i|config™

Graphical Configuration Utility

Version 4

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Software Release Memo SR15939-80-7

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Changes for Rev 2, September 2008

Section	Change
Cover	Revision number and date changed
1.7 Registration	Software registration link added
1.10 Customer/Product Support	Updated
Addenda	Software Release Memo SR15939-80-7 appended

Chapter 1 - Introduction

This Software Guide describes using the Siemens i|config™ Graphical Configuration Utility (Version 4) to develop configurations for the Siemens 353 family of process automation controllers.[1] Controller configurations are created on a personal computer (PC) by selecting, placing, and interconnecting function block and ladder logic graphic elements. A controller does not need to be connected to the PC while building the configuration. An example of a configuration screen is shown in Figure 1-1.

A completed configuration is downloaded from the PC to a controller using either COM, LIL[2], or Ethernet communications. A configuration can also be uploaded from a controller and edited. Alternatively, a MultiMediaCard (MMC) can be used to transfer a configuration between the PC and a controller.[3]
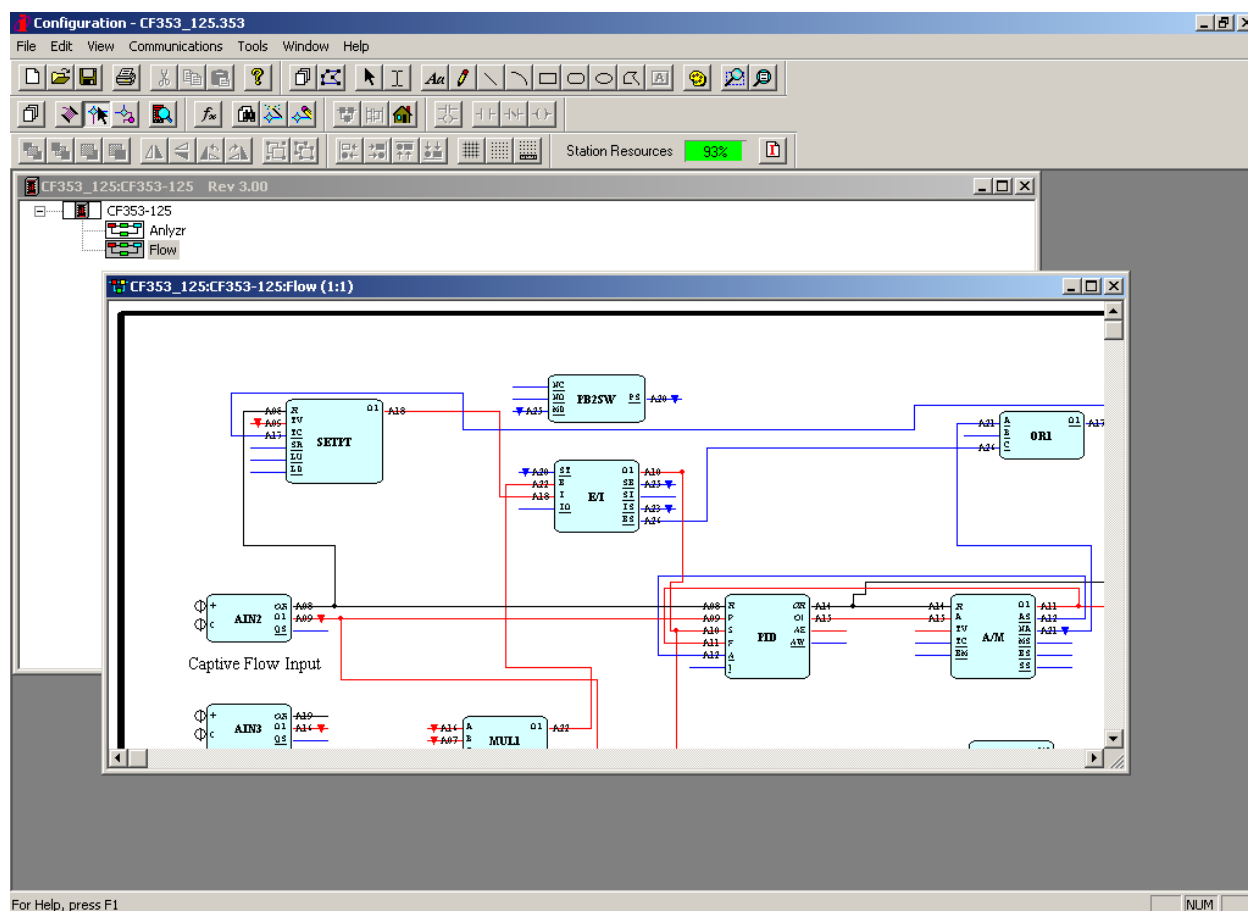
Figure 1-1 Typical configuration screen

While developing a configuration, the User's Manual for the controller model to be configured should be available for reference as it includes detailed information on function blocks, Factory Configured Options (FCOs), and controller configuration and operation.

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[1] Includes the Model 353 Process Automation Controller, Model 353R Rack Mount Process Automation Controller (i|pac™ Internet Control System), Model 352*Plus*™ Single-Loop Digital Controller, Model 354 Universal Control Station, and Model 354N Universal Loop Controller (model series 354 discontinued) from Siemens and Moore Products Co.

[2] Model 353 Design Level A supports LIL; Design Level B does not support LIL however Ethernet is standard.

[3] Requires Model 353, Design Level B; refer to the Model 353 User's Manual, UM353-1B for details.

1.1 Menus and Toolbars

i|config menus and toolbars are identified in Figure 1-2. Each menu selection and each toolbar button is discussed in this guide.
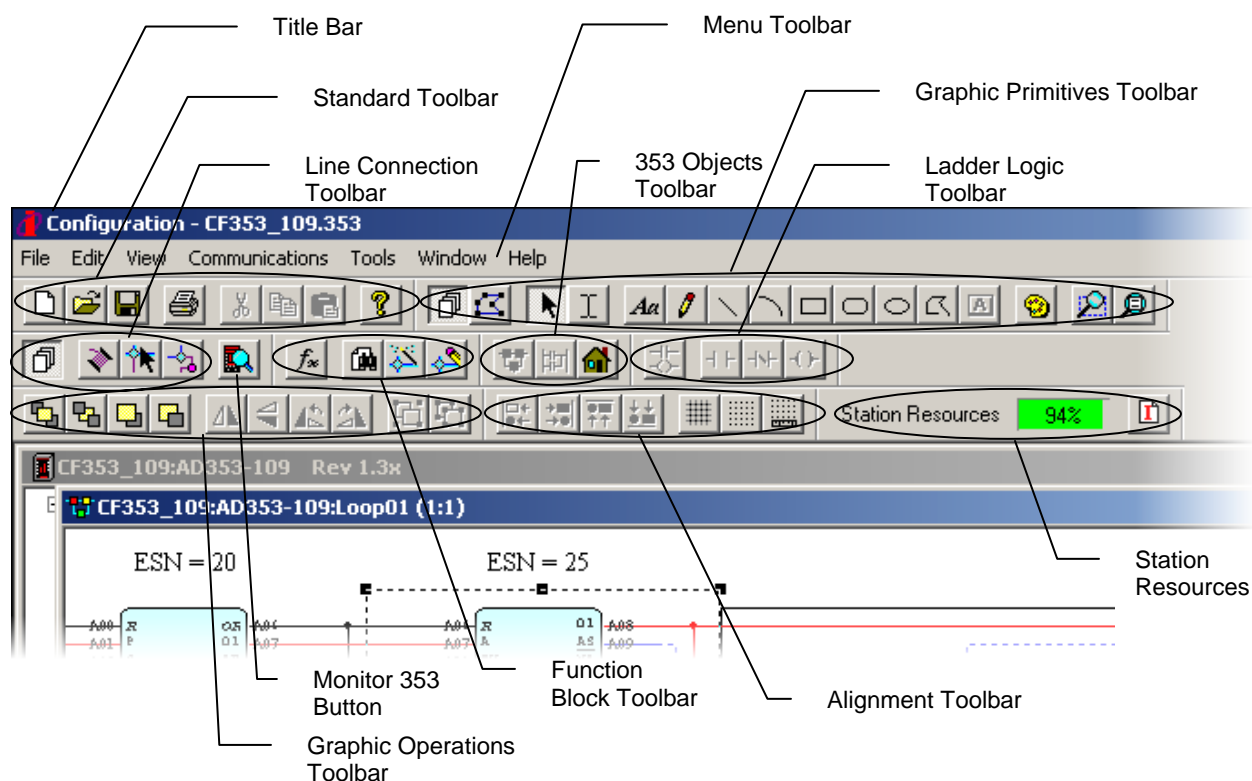
Figure 1-2 Toolbars

The i|config screen features familiar Windows® elements with application specific menus, toolbars and buttons:

- Title Bar – Shows the name of the presently viewed configuration.

- Menu Toolbar – Provides access to common Windows functions such as Open (a file or configuration), Save, Print, and Help.

- Standard Toolbar – Contains a series of button to directly access many common Windows functions such as New (configuration), Open, Save, and Print.

- Graphic Primitives Toolbar – Comprised of several toolbars with buttons to create drawing objects (e.g. lines, rectangles, arcs) and text, edit object attributes, and zoom in or out.

- Line Connection Toolbar – Contains tools to select and place function blocks in a function block loop and to add interconnecting lines to function block loops and ladder logic loops.

- 353 Objects Toolbar – Provides tools to create a new function block loop (either a custom loop or a loop based on a Factory Configured Option) or a new ladder logic loop.

- Function Block Toolbar – Includes tools to select, find, and interconnect function blocks.

- Ladder Logic Toolbar – Provides tools to select and place ladder logic elements (such as contacts, coils, and timers) in a ladder logic loop.

- Graphic Operations Toolbar (i.e. automatic placement) – Contains tools to move user-created graphic objects to the front or to the back of overlapping objects. Objects can also be rotated or flipped, or grouped and ungrouped.

- Alignment Toolbar – Contains tools to align user-created objects to a grid or to a dominant object to improve the appearance and readability of the loop drawing.

- Station Resources Toolbar – Provides an indication of available controller memory and function block resources.

- Monitor 353 Button – Enables uploading of active process data from a controller and viewing of that data within i|config, in the operating function block or ladder logic loop.

1.2 Configuration Views

i|config has four types of configuration views:

- Station View[4]

- Function Block View

- Ladder Logic View

- Report Views:

    - o   Function Block Parameters
    - o   Connection Identifiers
    - o   References

Each of these views is briefly discussed below and in greater detail in subsequent chapters.

In each view, colored buttons in the toolbars and black text in menu lists indicate available operations. Grayed buttons and grayed text in menu lists indicate operations that are not available in that view.

1.2.1 Station View

The Station view displays a tree control list of function blocks and ladder logic loops that have been created. The station view automatically displays when a new or existing file is opened. Function block loops and ladder logic loops are created in this view. Figure 1-3 shows a station view for a configuration.

The title bar of the station view specifies the following:

Configuration File Name: Controller Tag Name.....Database Revision

The station view is discussed in more detail in Chapter 2 Working with the Station View.

1.2.2 Function Block View

The **Function Block View** provides workspace for developing a loop using function block objects. In this view, function blocks are selected, placed, and connected to create a function block loop. The active screen in Figure 1-1 is a view of a function block loop.

The title bar in the function block view specifies:

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[4] In this guide, Station and Controller are used interchangeably.

Configuration File Name: Controller Tag Name: Loop Name (zoom level)

The function block view is discussed in detail in Chapter 3 Working with Function Block Loops.
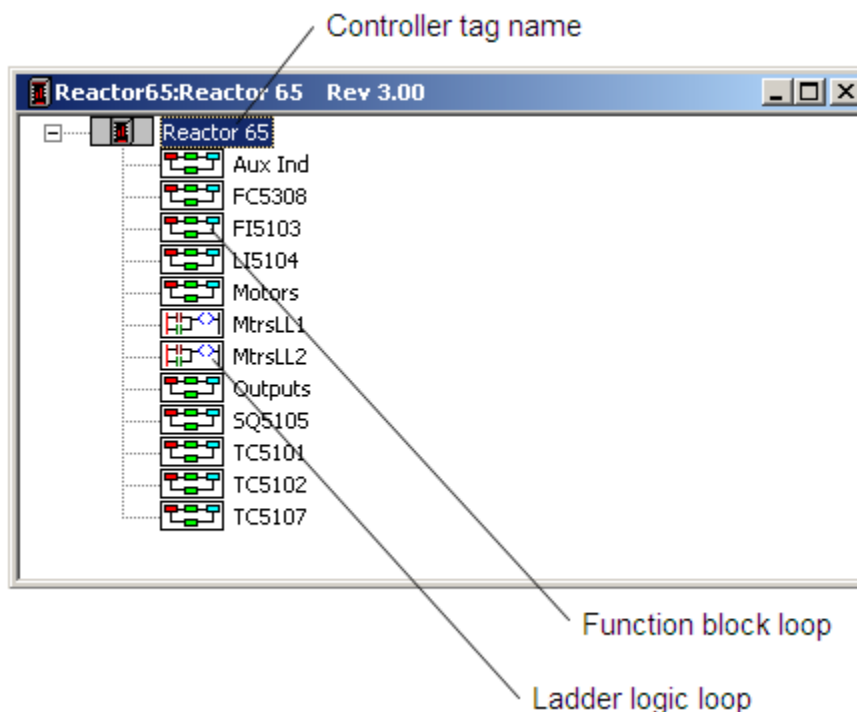
Figure 1-3 Station view

1.2.3 Ladder Logic View

The ladder logic view provides a four page workspace for developing a ladder logic loop. Ladder logic elements are selected, placed, and connected in this view.

The title bar in the ladder logic view specifies:

Configuration File Name: Controller Tag Name: Loop Name (zoom level) Page #

The ladder logic view is discussed in detail in Chapter 4 Working with Ladder Logic Loops.

1.2.4 Report View

Three report views display lists of function block parameters, connections, and references, and how they are used. These views include:

- Function block parameters – displays a list of function blocks and their parameters used in the configuration.

- Connection identifiers – displays a list of function block outputs and their connections in the configuration.

- References – displays the reference name and the value for user-defined and fixed value references in the configuration.

For more information on report views, refer to Chapter 2 Working with the Station View.

1.3 Application Publications and Configurations

A series of application oriented publications can be found on the Siemens Internet site. The configurations described in many of these papers can be downloaded and opened in i|config. These example configurations can make learning i|config even easier. See the link below.

> Process Application Data (AD) Publications and Downloadable Configurations:
> http://www2.sea.siemens.com/Products/Process-Instrumentation/Support/PI-Application-Documents.htm

> The configuration file default installation path is C:\program files\cfg353\configs.

> **IMPORTANT**
> A configuration file is intended to provide a more complete understanding of the concepts put forth in the associated AD publication and is not intended for use in actual process applications without necessary modifications and/or testing by a knowledgeable user aware of actual system requirements.

1.4 PC Requirements

The PC on which i|config is to be installed should have:

- Microsoft® Windows® 98, 2000, NT4.0, or XP operating system

- 600 MHz or faster microprocessor

- CD-ROM Drive

- VGA (800x600) or higher display

- 256 MB of RAM minimum (512 MB or more will improve performance)

- Mouse

- 1 GB available hard disk space

- Adobe Reader to open the on-line Software Guide

As needed:

- Card reader for a MultiMediaCard (MMC) to transfer configurations[5]

- Appropriate PC to controller cable to transfer configurations (dependent upon selected communications protocol and controller port) – Refer to Chapter 5 Communicating with the Controller for additional information.

1.5 Configuration Prerequisites

To be able to quickly and easily build controller configurations:

1. Read and understand the i|config Software Guide.

2. Understand the operation and configuration of the controller to be configured by reading the appropriate User's Manual listed in Table 1-1.

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[5] Requires Model 353, Design Level B; refer to the Model 353 User's Manual, UM353-1B for details.

Table 1-1 Controller design levels and manuals

Controller	Design Level	User's Manual
Model 353	A	UM353-1
	B	UM353-1B
Model 353R	B	UM353R-1
i|pac	A	UMiPAC-1, Rev 1 and Rev 2
	B	UMiPAC-1, Rev 3 and later
Model 352*Plus*	A	UM352P-1
Model 354	A	UM354-1
Model 354N	A	UM354N-1

Refer to the appropriate User's Manual to determine the position of the Design Level letter in the controller model number and for the location of the model number. See Section 1.10 Product Support to download the current revision of a manual.

3. Have a working knowledge of the Windows operating system.

4. Understand hexadecimal number formats.

5. Know how to select items in a Windows program (for more information see Section 6.7.3 Selection Mode in Chapter 6 Using the Toolbars).

6. Be sure the PC and controller are correctly connected and are working properly. The 353 controller family supports Modbus, Local Instrument Link (LIL)[6], and Ethernet communications[7].

1.6 Installation

Before installing i|config, refer to Section 1.4 PC Requirements to be sure the personal computer meets or exceeds the minimum requirements.

Insert the i|config CD-ROM in a CD or DVD disk drive. Installation should begin automatically. Follow the on-screen prompts to install i|config.

Note: Read the readme.txt file on the CD before installing i|config for recommendations concerning uninstalling an earlier version of i|config and moving stored configurations.

Note: If Windows Auto-run is not enabled and the installation program does not launch automatically, click Start > Run. Type the command shown in Figure 1-4 below, replacing "d" with the letter of the disk drive in which the CD-ROM has been inserted. Click OK. Follow the on-screen prompts to install i|config.

The default installation path is c:\\program files\siemens\iconfig.

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[6] LIL is supported in Model 353 Design Level A, 353R and 352P; LIL is not supported in Model 353 Design Level B.
[7] Ethernet communications is standard in Model 353 Design Level B and optional in Model 353 Design Level A, Model 353R, Model 352P, and Models 354 and 354N.
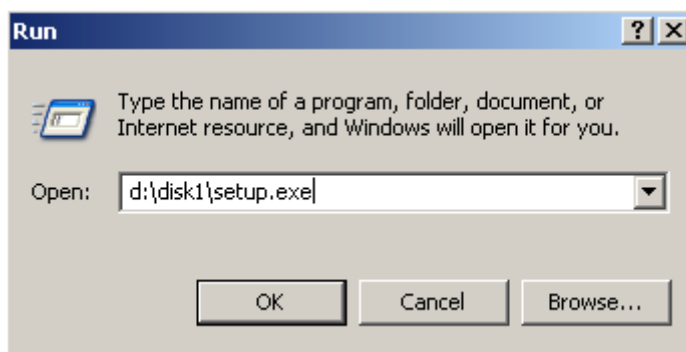
Figure 1-4 Run dialog

1.7 Registration

Registration is highly recommended to ensure that you receive prompt notification of enhancements and operational issues. A registration card is included with the installation CD. Write the requested information on the card and mail it to the address provided. Alternatively, software can be registered at http://www.sea.siemens.com/instrbu/support/swregistration2.htm.

1.8 Contents

Chapter 1 – Introduction, provides an overview of i|config. It also contains an overview of this Software Guide and describes the conventions used in this guide.

Chapter 2 – Working with the Station View, describes how to use the station view to develop a configuration.

Chapter 3 – Working with Function Block Loops, describes how to create function block loops to develop configurations for control of continuous processes.

Chapter 4 - Working with Ladder Logic Loops, describes how to create ladder logic loops to develop configurations for control of discrete processes.

Chapter 5 – Communicating with the Controller, discusses configuring the various communication ports to download a configuration from the PC to the controller or to upload a configuration from the controller to the PC.

Chapter 6 – Using the Toolbars, describes how to use the toolbars to perform many of the operations in i|config.

Chapter 7 – Using the File Menu, discusses the basic file operations such as creating a new file, opening an existing file, saving a file, deleting a file, printing a file and other common Window functions.

Chapter 8 – Using the Edit Menu, discusses operations that are performed on items, such as cut, copy, paste, delete, and editing item attributes. This chapter also discusses editing references in the configuration.

Chapter 9 – Using the View Menu, describes displaying the toolbars and other viewing options such as report views.

Chapter 10 – Using the Loop Menu, discusses how to create and manipulate a function block loop or ladder logic loop.

Chapter 11 – Using the Communications Menu, provides a serial port configuration procedure. Refer to Chapter 5 for detailed port configuration, upload and download procedures.

Chapter 12 – Using the Tools Menu, describes how to set up a path for uploading a configuration and discusses loop resource information.

Chapter 13 – Using the Windows Menu, discusses the arrangement of open windows and how to close an open window.

Chapter 14 – Using the Help Menu, discusses how to access the online Software Guide and other information about i|config.

1.9 Software Guide Conventions

The following conventions are used throughout this guide.

Steps in a procedure begin with an arrow at the left margin pointing right. For example:

➢   **This indicates a set of steps to follow.**

Keys to press on the keyboard are bold and within (<) less than or (>) greater than symbols. For example, **<Enter>** means press the Enter key.

Keyboard shortcuts appear in the following format **<Ctrl + P>**. This format means press and hold the "Ctrl" key and press the "P" key.

Buttons to click on the screen are bold and within brackets. For example **[OK]** means click the OK button on the screen.

Items the user will select from a submenu are in bold and displayed by:

Menu > Menu Option > Submenu option

Notes appear in this font. The word "Note:" appears before the explanation.

"Select" refers to clicking a menu option, an item in a list, a function block, a ladder logic element, a connection line, or a graphic item.

"Click" refers to clicking the left mouse button on a toolbar or dialog button.

"Double-click" refers to clicking the left mouse button twice consecutively.

"Drag" refers to holding the left mouse button down on a selected item and moving it to a new location.

"View" refers to the active window. Views in i|config include the station view, function block view, ladder logic view, and report view.

"Loop" refers to one function block or ladder logic view.

"Items" refer to function blocks, ladder logic elements, connection lines, and graphic items created from the **Graphic Primitives** toolbar.

Whenever **[Cancel]** is an option on the dialog, the user can click this button or press **<Esc>** to cancel the operation.

Pressing **<Esc>** ends any item or line operation.

Listed below are the i|config keyboard shortcuts.

```
Alt+I................Zoom In
Alt+O..............Zoom Out

Ctrl+N.............File New
Ctrl+O ............File Open
Ctrl+S.............File Save
Ctrl+P.............File Print

Ctrl+C.............Copy
Ctrl+X.............Cut
Ctrl+V.............Paste

Ctrl+A.............Select All
```

1.10 Customer/Product Support

Support is available through an online Support Request service; a link is provided in the table at the end of this section.

When contacting Siemens for support:

- Please provide complete product information:
    - ➢ For hardware, this information is provided on the product nameplate (part number or model number, serial number, and/or version).
    - ➢ For most software, this information is given in the Help > About screen.
- If there is a problem with product operation:
    - ➢ Is the problem intermittent or repeatable? What symptoms have been observed?
    - ➢ What steps, configuration changes, loop modifications, etc. were performed before the problem occurred?
    - ➢ What status messages, error messages, or LED indications are displayed?
    - ➢ What troubleshooting steps have been performed?
    - ➢ Is the installation environment (e.g. temperature, humidity) within the product's specified operating parameters? For software, does the PC meet or exceed the minimum requirements (e.g. processor, memory, operating system)?
- A copy of the product Service Instruction, User's Manual, or other technical publication should be at hand. The Siemens public Internet site (see the table) has current revisions of technical literature, in Portable Document Format, for downloading.

- To send an instrument to Siemens for warranty or non-warranty service, call Repair Service and request a Return Material Authorization (RMA).

IMPORTANT

An instrument must be thoroughly cleaned (decontaminated) to remove any process materials, hazardous materials, or blood-borne pathogens prior to return for repair. Read and complete the Siemens RMA form(s).

Technical Support

For the location of your local Siemens representative, visit the Siemens Process Instrumentation product support page at http://www2.sea.siemens.com/Products/Process-Instrumentation/Support/Customer-Support.htm.

For technical support refer to the following table and click the appropriate link.

Technical Support	
Online Support Request	http://www.siemens.com/automation/support-request
Telephone	1 800 333 7421
Hours of Operation	8 a.m. to 4:45 p.m. eastern time, Monday through Friday (except holidays)
Technical Publications in PDF	http://www2.sea.siemens.com/Products/Process-Instrumentation/Support/PI-User-Manuals.htm then click the product line (e.g. Control Solutions)
Public Internet Site	http://www2.sea.siemens.com/Products/Process-Instrumentation
Repair Service	1 800 365 8766 extension 3187 (for warranty and non-warranty service)

Chapter 2 - Working with the Station View

The station view represents a complete configuration to download to a controller. It displays a tree of function block and ladder logic loops. Figure 2-1 shows a new station view and a station view with configured loops, such as will be seen when opening a configuration example from the Siemens Web site (refer to Section 1.3 Application Publications and Configurations).
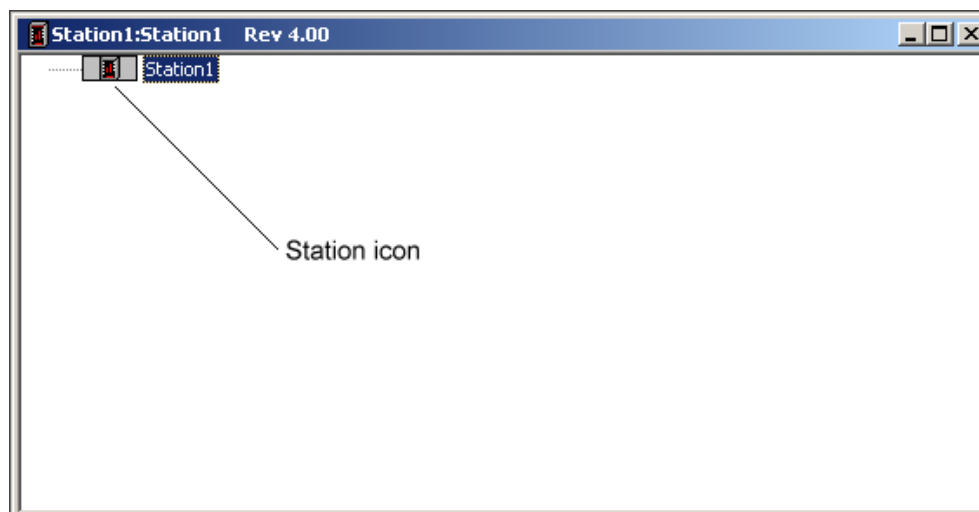
A. New station view
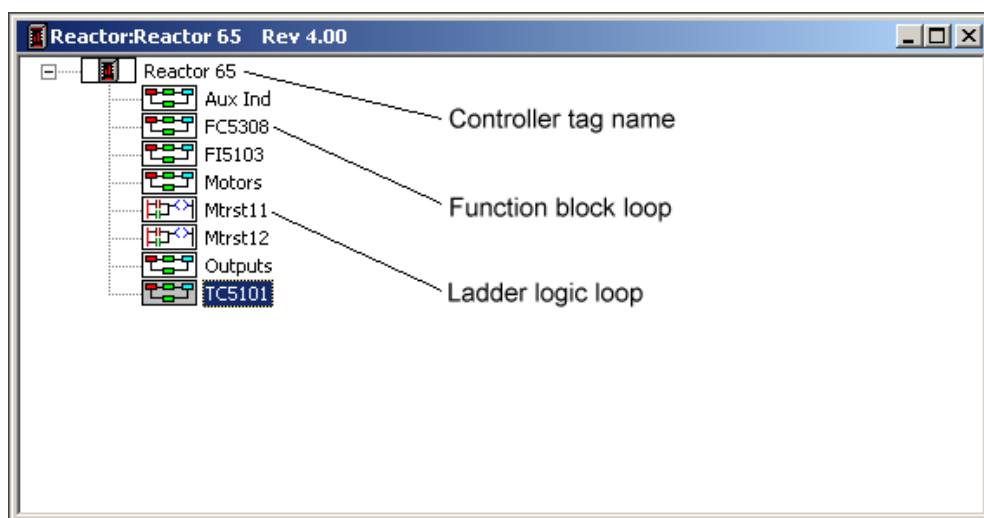
B. Station view with function block and ladder logic loops

Figure 2-1 Station views

As a configuration is created, the percent of station (controller) memory available is shown in the Station Resources toolbar. The bargraph will change color from green to yellow to red as controller memory is consumed. A configuration should not be so large that Station Resources shows red. Consider moving independent loops to another controller or split a very large configuration into two or more configurations.
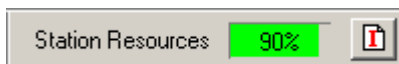
Configuration File Management

Keep careful track of each new configuration and subsequent edits so the latest version of the configuration can be easily identified by all involved personnel. Assigning a meaningful configuration file name will help identify a configuration.

Secure the computer system and network on which configurations are created and stored.

If you want to preserve your configuration notes and documentation, take steps to ensure that i|config™ does not need to auto-draw the configuration after an upload from the controller. For example, at the controller faceplate:

- Allow only tuning and other soft parameter changes

- Do not add or delete function blocks or loops

- Do not change loop names

- Do not add, delete or change any line connections.

Except for tuning and soft parameter changes, make all changes in i|config and download the edited configuration to the controller. See Section 5.4 Upload for more information.

2.1 Creating/Opening Configurations

Begin a new configuration by creating a new station view. The station view enables access to the function block and ladder logic views. A new controller configuration is created from the **File** menu. For more information, see Chapter 7 Using the File Menu.

➢ **To create a new configuration:**

1. Do one of the following:

- Select **File** > **New**.

    OR

- Click **[New]** on the **Standard** toolbar.

    OR

- Press **<Ctrl+N>**.

2. Select the database revision number (i.e. the firmware revision number of the controller to which this configuration will be downloaded). See Figure 2-2.
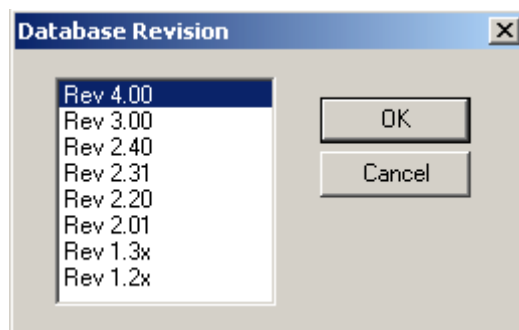
Figure 2-2 Database Revision

A new station view appears on the screen; see Figure 2-1. A new station view provides a blank workspace area. The default configuration file name and controller tag name are defaulted to Station1.

3.   Right click the station icon ▮▮ Station1 and select Configure Item Attributes; See Figure 2-3. In the **New Value** text box, type a meaningful controller tag name to replace "Station 1" and click **[Accept]** and then **[OK]**.
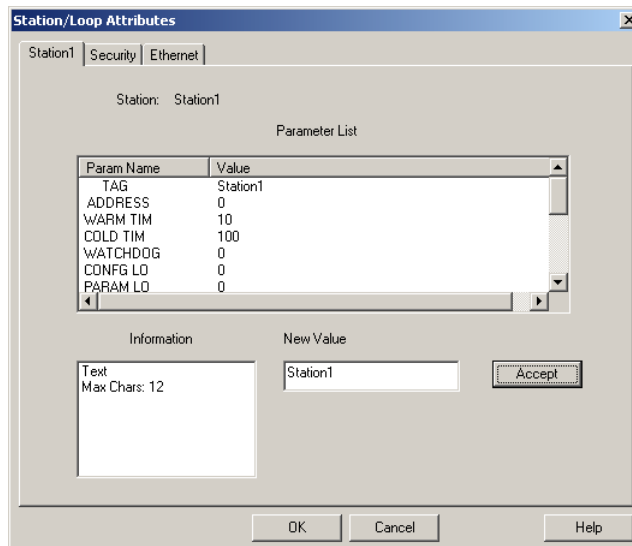
Figure 2-3 Station/Loop Attributes

4.   Select each tab in turn and configure the parameters. Refer to the STATN – Station Parameter function block, SECUR – Security function block, and ETHERNET – Ethernet Communications Network function block in the controller User's Manual as needed.

5.   Select **File** > **Save As** and type a meaningful name for the configuration. Click **[Save]**. The new names appear in the title bar.

   Note: The file name should not exceed 20 characters.

➢ **To open an existing configuration:**

1. Do one of the following.

   •   Select **File > Open**.

      OR

   •   Click **[Open]** on the **Standard** toolbar. 📂

      OR

   •   Press **<Ctrl+O>**.

   The Select Database File opens. See Figure 2-4.

Configuration File Names
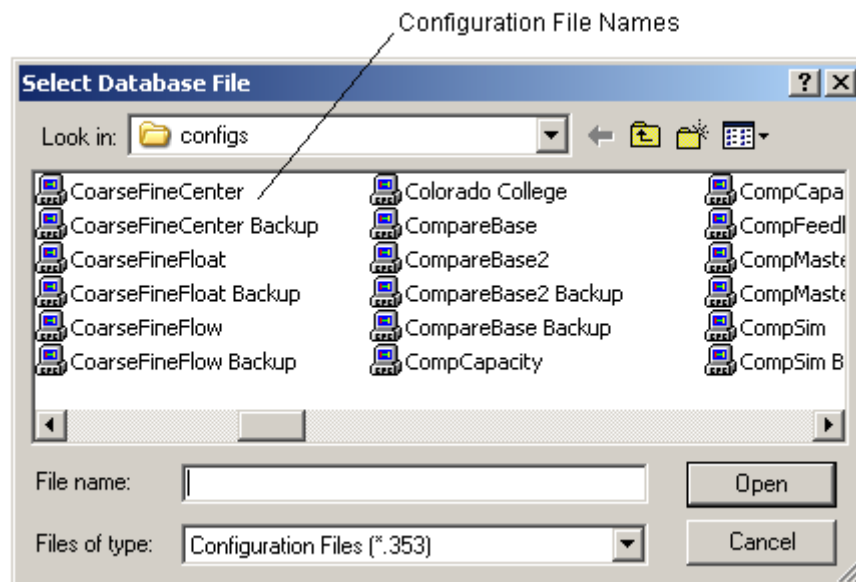
Figure 2-4 Select Database File dialog

2. To select and open a file, do one of the following.

- Select a file from the list, click **[Open]**.

  OR

- Type a file name in the File name text box, click **[Open]**.

  OR

- Double-click a file in the list.

  The configuration opens in the station view. If a database file (.V3C) is opened and a corresponding graphic file (.353) is not available, i|config will create a graphic file and auto-draw function block objects.

2.2 Creating a Configuration from an FCO

A Factory Configured Option (FCO) is a controller configuration file that has preconfigured function block loops. The desired FCO is selected from the list box in Figure 2-5. Each FCO is described and diagrammed in the controller User Manual. An FCO is often used as a starting point to develop a needed configuration.

➢ **To create a configuration from a Factory Configured Option:**

1. Do one of the following.

- Select **File > New FCO**.

  OR

- Click **[New FCO]** on the **Standard** toolbar.

The Databases Revision dialog display opens; see Figure 2-2. Select the revision level of the firmware in the controller to which this configuration will be downloaded. After selecting the revision level the Factory Configured Options dialog will open. See Figure 2-5.

Note: The selected database revision number must match the firmware revision number of the controller for which the configuration is being developed. If the configuration may be downloaded to two or more controllers with different firmware revision numbers, select the lowest revision number of those controllers and save the configuration with that Revision level. i|config can upgrade a configuration to a higher level. You can then save the same configuration as a different file name for use in the controller with the higher Revision level.

Use i|config to upgrade a configuration to a higher database level when replacing an installed controller with a newer controller that has a higher database level.
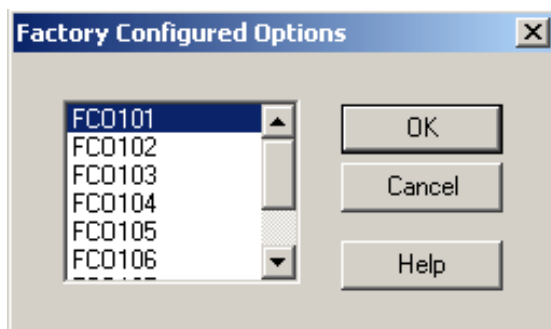
Figure 2-5   Factory Configured Option dialog

2.   To select and open an FCO, do one of the following.

- Select a Factory Configured Option from the dialog, click **[OK]**.
  OR
- Double click a Factory Configured Option in the dialog.

A station view of the Factory Configured Option will open.

2.3 Creating Loops

Create and open a loop from the station view tree. A controller supports multiple loops.

Loops consist of function block or ladder logic items. Once all loops in the configuration are completed, the configuration is ready to download to the controller.

➢ **To create a Loop using the Menu:**

1.   Do one of the following.

   - Select **Loop > New > Function Block**.

     OR

   - Select **Loop > New > Ladder Logic**.

     The Loop Name dialog displays. "Loopxx" appears as the default in the Enter Loop Name text box. See Figure 2-6.

2.   Type a meaningful name (up to 12 characters) in the Enter Loop Name text box. Use a unique name for each loop in the controller. (The last 6 characters will display on the controller faceplate; press TAG to scroll the entire loop name.)

3.   Click **[OK]**

     A function block or ladder logic icon appears with the name of the loop specified in the Loop Name dialog on the station tree. See Figure 2-1.
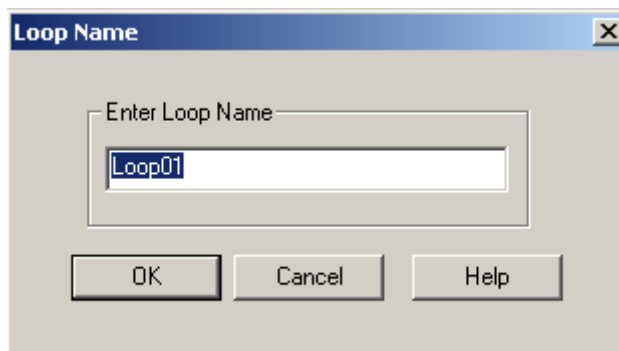
Figure 2-6 Loop Name dialog

➢ **To create a Loop using the toolbar, do one of the following:**

   - Click **[Function Block Loop]** in the **353 Objects Toolbar**.

     OR

   - Click **[Ladder Logic Loop]** in the **353 Objects Toolbar**.

   A function block or ladder logic icon appears with the name of the loop specified in the Loop Name dialog on the controller tree. See Figure 2-1.

2.4 Selecting the Station and/or Loop(s)

An item must be selected before an operation can be performed on that item. Items are selected individually or in a group.

➢ **To select the station and/or loop**:

1. Click the station, function block loop, or ladder logic loop in the tree. The controller or loop icon and name are highlighted.

2. To select two or more loops:

   • **<Shift>**-click on another item in the tree. All items between the first loop clicked and the second are highlighted.

     OR

   • **<Ctrl>**-click on another item or multiple items in the tree. Each item clicked is highlighted.

➢ **To deselect a selected item**:

   • **<Ctrl>**-click the icon or name of the selected item in the tree. The selected item is deselected.

2.5 Changing the Station (Controller) or Loop name

The controller and loop names are changed in the tree structure.

➢ **To change a controller or loop name**:

1. Click the controller or loop name in the tree. See Figure 2-7.

2. After a short pause, click the name again to select and edit the name.
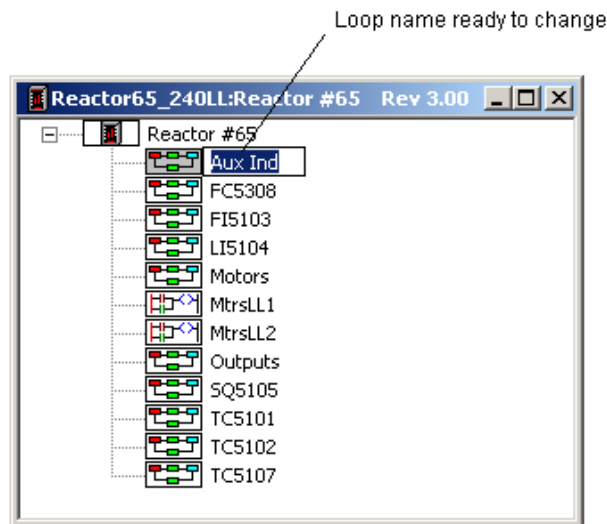
Figure 2-7 Loop name ready to change

3. Type a name in the box. Use a unique, meaningful name for each loop in the configuration. A maximum of 12 characters is allowed.

4. Press **<Enter>** or click on the workspace.

2.6 Changing the Station and/or Loop Attributes

The attributes of the station and/or loops are edited one at a time or all at once. Station attributes are available to edit when the station is selected, loop attributes are available to edit when the loop is selected, and both the station and the loop attributes are available to edit when they both are selected.

➢ **To edit station and/or loop attributes**:

Select the station and/or loop and do one of the following.

- Select **Edit > Item** Attributes.

- Right-click on the station and/or loop and select **Edit Item Attributes** from the pop-up menu.

The Station/Loop Attributes dialog displays a tab for each item selected. If the station was selected, a number of tabs may be available (e.g. Security, Ethernet). See Figure 2-8 to view the tabs that display when the station and a number of loops are selected.
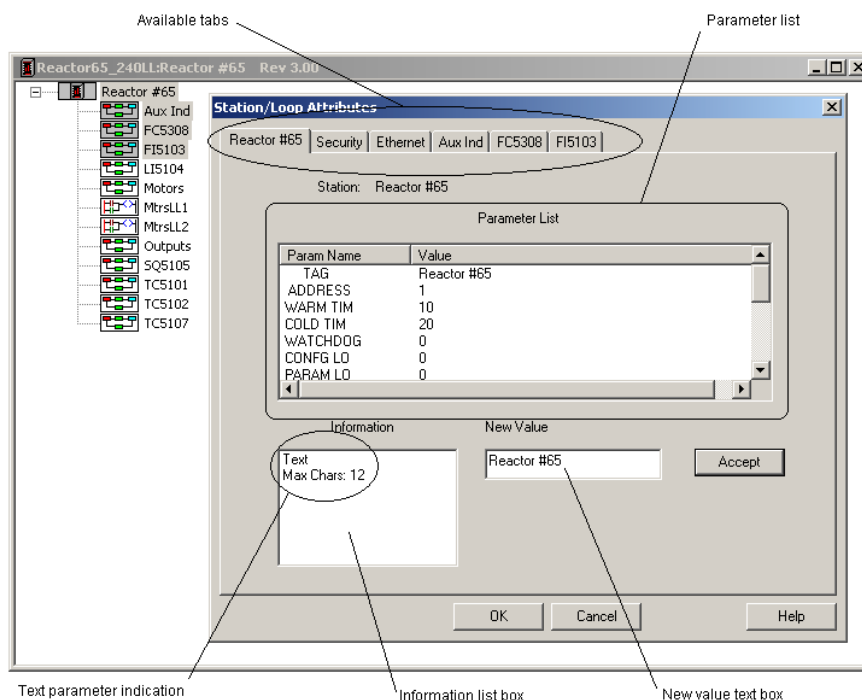
Figure 2-8 Station/Loop Attributes dialog

The Station/Loop Attributes dialog displays a list of parameters, depending on the active tab. There are three types of parameters in the station view.
- Text
- Numeric
- Discrete

The type of parameter is specified by the data in the Information list box. A Selections list box displays, rather than an Information list box, when the selected parameter is a

discrete parameter. Each tab may not have all three types of parameters available to edit.

All parameters behind the tabs that display on the Station/Loop Attributes dialog are editable. Changes do not apply to the station until the user clicks **[OK]**. All changes made in the dialog are cancelled by clicking **[Cancel]**.

2.6.1 Text Parameters

A text parameter is a character value of a parameter. Characters are entered in the New Value text box. The Information list box indicates the maximum character length allowed for the value. See Figure 2-8 for an example.

➢   To edit a text parameter:

1.   Select a text parameter on the Parameter List

     The first line in the Information list box indicates that the selected parameter is a text parameter. The second line indicates the maximum number of characters for this parameter.

2.   Enter any characters, up to the maximum number, in the New Value text box.

3.   Click **[Accept]**. The modified value changes in the Parameter List.

4.   Click **[OK]**. The change is stored in the configuration.

2.6.2 Numeric Parameters

A numeric parameter is a number value for a parameter. Numbers are entered in the New Value text box. The Information list box provides the range of numbers available for a value. See Figure 2-9 for an example.

➢   To edit a numeric parameter:

1.   Select a numeric parameter on the Parameter List.

     The first line of the Information list box indicates that the selected parameter is an integer or real number parameter. It also displays the minimum and maximum numeric values for the selected parameter.

2.   Enter a value, within the valid range, in the New Value text box.

3.   Click **[Accept]**. The modified value changes in the Parameter List.

4.   Click **[OK]**. The change is stored in the configuration.
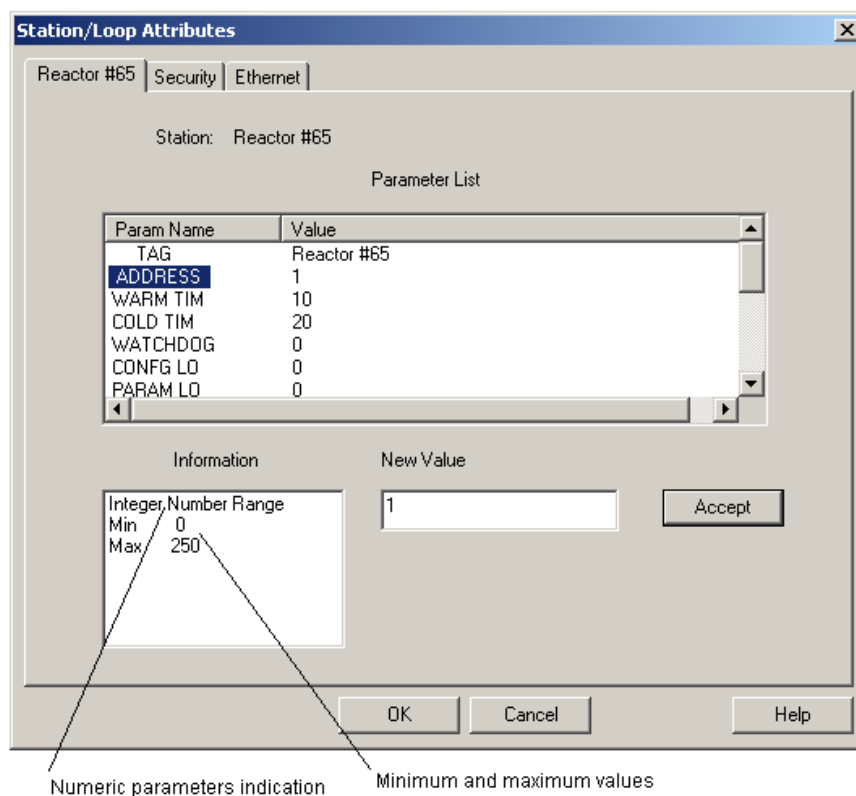
Figure 2-9 Station/Loop Attributes dialog in edit numeric parameter mode

2.6.3 Discrete Parameters

A discrete parameter is a parameter for which a list of choices for the value displays in the Selections list box.

➢   To edit a discrete parameter:

   1.   Select a discrete parameter in the Parameter List.

     The Selections list box displays a list of the values to select to assign to the parameter. See Figure 2-10.

   2.   Select the appropriate value in the Selections list box. The selected value changes in the Parameter List.

   3.   Click **[OK]**. The changes store in the configuration.
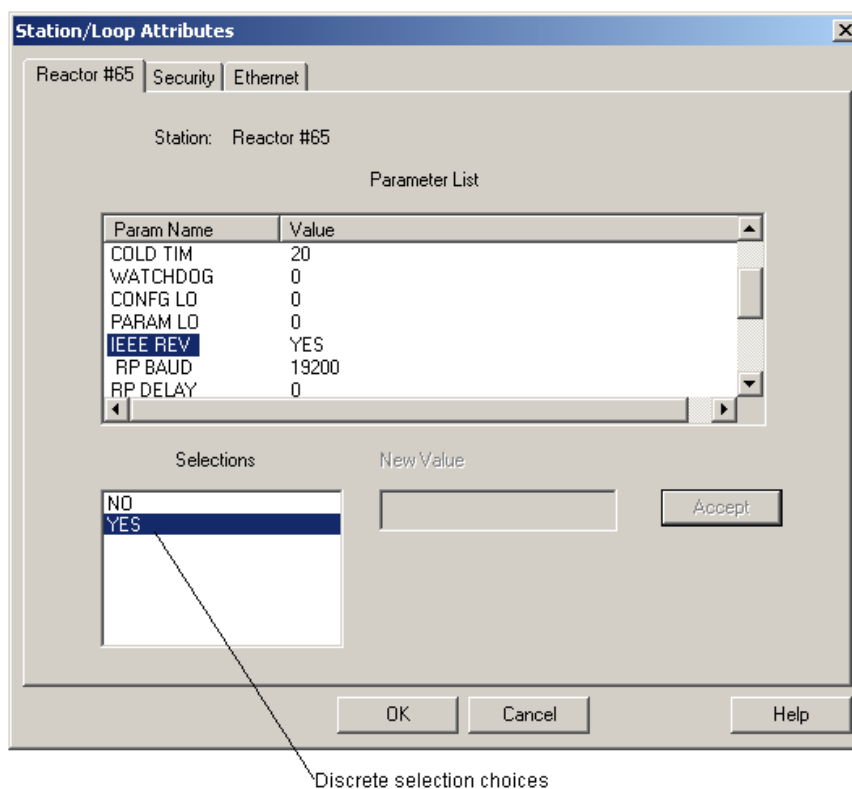
Figure 2-10 Station/Loop Attributes dialog in edit discrete parameter mode

2.7 Opening Loops

A loop is shown in a function block view or a ladder logic view that is created in the station view. The user selects and places items specific to the loop - function blocks for function block loops and ladder logic elements for ladder logic loops - within a displayed loop.

➢ **To open a loop:**

1. Do one of the following:

    • Select a loop in the tree, then **Loop > Open** from the menu.

       OR

    • Double-click a loop in the tree.

       OR

    • Right-click a loop in the tree and then select **Open** from the pop up menu.

    The function block view or ladder logic view displays, depending on the selected loop. Function block and ladder logic views are shown in Figures 2-11 and 2-12, respectively.
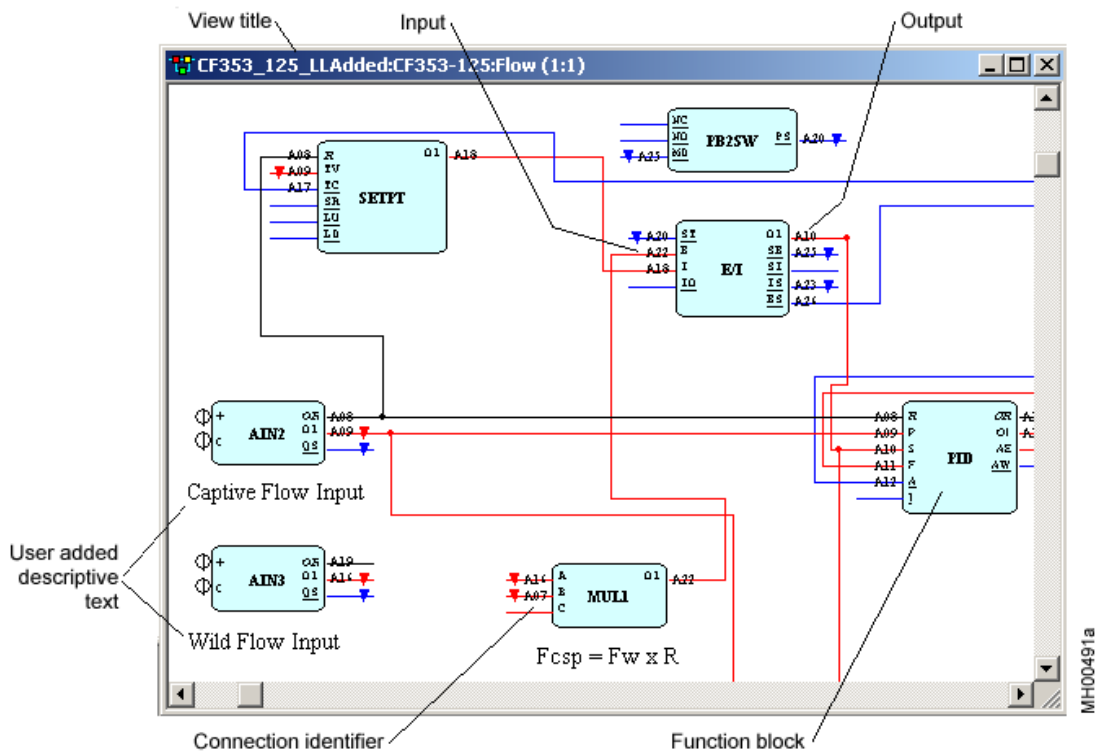
Figure 2-11 Function block view
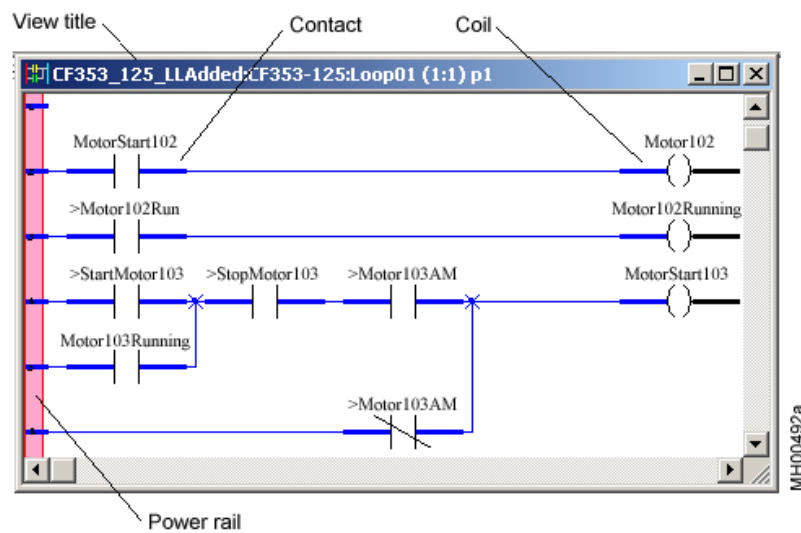
Figure 2-12 Ladder logic view

2.8 Cutting, Copying, and Pasting Loops

A loop may be cut, copied, and pasted only in the station view.

A function block loop can be cut, copied, and pasted into the same or different controller configuration (of the same database level) but any physical I/O blocks (e.g. AIN, DIN, DOUT) will be removed. Any function block associated with a fixed resource (I/O, Ethernet, LIL, LON) will not be copied. All line connections to other loops are unconfigured.

A ladder logic loop can be cut, copied, and pasted but all references in the pasted loop will be unconfigured.

Some function blocks may have only one instance, or a maximum number of instances, in a controller configuration. If i|config cannot paste one or more function blocks into a loop after copying, it removes those function blocks and all of their connections from the pasted loop. The function blocks that can be pasted display in the function block view exactly as in the original, with the same parameter values.

2.8.1 Cutting Loops

The cut function is used with the paste function to move a loop from one configuration to another. When a loop is cut, it is placed in the clipboard. The graphical and parameter information is removed from the loop. The loop can then be pasted into the same or a different controller configuration. See Section 2.8.3 Pasting Loops.

➢ **To cut a loop:**

1. Select a loop in the tree.

2. Do one of the following:

   • Select **Edit > Cut** from the menu.

     OR

   • Click the **[Cut]** button on the **Standard** toolbar. 🖊

     OR

   • Right-click on the loop in the station tree and, from the pop-up menu, select **Cut**.

     OR

   • Press **<Ctrl+X>**.

   A loop cut message displays as in Figure 2-13.
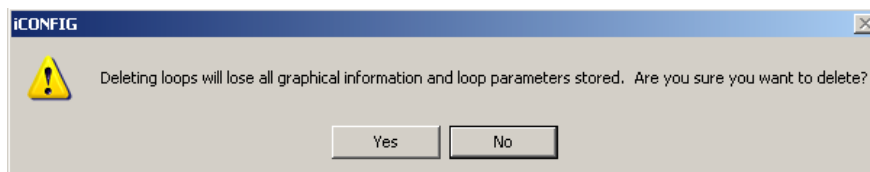
Figure 2-13 Cut loop confirmation message

3. Click **[Yes]**. The loop is cut from the configuration and placed in the clipboard.

2.8.2 Copying Loops

The copy function is used with the paste function to duplicate loops. When a loop is copied, it is placed in the clipboard. The loop can then be pasted into the same or a different controller configuration. See Section 2.8.3 Pasting Loops.

➢ **To copy a loop:**

1. Select a loop in the tree.

2. Do one of the following:

- Select **Edit > Copy** from the menu.

  OR

- Click the **[Copy]** button on the **Standard** toolbar.

  OR

- Right-click on the loop in the station tree and, from the pop-up menu, select **Copy**.

  OR

- Press **<Ctrl+C>**.

The loop is copied and placed in the clipboard.

2.8.3 Pasting Loops

The paste function is used with the cut and copy functions. Pasting is useful to move a loop from one controller configuration to another or to duplicate a loop within the same configuration.

Note: Loops may not be pasted when controller memory is exceeded.

➢ **To paste a function block loop:**

1. Cut or copy a loop in the tree.

2. Select the controller (station) name in the station view.

3. Do one of the following:

- Select **Edit > Paste** from the menu.

  OR

- Click the **[Paste]** button on the **Standard** toolbar.

  OR

- Right-click on the loop in the tree and, from the pop-up menu, select **Paste**.

  OR

- Press **<Ctrl+V>**.

The loop is pasted into the station view.

2.9 Deleting Loops

Deleting a loop removes a function block or ladder logic loop from the station view. When a loop is deleted, all the graphic and parameter information is removed from the configuration.

➢ **To delete a loop:**

    1.   Select the loop in the tree.

    2.   Do one of the following:

       •   Select **Edit > Delete** from the menu.

         OR

       •   Right-click on the loop in the tree and, from the pop-up menu, select **Delete**.

         OR

       •   Press **<Delete>**.

    The deletion confirmation message displays as in Figure 2-14.
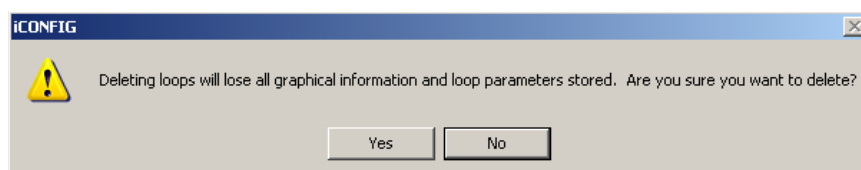
Figure 2-14 Deletion confirmation message

    3.   Click **[Yes]**. The loop is deleted form the configuration.

2.10 Saving Configurations

When an open configuration is saved to a file it is stored as a pair of files: a database file with a .V3C extension and a graphical file with a .353 extension.

Note: When saving a configuration that will be copied to a MultiMediaCard (MMC), the file name should be no more than 8 characters (the 3 character extension will be added by i|config). Longer file names will be reduced to 8 characters and files may be difficult to identify when stepping through the MMC file tree from the controller faceplate.

Note: When saving a previously saved configuration, i|config will save the original files (.353 and .V3C) as filenameBackup.353 and .V3C and then saves the new .353 and .V3C files.

➢ **To save a configuration:**

    1.   Do one of the following:

       •   Select **File > Save** from the menu.

         OR

       •   Select **File > Save As** from the menu.

         OR

- Click the **[Save]** button on the **Standard** toolbar. 🖫

    OR

- Press **<Ctrl+S>**.

    The Select Database File dialog opens. See Figure 2-15.
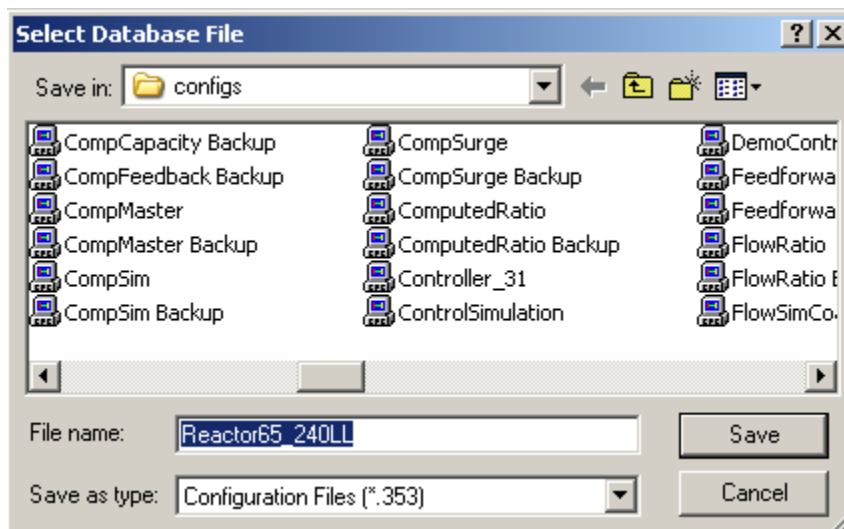
Figure 2-15 Select Database File dialog

2. Select the folder in which to save the configuration. The "configs" folder displays as the default folder.

3. Type a new file name in the File name text box.

4. Click **[Save]**. The configuration is saved in the selected folder.

2.11 Closing Configurations

A configuration can be closed, after it is saved, without losing any graphical information. If the user attempts to close a configuration before saving, i|config displays a warning message offering to save the configuration before closing.

➢ **To close a configuration**:

1. Select **File > Close**.

    If the configuration has been saved, the file closes and it is removed from the view. If the configuration has not been saved, the message in Figure 2-16 is displayed.
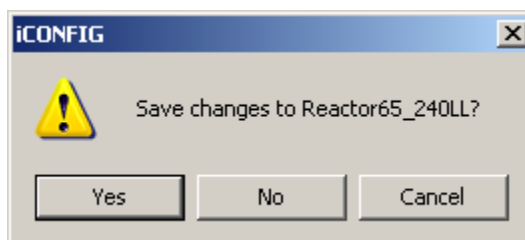
Figure 2-16 Save warning message

2. Click **[Yes]** to save and close the configuration. If the configuration has not been previously saved the Select Database File dialog will open. See Section 2.10 Saving Configurations section for more information on entering a file name and saving the configuration.

Click **[No]** to close the configuration without saving.

Click **[Cancel]** to cancel the configuration closing operation.

2.12 Deleting Configurations

A configuration can be deleted using the File menu or the delete key on the keyboard. Both the .V3C and .353 files will be deleted when the configuration is deleted.

➢ **To delete a configuration:**

1. Select **File > Delete**.

The Select File to Delete dialog is displayed. See Figure 2-17.
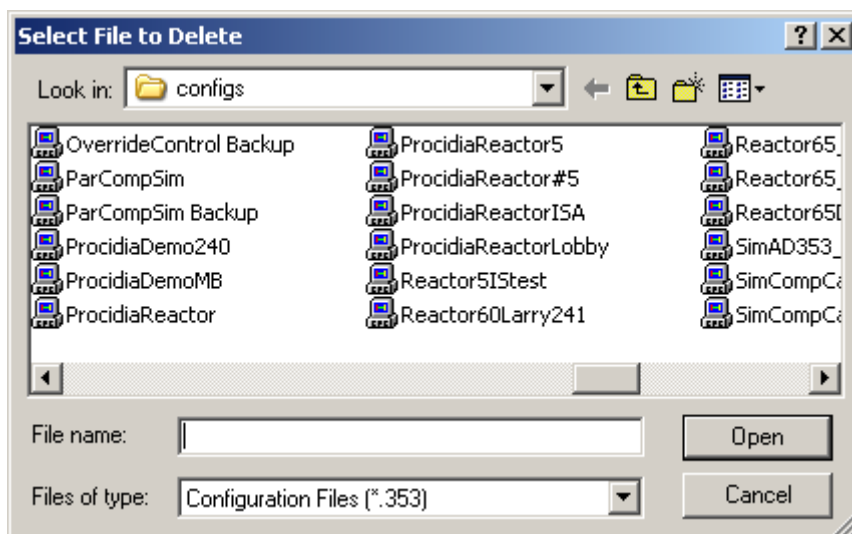
Figure 2-17 Select File to Delete dialog

2. Do one of the following:

- Select the file to delete and click **[Open]**.

  OR

- Enter the file name in the File Name text box and click **[Open]**.

  OR

- Select the file to delete and press **<Delete>**.

  The deletion confirmation displays. See Figure 2-18.
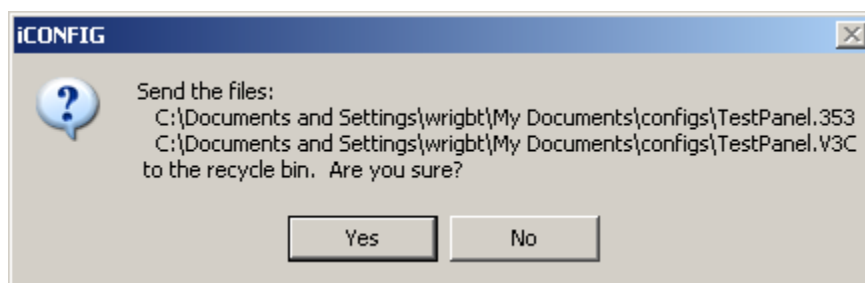
Figure 2-18 Deletion confirmation message

3.   Click **[Yes]**. The file is deleted.

Click **[No]** to cancel the delete operation.

2.13 Viewing Controller (Station) Information

i|config provides you with a method to view function block parameters, connection identifiers, and references used in the active configuration. These can be printed for easier viewing. For information on printing configuration information, see Section 2.14 Printing Configuration Information.

2.13.1 Function Block Parameters

Function block parameters are the parameters of a controller, including all parts of its loops and their function blocks, if any, that can be changed using the Attributes dialogs. See Section 2.6 Editing the Station and/or Loop Attributes for more information. Printing function block parameters may make it easier to review controller parameter information.

➢   **To view function block parameters:**

Select **View > Function Block Parameters**.

The Function Block Parameters report view for the active configuration is displayed.

2.13.2 Connection Identifiers

Connection identifiers are used to label the connections between an output on a function block and any inputs to which it connects. This report is especially useful for identifying connections between function block loops. Connections on ladder logic loops do not use connection identifiers. The Connection Identifier report view displays all connection identifiers and their values of the active configuration.

➢   **To view connection identifiers:**

Select **View > Connection Identifiers**

The Connection Identifiers report view for the active configuration is displayed.

2.13.3 References

References label the digital outputs of function blocks and coils. They have a name and a value. The References report view displays all references and their values for the active configuration. The two types of references are:

- User-defined (i.e. external reference or function block reference)

- Fixed value (i.e. coil reference)
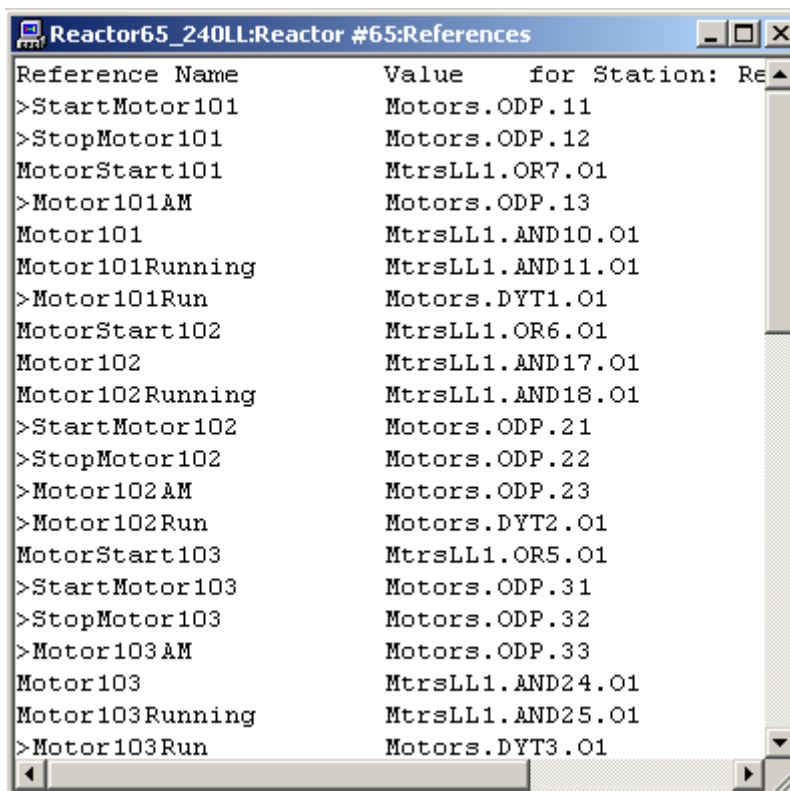
The user creates a user-defined reference through the Edit Reference dialog. The value of a user defined reference is a digital output of a function block on a function block loop.

Fixed value references are created automatically when a coil is created on a ladder logic loop. The user cannot create a fixed value reference.

➢ **To view references:**

Select **View > References**.

The References report view for the active configuration is displayed. See Figure 2-19.

Figure 2-19 References report view

2.14 Printing Configuration Information

The Function Block Parameters, Connection Identifiers, and References report values can be printed to document the information in hard copy form. See Figure 2-20. One report can be printed at a time. The following procedure describes how to print these views. For more information on printing, see Section 7.12 Print.
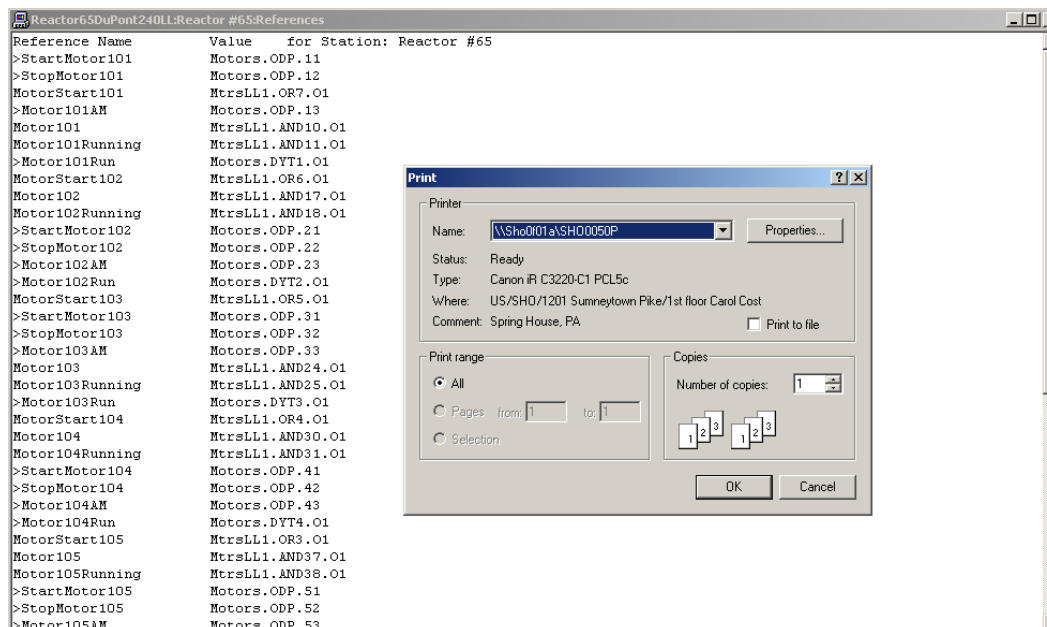
Figure 2-20 Print dialog

➢ **To print configuration information:**

1.   Make the view to be printed the active window.

2.   Do one of the following:

   •   Select **File > Print** in the active window.

      OR

   •   Press **<Ctrl + P>**.

   The Print dialog displays. See Figure 2-20.

3.   Make any necessary changes to the Print dialog.

4.   Click **[Print]**. The active report is sent to the printer.

2.15 Closing Report Views

The report views do not need to be open while creating the configuration.

> ➢ **To close a report view:**

    1.   Make the report view the active window.

    2.   Click ☒ in the upper right corner of the window.

2.16 Creating and Editing References

As described in Section 2.13 Viewing Controller (Station) Information, there are two types of references: user-defined and fixed-value. User-defined references can be created manually. i|config automatically creates fixed-value references when coils are created in a ladder logic loop. Since fixed-value references are automatically created, they are limited in what can be edited.

2.16.1 Creating References

References have a name and a value. User defined references are the only type of reference that can be created manually. Up to 16 characters may be used in a reference name. The value of a user defined reference is a digital output on a function block.

When configuring a value for a reference, at least one function block loop must have a function block that has a digital output. The value is the source output of a connection. In an external (user-defined) reference, the source output is defined in the Reference Create/Modify dialog box. For a coil (fixed) reference, the value (source output connection) is defined in ladder logic loop when the coil input is configured to a ladder logic element. For more information, see Section 8.7 References.

2.16.2 Modifying References

Modify one reference at a time. The name of a user-defined reference or a fixed-value reference may be edited. A user-defined reference value may be edited; editing of a fixed-value reference is limited, hence the name "fixed value." For more information, see Section 8.7 References.

2.16.3 Showing Uses of References

The Show Uses option displays where a reference is used. It shows uses of the selected reference. For more information, see Section 8.7 References.

2.16.4 Deleting References

A fixed value reference can not be deleted.

The user can select multiple user-defined references to delete all at once. **[Delete]** is only enabled if all selected references are user defined. For more information, see Section 8.7 References.

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Chapter 3 - Working with Function Block Loops

Function block loops represent configurations that create continuous control applications. Each loop is comprised of function blocks, connection lines and, where needed, graphic items.

The function block view displays when the user double-clicks a function block loop in the tree control of the station view or right-clicks on the icon and, from the pop-up menu, selects **[Open]**.

The view shows the workspace for creating configurations using function blocks. See Figure 3-1 for an example of a function block view.
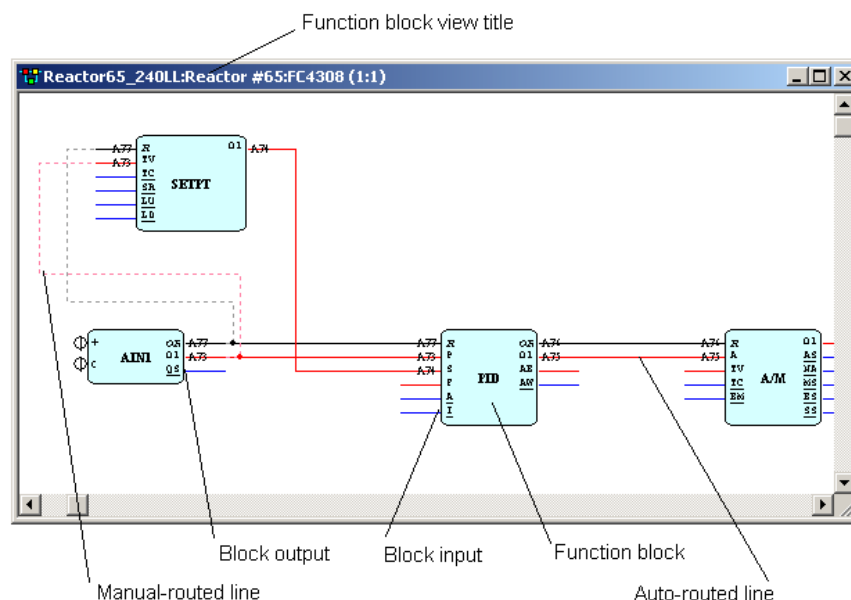
Figure 3-1 Function block view

The title of the function block view specifies the following:

File Name: Station (Controller) Name: Loop Name (zoom level)

3.1 Creating/Opening a Function Block Loop

Creating a function block loop involves placing function blocks onto the workspace and making connections between blocks.

➢ **To create a function block loop**:

Do one of the following to create a function block loop:

- With the Station View (see Figure 2-1) displayed, select **Loop > New > Function Block** from the menu toolbar.

    The Loop Name dialog will open. The default name appears in the Enter Loop Name text box. See Figure 3-2. Type a meaningful, unique loop name into the Enter Loop Name text box and click **[OK]**. The name may be up to 12 characters; the period (.) and quote marks (") are not legal characters. A function block icon is created and placed in the tree control.
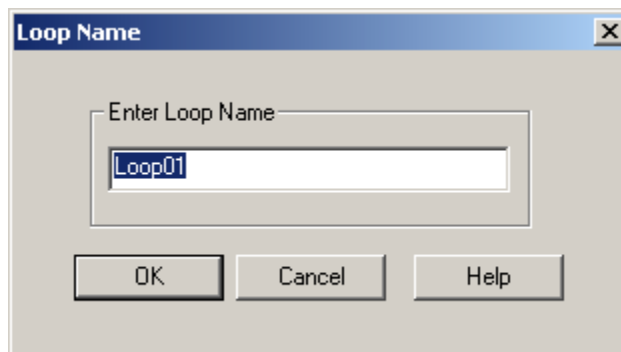
Figure 3-2 Loop Name dialog

   OR

- Click the **[Function Block Loop]** button on the **353 Objects Toolbar**.

     A function block loop icon is constructed and placed in the tree control with a
     default name used for the loop name.

➢ **To open a function block loop**:

   Do one of the following to open a function block loop:

- From the tree control, select the loop icon and then select **Loop > Open** from the
  menu.

   OR

- Right-click on the function block loop icon and, from the pop-up menu, select
  Open.

   OR

- From the tree control, double-click on the function block loop.

     The loop opens and the function block loop is displayed.

3.2 Describing Function Blocks

A function block is the building block for creating a function block loop. Function blocks are
placed on the workspace one at a time, or multiple times when in the repeat mode. Up to 250
function blocks can be placed in a loop. Function blocks can be placed anywhere on the
workspace except on top of other blocks, on top of connecting lines, or off the sheet.

Function blocks display as a rounded rectangle (block) with short input and output lines
projecting from the block. See Figure 3-3. Inputs are located on the left side of the block and
outputs are located on the right side of the block. All inputs and outputs are identified. Blocks
that have physical inputs or outputs associated with them will have screw terminal symbols on
one side of the block.
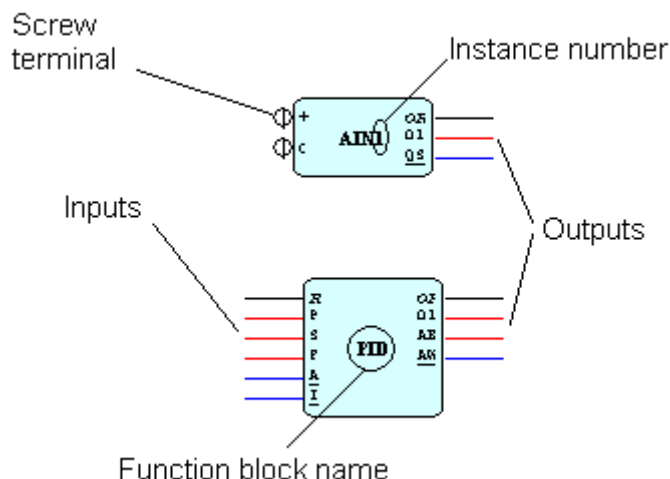
Figure 3-3 Function blocks

The block name and instance number appear in the center of the block. Instance numbers are described in the controller User's Manual.

The three types of block inputs and outputs are shown in Table 3-1 below. An input can have only one connection but outputs can have multiple connections.

Table 3-1 Input/Output Types

I/O Type	Color	Provides
Range	Black	Range (Scaling)
Analog	Red	Real (Floating Point Number)
Digital	Blue	Discrete (I/O)

While many function block attributes may be edited, refer to Section 3.5 Editing Function Block Attributes, three attributes are not editable: the block size, the font of the text within the function block, and the colors of the input and output connection lines.

3.3 Placing Function Blocks

Function blocks are selected and placed from the Select Item to Create dialog shown in Figure 3-4. i|config™ allows some function blocks to be placed only once in a configuration or loop while others can be used multiple times. Function blocks associated with a physical resource (e.g. I/O blocks) can be used once per configuration. Other function blocks are allowed only one instance per loop (e.g. PID, A/M). If a function block can be used only once, it disappears from the Select Item to Create dialog once it has been used. If the function block can be used more than once, the name of the function block is displayed in the dialog with the next available instance number.

> **Note: Function blocks are described in the controller User Manual.**

➢ **To place a function block**:

1. Click the **[New Function Block]** button on the **Line Connection** toolbar. f_*

    The "Select Item to Create" dialog is displayed. See Figure 3-4.
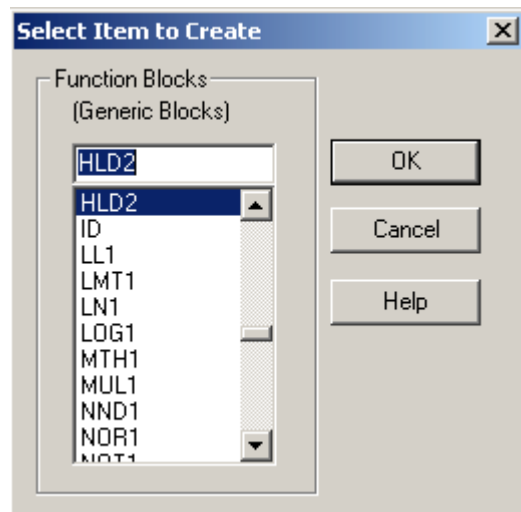
Select Item to Create	IMPORTANT
Function Blocks (Generic Blocks) HLD2 HLD2, ID, LL1, LMT1, LN1, LOG1, MTH1, MUL1, NND1, NOR1, NOT1 OK Cancel Help	The controller that is to receive the completed configuration must be a model (including installed circuit boards) and design level that supports all selected function blocks. Selecting certain function blocks will cause a "controller model warning message" to be displayed. To learn which blocks a particular controller supports, refer to the controller's nameplate for its complete model number and to the Model Designation and Configuration Overview sections of the User's Manual for that controller model. See Table 1-1 for a list of manuals.

Figure 3-4 Select Item to Create dialog (Generic Blocks shown)

2. Do one of the following to place function blocks on the loop workspace.

    • Select a function block. Click **[OK]**.
      OR

    • Enter the name of the block in the text box. Click **[OK]**.
      OR

    • Double-click the desired function block name in the list.

    A dotted box appears in the workspace which indicates the start of the function block placement process.

    Note: The function block floats with the cursor until you physically place it.

3. Move the box to a valid location for placement and click. The function block displays on the function block view workspace.

    Note: When a function block is dragged outside the view, the view automatically scrolls, keeping the function block visible within the workspace.

    If the cursor displays as a not allowed symbol (∅), the placement location is not valid.

➢ **To place a function block multiple times consecutively**:

1. Click the **[Multiple Create]** button on the **Line Connection** toolbar.

2. Repeat the previous "To place a function block" until all required function blocks are placed in the workspace.

    `Note:  To stop placing blocks, any time during the procedure, press <Esc>, click [Cancel] or right click when the dotted box appears.`

3.4 Viewing Station and Loop Resources

Station (Controller) Resources are displayed in bargraph form and numerically, as a percent of controller memory consumed. Details are accessed by clicking the Information button in the toolbar. The bargraph will change color from green to yellow to red as controller memory is consumed.

A function block loop can support up to 250 function blocks. The Station Resources Information dialog shows the number of function blocks that have been placed in a loop. It also shows the "Percent of function blocks available," as a percentage of 250; see Figure 3-5. In addition, in the Station Resource Information portion of the dialog, the "Cycle time base" time (i.e. calculated controller execution time) is shown. These measurements can be displayed in the function block and ladder logic views.

➢ **To view loop resources**:

1. Open the loop and do one of the following:

    •   Select **Tools > Loop Resources**.

        OR

    •   Click the Loop Information icon on the Station (**Controller) Resources** toolbar.

    The Loop Resource Information dialog appears. See Figure 3-5.
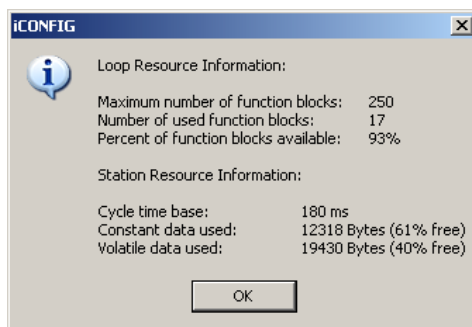
Figure 3-5 Loop Resources Information dialog

2. View the information and then click **[OK]** to close the dialog.

3.5 Editing Function Block Attributes

Function blocks are edited by changing their attributes (i.e. parameters). The Item Attributes dialog (see Figure 3-6) displays a list of parameters, depending on the active tab. There are four types of parameters in the function block view.

* Text

* Numeric: Integer, Real, AUTO format, HEX (hexadecimal) format.

* Discrete

* Input

The type of parameter is specified by the data in the Information list box. A Selections list box displays, rather that an Information list box, when the selected parameter is a discrete parameter. Each tab does not necessarily have all types of parameters available to edit.

The user can change all parameters that display on the Items Attributes dialog. Changes do not apply to the configuration until the user clicks **[OK]**. All changes made in the dialog, except for input parameters, are cancelled if the user clicks **[Cancel]**.

Some blocks do not have attributes to edit. If they do not, the Item Attributes dialog does not display a tab for the selected function block attribute.

➢ **To edit function block attributes**:

Do one of the following to start the editing process:

* Select the function block and then select **Edit > Item Attributes**.

    OR

* Select the function block and then click the **[Edit Item Attributes]** button on the **Graphic Primitives** toolbar.

    OR

* Select the function block and then click the **[Line Connection Attributes]** button on the **Line Connection** toolbar.

    OR

* Right click the function block and from the pop-up menu select **Edit Item Attributes**.

    OR

* Click the **[Selection Mode]** button on the **Graphic Primitives** toolbar and then double-click the function block.

    OR

* Click the **[Line Connection Selection Mode]** button on the **Line Connection** toolbar and then double-click the function block.

    The Item Attributes dialog opens. The names of the selected items display as tabs in the dialog.

3.5.1 Text Parameters

A text parameter is a character value of a parameter. Characters are entered in the New Value text box. The Information list box indicates the maximum number of characters allowed for the value. See Figure 3-6.

➢ **To edit text parameters**:

    1. Select a text parameter in the Parameter list of the Item Attributes dialog. The Information box shows the text information and the New Value box shows the current value.
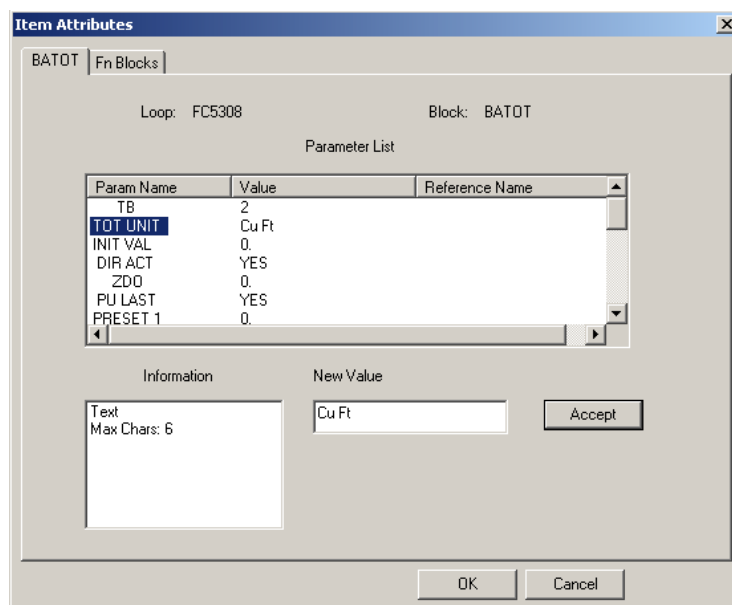
Figure 3-6 Item Attributes dialog in edit text mode

    The first line in the Information box indicates that the selected parameter is a text parameter. The second line indicates that the parameter has a maximum of 6 characters.

    2. Type a value in the New Value text box.

    3. Click **[Accept]**. The value changes in the parameter list.

    4. Click **[OK]**. The change stores in the configuration.

3.5.2 Numeric Parameters

A numeric parameter is a number value for a parameter. Numbers are entered in the New Value text box. The Information list box provides the range of numbers for the value. There are four types of numeric parameters: integer, real, AUTO format, and HEX format.

➢ **To edit numeric parameters**:

    1. Select a numeric parameter in the Parameter list.

    Depending on the type of parameter selected, the corresponding edit numeric parameter mode of the Item Attributes dialog displays. Each of the four types of numeric parameters is discussed below.

See Figure 3-7 for an example of the edit integer parameter mode. The Information list box indicates that the selected parameter is an integer parameter. It also displays the minimum and maximum range for the integer value.
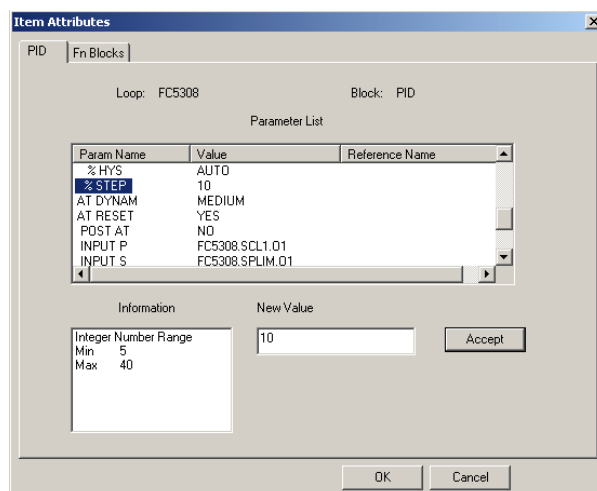
Figure 3-7 Item Attributes dialog in edit integer mode

Figure 3-8 is an example of the edit real number parameter mode. The Information list box indicates that the selected parameter is a real parameter. It also displays the minimum and maximum range for the real value.
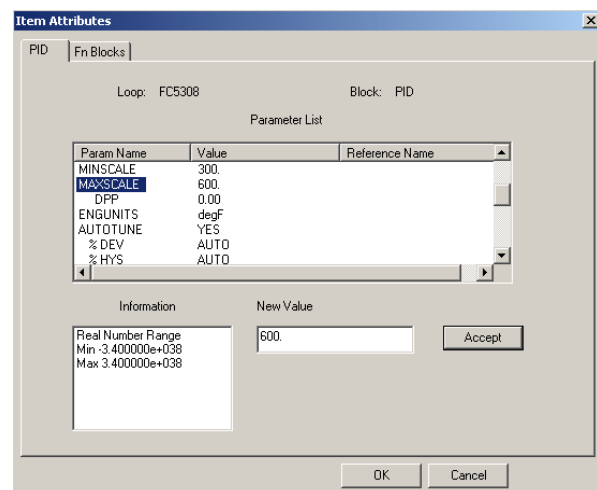
Figure 3-8 Item Attributes dialog in edit real mode

Figure 3-9 is an example of the edit AUTO parameter mode. The Information list box indicates that the selected parameter is a real parameter. It also displays the range values. If a New Value of "0" is entered, "AUTO" displays as the value in the Parameter List.
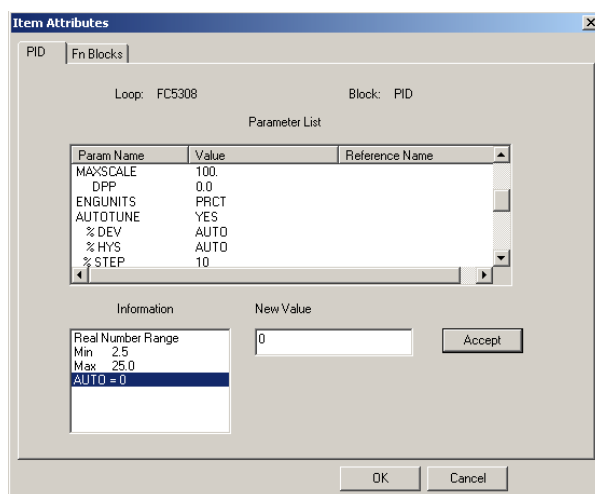
Figure 3-9 Item Attributes in edit AUTO mode

Figure 3-10 is an example of the edit HEX parameter mode. The Information list box indicates that the selected parameter is a HEX number parameter. It also displays the HEX value range for the selected parameter.
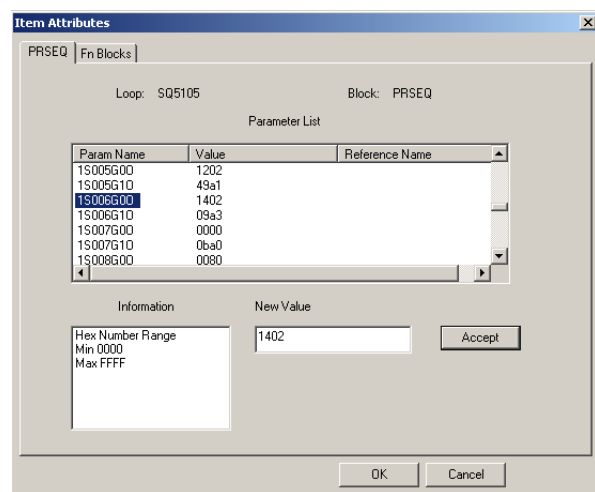
Figure 3-10 Item Attributes dialog in edit HEX mode

2.   Enter the desired value in the New Value text box

3.   Click **[Accept]**. The value changes in the parameter list.

4.   Click **[OK]**. The change stores in the configuration.

3.5.3 Discrete Parameters

A discrete parameter is a parameter for which a list of choices for the value displays in the Selections text box. The user cannot manually enter a value but selects from the choices.

➢ **To edit discrete parameters**:

1. Select a discrete parameter on the Parameter List.

    The Item Attributes dialog displays the Selections box with the discrete information and the current value highlighted. See Figure 3-11.
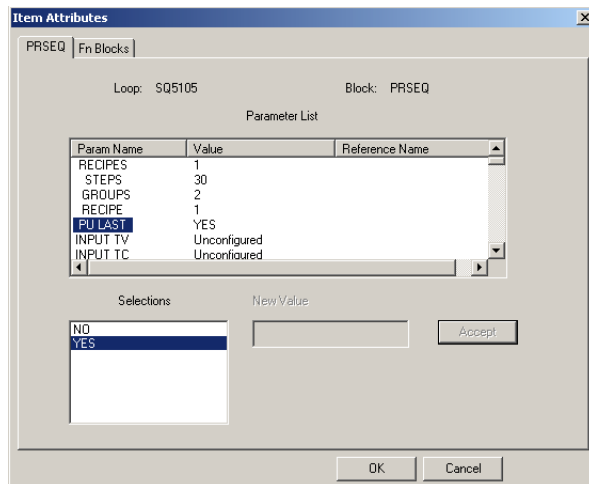
Figure 3-11 Item Attributes in edit discrete mode

2. Select the value in the Selections list box. The value changes in the Parameter List.

3. Click **[OK]**. The change stores in the configuration.

3.5.4 Input Parameters

Input parameters refer to inputs to a function block. An input value is configured by a loop/block/output reference or by "unconfigured."

➢ **To configure input parameters by the loop/block/output method**:

1. Select an input parameter from the Parameter List. The Item Attributes dialog for the edit input parameters mode displays; see Figure 3-12.
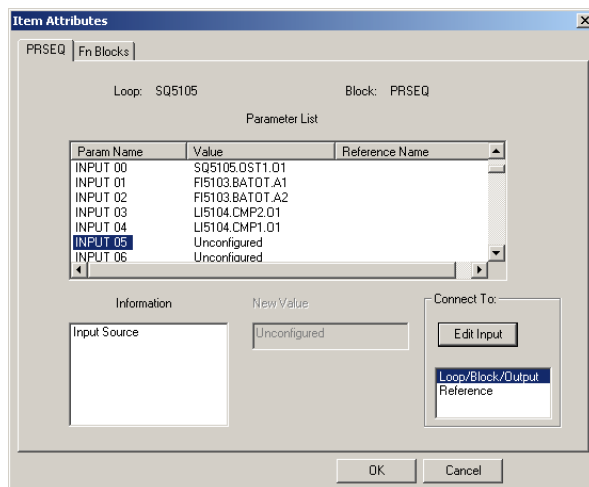
Figure 3-12 Item Attributes dialog in edit input mode

The Information list box indicates that the selected parameter is an input parameter. The Connect To list box indicates that the input can be connected to a Loop/Block/Output or a Reference. The **[Edit Input]** button allows the user to edit the input connection.

2. Click **[Edit Input]**. The dialog box for a Loop/Block/Output connection is displayed. See Figure 3-13.
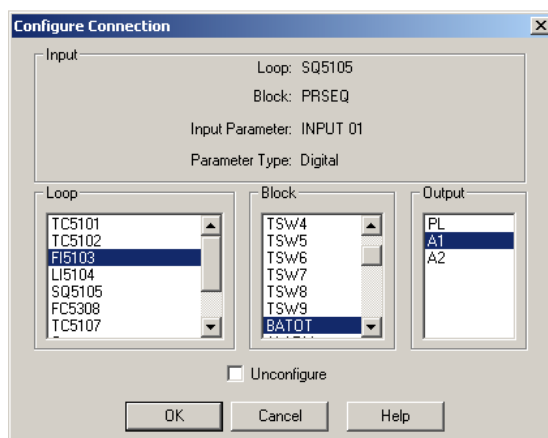
Figure 3-13 Configuration Connection dialog

3. Select the loop from the Loop list box. A list of blocks in the selected loop will be displayed in the Block list box.

4. Select a function block from the Block list box. A list of available outputs will be displayed in the Output list box.

5. Select the output from the Output list box.

6. Click **[OK]**.

The input parameter is configured by the selected loop/block/output value. A triangle and a connection identifier (e.g. A25) appear at both connection points in the graphic function block view signifying a connection; a line is not drawn. The connection identifier is added to the Connection Identifiers report view. The value also changes in the Parameter List in the Item Attributes dialog.

➢ **To unconfigure an input parameter**:

1. Perform steps 1 and 2 of "**To configure input parameters by the loop/block/output method**" above.

2. Click the Unconfigure check box.

3. Click **[OK]**. The input value is unconfigured.

➢ **To configure a digital input parameter by reference**:

1. Select a digital input from the Parameter List in the Items Attributes dialog.

2. Select Reference in the Connect To list box.

3. Click **[Edit Input]**. The Set Reference dialog opens. See Figure 3-14.
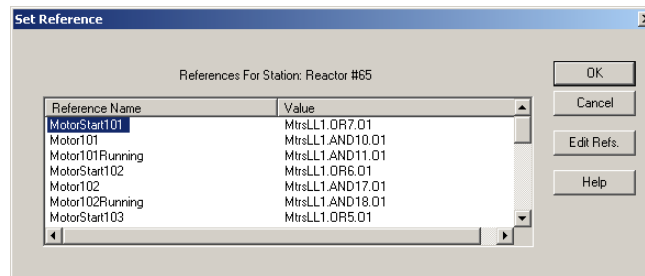
Figure 3-14 Set Reference dialog

4. Select a reference from the Set Reference dialog.

    Note: Only fixed value references are displayed and, therefore, are the only ones that can be selected.

5. Click **[OK]**. The changes are made in Item Attributes dialog. Changes are listed there by value and by reference.

6. Click **[OK]**.

3.6 Connecting Function Blocks using Connection Lines

Connection lines are created using the Line Connection Mode button on the Line Connection toolbar. Only function blocks in the same loop can be connected with connection lines. There are four ways to make a connection line:

- Click a block input and then click a block output.

- Click a block input and then click a connection line.

- Click a block output and then click an unconfigured input.

- Click a connection line and then click an unconfigured input.

The Line Connection Mode button is also referred to as the Wire Spool button because the cursor becomes a spool when the Line Connection Mode button is selected.

A connection line can go anywhere on the workspace, except through a function block. If a connection line can not be routed, a triangle and connection identifier display on the block input and output to signify a connection.

The attributes of a connection line can be changed in the Line Connection tab of the Item Attributes dialog. Refer to Section 3.9 Editing Connection Lines for further information.

To minimize configuration errors, i|config will draw a connection line only between the same type of input and output. For example:

- A Range input connects to a Range output (black to black)

- An Analog input connects to an Analog output (red to red)

- A Digital input connects to a Digital output (blue to blue)

If a line ends on an input, the input must be unconfigured. A line started on an input can end on an output or an existing connection line. Connection dots, points at which lines connect to each other, display on any lines that share the same segment.

Connection lines are made only between inputs and outputs of function blocks in the same loop. When a connection is made, a connection identifier (e.g. A25) is shown on the input and the output to identify the connection. If a connection is made, but the line could not be routed, a triangle and a connection identifier display on the input and the output to signify that a connection exists.

➢ **To connect function blocks on the same loop**:

1. Click the **[Line Connection Mode]** button. 〈image〉 The cursor becomes a wire spool.

2. Click a valid starting point.

    Note: The cursor displays as a spool with a (+) sign when over a valid connection point. It displays with a (∅) symbol when the connection point is not valid.

3. Move the cursor to a valid connection point.

4. Click a valid ending point to make a connection.

    If possible, a line is drawn between the connection points. If a line can not be routed between the two points, a triangle and a connection identifier appear at each connection point signifying a connection.

    Note: Press <Esc> at any point, when creating a connection line, to cancel the operation.

    A connection can start on an input, an output, or an existing connection line. If the input already has a connection or is used by a reference, a warning message is displayed. See Figure 3-15.
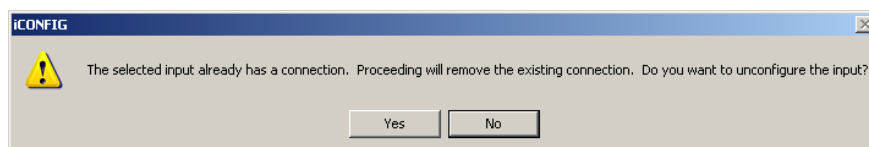
Figure 3-15 Input already has a connection warning message

    If a connection line starts on an existing line, the starting point is considered to be the output of the connection line on which the user started.

3.6.1 Auto-Routed and Manual-Routed Connection Lines

The connection line between two items is the line connection path. Line connection paths represent signal connections between inputs and outputs. There are two types of connection lines.

* Auto-routed connection lines

* Manual-routed connection lines

An Auto-routed connection line is generated when the spool tool is used to directly connect an input to an output (e.g. click an input and click a valid output, two clicks). An Auto-routed line is solid and is auto-routed by i|config to form a signal path between an input and an output. See figure 3-16.
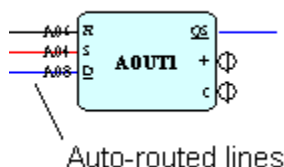
Figure 3-16 Auto-routed lines

A Manual-routed connection line is generated when more than two clicks occur in routing a line between an input and an output. A Manual-routed connection line is dotted and has auto-routed segments between each click. See Figure 3-17.
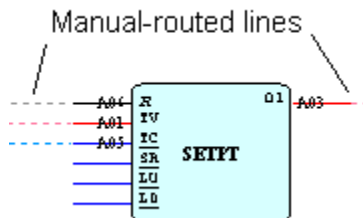
Figure 3-17 Manual-routed lines

3.6.2 Connection Dots

Where two or more connection lines intersect, a connection dot is placed at the junction. A connection dot is the point at which two or more lines connect, rather than where they cross over each other. See Figure 3-18.
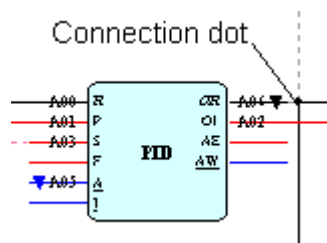
Figure 3-18 Connection dot

3.7 Connecting Function Blocks without Connection Lines

Function blocks may be connected on the same or different loops in the line connection mode. This is done using the Configure Connections dialog; see Section 3.5 Editing Function Block Attributes.

➢ **To connect function blocks without connection lines**:

1. Click the **[Line Connection Mode]** button. 🔧 The cursor becomes a wire spool.

2. Do one of the following:

    - **<Ctrl>+**click on a function block input or output.

        OR

    - Right-click on a function block input or output. Select **Configure Connections** from the pop-up menu.

    The Configure Connection dialog, shown in Figure 3-19, is displayed *if the input is unconfigured.* If the warning dialog in Figure 3-20 is displayed, do one of the following:

    - Click **[Yes]** to unconfigure the existing input connection.

        OR

    - Click **[No]** to leave the input connection unchanged.
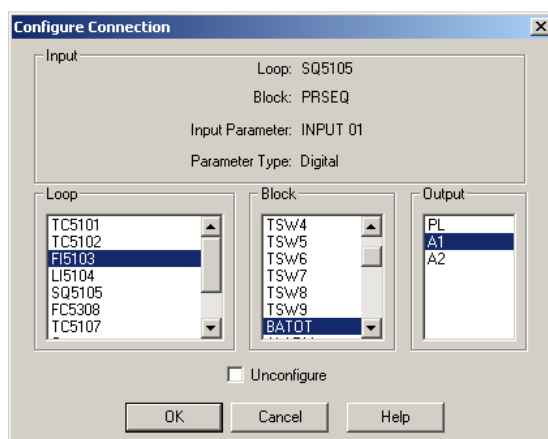
Figure 3-19 Configuration Connection dialog
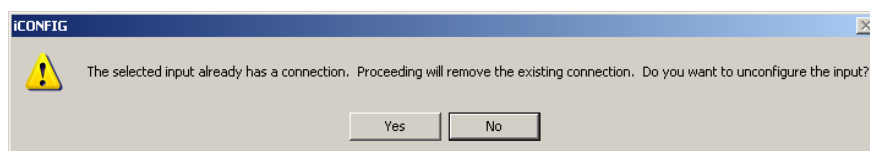
Figure 3-20 Input already has a connection warning message

3. Select a loop from the Loop list box. A list of Blocks displays in the Block list box.

4. Select a block from the Blocks list box. A list of outputs, of the same type, displays in the Output list box.

5. Select an output, if any, from the Output list box.

6. Click **[OK]**.

The input parameter is configured by the selected loop/block/output value. A triangle and a connection identifier (e.g. A05) on the input and output of the function blocks in the graphic function block view signify a connection. The connection identifier is added to the Connection Identifiers report view. The value also changes in the Parameter List in the Item Attributes dialog.

➢ **To unconfigure input connections on the same loop:**

1. Click the **[Line Connection Mode]** button. The cursor becomes a wire spool.

2. Right-click on the input connection to be unconfigured. The Configure Connection dialog appears; see Figure 3-13.

3. Click the Unconfigure check box.

    If you are unconfiguring an output with at least one connection, the message in Figure 3-21 appears.
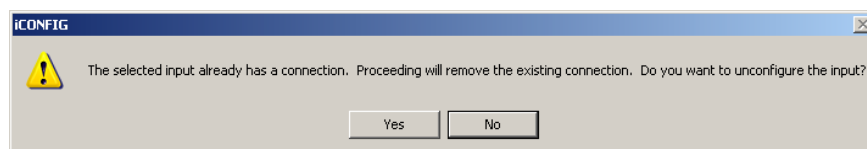
Figure 3-21 Input already has a connection warning message

4. Click **[Yes]** to unconfigure the existing input connection and remove the connection.

    Click **[No]** to cancel the operation.

3.8 Viewing Connections

Connections are displayed in the Connection Info dialog. This dialog displays a list of connections for the selected input or output, and it indicates if there are connections to another loop.

➢ **To view input or output connections**:

1. Click the **[Line Connection Mode]** button. The cursor becomes a wire spool.

2. Right-click a function block input or output and from the pop-up menu, select **Show Connections**.

    The Connection Info dialog displays a list of input or outputs showing the loop.block.input or output connection for the selected input or output. See Figure 3-22.
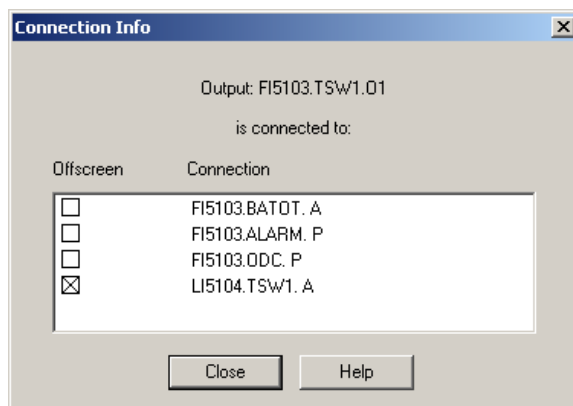
Figure 3-22 Connection Info dialog

3.   Click **[Close]**. The dialog closes.

3.9 Editing Connection Lines

Connection lines cannot be moved or sized. However, the user can perform other editing functions on lines.

➢   **To edit connection lines**:

1.   Do one of the following:

   - Click the **[Line Connection Attributes]** button 🔧 on the **Line Connection** toolbar.

     OR

   - Click the **[Line Connection Selection Mode]** button 🔧 on the **Line Connection** toolbar.

     The Item Attributes dialog displays. See Figure 3-23.
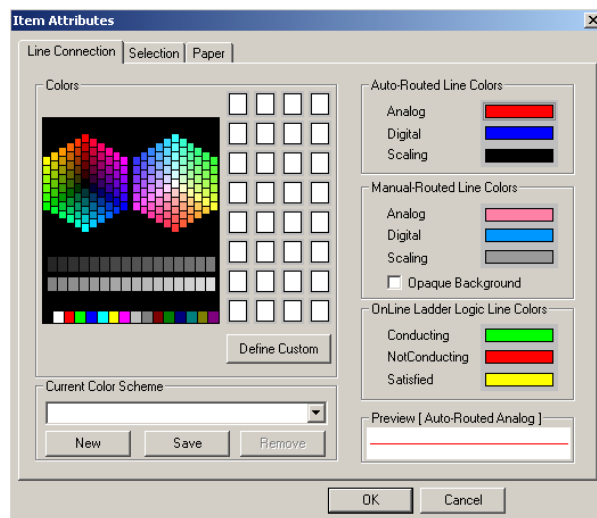
Figure 3-23 Item Attributes dialog

2. Click the Line Connection tab, if it is not already selected.

3. Select and edit the attribute(s) as desired. Refer to procedure for selecting a color in the "Custom Colors" section in Chapter 6 Using the Toolbars.

4. Click **[OK]**. The modification of the line connection attributes display in the function block loop.

3.10 Deleting Connection Lines

Deleting a connection line removes a connection between an input and an output.

➢ **To delete a connection line**:

1. Do one of the following:

    • Click the **[Line Connection Selection Mode]** button [icon] on the **Line Connection** toolbar.

       OR

    • Click the **[Selection Mode]** button [icon] on the **Graphic Primitives** toolbar.

2. Do one of the following:

    • Select the line, and then select **Edit > Delete**.

       OR

    • Select the line, and then press **<Delete>**.

       OR

    • Right-click the line and select **Delete** from the pop-up menu.

3.11 Moving Function Blocks

When moving a function block, i|config will attempt to reroute auto-routed connections to the block being moved. A function block cannot be moved on top of another function block or a connection line.

➢ **To move a function block to an empty location**:

1. Click the **[Line Connection Selection Mode]** button [icon] on the **Line Connection** toolbar.

2. Click the selected function block, drag it to a valid location, and release the mouse button. The function block displays in the new location.

    Note: the cursor displays with a "plus" (+) sign if the move is valid. It displays with a "not allowed" (∅) if the move is invalid. If a "not allowed" symbol appears but no interfering line is visible, click View in the Menu Toolbar to ensure that all lines are displayed (checked).
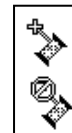
➢ **To move a function block to a line interference location**:

1. Click the **Erase Line Connection** button. Auto and manual-routed lines are erased.

2. Click the function block and drag it to a valid location. Release the mouse button.

3.   Click the **Automatic Line Connection** button. Lines are Auto routed; previously manual-routed lines will be Auto routed. Where a line can be routed for visual display, the connection will be made and a triangle and connection identifiers added.

➢ **To move a function block to a function block interference location**:

1.   Click the **Erase Line Connection** button.

2.   Move the interfering function block to a new location. Move the initial function block to the now vacated location.

3.   Click the **Automatic Line Connection** button.

3.12 Deleting Function Blocks

When deleting a function block, i|config will delete all connections to that block and all parameters associated with the block.

➢ **To delete a function block**:

1.   Select one of the following mode buttons:

   •   Click the **[Line Connection Selection Mode]** button 🔲 on the **Line Connection** toolbar.

      OR

   •   Click the **[Selection Mode]** button 🔲 on the **Graphic Primitives** toolbar.

2.   Do one of the following to start the delete process:

   •   Select a function block, and then select **Edit > Delete**.

      OR

   •   Right-click a function block and from the pop-up menu select **Delete**.

      OR

   •   Select the function block and then press **<Delete>**.

   The deletion confirmation dialog displays. See Figure 3-24.
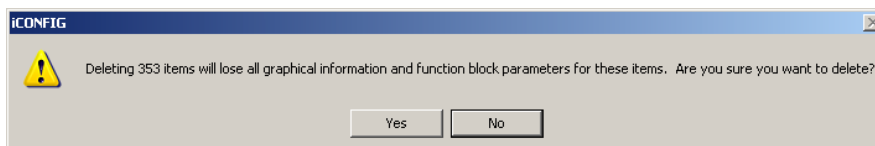
Figure 3-24 Delete confirmation

3.   Click **[Yes]**. The function block and all its parameters are deleted from the configuration.

3.13 Printing Function Block Loops

There are several print options from which to choose:

- Screen

- Active Window – Current View

- Active Window – Entire View

- Active Window – 1 to 1

For more information on printing, refer to Section 7.10 Print.

➢ **To print a function block loop**:

1. Open the loop to be printed.

2. Select **File > Print Options >** *Desired Option*.

3. Do one of the following:

    - Select **File > Print**.

      OR

    - Click the **[Print]** button 🖨 on the **Standard** toolbar.

      OR

    - Press **<Ctrl+P>**.

    The Print dialog displays. See Figure 3-25
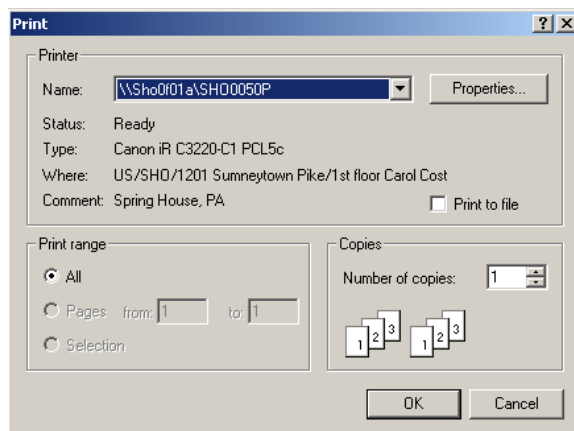
Figure 3-25 Print dialog

4. Make changes to the dialog, if necessary.

5. Click **[OK]**. The selected option is sent to the printer.

Chapter 4 - Working with Ladder Logic Loops

Sections 4.1 through 4.6 provide an introduction to the relationship between the ladder logic and Boolean elements plus details concerning ladder elements, contacts, coils, and timers. An example is provided of the creation of ladder logic loops and a function block loop that contains the discrete I/O associated with the ladder logic loop. Details of the actual steps used in the configuration of a ladder logic loop are provided in Sections 4.7 through 4.18.

4.1 Overview

Ladder Logic loops are used in place of Boolean logic (function blocks) to design discrete logic operations. Since 353 controllers are based on function block objects, i|config™ converts a ladder logic design to an equivalent Boolean design that will be downloaded to the controller.

4.1.1 Ladder Logic Pages

Up to four pages of ladder logic rungs are permitted in a ladder logic loop. In practice, it is best to use only two pages of ladder logic per loop. After the second page, you typically will run out of loop resources. For this reason, it is best to switch to a new loop after two pages of ladder.

When configuring ladder logic, allow an empty rung between each rung of ladder created. While testing (debugging) the ladder logic, you will probably need to add more contacts or rungs of logic. Having unused rungs makes it easy to add needed rungs.

4.1.2 Ladder Logic Configuration

A summary of the steps involved in assigning names to Ladder Logic elements follows. Each step is then further divided into steps in subsequent paragraphs.

1. Create the loop(s) necessary for the ladder.

2. Create the Reference List for the discrete inputs to the ladder.

3. Draw the ladder.

4. Name the contacts in the ladder.

5. Name the coils in the ladder.

6. Connect the coils to the discrete outputs.

➢ **Create a Function Block Loop for I/O**:

1. Click the Function Block Loop button 🖫 to create a new loop. Give the loop a meaningful name, for example, "Motor105 I/O". Refer to Chapters 2 and 3 as needed. This loop will contain the reference names that will be the connections between this function block loop and the related ladder logic loop.

2. In this loop place all of the I/O blocks (e.g. Comparators, DIN's, DID's, DOUT's and DOD blocks) that will be referred to from the ladders.

➢ **Create the Reference List**:

1. Select **Reference** from the Edit>References menu to get the Edit/Reference dialog box.

2. Click the **[Create]** button to get the Create/Modify References dialog box.

3. Type the reference name of a discrete input to the ladder, such as "FAN RUNNING" or "MOTOR ON".

4. Select the name of the loop containing the Discrete I/O in the ladder. (The check mark in the box next to "Unconfigured" will clear.) Select the block and output that will be connected to the discrete input.

    A symbol may appear in front of the reference name:
        % – Indicates that the reference name is connected from the ladder to a signal outside the controller.
        > – Indicates a connection from the ladder to another loop within the station.
        No symbol – Indicates the reference name is connected only within the ladder.

5. Repeat steps 3 and 4 for each discrete input and output.

➢ **Create a Ladder Logic Loop and Draw the Ladder(s)**:

1. Click the Ladder Logic Loop button to construct the ladder. Give it a meaningful name, for example "Motor105."

2. Draw the ladder by clicking the **[New Ladder Logic Element]** button in the **Line Connection** Toolbar and selecting the appropriate contacts and coils.

3. Next, click the **[Line Connection Mode]** button on the **Line Connection** Toolbar. The cursor will change to a wire spool that is used to interconnect or "wire" the elements in the ladder.

4. Wire all the elements into the desired ladder logic configuration.

➢ **Name the Contacts**:

1. Name the contacts in the ladder using the wire spool cursor. Right-click on the contact name. The Set Reference dialog box will pop up.

2. For external inputs, select the proper discrete input from the list created earlier.

3. Add to the reference list any contact that comes from a loop within the station. Click the **[Edit/References]** button and click on the **[Create]** button. The Create/Modify References dialog box will pop up. Name the contact reference and then specify the loop block and output used to provide this discrete input to the ladder.

4. If a contact comes from a coil on the ladder, leave it unconfigured until the coils are named in the next step.

➢ **Name the Coils**:

1. To name coils, continue to use the wire spool. Right-click on the coil name; usually it will be in the form of DefCoilTagn.

2. The Create/Modify Reference dialog box will pop up with the coil name highlighted.

3. Change the reference name to the appropriate name and click **[OK]**.

4. Go to the next coil and repeat this procedure until all the coils are named.

5. Go back through the ladder and name the unconfigured contacts that come from the coils that were just named. This is done using the wire spool and right-clicking 'Unconfigured' above the contact. As before, the Set Reference dialog box pops up

and the appropriate coil name may be selected from the references listed by highlighting the appropriate name and clicking **[OK]**.

➢ **Connect the Coils**:

1. Connect each coil that drives a discrete output, such as START FAN, OPEN GAS SSV's, to a discrete output block. This is accomplished by opening the "Discrete I/O" function block loop with the **[Line Connection Selected Mode]** button 🔧 that is next the wire spool button.

2. Double-click the appropriate discrete block. The Item Attributes dialog box will pop up.

3. Select the tab for the block selected.

4. Select the appropriate input to highlight it.

5. Highlight the word **Reference** in the Connect to box.

6. Click the **[Edit Input]** button in that box. The Set Reference list will pop up with all the coil names listed.

7. Select the proper coil name that corresponds to the discrete output channel desired and then click **[OK]**. This connects the coil to that discrete output channel. When the coil goes high, the discrete output will go high.

4.2 Ladder Logic Elements

Logic functions are implemented in a controller using function blocks (Boolean functions). Many users, however, prefer ladder diagrams for developing logic configurations. i|config can be used to configure logic using ladder techniques. This section provides a list of ladder diagram elements, contacts, coils, and timers available for use within i|config. It also describes how they correspond to controller function blocks. A sample ladder logic page with a variety of elements is shown in Figure 4-1.
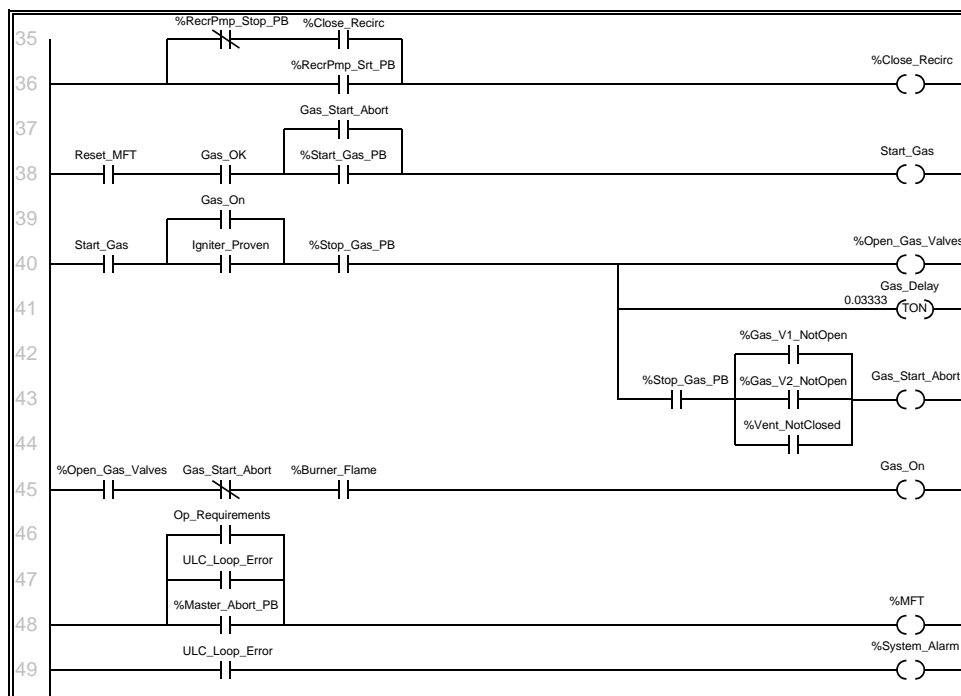
Figure 4-1 Sample ladder logic page

4.2.1 Ladder Elements

Power Rail (PR) |
This element is on the left of the ladder diagram and is always conducting.

Horizontal Shunt (HS) -----
This element conducts when the element on the left is conducting and transfers this state to the element on the right.

Vertical Shunt (VS) |
This element is the inclusive OR of the states of the elements to its left.

Connections by Reference <reference>
A <reference> is a connection element to:

- Another element within the ladder diagram

- An input or output in the related function block loop

- An input or output in another loop within the configuration

4.2.2 Contacts
A contact is a ladder element that copies a state to the element on its right equal to the logical AND of the state of the element on its left with the state of the reference.

4.2.2.1 Normally Open Contact --| |-- NOC

The NOC copies the state of the left horizontal shunt to the right horizontal shunt, if the state of the contact reference is TRUE. Otherwise the state of the right horizontal shunt will be non-conducting. *{The NOC is equivalent to a two input AND function block having inputs A <reference> & B and output O1. If the B input is connected to the Power Rail the contact output will equal the <reference> and an actual AND function block is not required.}*
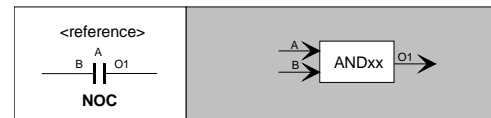
4.2.2.2 Normally Closed Contact --|\|-- NCC

The NCC copies the state of the left horizontal shunt to the right horizontal shunt, if the state of the contact reference is FALSE. Otherwise the state of the right horizontal shunt will be non-conducting. *{The NCC is equivalent to a two input AND function block having inputs A <reference> & B and output O1 and a NOT function connected to the A input of the AND block. If the B input is connected to the Power Rail the contact output will equal the output of the NOT function block and an AND function block is not required.}*
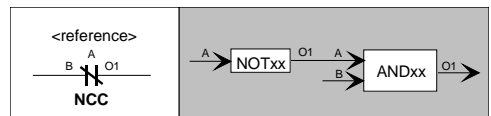
4.2.2.3 Positive Transition Sensing Contact --|P|-- PTC

The PTC copies the state of the left horizontal shunt to the right horizontal shunt for one scan cycle, when the state of the contact reference changes from FALSE to TRUE. Otherwise the state of the right horizontal shunt will be non-conducting. *{The PTC function is equivalent to a two input AND function block having inputs A <reference> & B and output O1 and a RTG rising edge trigger function*
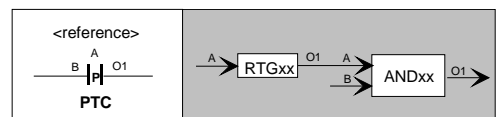
connected to the A input. If the B input is connected to the Power Rail the contact output will equal the output of the RTG function block and an AND function block is not required.}

4.2.2.4 Negative Transition Sensing Contact --|N|-- NTC

The NTC copies the state of the left horizontal shunt to the right horizontal shunt for one scan cycle, when the state of the contact reference changes from TRUE to FALSE. Otherwise the state of the right horizontal shunt will be non-conducting. *{The NTC function is equivalent to a two input AND function block having inputs A <reference> & B and output O1 and a FTG falling edge trigger function connected to the A input. If the B input is connected to the Power Rail the contact output will equal the output of the FTG function block and an AND function block is not required.}*
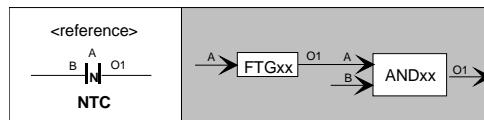
4.2.3 Coils

Coils copy the state of the left horizontal shunt to the right horizontal shunt without modification and store the state of the left horizontal shunt into a Boolean variable, having a unique user assigned name for use within the graphical ladder diagram.

4.2.3.1 Coil --(C)--

The C coil sets the state of the reference to TRUE when the left horizontal shunt is conducting and to FALSE when not conducting. *{The coil function is associated with the output state of another function block and assigns a unique reference name within the ladder diagram to this state.}*
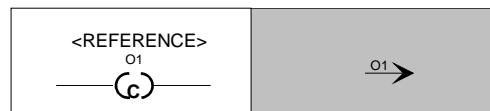
4.2.3.2 Set (Latch) Coil --(S)--

The S coil sets the state of the coil reference TRUE when the left horizontal shunt changes from not conducting to conducting. It will remain TRUE, after the left horizontal shunt returns to a not conducting state, until the reference is reset using an R coil assigned to the same reference. During a warm or cold start of the controller, the reference will be set to FALSE. *{The set coil function is equivalent to a SRF function block having input S connected to the left horizontal shunt, the block output O1 associated with the coil reference, and PU LAST set to NO. The left horizontal shunt of the corresponding R coil is connected to the R input. Set is paired with the complementary Reset function.}*
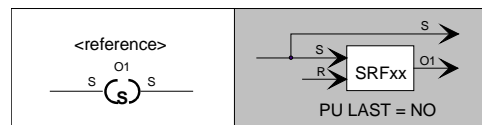
4.2.3.3 Reset (Unlatch) Coil --(R)--

The R coil resets the state of the coil reference to FALSE when the left horizontal shunt changes from not conducting to conducting. It will remain FALSE after the left horizontal shunt returns to a not conducting state, until the reference is set using an S coil assigned to the same reference. During a warm or cold start of the controller, the reference will be set to FALSE. *{The reset coil function is equivalent to a SRF function block having input R connected to the left horizontal shunt, the block output O1 associated with the coil reference, and PU LAST set to NO. The left horizontal shunt of the corresponding S coil is connected to the S input. Reset is paired with the complementary Set function.}*
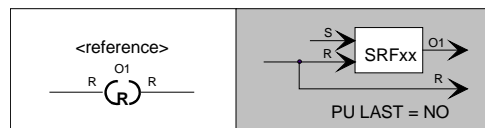
4.2.3.4 Retentive (Memory) Coil --(M)--

The M coil sets the state of the coil reference to TRUE when the left horizontal shunt is conducting and will set it to FALSE when the shunt is not conducting. It will retain the state of the reference during a warm start (of the controller) until the coil is executed on the first scan cycle. *{The retentive coil function is equivalent to a SRF function block having input S connected to the left horizontal shunt, the R input is not connected (defaulting to TRUE), the block output O1 associated with the coil reference, and PU LAST set to YES.}*
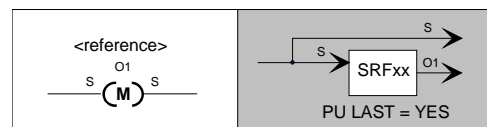
4.2.3.5 Set Retentive (Memory) Coil --(SM)--

The SM coil sets the state of the coil reference TRUE when the left horizontal shunt changes from not conducting to conducting. It will remain TRUE, after the left horizontal shunt returns to a not conducting state, until the reference is reset using a RM coil assigned to the same reference. During a warm start of the controller, the reference will be retained at the previous value and during a cold start it will be set to FALSE. *{The set retentive coil function is equivalent to a SRF function block having input S connected to the left horizontal shunt, the block output O1 associated with the coil reference, and PU LAST set to YES. The left horizontal shunt of the corresponding RM coil is connected to the R input. Set is paired with the complementary Reset function below.}*
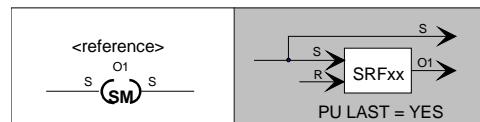
4.2.3.6 Reset Retentive (Memory) Coil --(RM)--

The RM coil resets the state of the coil reference to FALSE when the left horizontal shunt changes from not conducting to conducting. It will remain FALSE after the left horizontal shunt returns to a not conducting state, until the reference is set using a SM coil assigned to the same reference. During a warm start of the controller, the reference will be retained at the previous value and during a cold start it will be set to FALSE. *{The reset retentive coil function is equivalent to a SRF function block having input R connected to the left horizontal shunt, the block output O1 associated with the coil reference, and PU LAST set to YES. The left horizontal shunt of the corresponding SM coil is connected to the S input. Reset is paired with the complementary Set function above.}*
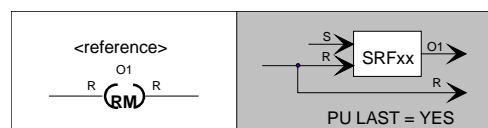
4.2.3.7 Positive Transition-Sensing Coil --(P)--

The P coil changes the state of the coil reference from FALSE to TRUE for one scan cycle, when the left horizontal shunt changes from not conducting to conducting. *{The positive transition-sensing coil function is equivalent to a RTG function block having input A connected to the left horizontal shunt and the block output O1 associated with the coil reference.}*
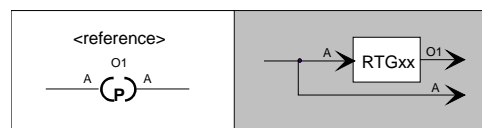
4.2.3.8 Negative Transition-Sensing Coil --(N)--

The N coil changes the state of the coil reference from FALSE to TRUE for one scan cycle, when the left horizontal shunt changes from conducting to not conducting. *{The negative transition-sensing coil function is equivalent to a FTG function block having input A connected to the left horizontal shunt and the block output O1 associated with the coil reference.}*
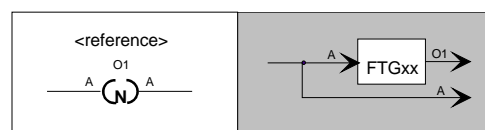
4.2.3.9 Negated Coil --(NG)--

The NG coil sets the state of the coil reference TRUE when the left horizontal shunt not conducting and to FALSE when conducting. *{The negated coil function is equivalent to a NOT function block having input A connected to the left horizontal shunt and the block output O1 associated with the coil reference.}*
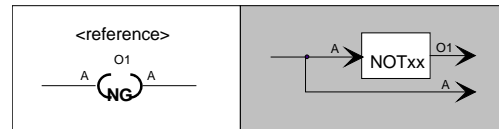
4.2.4 Timers

Timers are similar to coils. They copy the state of the left horizontal shunt to the right horizontal shunt without modification and store a state into a Boolean reference based on the state of the left horizontal shunt and the operation of the specific timer function.

4.2.4.1 Retentive On Timer -- (ROT)--

The ROT changes its coil reference from FALSE to TRUE after the left horizontal shunt has been conducting for a time equal to or greater than the time setting, provided its associated EROT is conducting. Once the timer has been started, the elapsed time will be retained even if the left horizontal shunt returns to a not conducting state. The elapsed timer will continue when the state returns to conducting. The ROT must be used with an EROT (enable retentive on timer) having the same reference as the ROT but preceded by NOT (e.g. ROT is TIMER1 and EROT is NOTTIMER1). During a warm or cold start of the controller, the reference will be initialized to FALSE and the elapsed timer will be initialized to 0. *{This function and its associated EROT corresponds to a ROT function block with the PU LAST set to NO, the left horizontal shunt connected to the ON input, and the D output corresponding to the reference. The left horizontal shunt of the corresponding EROT coil is connected to the EN input.}*
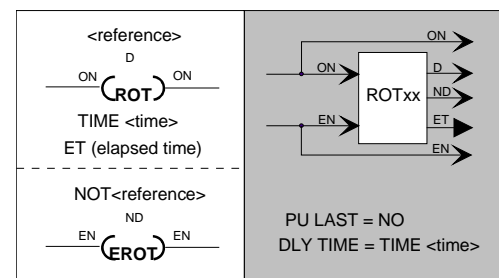
4.2.4.2 Enable Retentive On Timer --(EROT)--

The EROT changes its coil reference from FALSE to TRUE when the left horizontal shunt is conducting and its associated ROT is NOT TRUE. *{This function and its associated ROT corresponds to a ROT function block with the PU LAST set to NO, the left horizontal shunt connected to the EN input, and the DN output corresponding to the reference. The left horizontal shunt of the corresponding ROT coil is connected to the ON input.}*

4.2.4.3 Retentive On Timer (Memory) --(ROTM)--

The ROTM changes its coil reference from FALSE to TRUE after the left horizontal shunt has been conducting for a time equal to or greater than the time setting, provided its associated EROTM is conducting. Once the timer has been started, the elapsed time will be retained even if the left horizontal shunt returns to a not conducting state. The elapsed timer will continue when the state returns to conducting. The ROTM must be used with an EROTM (enable retentive on timer) having the same reference as the ROTM but preceded by NOT (e.g. ROTM is TIMER2 and EROTM is NOTTIMER2). During a warm start of the controller, the references and elapsed timer will be initialized to their previous values. *{This function and the matching EROTM corresponds to a ROT function block with the PU LAST set to YES, the left horizontal shunt connected to the ON*
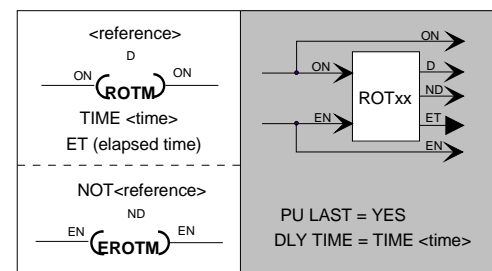
input, and the D output corresponding to the reference. The left horizontal shunt of the associated EROTM coil is connected to the EN input.}

4.2.4.4 Enable Retentive On Timer (Memory) --(EROTM)--

The EROTM changes its coil reference from FALSE to TRUE when the left horizontal shunt is conducting and its associated ROTM is NOT TRUE. *{This function and its associated ROTM corresponds to a ROT function block with the PU LAST set to YES, the left horizontal shunt connected to the EN input, and the DN output corresponding to the reference. The left horizontal shunt of the associated ROTM coil is connected to the ON input.}*

4.2.4.5 On-Delay Timer --(TON)--

The TON changes the coil reference from FALSE to TRUE after the left horizontal shunt changes from not conducting to conducting and has been conducting for a time equal to or greater than the time setting. The reference will remain TRUE until the left horizontal shunt returns to a not conducting state. During a warm start of

the controller, the reference will be set FALSE, any elapsed time will reset to 0.0, and the timer will act on state of the left horizontal shunt during the first scan. *{The TON function is equivalent to the DYT function block with the TYPE set to ON, PU LAST set to NO, and the DLY TIME set to the time.}*

```
<reference>
       O1
   P  (TON)  P
   TIME <time>
   ET (elapsed time)
```
```
                        P
        P     DYTxx   O1
                      ET
   TYPE = ON
   PU LAST = NO
   DYT TIME = TIME <time>
```
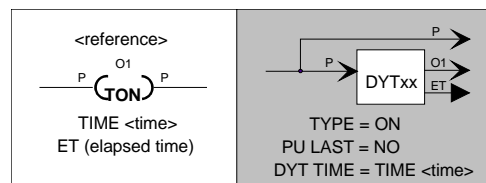
4.2.4.6 On-Delay Retentive (Memory) Timer --(TONM)--

The TONM changes the coil reference from FALSE to TRUE after the left horizontal shunt changes from not conducting to conducting and has been conducting for a time equal to or greater than the time setting. It will remain TRUE until the left horizontal shunt returns to a not conducting state. During a warm start of the

controller, the reference will be set to the last state, any elapsed time will be retained including that time accumulated during a power out condition. The timer will act on the state of the left horizontal shunt during the first scan based on the state of the last scan prior to power out. *{The TONM function is equivalent to the DYT function block with the TYPE set to ON, PU LAST set to YES, and the DLY TIME set to the time.}*

```
<reference>
       O1
   P  (TONM)  P
   TIME <time>
   ET (elapsed time)
```
```
                        P
        P     DYTxx   O1
                      ET
   TYPE = ON
   PU LAST = YES
   DYT TIME = TIME <time>
```
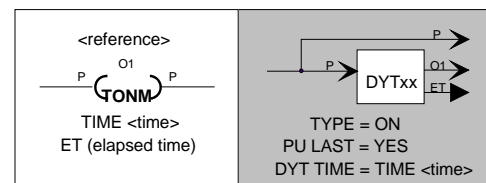
4.2.4.7 Off-Delay Timer --(TOF)--

The TOF changes the coil reference from TRUE to FALSE after the left horizontal shunt changes from conducting to not conducting and has been in a not conducting state for a time equal to or greater than the time setting. It will remain FALSE until the left horizontal shunt returns to a conducting state. During a warm start

```
<reference>
       O1
   P  (TOF)  P
   TIME <time>
   ET (elapsed time)
```
```
                        P
        P     DYTxx   O1
                      ET
   TYPE = OFF
   PU LAST = NO
   DYT TIME = TIME <time>
```

of the controller, the reference will be set FALSE, any elapsed time will reset to 0.0, and the timer will act on state of the left horizontal shunt during the first scan. *{The TOF function is equivalent to the DYT function block with the TYPE set to OFF, PU LAST set to NO, and the DLY TIME set to the time.}*
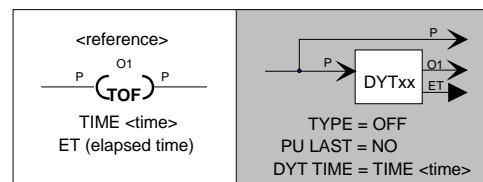
4.2.4.8 Off-Delay Retentive (Memory) Timer --(TOFM)--

The TOFM changes the coil reference from TRUE to FALSE after the left horizontal shunt changes from conducting to not conducting and has been in a not conducting state for a time equal to or greater than the time setting and will remain FALSE until the left horizontal shunt returns to a conducting state. During a warm start of the controller, the reference will be set to the last value, the elapsed time will retained including that time accumulated during a power out condition, and the timer will act on state of the left horizontal shunt during the first scan based on the state on the last scan prior to power out. *{The TOF function is equivalent to the DYT function block with the TYPE set to OFF, PU LAST set to YES, and the DLY TIME set to the time.}*
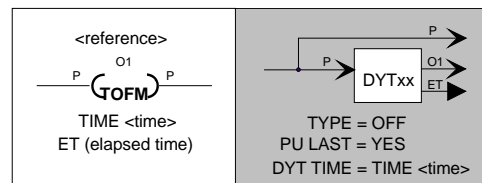
4.2.4.9 Timed Pulse Timer --(TP)--

The TP changes the coil reference from FALSE to TRUE when the left horizontal shunt changes from a not conducting to a conducting state and will remain TRUE for a period equal to the time setting regardless of the state of the left horizontal shunt. The timed pulse can not be retriggered until after the time expires. During a warm start of the controller, the reference will be set FALSE, any elapsed time will reset to 0.0, and the timer will act on state of the left horizontal shunt during the first scan. *{The TP function is equivalent to the OST function block with RETRIG set to NO, PU LAST set to NO, and the ON TIME set to the time.}*
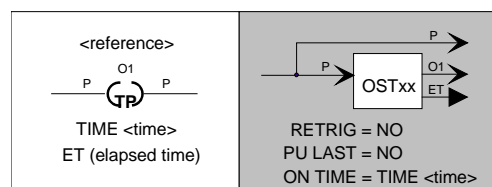
4.2.4.10 Timed Pulse Retentive (Memory) Timer --(TPM)--

The TPM changes the coil reference from FALSE to TRUE when the left horizontal shunt changes from a not conducting to a conducting state and will remain TRUE for a period equal to the time setting regardless of the state of the left horizontal shunt. The timed pulse can not be retriggered until after the time expires. During a warm start of the controller, the reference will be set to the last state, any elapsed time will retained including that time accumulated during a power out condition, the timer will continue timing, if time has not elapsed, and if elapsed will act on state of the left horizontal shunt during the first scan based on the state during the last scan prior to power out. *{The TP function is equivalent to the OST function block with RETRIG set to NO, PU LAST set to YES, and the ON TIME set to the time.}*

4.2.4.11 Retriggerable Timed Pulse Timer --(RTP)--

The RTP changes the coil reference from FALSE to TRUE when the left horizontal shunt changes from a not conducting to a conducting state and will remain TRUE for a period equal to the time setting regardless of the state of the left horizontal shunt. The timed pulse can be retriggered if the left horizontal shunt changes from a not conducting to a conducting state during the timing period. During a warm start of the controller, the reference will be set FALSE, any elapsed time will reset to 0.0, and the timer will act on the state of the left horizontal shunt during the first scan. *{The TP function is equivalent to the OST function block with RETRIG set to YES, PU LAST set to NO, and the ON TIME set to the time.}*
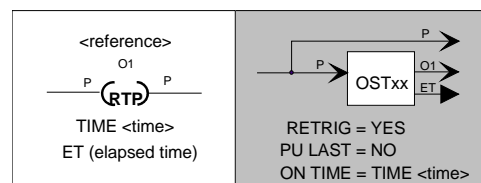
4.2.4.12 Retriggerable Timed Pulse Retentive (Memory) Timer --(RTPM)--

The RTPM changes the coil reference from FALSE to TRUE when the left horizontal shunt changes from a not conducting to a conducting state and will remain TRUE for a period equal to the time setting regardless of the state of the left horizontal shunt. The timed pulse can be retriggered if the left horizontal shunt changes

```
            <reference>
                O1
        P   (RTPM)  P
          TIME <time>
          ET (elapsed time)
```

```
                          P
        P   ┌──────┐
        ●───│ OSTxx│ O1
            │      │ ET
            └──────┘
        RETRIG = YES
        PU LAST = YES
        ON TIME = TIME <time>
```

from a not conducting to a conducting state during the timing period. During a warm start of the controller, the reference will be set to the last state, any elapsed time will retained including that time accumulated during a power out condition, the timer will continue timing if time has not elapsed, and if elapsed will act on state of the left horizontal shunt during the first scan based on the state during the last scan prior to power out *{The TP function is equivalent to the OST function block with RETRIG set to NO, PU LAST set to YES, and the ON TIME set to the time.}*

4.2.4.13 Repeat Cycle Timer --(RCT)--

The RCT changes the coil reference from FALSE to TRUE when the left horizontal shunt changes from a not conducting to a conducting state and will remain TRUE for a period equal to the on time. At the end of the on time the reference will go FALSE and remain FALSE until the off time expires. It will continue to repeat this

```
            <reference>
                O1
        S   (RCT)  S
          ON  <time>
          OFF <time>
          ET (elapsed time)
```

```
                          S
        S   ┌──────┐
        ────│ RCTxx│ O1
            │      │ ET
            └──────┘
        PU LAST = NO
        ON TIME = ON <time>
        OFF TIME = OFF <time>
```

cycle as long as the left horizontal shunt is conducting. The reference will always be FALSE when the left horizontal shunt is not conducting. During a warm start of the controller, the reference will be set FALSE, any elapsed time will reset to 0.0, and the timer will act on state of the left horizontal shunt during the first scan. *{The RCT function is equivalent to the RCT function block with INPUT AT unconfigured, PU LAST set to NO, the ON TIME set to the on time, and the OFF TIME set to the off time.}*
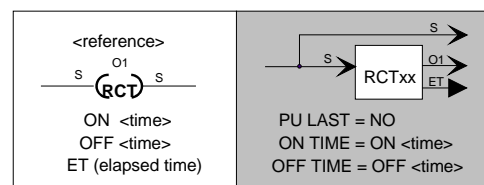
4.2.4.14 Repeat Cycle Retentive (Memory) Timer --(RCTM)--

The repeat cycle retentive timer RCTM changes the coil reference from FALSE to TRUE when the left horizontal shunt changes from a not conducting to a conducting state and will remain TRUE for a period equal to the on time. At the end of the on time the reference will go FALSE and remain FALSE until the off time expires. It

```
            <reference>
                O1
        S   (RCTM)  S
          ON  <time>
          OFF <time>
          ET (elapsed time)
```

```
                          S
        S   ┌──────┐
        ────│ RCTxx│ O1
            │      │ ET
            └──────┘
        PU LAST = YES
        ON TIME = ON <time>
        OFF TIME = OFF <time>
```

will continue to repeat this cycle as long as the left horizontal shunt is conducting. The reference will always be FALSE when the left horizontal shunt is not conducting. During a warm start of the controller, the reference will be set to the last value, any elapsed time will retained including that time accumulated during a power out condition, and the timer will act on state of the left horizontal shunt during the first scan. *{The RCT function is equivalent to the RCT function block with INPUT AT unconfigured, PU LAST set to YES, the ON TIME set to the on time, and the OFF TIME set to the off time.}*
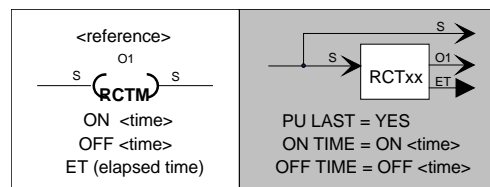
4.3 Ladder Logic Design Example

This section illustrates a typical controller ladder logic configuration using i|config. The configuration consists of a function block loop and a ladder logic loop. The function block loop contains the discrete I/O function blocks required to process the physical inputs and outputs to the station. The ladder logic loop contains the ladder logic diagrams.
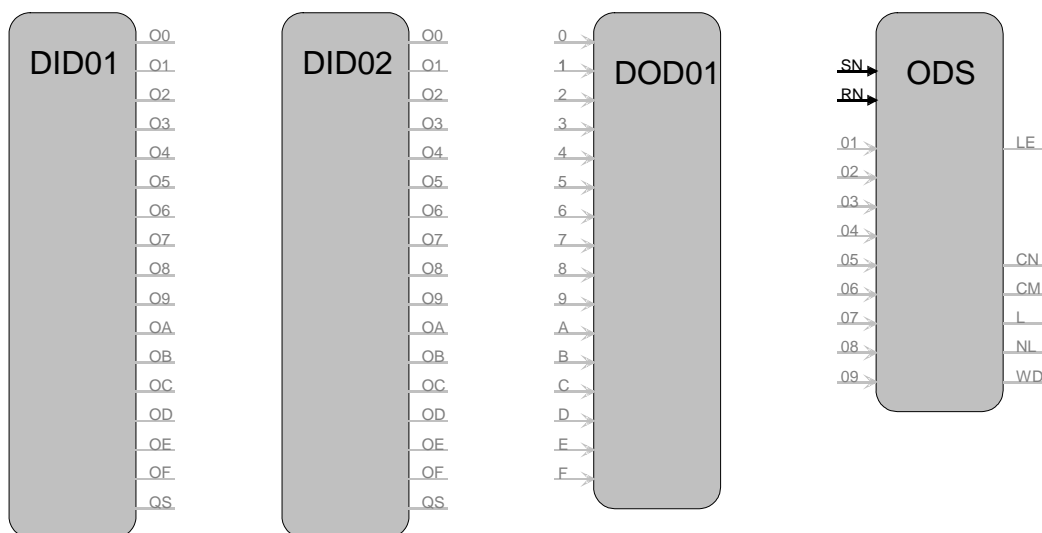
Figure 4-2 Loop function blocks

Reference connections for function block DID01:

Output O0:	%FDF_Start_PB	Output O8:	%Gas_Press_Lo
Output O1:	%FDF_Stop_PB	Output O9:	%Gas_Press_Hi
Output O2:	%FD_Fan_Running	Output OA:	%Gas_V1_Closed
Output O3:	%Air_Flow_LoLo	Output OB:	%Gas_V2_Closed
Output O4:	%Drum_Level_LoLo	Output OC:	%Oil_V1_Closed
Output O5:	%Oil_Temp_Lo	Output OD:	%Oil_V2_Closed
Output O6:	%Oil_HdrPress_Lo	Output OE:	%Start_Purge_PB
Output O7:	%Atom_Med_Hi	Output OF:	%Reset_MFT_PB

Reference connections for function block DID02:

Output O0:	%Start_Ignitr_PB	Output O8:	%Start_Gas_PB
Output O1:	%Burner_Flame	Output O9:	%Stop_Gas_PB
Output O2:	%Start_Oil_PB	Output OA:	%Gas_V1_NotOpen
Output O3:	%Stop_Oil_PB	Output OB:	%Gas_V2_NotOpen
Output O4:	%Oil_V1_NotOpen	Output OC:	%Vent_NotClosed
Output O5:	%Oil_V2_NotOpen	Output OD:	%Master_Abort_PB
Output O6:	%RecircPmp_Stop_PB	Output OE:	%
Output O7:	%RecircPmp_Strt_PB	Output OF:	%

Reference connections for function block DOD01:

Input 0:	%FDF_Start	Input 8:	%MFT
Input 1:	%Start_Purge	Input 9:	%System_Alarm
Input 2:	%Purge_InProgress	Input A:	%
Input 3:	%Purge_Complete	Input B:	%
Input 4:	%Opn_Ig_Gas_Vlvs	Input C:	%
Input 5:	%Open_Oil_Valves	Input D:	%
Input 6:	%Close_Recirc	Input E:	%
Input 7:	%Open_Gas_Valves	Input F:	%

Reference connections for function block ODS:

Output LE: Model 353_Loop_Error

The ODS can be used for displaying various operations within the ladder logic loops. The Universal display provides more capability for this type of loop in that it will be able to display various messages. See the description of the ODS function block for additional information. When a basic display is used it will normally display the loop tag.S and indicate the step number of the sequencer, if used. If message inputs are configured and a basic display is used they can be viewed by pressing the D button to advance through the list of active messages.

Other function blocks can also be used to provide Boolean inputs or outputs to the ladder logic elements. For example, a pushbutton function block could be used to start or stop a logic operation. The connections between these elements on the primary page are made by creating a reference for the inputs and outputs of these function blocks, similar to that above for the discrete I/O.
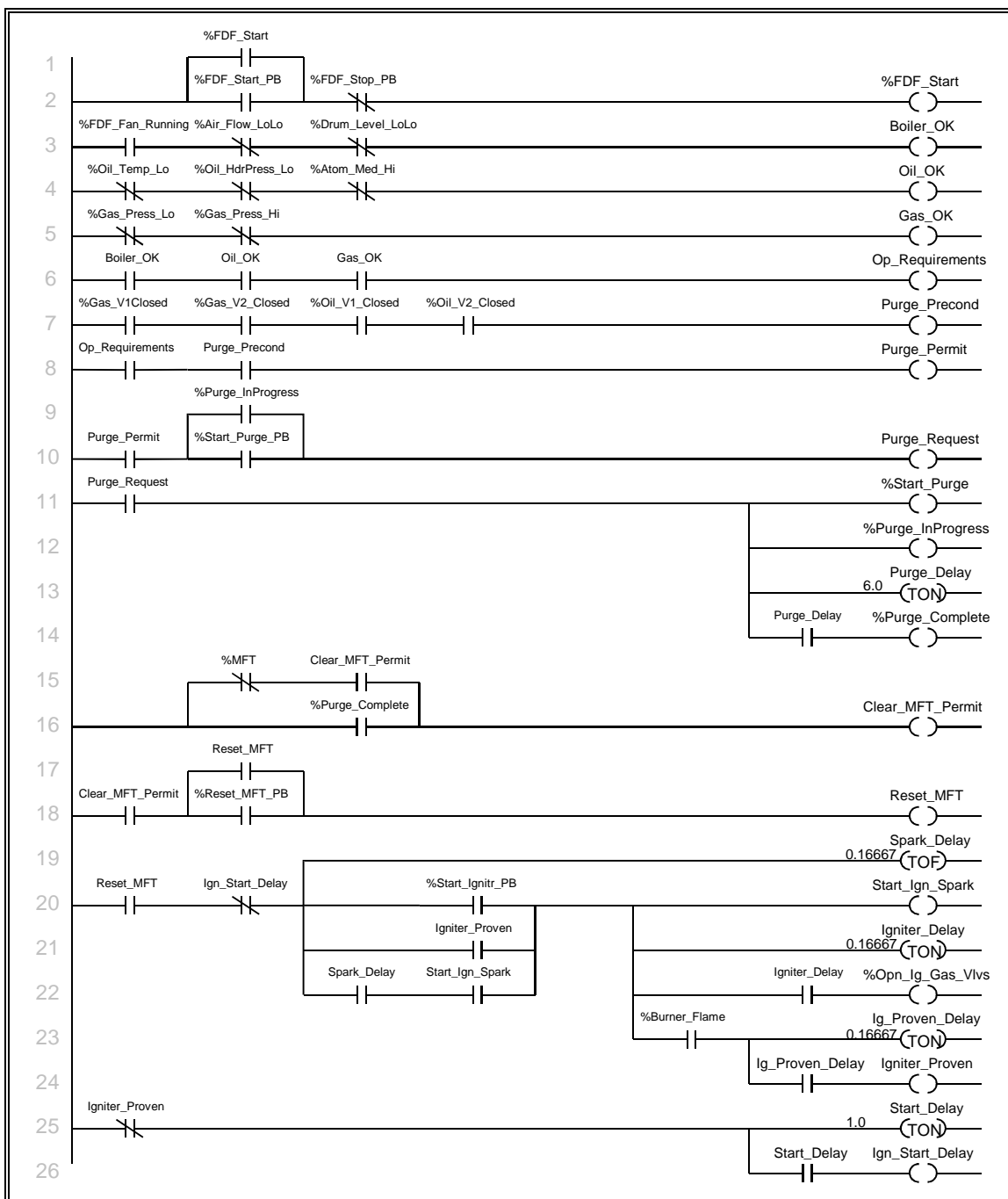
Figure 4-3 Graphical configuration of the first secondary page
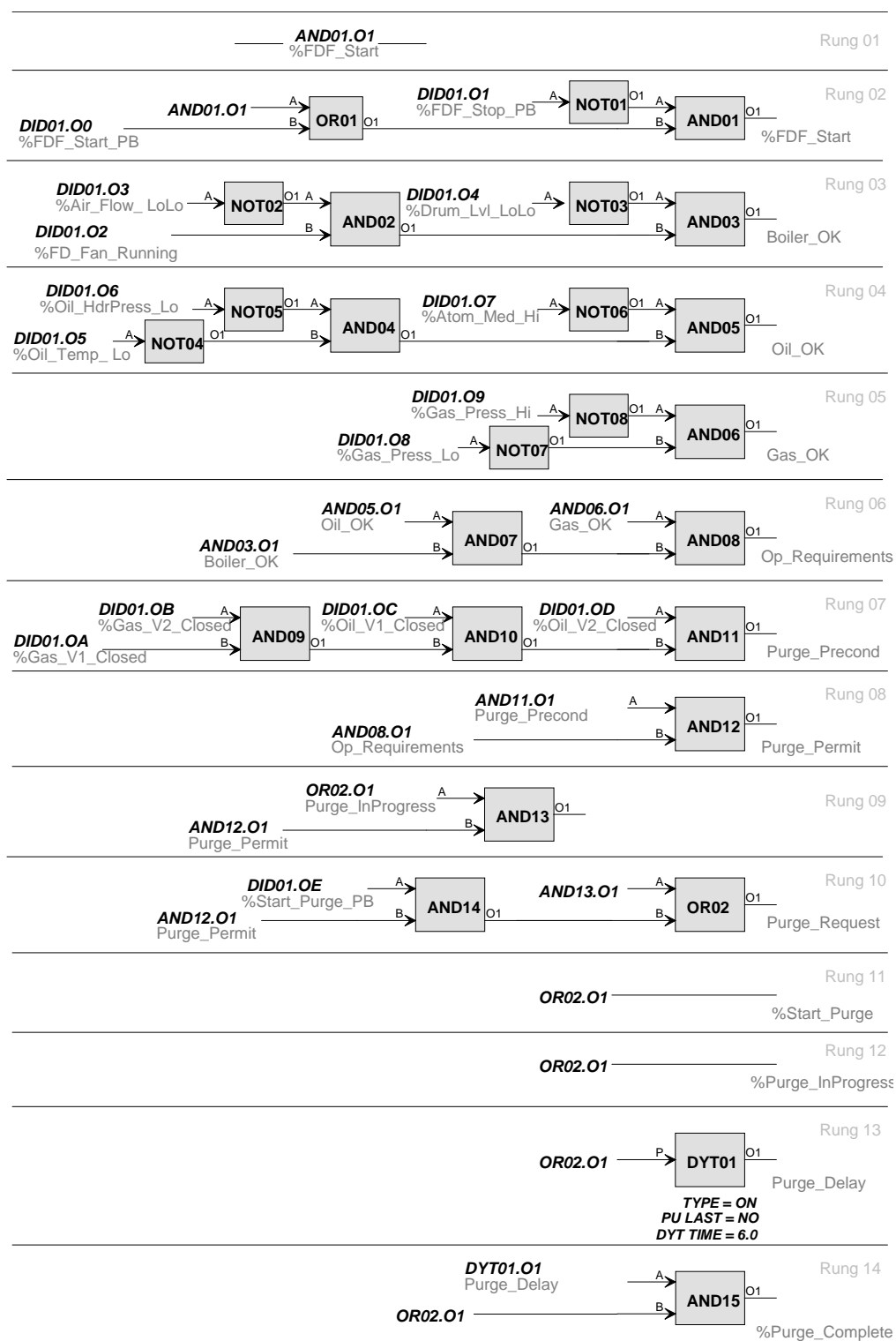
Figure 4-4 Ladder to function block conversion for Figure 4-3

OR03.O1
Clear_MFT_Permit   A
                                                              AND16   O1   Rung 15
OR13.O1   A   NOT09   B
%MFT

                                                AND16.01   A
AND15.O1   OR03   O1   Rung 16
%Purge_Complete   B
                                                                      Clear_MFT_Permit

                      OR02.O1   A
                      Reset_MFT   AND17   O1   Rung 17
OR03.O1   B
Clear_MFT_Permit

                DID01.OF   A
                %Reset_MFT_PB   AND14   **AND17.O1**   A
OR03.O1   B   O1   OR02   O1   Rung 18
Clear_MFT_Permit   B
                                                                      Reset_MFT

                                                     P   DYT02   O1   Rung 19
AND15.O1   Spark_Delay

                                                     TYPE = OF
                                                     PU LAST = NO
                                                     DYT TIME = 0.16667

AND22.O1   A   NOT10   O1 A   Rung 20
Ign_Start_Delay   AND15   **DID02.O0**   A
OR02.O1   B   O1 %Start Ignitr_PB   AND16   O1   B
Reset_MFT   OR03   O1
                                                     OR04.O1   C
                                                                      Start_Ign_Spark

AND21.O1   A   Rung 21
Igniter_Proven   AND17   O1   B   P   DYT03   O1
AND15.O1   B   OR04   **OR03.O1**   Igniter_Delay
                               C   O1
AND19.O1   **TYPE = ON**
                                                     PU LAST = NO
                                                     DYT TIME = 0.16667

DYT02.O1   A   **OR03.O1** A   **DYT03.O1**   A   Rung 22
Spark_Delay   AND18   AND19   O1 Igniter_Delay   AND20   O1
AND15.O1   B   O1   B   **OR03.O1**   B
                                                                      %Opn_Ig_Gas_Vlvs

                DID02.O1   A   Rung 23
                %Burner_Flame   AND21   O1   P   DYT04   O1
OR03.O1   B   Ig_Proven_Delay
                                                     TYPE = ON
                                                     PU LAST = NO
                                                     DYT TIME = 0.16667

                                                     DYT04.O1   A   Rung 24
                                                     Ig_Proven_Delay   AND22   O1
                                                     AND21.O1   B
                                                                      Igniter_Proven

AND22.O1   Rung 25
Igniter Flame Proven   A   NOT11   O1   P   DYT05   O1
                                                         Start_Delay
                                                     TYPE = ON
                                                     PU LAST = NO
                                                     DYT TIME = 1.0

                                                     DYT05.O1   A   Rung 26
                                                     Start_Delay   AND23   O1
                                                     NOT11.O1   B
                                                                      Ign_Start_Delay

Figure 4-4 Continued

4-15

Figure 4-5 Graphical configuration of the second secondary page
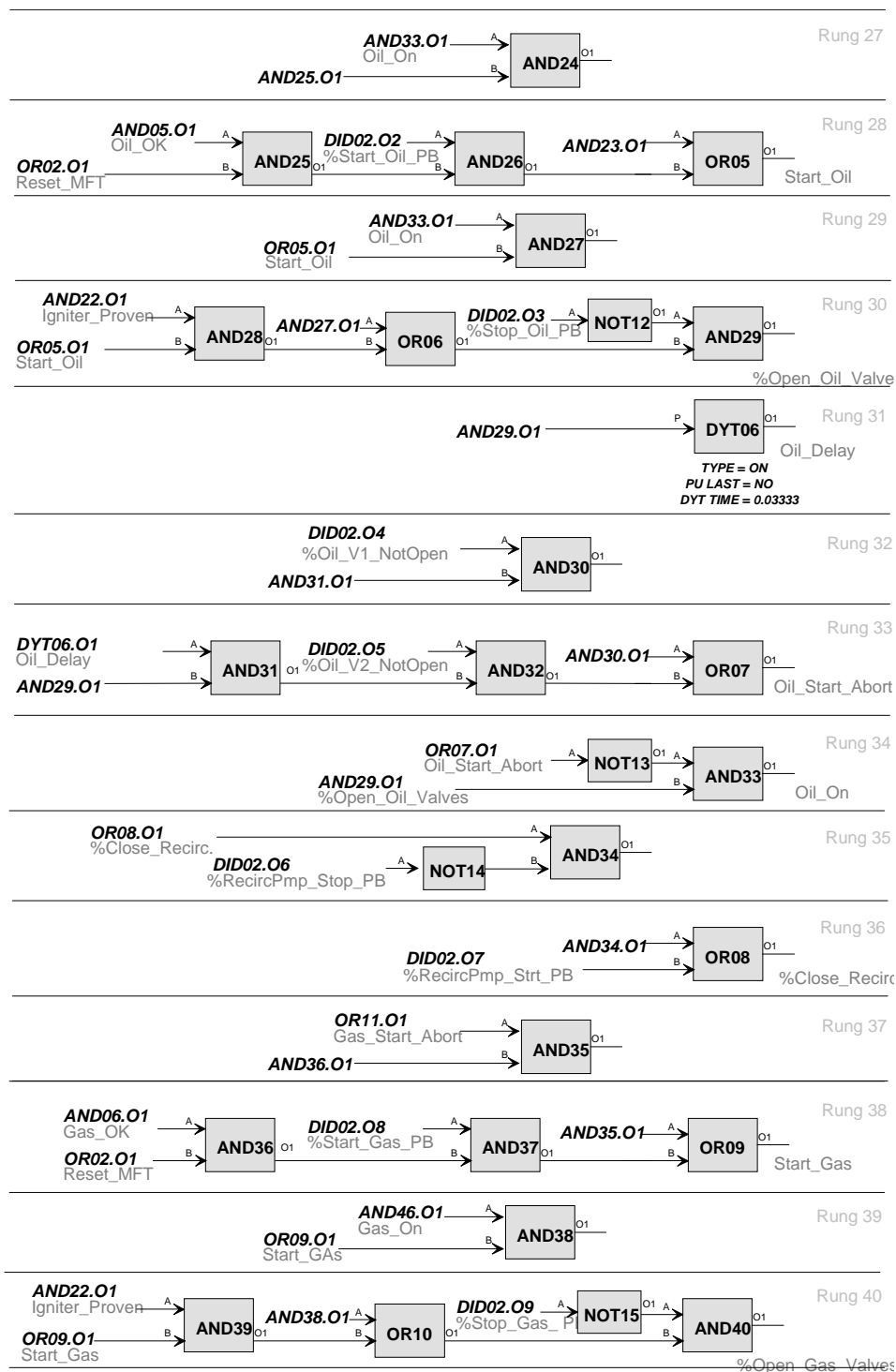
Figure 4-6 Ladder to function block conversion for Figure 4-5
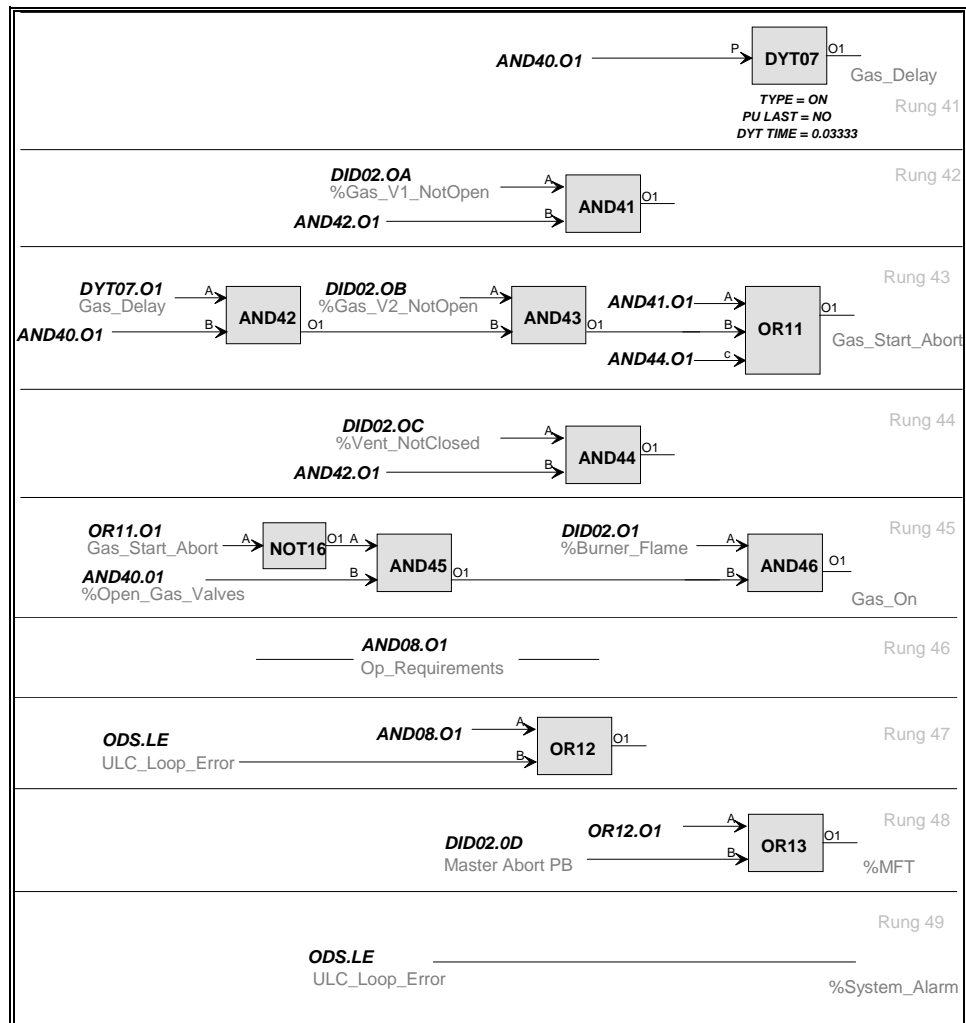
Figure 4-6 Continued

4.4 Creating/Opening Ladder Logic Loops

Creating ladder logic loops involves placing ladder logic elements onto the workspace and making the connections between the elements.

➢ **To create and name a ladder logic loop**:

Do one of the following to create a ladder logic loop:

- Select **Loop > New > Ladder Logic** from the active station view.

  The Loop Name dialog will open. The default name appears in the Enter Loop Name text box. See Figure 4-7. Type a meaningful name in the Enter Loop Name text box. Click **[OK]**. A ladder logic icon is created and placed in the tree control.
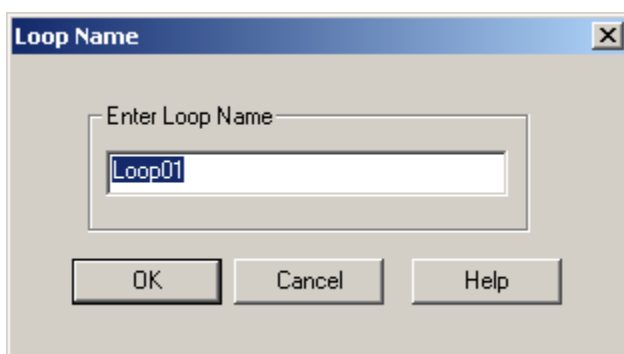
Figure 4-7 Loop Name dialog

OR

- Click the **[Ladder Logic Loop]** button on the **353 Objects Toolbar**. 🔲 A ladder logic loop icon is constructed and placed in the tree control with a default name for the loop name.

  To edit the default name, click the loop name in the tree and, after a short pause, click the name again to highlight the name. Type a meaningful name.

  Note: The name must be unique in that loop. No other loop can have the same name in the same controller. The maximum number of characters is 12.

➢ **To open a ladder logic loop**:

Do one of the following to open a ladder logic loop:

- From the tree control, select the loop icon and then select **Loop > Open**.
  OR
- Right-click on the ladder logic loop icon and, from the pop-up menu, select **Open**.
  OR
- From the tree control, double-click on the ladder logic loop.

  The loop opens and the ladder logic loop is displayed.

4.5 Describing Ladder Logic Elements

Ladder logic elements are comprised of inputs, outputs, references, and element names. Inputs appear on the left side of the element, outputs appear on the right side. All ladder logic inputs and outputs are of the digital type.

Note: The right side of a coil is not an output. Refer to Section 4.2 for detailed element descriptions.

The industry standard images that make up a ladder logic element cannot be modified. There are two types of ladder logic elements.

- Contacts

- Coils

4.5.1 Contacts

Contacts have a reference to which they connect. They take inputs, perform a logic operation, and send the result to another contact or a coil. Contacts are identified by straight vertical lines.

The name of the contact (e.g. NOC, NCC) is not shown on the element. The text above the contact represents the reference to which it is connected. See Figure 4-8.

Motor101Running
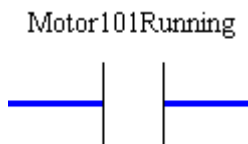
Figure 4-8 Contact

4.5.2 Coils

A coil creates a fixed value reference, which represents its output. A coil is identified by parenthesis. Some coils have a name that appears within the parenthesis. The text above the coil represents the fixed reference assigned to the coil. See Figure 4-9 where an On-Delay Retentive (Memory) Timer (TONM) is shown.

Motor101Start

(TONM)
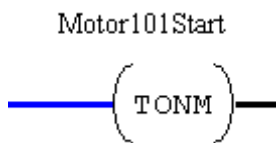
Figure 4-9 Coil

Most coils exist as a single ladder logic element. However, Set Coil and Reset Coil are combined to make a Set-Reset Coil, and Set Memory Coil and Reset Memory Coil are combined to make a Set-Reset Memory Coil. When one of these coils is place on a rung, two coils are placed on two consecutive rungs in the same column. See Figure 4-10.
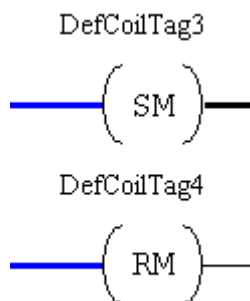
Figure 4-10 Set-Reset Memory Coil pair

Initially, a default reference name is displayed above each contact or coil. The default name can be changed by the user to a more meaningful name. See Chapter 8 Using the Edit Menu for more information on changing reference names.

4.5.3 Ladder Logic Pages

Each ladder logic loop has four pages of workspace on which to place ladder logic elements. The current page displays in the view title. See Figure 4-11.
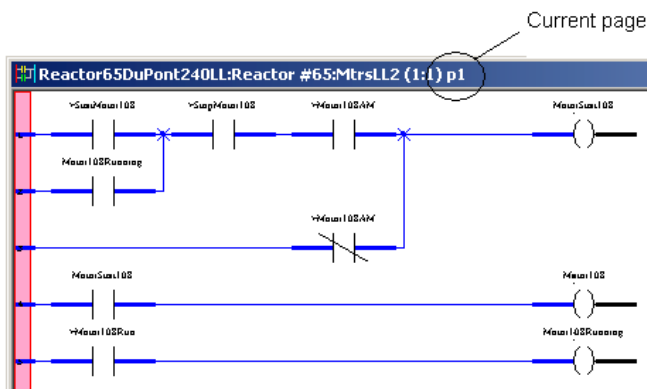
Figure 4-11 Current page in window title

➢ **To view ladder logic pages**:

   Select **View > Ladder Logic Pages > Ladder Logic Page #**. The selected logic page is displayed.

   Note: All ladder logic elements connected by lines must reside on the same page. Elements can not be connected from one page to another.

4.5.4 Power Rail

The left side of each page is a power rail which represents the starting point for each rung of logic. The power rail has 38 connection points (rungs) on each page. A ladder logic element can be placed anywhere on a page to the right of the power rail. See Figure 4-12.
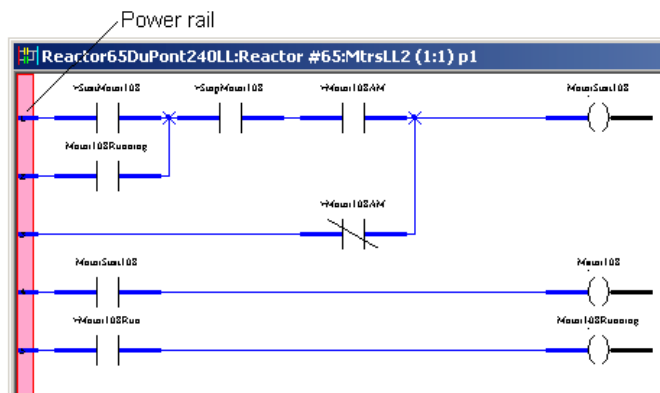
Figure 4-12 Power rail

4.6 Placing Ladder Logic Elements

Each ladder logic element can be placed multiple times in a loop. Ladder logic elements are described in detail in Section 4.2 Ladder Logic Elements.

➢ **To place any ladder logic element**:

1. Click the **[New Ladder Logic Element]** button on the **Line Connection** toolbar.
   The Select Item to Create dialog displays. See Figure 4-13.
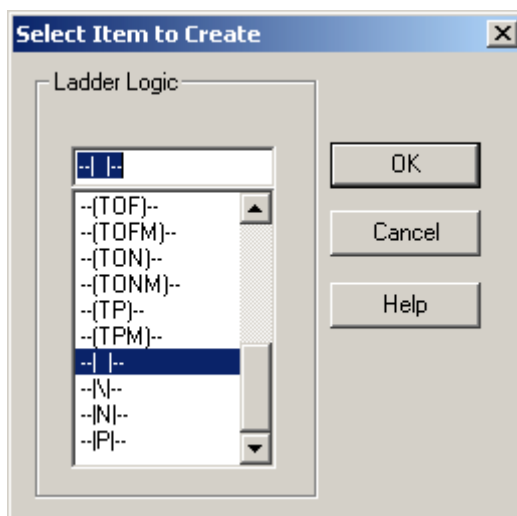
Figure 4-13 Select Item to Create dialog
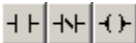
2. Select the ladder logic element to create. Click **[OK]**.

   Note: The dotted outline of the element floats with the cursor until it is placed as described in the next step.

3. Move the cursor to a valid location on the ladder and click to place the ladder logic element. The element displays on the ladder logic view.

    Note: To place the element on an area of the workspace not presently viewed, move the cursor to the workspace boarder. The view automatically scrolls, keeping the element visible within the workspace. If the cursor displays as a not allowed symbol (∅), the placement is not valid.

➢ **To place basic ladder logic elements**:

1. Click the desired element **[NO Contact]**, **[NC Contact]**, or **[Coil]** button on the **Line Connection** toolbar.

2. Move the ladder logic element to a valid location on the ladder and click. The element displays on the ladder logic view.

➢ **To place ladder logic elements multiple times consecutively**:

1. Click the **[Multiple Create]** button on the **Line Connection** toolbar.

2. Repeat the previous steps until all ladder logic elements are placed.

    Note: To stop placing ladder logic elements, any time during the procedure, press <Esc> or click [Cancel].

4.7 Viewing Loop Resources

The Loop Resources Information dialog displays the number of function blocks available to place. One ladder logic loop supports up to 250 function blocks. A ladder logic element can have zero, one, or two function blocks associated with it, so resource usage is not necessarily one logic element to one function block. In other words, the **Loop Resource Available** toolbar shows the number of function blocks available, not the number of ladder logic elements.

➢ **To view loop resources**:

1. Do one of the following to view loop resources.

    • Select **Tools > Loop Resources** from the menu.

       OR

    • Click the **[Available Block Information]** button on the **Loop Resources Available** toolbar. The Loop Resources dialog displays. See Figure 4-14.

2. View the information. Click **[OK]**. The dialog closes.
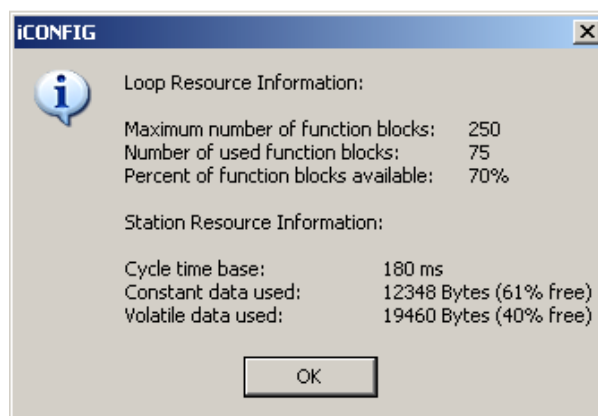
Figure 4-14 Loop Resources Information dialog

4.8 Editing Ladder Logic Attributes

The Item Attributes dialog allows you to change some parameters of ladder logic elements. Only numeric parameters can be changed.

The attributes of the following function block elements can not be changed.

   Coils: --(C)--, --(M)--, --(N)--, --(NG)--, --(P)--, --(S/R)--, --(SM/SR)—

   Contacts: (all) --| |--, --|/|--, --|N|--, --|P|--

➢ **To edit ladder logic elements**:

   Do one of the following to open the Item Attributes dialog.

- Select the ladder logic element, then select **Edit > Item Attributes**.

  OR

- Select the ladder logic element, then click the **[Edit Item Attributes]** button on the **Graphic Primitives** toolbar.

  OR

- Select the ladder logic element, then click the **[Line Connection Attributes]** button on the **Line Connection** toolbar.

  OR

- Right-click the ladder logic element and, from the pop-up menu, select **Edit Item Attributes**.

  OR

- Click the **[Selection Mode]** button on the **Graphics Primitives** toolbar, and double-click the ladder logic element.

  OR

- Click the **[Line Connection Selection Mode]** button on the **Line Connection** toolbar, then double-click the ladder logic element.

The **Item Attributes** dialog displays. See Figure 4-15.

4.8.1 Numeric Parameters

A numeric parameter is a number value for a parameter. Values are entered in the New Value text box. The Information list box indicates the number type and the range of numbers available for the parameter. See Figure 4-15.
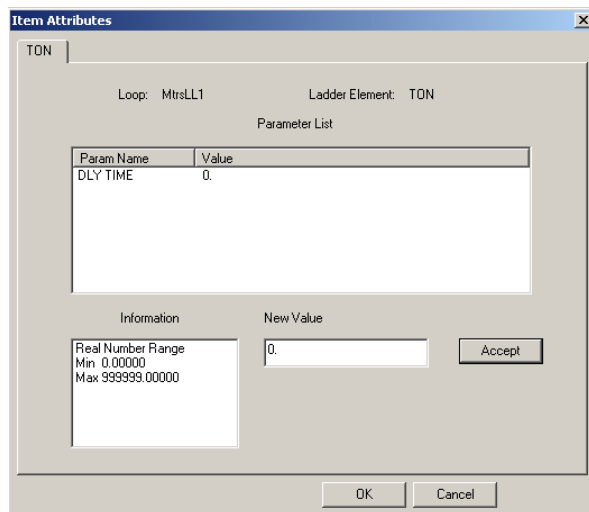
Figure 4-15 Item Attributes dialog to edit numeric parameter

➢ **To edit numeric parameters**:

1. In the Item Attributes dialog, select a numeric parameter on the Parameter List.

2. Enter a value, within the valid range, in the New Value text box.

3. Click **[Accept]**. The new value is entered in the Parameter List.

4. Click **[OK]**. The change stores in the configuration.

4.9 Connecting Ladder Logic Elements on the Same Page

Connection lines are created using the Line Connection Mode button on the Line Connection toolbar. Line connections can only be made between logic elements on the same page. Line connections can not be made to logic elements on other pages or loops.

There are five ways to make a line connection:

• Click an input and then click on an output.

• Click an output and then click an input.

• Click an input or output and then click a connection line.

• Click a connection line and then click another connection line.

• Click a connection line and then click an input.

➢ **To connect ladder logic elements**:

1. Click the **[Line Connection Mode]** button ![icon] on the **Line Connection** toolbar. The cursor changes to a wire spool.

2. Click a valid starting point.

   Note: The cursor displays as a spool with a plus (+) sign when it is over a valid connection point. The cursor displays as a spool with a not allowed symbol (∅) when the connection location is not valid.

3. Move the cursor to a valid connection point

4. Click a valid ending connection point. A connection is made and is represented as a line.

   Note: Press <Esc> at any point, when creating a connection line, to cancel the operation.

4.9.1 Manual vs. Auto-Routed Connection Lines

The connection line between two elements is the line connection path. Line connection paths represent logic connections between inputs and outputs. i|config can create two types of connection lines.

- Auto-routed connection lines

- Manual-routed connection lines

Auto-routed connection lines are generated when the spool tool is used to directly connect an input to an output. Auto-routed lines are solid and are auto-routed by the application to form a path between an input and output. See Figure 4-16.
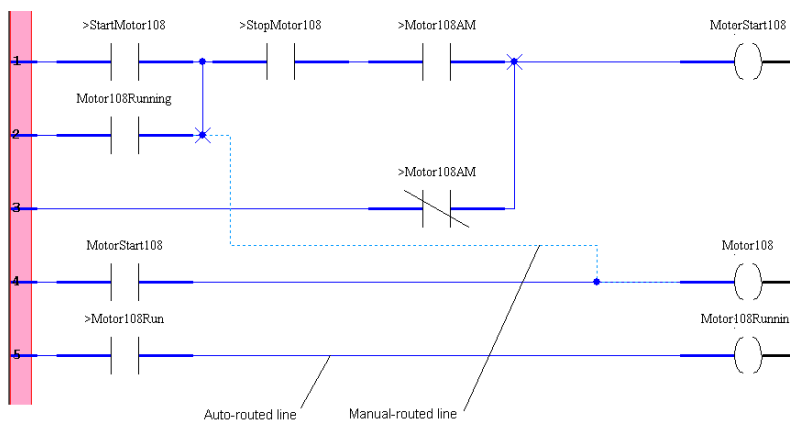
Figure 4-16 Auto-routed and Manual-routed lines

Manual-routed lines are created when the user clicks the Line Connection Mode button, clicks an input or an output and then clicks the workspace one or more times while routing the line between the input and output connection points. Manual-routed lines are dotted and have auto-routed fixed line segments between each click.

Connection lines can go anywhere on the workspace except through ladder logic elements. If connection lines cannot be routed, no connection is possible. If this situation occurs, a manual-routed connection line must be made, or a ladder logic element must be moved, so that a connection line can be routed.

4.9.2 Connection Dots

Where a connection line terminates at another line, a connection dot is visible on the line. A connection dot is the point at which lines connect to each other, rather than where they cross. See Figure 4-17.
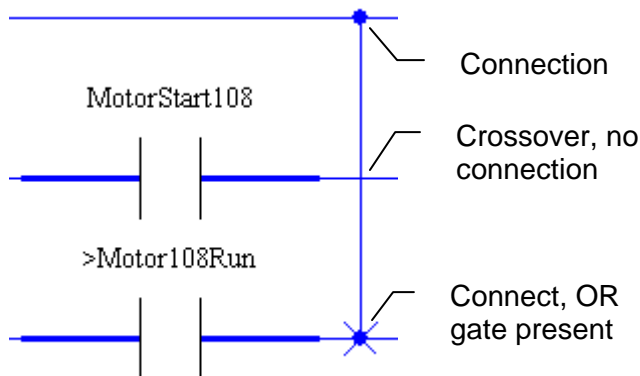
Figure 4-17 Line crossing and line connection

Whenever two or more outputs connect to the same input, one or more OR gates are present. This is indicated by an "X" displayed over the connection dot.

Note: OR gates are provided automatically as you connect logic elements.

4.10 Making Connections to References

Use the Set Reference dialog to make connections to references. This dialog displays all references in the current configuration. In this dialog you can choose either a fixed value reference or a user-defined reference. See Section 2.16 References for more information.

➢ **To assign a reference to a contact**:

1. Click the **[Line Connection Mode]** button on the **Line Connection** toolbar. The cursor changes to a wire spool.

2. Right-click the reference name above the contact. The Set Reference dialog displays. See Figure 4-18.
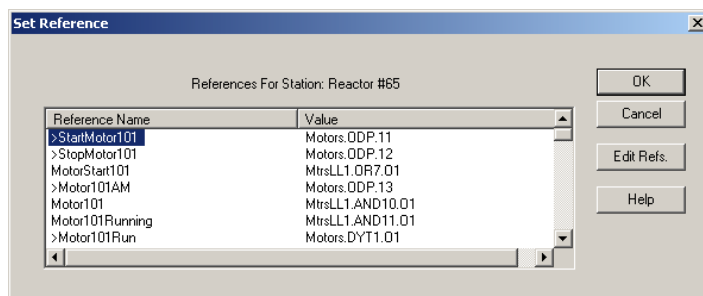
Figure 4-18 Set Reference dialog

3. Do one of the following:

- Select the reference. Click **[OK]**.

  OR

- Double-click the reference.

  The reference is assigned to that contact. The user can edit references by clicking on the Edit Refs button on the Set Reference dialog. See Chapter 2 Working with the Station View for further information.

4.11 Changing Reference Names on Coils

A coil creates a fixed value reference. This means that only the coil name can be changed, not its value.

➢ **To change a coil's reference name**:

1. Click the **[Line Connection Mode]** button on the **Line Connection** toolbar. [icon] The cursor changes to a wire spool.

2. Right-click the reference name above the coil the Create/Modify References dialog displays. See Figure 4-19.
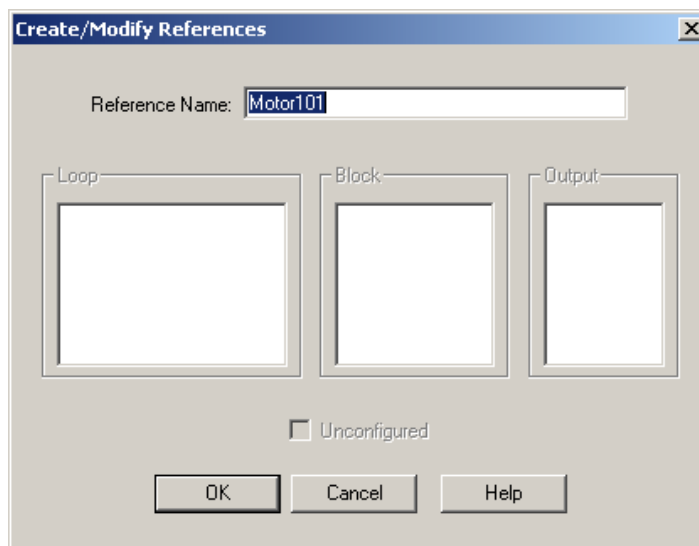
Figure 4-19 Create/Modify References

3. Enter a new reference name in the Reference Name text box.

   Note: Use a unique name for each reference in a controller configuration. A maximum of 16 characters is allowed.

4. Click **[OK]**. The reference is saved in the configuration.

The coil reference name can also be changed using the Edit References dialog. See Chapter 2 Working with the Station View, for further information.

4.12 Viewing Connections

Connections are displayed via the Connection Info dialog. This dialog displays a list of connections for the selected input or output, and it indicates if the connections are also on another loop. This list does not show ladder logic elements, only the internal function blocks.

➢   **To view input or output connections**:

1. Click the **[Line Connection Mode]** button on the **Line Connection** toolbar. The cursor changes to a wire spool.

2. Right-click a ladder logic element input or output and, from the pop-up menu, select **Show Connections**. The Connection Info dialog displays a list of inputs and outputs showing the loop/block/input or output connections. See Figure 4-20.
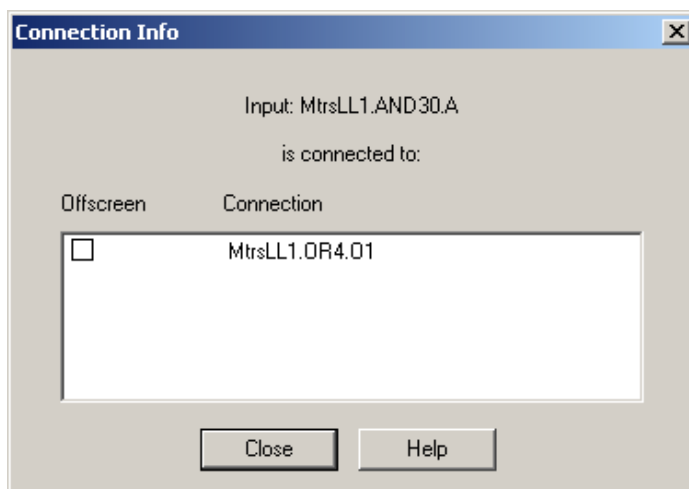
Figure 4-20 Connection Info dialog

3. View the information. Click **[Close]**. The dialog closes.

4.13 Editing Connection Lines

Connection line color and background can be changed. Lines cannot be moved or sized.

➢   **To edit connection lines**:

1. Do one of the following:

    •   Click the **[Line Connection Attributes]** button on the **Line Connection** toolbar.

        OR

    •   Click the **[Line Connection Selection Mode]** button on the **Line Connection** toolbar. Double-click on the workspace.

    The Item Attributes dialog displays. See Figure 4-21.
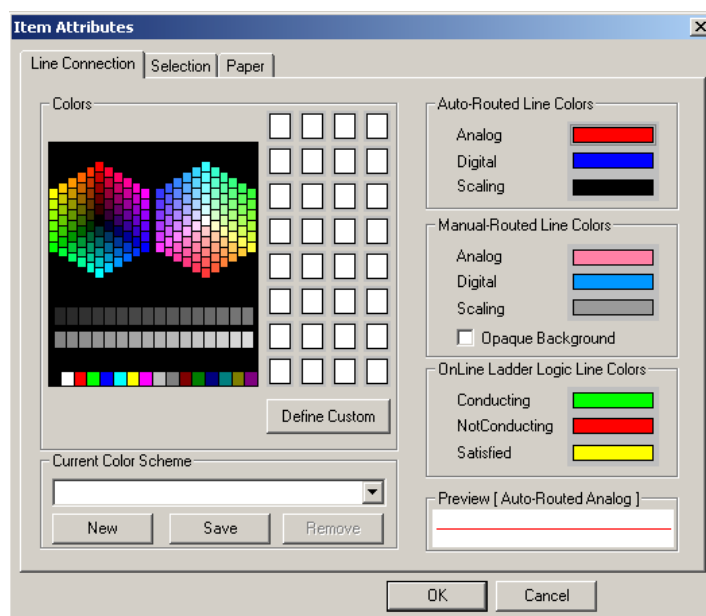
Figure 4-21 Item Attributes dialog

2.   Select the Line Connection tab, if not already selected.

As desired, select different line colors. Or, select an opaque background for manual-routed lines by clicking the Opaque Background check box. Refer to the procedure for selecting a color in Section 6.7.14.1 Custom Colors.

3.   Click **[OK]** save changes or click **[Cancel]** to discard changes. The modification of the line connection attributes display in the ladder logic loop.

4.14 Deleting Connection Lines

Deleting a connection line removes the connection that the line represents.

➢   **To delete a connection line**:

1.   Do one of the following:

•   Click the **[Line Connection Selection Mode]** button on the **Line Connection** toolbar.

OR

•   Click the **[Selection Mode]** button on the **Graphic Primitives** toolbar.

2.   Do one of the following to start the delete process.

•   Select the line, then select **Edit > Delete** from the menu.

OR

•   Select the line, then press **<Delete>**.

OR

•   Right-click the line and, from the pop-up menu, select **Delete**. The connection line is removed from the configuration.

4.15 Moving Ladder Logic Elements

A ladder logic element with or without connection lines can be moved. If that element has connection lines, they will be erased and will need to be redrawn. As with function blocks, a ladder logic element cannot be moved on top of another element or a connection line. Select a ladder logic element to be moved with the Line Connection Selection Mode tool.

Refer to Section 3.3 Placing Function Blocks for further information.

➢ **To move a ladder logic elements**:

1. Click the **[Line Connection Selection Mode]** button on the **Line Connection** toolbar.

2. Click the selected ladder logic element, drag it to a valid location, and release the mouse button. The element displays in the new location.

    Note: The cursor displays as a spool with a plus (+) sign when it is over a valid connection point. The cursor displays as a spool with a not allowed symbol (∅) when the connection location is not valid.

4.16 Deleting Ladder Logic Elements

Deleting a ladder logic element removes all connections to the element and all function block parameters associated with the element.

Deleting a coil also deletes the coil's reference(s). If any contact or function block digital input is connected to the reference, when the coil is deleted, the function block digital input becomes unconfigured.

➢ **To delete a ladder logic element**:

1. Do one of the following:

    • Click the **[Line Connection Selection Mode]** button on the **Line Connection** toolbar.

      OR

    • Click the **[Selection Mode]** button on the **Graphic PrimitivesPrimitives** toolbar.

2. Do one of the following to start the delete process.

    • Select the ladder logic element, then select **Edit > Delete** from the menu.
      OR

    • Select the ladder logic element, then press **<Delete>**.
      OR

    • Right-click the ladder logic element and, from the pop-up menu, select **Delete**.

    The deletion confirmation dialog displays. See Figure 4-22.
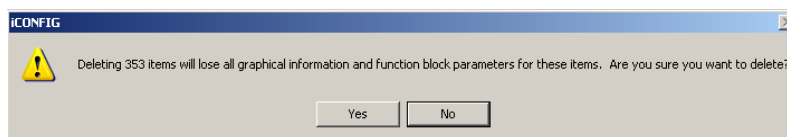
Figure 4-22 Delete Confirmation message

3.   Click **[Yes]**. The connection line is removed from the configuration.

4.17 Execution Sequence

The Execution Sequence Number (ESN) determines the order in which the ladder logic elements are executed. The ESN is determined by the X, Y location of the elements. The top left point of each ladder logic element is used in determining the sequence.

The system automatically assigns a number when the user saves or downloads the active configuration to the controller. If the system is unable to assign a sequence number to all ladder logic elements, it will not download the configuration.

If a connection dot has an OR gate and has four or more lines associated with it, multiple sequence numbers are associated with the dot.

Note: Minimize adding connection lines that create OR gate connections. This can be done by creating several simpler ladder logic loops of one page each instead of building one complex, multiple page view.

The user cannot modify the execution sequence manually. The sequence can be viewed in the Function Blocks Parameters report view. See Section 2.13.1 Function Block Parameters for further information.

Execution sequence numbers are assigned top to bottom, left to right, as follows:
- First page, power rail, top to bottom.
- Second page, power rail, top to bottom.
- Third page, power rail, top to bottom.
- Fourth page, power rail, top to bottom.
- First page, first column, top to bottom.
- Second page, first column, top to bottom.
- Third page, first column, top to bottom.
- Fourth page, first column, top to bottom.
- First page, second column, top to bottom.
- Second page, second column, top to bottom.
- Etc.

4.18 Printing Ladder Logic Loops

There are various options from which to choose.

- Screen
- Active Window – Current View
- Active Window – Entire View
- Active Window – 1 to 1

If either the **Active Window – Entire View** or **Active Window – 1 to 1** is selected, all four ladder logic view pages are printed. For more information on printing, see Section 7.10 Print.

➢   To print a ladder logic loop:

1.   Open the loop to be printed.

2.   Select **File > Print Options > Desired Option**.

3.   Do one of the following:

- Select **File > Print**.

   OR

- Click the **[Print]** button 🖨 on the **Standard** toolbar.

   OR

- Press **<Ctrl+P>**.

   The Print dialog displays. See Figure 4-23.
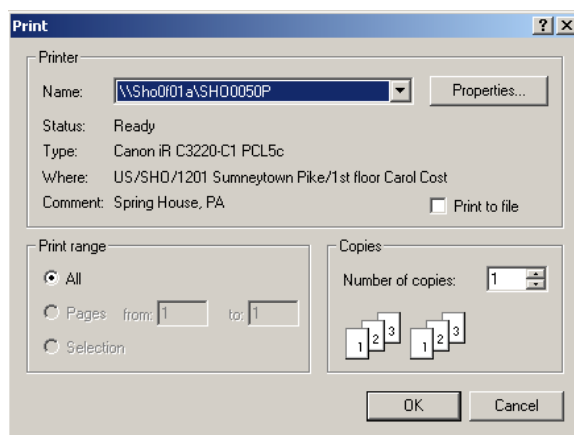
Figure 4-23 Print dialog

4.   Make changes to the dialog, if necessary.

5.   Click **[OK]**. The selected option is sent to the printer.

Chapter 5 - Communicating with the Controller

Network communications must be established between a PC running i|config™ and a controller to download a configuration to a controller or upload a configuration from a controller. This chapter describes how to configure PC and controller communication ports and how to transfer data between PC and controller.

Four communication protocols are available.

- MODBUS (Front Port) – Select when the PC is connected to the controller's RS232 communication port:

  Model 353: MJ11 jack on controller faceplate

  i|pac and Model 353R: P1 on the Control Carrier

  PC port settings must match those in the controller's STATN – Station Parameters function block.

- MODBUS (Rear Port) – Select when the PC is connected to the controller's RS485 communications port (a user-supplied RS232 to RS485 communication protocol converter may be needed):

  Model 353: Terminals NCA and NCB on controller rear terminals

  i|pac and Model 353R: Terminals NCA and NCB on the Control Carrier

  PC settings must match those in the controller's STATN – Station Parameters function block.

- ICI320 – Select when the controller's optional LIL (Local Instrument Link) communications will be used to transfer the configuration – requires that a LIL Network Board be installed in the controller. All settings in the Communication Configuration dialog are configurable and must match the settings in the Model 320 ICI. See Application Document AD320-10 *Model 320 Local Instrument Link Independent Computer Interface User's Manual* for more information on the Model 320 settings. (For a PDF of AD320-10, go to https://www.sea.siemens.com/instrbu/docs/pdf/ad320-10.pdf).

- Ethernet – Select when the controller includes Ethernet communications and an IP address has been entered in the controller's Ethernet function block. See Section 5.2.

  Model 353: Ethernet connector in case rear terminal assembly

  i|pac and Model 353R: Ethernet connector is P4 on the control carrier

MODBUS and ICI 320 procedures are furnished in Section 5.1 below. The Ethernet procedure is provided in Section 5.2. Procedures to perform a configuration download to, or upload from, a controller are in Sections 5.3, 5.4 and 5.5. Grayed selections in the communications dialog box are preset and need not be changed.

The communication parameters found in the controller STATioN and ETHERNET function blocks can be edited by right-clicking the station icon ▮▮ Station1 in the station view. See Figure 5-1.
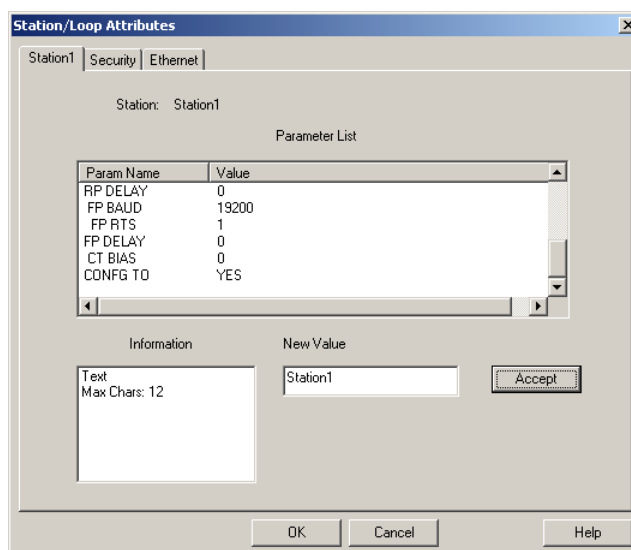
Figure 5-1 Station/Loop Attributes dialog

5.1 PC Serial Port Configuration

➢ **To configure the serial communication port**:

1. From the Menu Toolbar, select **Communications > Configure**. The Communication Configuration dialog displays. See Figure 5-2.
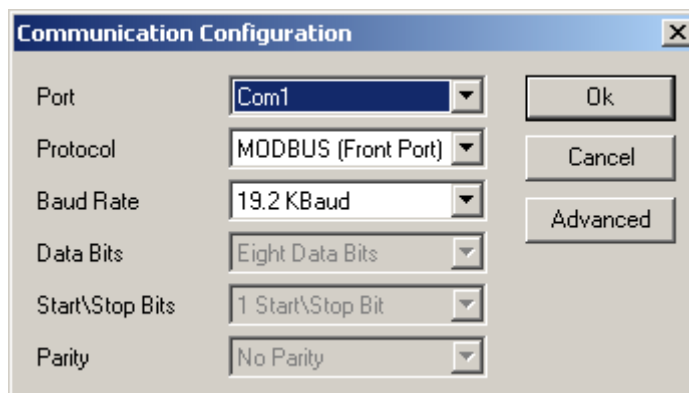
Figure 5-2 Communication Configuration dialog

2. Select the **Port** drop down menu and select the desired Com port.

3. Select the **Protocol** menu and select the needed communications protocol.
   - MODBUS (Front Port)
   - MODBUS (Rear Port)
   - ICI320

4. Do one of the following:

   MODBUS selected above – Select the **Baud Rate** menu and select a baud rate from the list that matches the controller baud rate.

ICI320 selected above – Select the needed ICI 320 communication settings from the drop down menus.
- Baud Rate
- Data bits
- Start/Stop bits
- Parity

5. Click **[OK].** The communication changes are saved and will be used for all future communications, until the communication port is changed.

5.2 PC Ethernet Port Configuration

Ethernet communication can be used to transfer configurations if the controller has Ethernet communications available and a valid IP address has been entered into the controller. See the "ETHERNET" function block section in the controller User's Manual for more information on setting the addressing of the controller.

Note: The IP address in the Ethernet tab of the Station/Loop Attributes dialog block must match the IP address in the Ethernet function block in the controller.

➢ **To set Ethernet Communications**:

1. Select **Communications > Configure** from the menu.

2. Select the **Port** drop down menu.

3. Select **Ethernet**.

4. Click **[OK]**. The communication changes are saved and will be used for all future communications, until the communication port is changed.

5.3 Downloading to the Controller

After creating a configuration, the next step is to download it to the controller.

A configuration is made up of two files: a graphic file with a .353 extension and a database file with a .V3C extension. Only the .V3C file is downloaded to the controller. However, both files are saved as a pair in the PC and both can be saved to a MultiMediaCard.

➢ **To download a configuration**:

Click **< File > Download** in the Menu Bar and select one of the following.
- Current Station Configuration
- Download From File

See the subsections below for descriptions of the above selections.

5.3.1 Current Station Configuration

This option downloads the configuration that is presently open in i|config. If the configuration contains any ladder logic loops, the system assigns Execution Sequence Numbers (ESN) before the download starts. If the ESN assignment fails for any reason, the configuration can not be downloaded or saved. See Section 4.17 Execution Sequence for more information on the assignment of ESN numbers.

Always save the configuration before downloading it to the controller. Also be sure that the configuration and controller have the same Database Revision Number.

➢ **To download the active configuration**:

1. Save the configuration.

    IMPORTANT: The configuration file name is stored in the station when it is downloaded. If the configuration is not saved at least once before the download, it will not be possible to merge the data with a graphic file when you upload.

2. Select **File > Download > Current Station Configuration**. The download caution message in Figure 5-3 will appear. Read the message, click **[OK]**, and take appropriate steps to avoid a process upset. Note that the configuration downloaded in step 5 will become the active configuration in the selected controller.
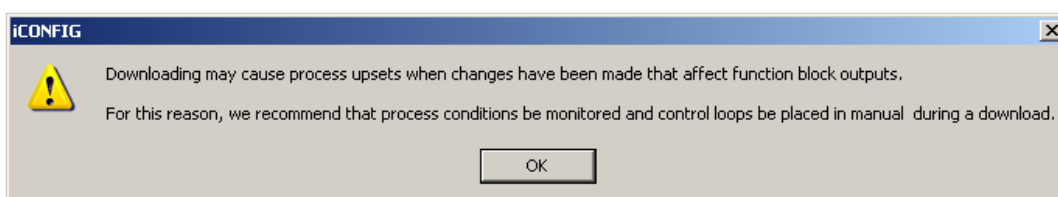
Figure 5-3 Download caution message

3. Select the communication port to use for downloading the configuration from the drop down menu in the Station Selection dialog. See Figure 5-4.
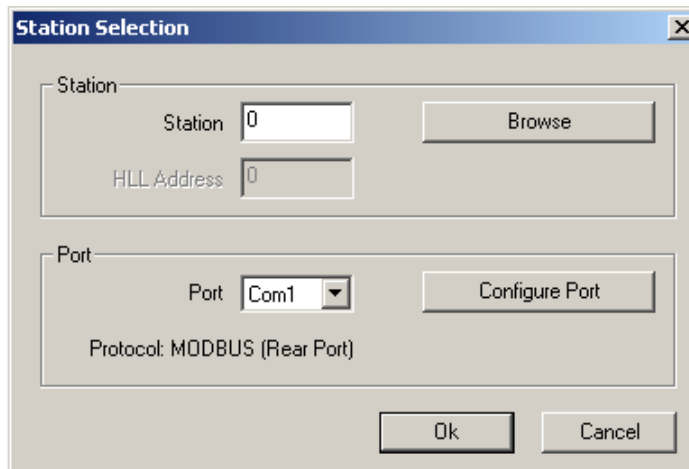
Figure 5-4 Station Selection dialog

Note: See Section 5.1 Serial Port Configuration or Section 5.2 Ethernet Port Configuration for more information if the port needs to be configured.

A message similar to that shown in Figure 5-5 will appear if a PC port configuration setting (e.g. baud rate, IP address) differs from the equivalent setting in the configuration to be downloaded.
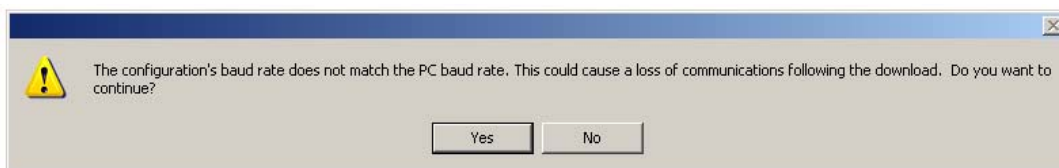
Figure 5-5 Parameter disagreement message

4. When downloading to a controller (station) on Ethernet, MODBUS (Rear Port), or LIL, an additional dialog must be opened in order to select the specific station address if you can not enter it in the Station Selection dialog

    •   For MODBUS (Rear Port) or LIL, select the Browse button to view the stations on the multi-drop network. After polling the multi-drop network for available controllers, a Station List dialog (See Figure 5-6) will open. Select the desired controller from the list.
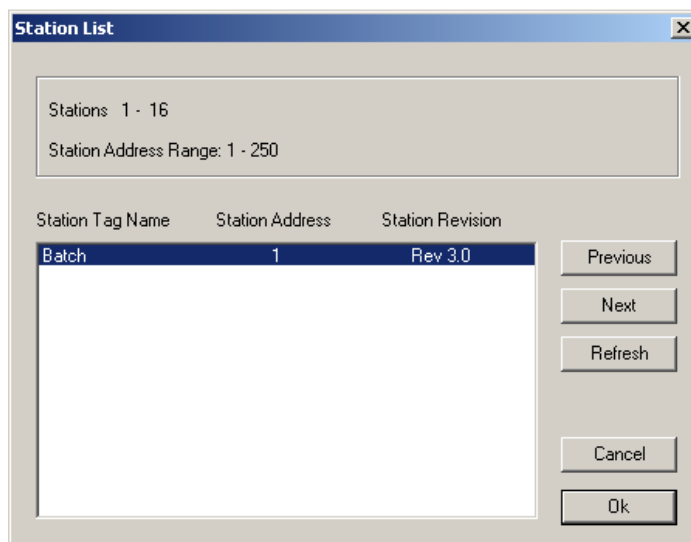
Figure 5-6 Station List dialog

    •   For Ethernet, select **[OK]** on the Station Selection dialog. The system will query the Ethernet network using UDP (User Datagram Protocol) to determine the Procidia controllers present and will list them by IP address and station tag on the Procidia Selection dialog. Select the desired controller from the list. If the dialog does not list any controllers but you know one is present you can enter the IP address manually in the top text box. See Figure 5-7.
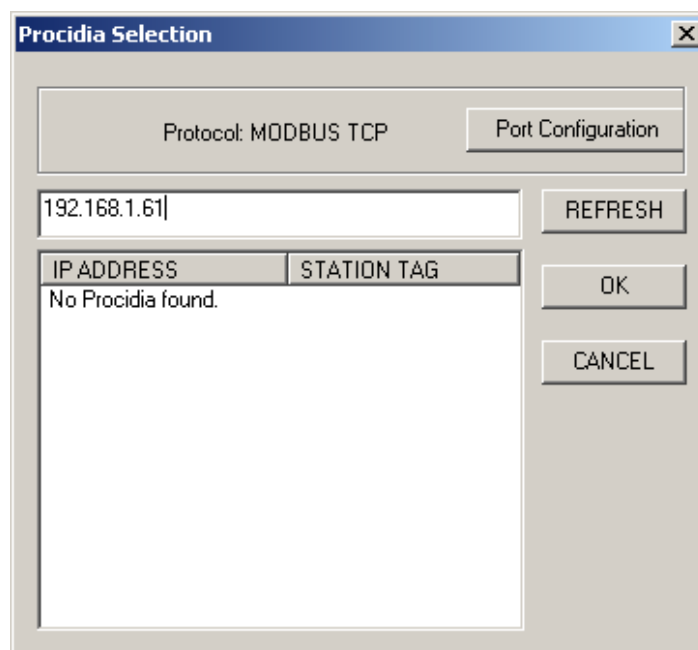
Figure 5-7 Procidia Selection dialog

5.   Click **[OK]**. The configuration downloads to the controller.

5.3.2 Downloading From File

This option downloads a file from a disk (e.g. hard drive) directly to a controller. Download From File, transfers the database .V3C file directly to a controller.

Be sure that the configuration and controller have the same Database Revision Number.

➢ **To download a configuration from a file**:

1.   Select **File > Download > Download From File**. The download caution message similar to that in Figure 5-8 will appear. Read the message, click **[OK]**, and take appropriate steps to avoid a process upset. Note that the configuration downloaded in step 5 will become the active configuration in the selected controller.
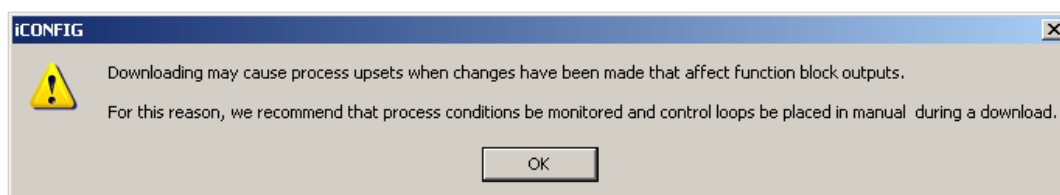
Figure 5-8 Download caution message

2.   The Select Database dialog is displayed. See Figure 5-9.
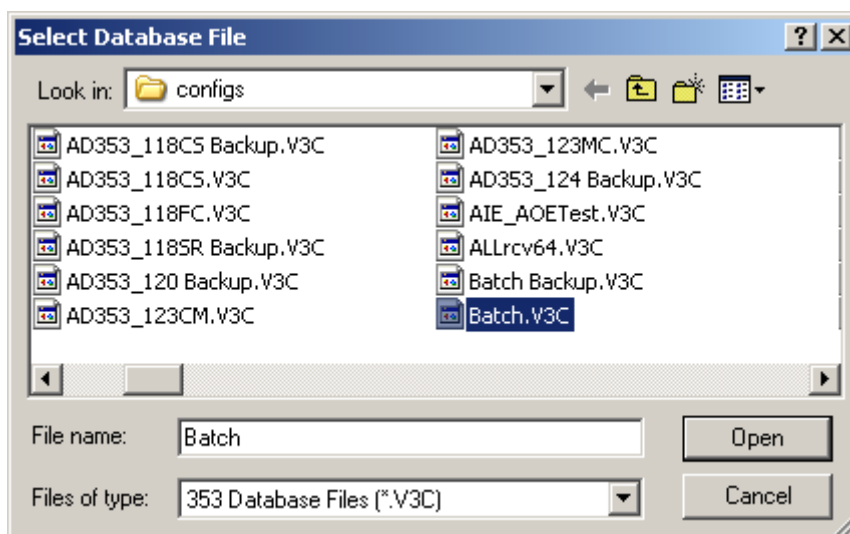
Figure 5-9 Select Database File dialog

3.   Do one of the following:

   - Select the database file to download, and then click **[OK]**.

     OR

   - Enter file name in the File Name text box, and then click **[OK]**.

     OR

   - Double-click on the file name.

   The Select Station to Download dialog displays, from which you can select the port to use for downloading.

4.   Select the communication port to use for downloading the configuration from the drop down menu in the Station Selection dialog. See the previous method for downloading the active configuration for more steps necessary when downloading to multi-drop stations on MODBUS (Rear Port), LIL, or Ethernet.

   A message similar to that shown in Figure 5-10 will appear if a PC port configuration setting (e.g. baud rate, IP address) differs from the equivalent setting in the configuration to be downloaded.
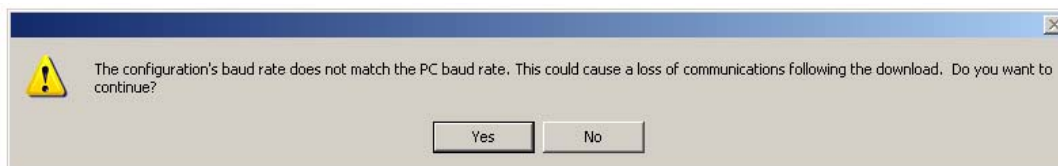
Figure 5-10 Parameter disagreement message

5.   Click **[OK]**. The configuration downloads to the controller

5.4 Uploading from the Controller

The database file path and extension are not stored in the controller. Because only the database file is downloaded to the controller, the upload path must be set to the directory where the graphic file is stored so the two files can merge during the upload.

➢ **To set the upload path**:

1. Select **Tools > Upload File Path**. The Options dialog displays. See Figure 5-11.
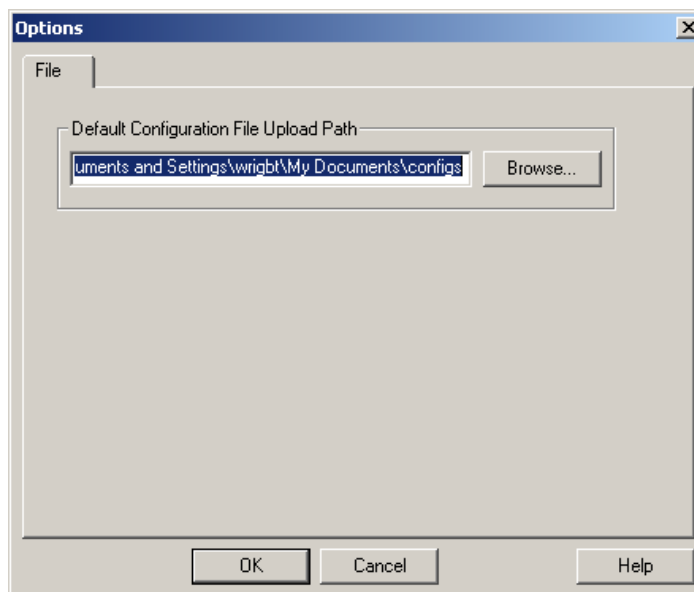
Figure 5-11 Options dialog

2. In the File tab, enter the desired upload path, if it is not currently displayed in the text field.

    Note: If a merge with the stored configuration is NOT desired, create a new folder and select it as the upload destination.

3. Click **[OK]**. The upload path is accepted. The Options path dialog closes and the selected path is used when uploading the configuration.

5.4.1 Upload

This option uploads a database from a controller and displays it within i|config.

If the database that is being uploaded from the controller has a configuration file associated with it on the PC, i|config will attempt to merge the database with the graphic file on the PC. If the database can be merged with the one on the PC, the existing database file on the PC will be updated to reflect the parameter values of the uploaded database. Merging of an uploaded database will not be permitted if any of the following modifications were made to the controller configuration:

• A loop was added or deleted from the controller.

• A block was added or deleted from a loop.

• Any input to any block in any loop was changed.

If the uploaded database can not be merged with an existing graphic file on the PC, i|config will attempt to auto-draw the graphic configuration. When a configuration is auto-drawn:

- A station view will be created to hold the names of all the loops found in the uploaded configuration.

- For each function block loop that is found, a function block view will be created.

- A ladder logic view will be redrawn as its function block equivalent rather than a view with ladder logic elements.

As a function block view is created, all function blocks that belong to the loop will be auto-drawn by the system and placed on the loop view. Placement of the function blocks on the loop view occurs as followings.

- Display blocks (e.g. ODC, ODP) are drawn in the lower left corner of the view.

- SETPT, ALARM, PID, AM blocks are drawn at the center of the view.

- Input blocks are drawn on the left side of the view.

- Output blocks are drawn on the right side of the view.

- All other blocks are drawn where view space is available.

i|config will not generate connection lines between function blocks when it auto-draws a configuration. To quickly establish connection lines, after function blocks have been repositioned according to the users needs, use the Automatic Line connection button on the Line Connection toolbar. See Section 6.4.3 Automatic Line Connection for details.

➢ **To upload**:

1.   Select **File > Upload**. The Select Station dialog displays; see Figure 5-12.
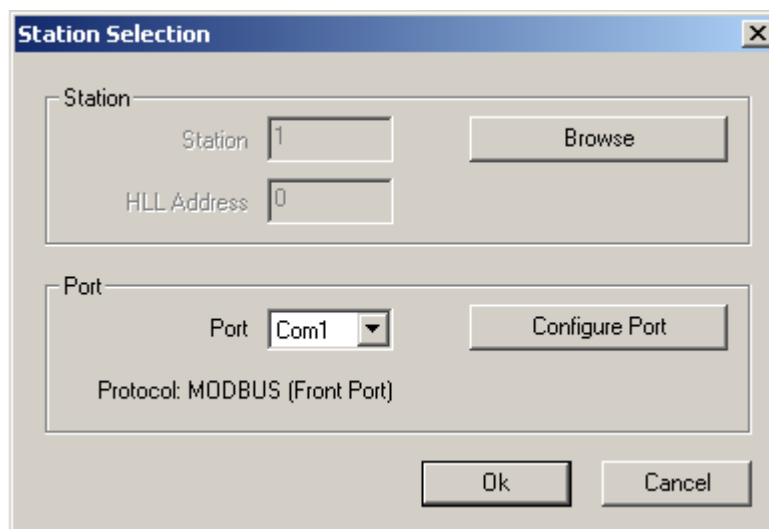
Figure 5-12 Select Station to upload from dialog

2.   Select the communication port to use for uploading the configuration from the drop down menu in the Station Selection dialog. See the previous method for downloading the active configuration for more steps necessary when downloading to multi-drop stations on MODBUS (Rear Port), LIL, or Ethernet.

3.   Click **[OK]**. The configuration will upload from the controller.

If the uploaded configuration is merged with a configuration on the PC, the configuration is updated on the disk.

If the merge fails, a message is displayed stating that a merge failed during the upload.

If there is no configuration on the PC for the uploaded configuration to merge with[8], i|config will auto-draw the graphic view(s) for the uploaded database. When the auto-draw process is complete, the user can select **File > Save** to save the uploaded configuration to disk.

➢ **To save a new configuration after a failed merge**:

1. A message box is displayed stating that a merge has failed. You are asked if you want to save the uploaded database to another file.

2. Click **[Yes]**. The new database is auto-drawn by i|config. When the auto-draw process is complete, select **File > Save** to save the uploaded configuration to disk.

   IMPORTANT: Be careful not to save the uploaded database to an existing database file that has an associated graphics file (.353). If the file to be uploaded differs in any way that might make the Upload/Merge process fail, as described previously, the graphics file corresponding to the saved database is invalid. Attempting to open that graphics file will cause unpredictable results.

5.5 Station Selection

The Select Station to download to dialog displays in all download procedures and the Select Station to upload from dialog displays in all upload procedures. Use these dialogs to select the proper communication port and station address to download to, or upload from, a specific station. See Figure 5-13.
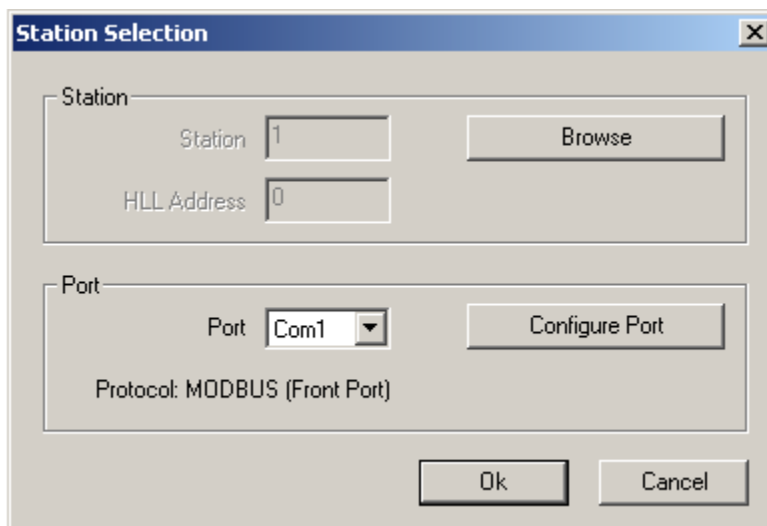
Figure 5-13 Select Station dialog

If the address of the station is not configured, the user can configure it from either dialog.

---

[8] This will be the case when: the configuration was created at a controller faceplate; or the configuration being uploaded was created in i|config but was saved to a folder other than the default folder; see Figure 5.11; or the configuration's graphic content was edited at the controller faceplate.

➢ **To configure the PC port**:

1. From the Station Selection dialog, click **[Configure Port]**. The Port Configuration dialog displays.

2. Use the drop-down menus to configure the ports. The PC port configuration must match the controller communication configuration in the STATN - Station Parameter function block or Ethernet function block.

3. Click **[OK]**. The communications configuration is saved and is used hereafter until you reconfigure the port communications. The address fields appear differently, depending on the driver selected for the port.
    *   ICI320 - the HLL and LIL address of the unit must be specified
    *   MODBUS (Rear Port) - the MODBUS address of the unit must be specified
    *   MODBUS (Front Port) - the station address is always 1 and, therefore, need not be specified

The address of the station may not be evident, in which case the user can choose to view a list of stations connected to a particular communication port. This list is available in the Station Name Selection dialog. This dialog displays a range of station addresses, which can be incremented or decremented as desired. Once the correct address displays on the list, the user can automatically configure those fields in the Station Selection dialog.

If the driver is MODBUS (Front Port) or MODBUS (Rear Port), the address range is listed. If the driver is ICI320, the HLL address is listed.

➢ **To view the stations connected to the selected communication port and configure fields in the Station Selection dialog**:

1. From the Station Selection dialog, click **[Browse]**.

    The Station Name Selection dialog, with a range of station names and addresses, displays.

2. If the correct station name and address do not display, click **[Next]** or **[Previous]**.

    The next or previous range of station names and addresses display.

3. Repeat step 2 until the correct station name and address displays on the list.

4. Do one of the following:

    *   Select the station to communicate with. Click **[OK]**.

        OR

    *   Double-click on the station name.

The Station Name Selection dialog closes and the appropriate address fields are populated in the Station Selection dialog.

5.6 i|config Actions During Download or Upload

Before downloading to the station, the software performs the following operations:

- Retrieves the current station status and displays it in the download confirmation dialog

- Disables the **[OK]** button on the confirmation dialog if a download is not allowed with the current station status

  If this occurs, use **[Cancel]** to close the dialog. If the station status allows a download, press **[OK]** to download the file.

Before uploading from the station, the software performs the following operations:

- Retrieves the current station error status and displays it in a dialog

- Disables the **[OK]** button on the dialog if an upload is not allowed. If this occurs, use **[Cancel]** to close the dialog. If no errors are present, the upload proceeds immediately with no confirmation.

5.7 Monitor Mode

The **Monitor Mode** button is used to populate a displayed function block or ladder logic loop with the live variables from the 353 that is running the displayed loop. Figure 5-14 shows the variables highlighted in yellow. The PC to 353 communication requirements stated earlier in this chapter must be met.
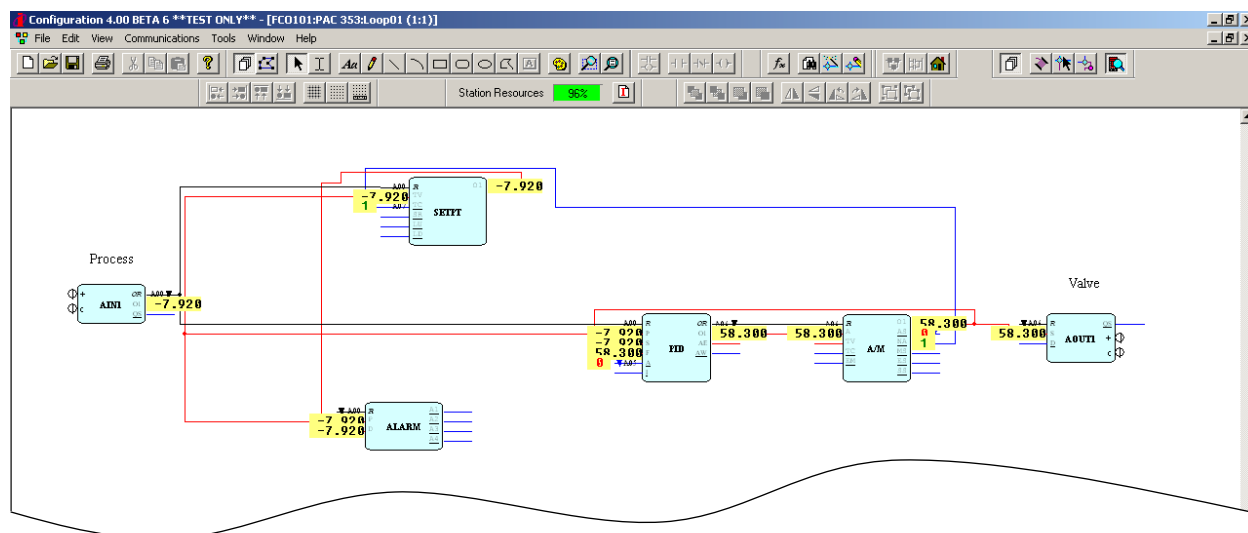
Figure 5-14 Function block loop with 353 live variables

➢   To monitor live variables:

  1.   Open the function block or ladder logic loop that is to be monitored.

  2.   Click the **Monitor Mode** button to display the dialog in Figure 5-13. Select the Station and Port as described earlier in this chapter.
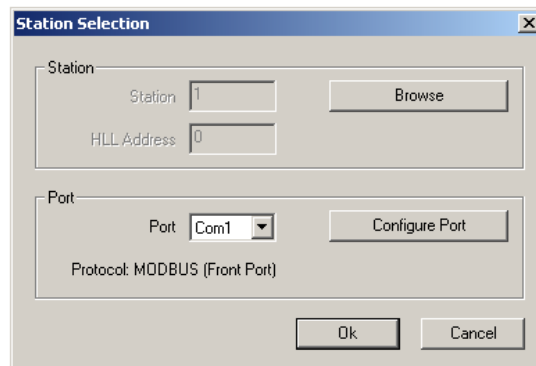
Figure 5-15 Station Selection dialog

3. As needed, zoom in on the loop to allow the live variables to appear. Variables will appear when the display is zoomed to a size that permits reading.

Chapter 6 - Using the Toolbars

i|config™ toolbars are shown in Figure 6-1. Each toolbar is a series of buttons that provide quick access to an i|config function. All toolbars display the first time i|config is installed and run. Individual toolbars, or all toolbars, can be toggled on and off as desired.
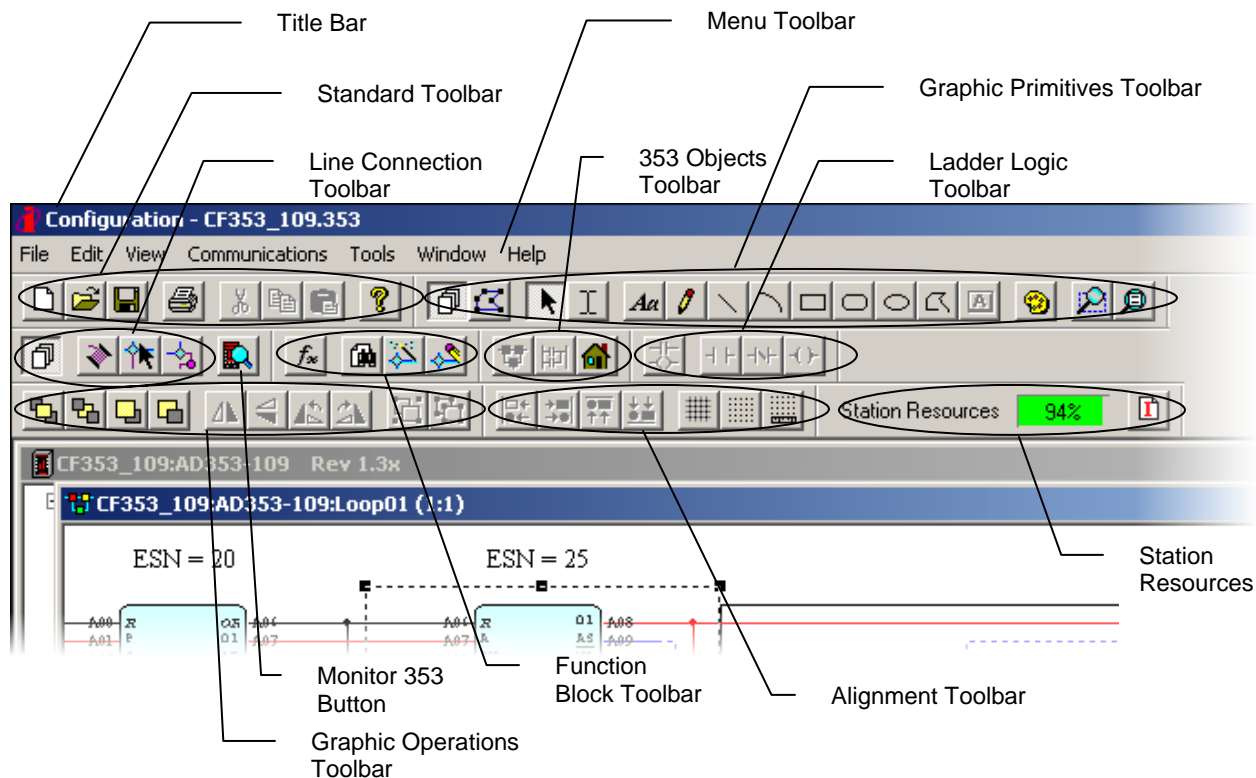
Figure 6-1 Toolbars

➢ **To toggle the display of the toolbars**:

1.   Select **View > Toolbars**. The Toolbar dialog displays. See Figure 6-2.
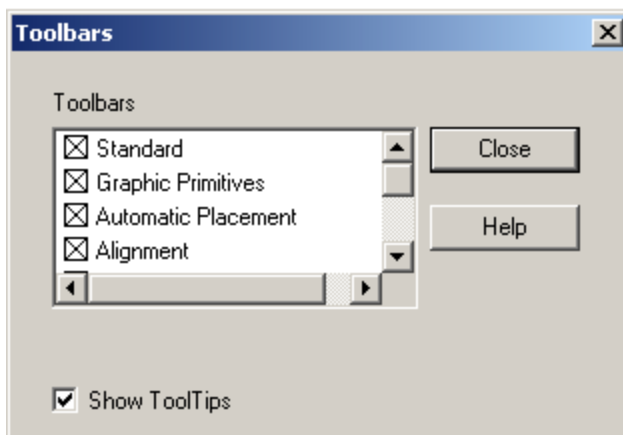
Figure 6-2 Toolbars dialog

2. Click the check box for the toolbar to toggle on or off. If an X displays in the check box, the corresponding toolbar will be displayed.

3. Click **[Close]**. The Toolbars dialog closes.

Note: Toolbars can be placed in any location by clicking on the grey area of the toolbar and dragging it to a new location.

6.1 Using the Standard Toolbar

The Standard toolbar, shown in Figure 6-3 includes buttons that are used to manipulate a file.

Figure 6-3 Standard toolbar

6.1.1 New

 The **New** button creates a new configuration. This button is available in all views.

➢ **To create a new configuration**:

1. Click the **New** button on the **Standard** toolbar. The Database Revision dialog displays. See Figure 6-4.
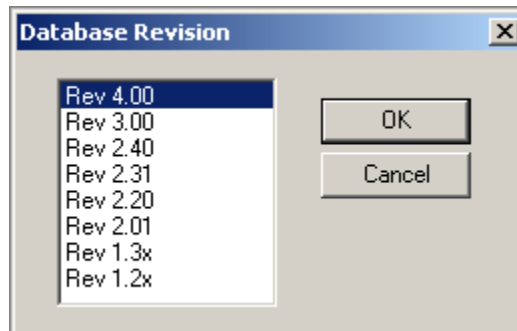
Figure 6-4 Database Revision dialog

2. Select the database revision level desired.

   Note: If the configuration will be downloaded to several controllers that have different database (firmware) revisions, choose the lowest database revision in the group of controllers. Create the configuration and save it. Use i|config to upgrade the configuration to the higher revision level (File > Upgrade to). Save the upgraded configuration with a different file name for use in a controller with the higher database revision level.

3. Click **[OK]**. The new configuration opens at the Station view using a default station name.

6.1.2 Open

The **Open** button opens a dialog box from which an existing configuration can be selected and opened. A configuration consists of a graphic file (.353) and a database file (.V3C). In normal situations, the (.353) file is opened and the (.V3C) file is automatically merged with it. If for some reason the graphic file does not exist, a (.V3C) file can be opened in i|config and the software will auto-draw the function block views.

When a configuration is auto-drawn, the line connections between function blocks are not drawn however the connection identifiers are included. Blocks can be moved to a desired layout and then the Automatic Line Connection button can be used to auto-route the lines. See Section 6.4.3 Automatic Line Connection later in this chapter.

➢ **To open a new configuration**:

1. Click the **Open** button on the **Standard** toolbar. The Select Database File dialog displays. See Figure 6-5.
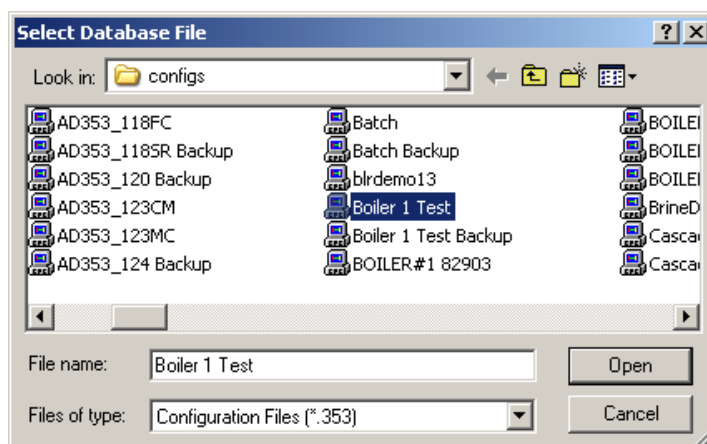
Figure 6-5 Select Database File dialog

2. Do one of the following:

   • Select the file from the list, then click **[Open]**.

     OR

   • Enter a file name in the File name text box, and then click **[Open]**.

     OR

   • Double-click the file name.

   A station view displays. If a database file was selected, additional function block views may open. If these views are displayed, graphic function block associated with them will be auto-drawn.

6.1.3 Save

The **Save** button saves a new or modified configuration file. When a file is saved, i|config saves both the graphic (.353) and database (.V3C) files.

➢ **To save a new or modified configuration**:

1. Click the **Save** button on the **Standard** toolbar. The Select Database File dialog displays. See Figure 6-6.

    Note: A previously saved configuration file will save immediately using the existing file name without displaying the Select Database File dialog.
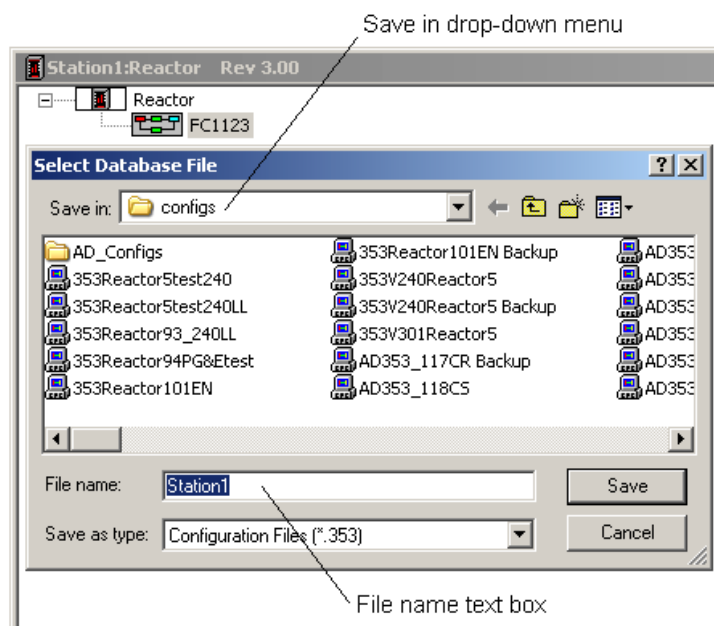
Figure 6-6 Select Database File dialog for saving a new configuration

2. Select the folder in which to save the configuration. The "C:\Program Files\Siemens\iConfig\Configs" folder displays as the default directory.

3. Enter a new file name in the File name text box.

4. Click **[Save]**. The configuration is saved as the entered file name in the selected folder.

6.1.4 Print

The **Print** button sends a configuration loop view to the printer. This option is available in both the function block and ladder logic views.

Note: The Function Block Parameters and Connection Identifiers report views open Notepad to view the report. In this case the Notepad menu selection is used for printing the report.

➢ **To print a configuration**:

1. Click the **Print** button on the **Standard** toolbar. The Print dialog displays. See Figure 6-7.
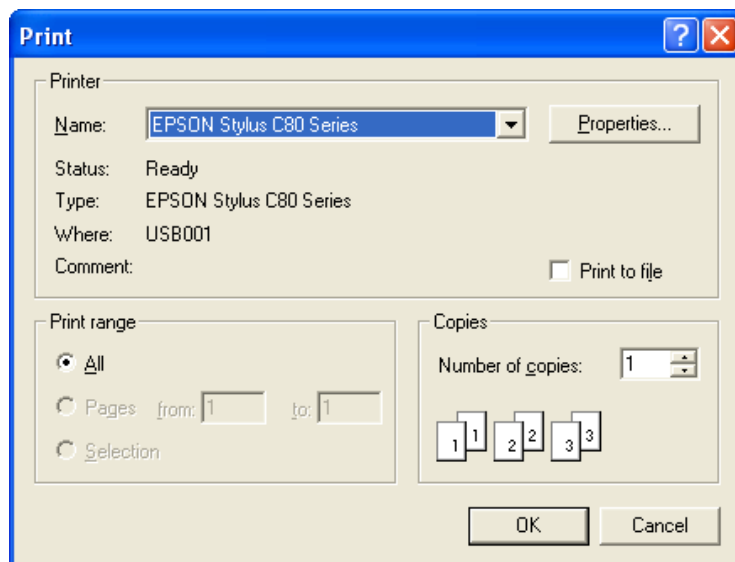
Figure 6-7 Print dialog

2. Make changes to the dialog, if necessary.

3. Click **[OK]**. The view is sent to the printer.

6.1.5 Cut

 The **Cut** button removes the selected graphic item or function block loop from the present location and moves it to the Clipboard. Cut is used in combination with the Paste button to move an item or several items from one location to another. For more information on cutting function block loops, see Section 2.8.1 Cutting Loops.

This option is available in the station view to cut function block loops and in the function block and ladder logic views to cut graphic items.

➢ **To cut an item**:

1. Select the item to cut.

2. Click the **Cut** button on the **Standard** toolbar. The item may be cut or a message may appear, depending on the graphic item selected. See Figure 6-8.
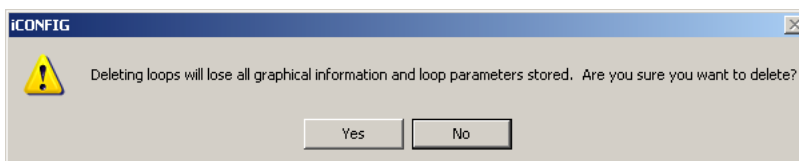
Figure 6-8 Cut message

3. Click **[Yes]**. The item is cut and pasted to the Clipboard.

6.1.6 Copy

The **Copy** button copies the selected graphic items or function block loops to the Clipboard. It is used in combination with the Paste button to duplicate items.

For more information on copying function block loops, see Section 2.8.2 Copying Loops.

This option is available in the station view to copy function block loops and in the function block and ladder logic views to copy graphic items.

➢ **To copy an item**:

1.   Select the item to copy.

2.   Click the **Copy** button on the **Standard** toolbar. The item is copied and pasted to the Clipboard.

6.1.7 Paste

The **Paste** button moves the contents of the Clipboard to the active view. This button is used with the Cut and Copy functions to move items to new locations or to duplicate items.

This option is available in the station view to paste function block loops and in the function block and ladder logic views to paste graphic items. For more information on pasting, see the Section 2.8.3 Pasting Loops.

➢ **To paste an item**:

1.   Use Cut or Copy to select the item or items and transfer them to the Clipboard.

2.   Click the **Paste** button on the **Standard** toolbar to move the selection from the Clipboard to the active view.

6.1.8 Online Manual

The **Online Manual** button opens this Software Guide using Adobe® Reader®.

➢ **To display the manual**:

Click the **Online Manual** button on the **Standard** toolbar. The Manual opens in the Adobe Reader.

6.2 Using the 353 Objects Toolbar

The **353 Objects Toolbar**, shown in Figure 6-9, includes buttons that creates new configurations and adds loops to the configuration.
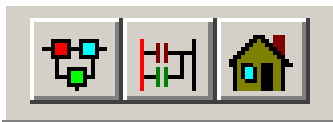
Figure 6-9 353 Objects Toolbar

6.2.1 Function Block Loop

The **Function Block Loop** button creates function block loops and places them on the station view. This button is active in the station view.

➢ **To create a function block view**:

Click the **Function Block Loop** button on the **353 Objects Toolbar**. A new function block loop displays in the station view tree.

6.2.2 Ladder Logic Loop

The **Ladder Logic Loop** button creates ladder logic loops and places them on the station view. This button is active in the station view.

➢ **To create a function block view**:

Click the **Ladder Logic Loop** button on the **353 Objects Toolbar**. A new ladder logic loop displays in the station view tree.

6.2.3 New FCO

The **New FCO** button creates a new configuration from the list of factory configured options. This button is active in the station view.

➢ **To create a configuration from a Factory Configured Option**:

1.   Click the **New FCO** button on the **353 Objects Toolbar**

The Database Revision dialog opens. See Figure 6-10. Select the revision level of the firmware in the controller that the FCO will be downloaded to. After selecting the revision level the Factory Configured Dialog will open. See Figure 6-11.

Note: If the configuration will be downloaded to several controllers that have different database (firmware) revisions, choose the lowest database revision in the group of controllers. Create the configuration and save it. Use i|config to upgrade the configuration to the higher revision level (File > Upgrade to). Save the upgraded

configuration with a different file name for use in a controller with the higher database revision level.
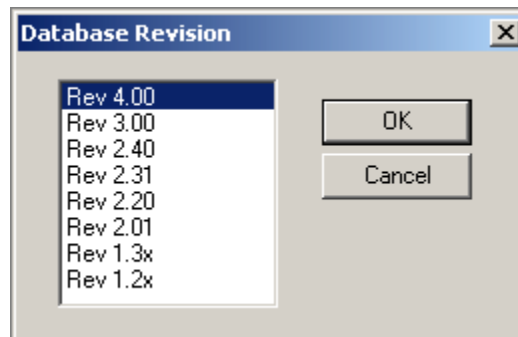
Figure 6-10 Database Revision dialog
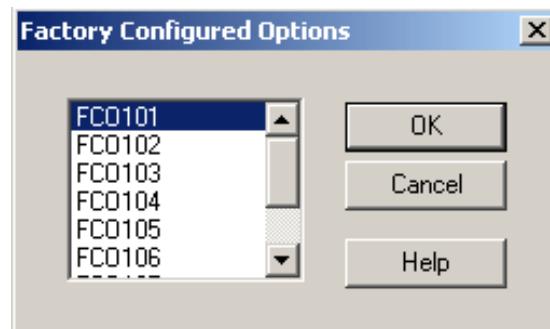
Figure 6-11 Factory Configured Option dialog

2. Do one of the following:

- Select a Factory Configured Option from the dialog, click **[OK]**.
  OR
- Double click a Factory Configured Option in the dialog.

A station view of the Factory Configured Option will open.

6.3 Using the Line Connection Toolbar

The **Line Connection** toolbar, shown in Figure 6-12 includes buttons that provide multiple functions on loop views. This button is available in the function block and ladder logic views.

Figure 6-12 Line Connection Toolbar

6.3.1 Multiple Create

The **Multiple Create** button creates multiple function blocks or ladder logic elements without clicking the item button multiple times. This option is available in the function block and ladder logic views.

➢ **To create multiple function blocks elements consecutively**:

1. Click the **Multiple Create** button on the **Line Connection** toolbar.

2. Click the **New Function Block** button on the **Line Connection** toolbar. f_x The Select Item to Create dialog opens. See Figure 6-13.
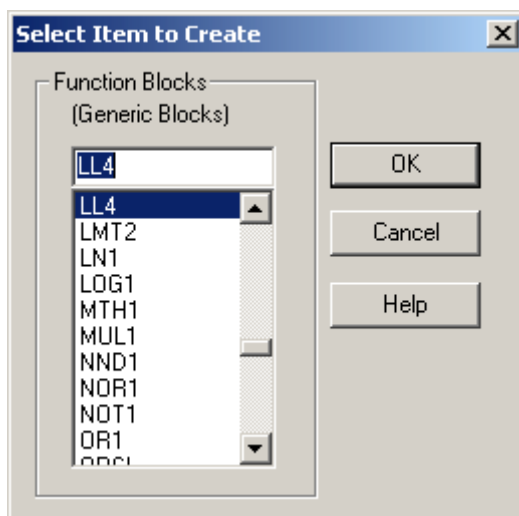
Figure 6-13 Select Item to Create

3. Select the function block and place it on the workspace. The dialog will open again. Continue placing blocks.

4. Press **<Esc>** or click **[Cancel]** when finished placing blocks.

   Note: For more information on placing function blocks, see Chapter 3 Working with Function Block Loops.

➢ **To create multiple ladder logic elements consecutively**:

1. Click the **Multiple Create** button on the **Line Connection** toolbar. The button appears pressed in.

2. Click the **New Ladder Logic Element** button on the **Line Connection** toolbar. The Select Item to Create dialog opens. See Figure 6-14.
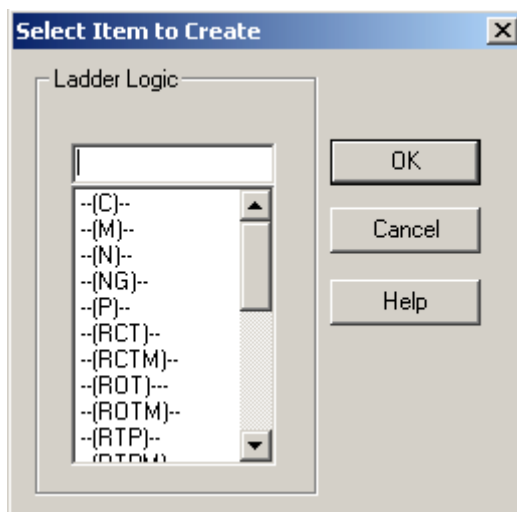
Figure 6-14 Select Item to Create

3. Select the ladder logic element and place it on the workspace. The dialog will open again. Continue placing ladder logic elements.

4. Press **<Esc>** or click **[Cancel]** when finished placing ladder logic elements.

   Note: For more information on placing ladder logic elements, see Chapter 4 Working with Ladder Logic Loops.

6.3.2 Line Connection Mode

The **Line Connection Mode** button creates connection lines between connectable items. This button is also referred to as the wire spool or simply as the spool. This option is available in the function block and ladder logic views.

Note: For more information on connecting function blocks, see Chapter 3 Working with Function Block Loops, and on connecting ladder logic elements, see Chapter 4 Working with Ladder Logic Loops.

➢ **To connect inputs and outputs**:

1. Click the **Line Connection Mode** button. The cursor becomes a wire spool.

2. Click a valid starting point.

   Note: The cursor displays as a spool with a (+) sign when over a valid connection point. It displays with a (∅) symbol when the connection point is not valid.

3. Move the cursor to a valid connection point.

4. Click a valid ending connection point.

A connection is made and is represented as a line. A triangle and an alphanumeric connection identifier displays on the connected input and output if an Auto-routed line can not be drawn between the connection points.

Note: Press <Esc> at any point, when creating a connection line, to cancel the operation.

Connections can start on an input, an output, or an existing connection line. If the input already has a connection or is used by a reference, a warning message is displayed. See Figure 6-15.
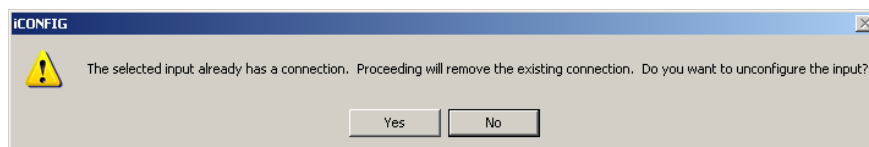
Figure 6-15 Input already has a connection warning message

If a connection line starts on an existing line, the staring point is considered to be the output of the connection line on which the user started.

6.3.3 Line Connection Selection Mode

 The **Line Connection Selection Mode** button selects a connection line, function block, or ladder logic element to edit. This option is available in the function block and ladder logic views.

In a ladder logic view, this mode enables the user to identify the function blocks associated with ladder logic elements. This is done whenever the mouse cursor moves over a ladder logic element and the cursor is stopped. After a short time, a tool tip styled information box appears and describes the function blocks associated with the ladder logic element, as shown at right.
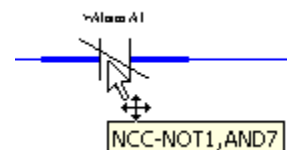
➢ **To select items to edit**:

1. Click the **Line Connection Selection Mode** button on the Line Connection toolbar.

2. Do one of the following to select items:

- Click on an item. A single item is selected. If the item was previously selected, it is deselected.

  OR

- **<Shift>** + click on multiple items. Multiple items are selected. If the items were previously selected, they are deselected.

  OR

- Click on an item where it overlays another item. The Choose Items to Select dialog displays a list of connection lines and items near the location point. See Figure 6-16. Select the item or items and click **[OK]**.

  OR

Choose Items to Select   ☒

    ID
    Line Connect Item
    Line Connect Item

    Select All

    OK   Cancel
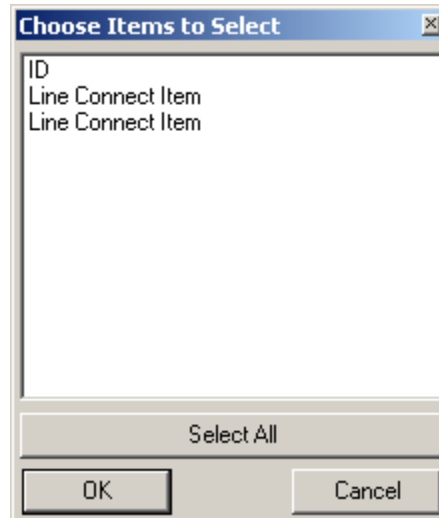
Figure 6-16 Choose Item to Select dialog

- **<Shift>** click on an item near where it overlays another item. The Choose Item to Select dialog displays. See Figure 6-16. Select the item or items and click **[OK]**.

  OR

- Click and drag a box across multiple items. All the items within the dragged area are selected.

  OR

- Right-click and from the pop up menu select **[Select All]**. All the items in the workspace are selected.

  OR

- Select **Edit > Select All** from the menu. All the items in the workspace are selected.

  OR

- Press **<Ctrl+A>**. All the items in the workspace are selected.

3.   Do one of the following to edit selected items:

- Click an editing toolbar button or select a menu option.

  OR

- Right-click on the selected items and select an edit option from the pop-up menu.

  OR

- Drag the selected items to a new valid location.

6.3.4 Line Connection Attributes

The **Line Connection Attributes** button displays the Item Attributes dialog. This dialog can contain one or more of the following tabs: **Line Connection, Fn (Function) Block**, **Selection**, and **Paper**. The Fn Block tab is available when a single function block or multiple function blocks have been selected. The other tabs are available when the **Line Connection Attributes** button is used and no item selections (e.g. lines, function blocks) have been made.

The user can change the parameters that appear on the Item Attributes dialog. Changes are not applied to the view until **[OK]** is clicked. All changes made in the dialog are cancelled if **[Cancel]** is clicked. This option is available in the function block and ladder logic views.

➢ **To edit line connection, selection, and paper attributes**:

1. Click the **Line Connection Attributes** button on the **Line Connection** toolbar. The Item Attributes dialog displays.

2. Select the tab desired. Refer to Sections 6.3.7.1 through 6.3.7.4 below to make the desired changes.

3. Click **[OK]** or **[Cancel]**.

6.3.4.1 Line Connection Tab

➢ **To change line colors**:

1. Click the **Line Connection** tab, if not already selected. See Figure 6-17.
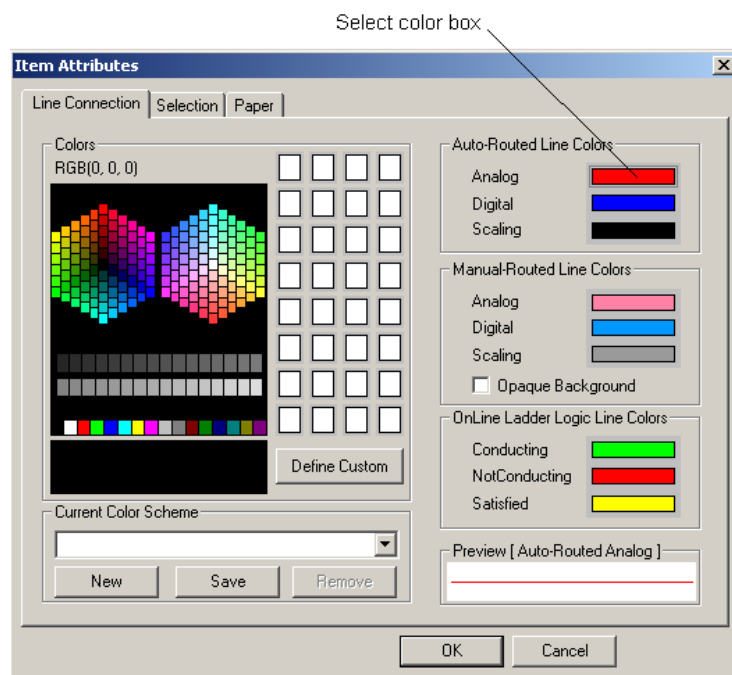
Figure 6-17 Line Connection tab - Item Attributes

2. Select the current color block of the line type to be changed.

3. Select a color from the color matrix. See Custom Colors later in this chapter for information on creating custom colors.

4. Click **[OK]**. All lines of the line type selected will change.

6.3.4.2 Selection Tab

➢ **To change the color outline of a selected item**:

1. Click the **Selection** tab, if not already selected. See Figure 6-18.
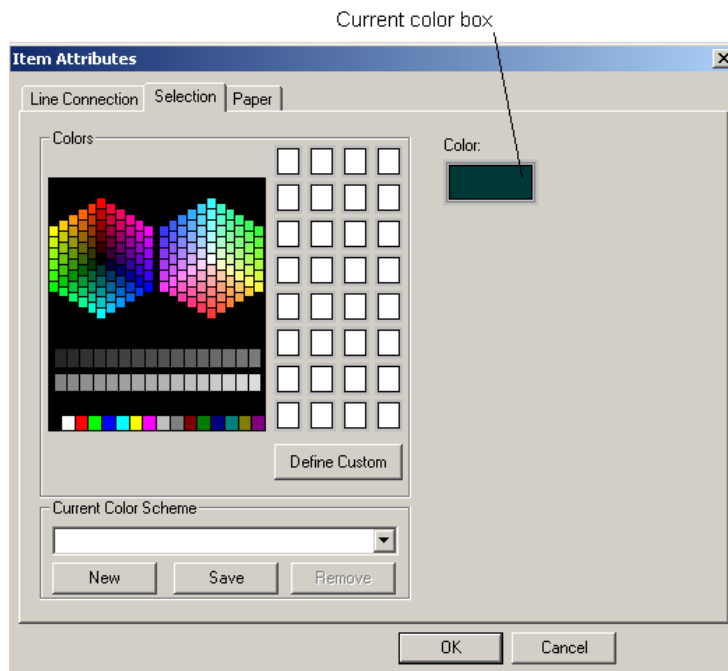
Figure 6-18 Selection tab – Item Attributes dialog

2. Select the current selection color block to be changed.

3. Select a color from the color matrix. See Custom Colors later in this chapter for information on creating custom colors.

4. Click **[OK]**. The outline of all selected items will now use the new color.

6.3.4.3 Paper Tab

➢ **To change the paper color**:

Paper refers to the workspace area. You can also change the color of the area behind the workspace.

1. Click the **Paper** tab, if not already selected. See Figure 6-19.

Current color boxes
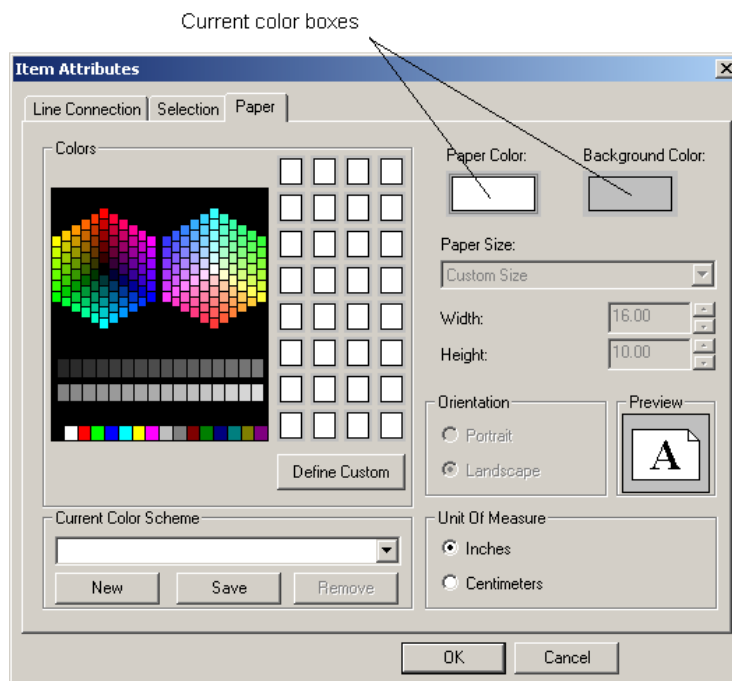
Figure 6-19 Paper tab – Item Attributes dialog

2.   Select the current Paper or Background color selection block to be changed.

3.   Select a color from the color matrix. See Custom Colors later in this chapter for information on creating custom colors.

4.   Click **[OK]**. The workspace or background colors will be changed.

6.3.4.4 Fn Block Tab

➢   **To edit Function Block colors**:

1.   Select a function block or blocks for attribute change

2.   Click the **Line Connection Attributes** button on the **Line Connection** toolbar. The Item Attributes dialog displays. See Figure 6-20.

Current block color
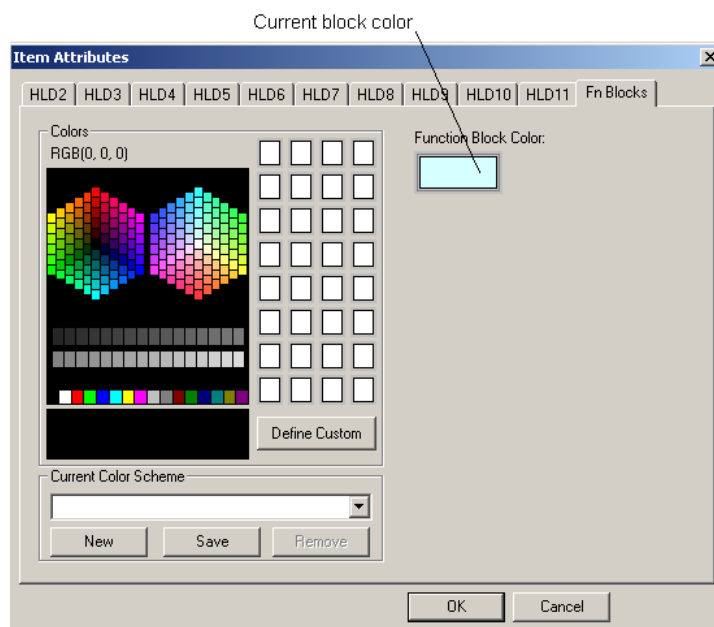
Figure 6-20 Item Attributes – Fn Blocks tab

3.   Select the **Fn Block** tab.

4.   Select the current Function Block Color box.

5.   Select a color from the color matrix. See Custom Colors later in this chapter for information on creating custom colors.

6.   Click **[OK]**. The colors of all the selected function blocks will be changed.

6.4 Using the Function Block Toolbar

The Function Block Toolbar, shown below, is active while a function block loop is displayed.

6.4.1 New Function Block

  The **New Function Block** button creates function blocks and places them in the active function block view. This option is available only in the function block view.

➢   **To place a new function block**:

1.   Click the **New Function Block** button on the **Line Connection** toolbar.

The "Select Item to Create" dialog is displayed. See Figure 6-21.

Figure 6-21 Select Item to Create dialog

2.   Do one of the following to place function blocks on the loop workspace.

   - Select a function block. Click **[OK]**.

     OR

   - Enter the name of the block in the text box. Click **[OK]**.

     OR

   - Double-click the function block.

     A dotted box appears in the workspace which indicates the start of the function block placement process.

     Note: The function block floats with the cursor until you physically place it.

3.   Drag the box to a valid location for placement and click. The function block displays on the function block view workspace.

   Note: When a function block is dragged off the page, the view automatically scrolls, keeping the function block visible within the workspace. If the cursor displays as a not allowed symbol (∅), the placement location is not valid.

6.4.2 Find Block

Click the Find Block button to locate a specific type of function block in the displayed loop.

➢   **To find a function block**:

1.   Click the **Find Block** button on the **Function Block** toolbar. f_x

     The "Select a block to find" dialog is displayed. See Figure 6-22.
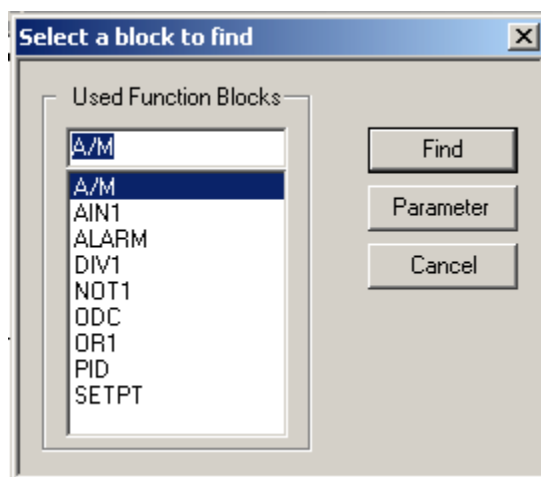
Figure 6-22 Select a block to find

2.   In the displayed dialog, select the function block type and instance number that is to be found in the displayed loop and click **Find**.

6.4.3 Automatic Line Connection

The **Automatic Line Connection** button automatically creates graphic lines for all existing configured connections. All connections which exist without line connections will have line connections drawn if routing of the line is possible.   All connections which have graphic lines will have the lines deleted and regenerated. This option is available only in the function block view.

➢   **To automatically generate connection lines**:

Click the **Automatic Line Connection** button on the **Line Connection** toolbar. The view enters the Zoom Page mode. As the system generates new line connections, the wait cursor is displayed. The system returns to the Line Connection Mode after completing the line generation process. The spool cursor is displayed and the view is updated to show the generated connection lines.

Where a line cannot be drawn, a triangle and an alphanumeric identifier appear at the input and output connection points.

6.4.4 Erase Line Connection

Clicking on the **Erase Line Connection** button *immediately* removes all construction lines from the function block loop. Click the Automatic Line Connection button to interconnect the function blocks.

6.5 Using the Ladder Logic Toolbar

The Ladder Logic Toolbar, shown below, is active while a ladder logic loop is displayed.

6.5.1 New Ladder Logic Element

The **New Ladder Logic Element** button creates ladder logic elements and places them in the active ladder logic view

➢ **To place any ladder logic element**:

1. Click the **New Ladder Logic Element** button on the **Line Connection** toolbar. The Select Item to Create dialog displays. See Figure 6-23.

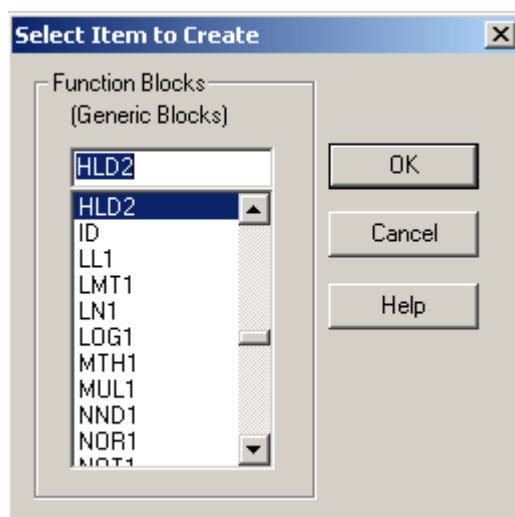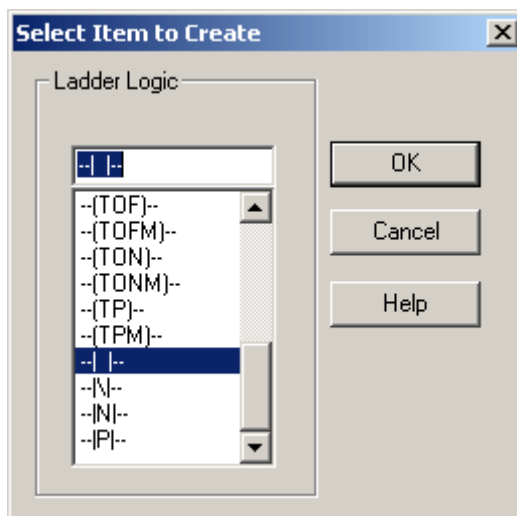**Figure 6-23 Select Item to Create dialog**

2. Select the ladder logic element to create. Click **[OK]**.

3. Drag the ladder logic element to a valid location on the ladder and click. The element displays on the ladder logic view. The dotted outline of the element floats with the cursor until it is placed.

   Note: If the element is dragged off the page, the view automatically scrolls, keeping the element visible within the workspace. If the cursor displays is a not allowed symbol (∅), the placement is not valid.

➢ **To place basic ladder logic elements**:

1. Click the desired element **NO Contact**, **NC Contact**, or **Coil** button on the **Line Connection** toolbar.

2. Drag the ladder logic element to a valid location on the ladder and click. The element displays on the ladder logic view.

6.6 Using the Station Resources Toolbar

The **Station Resources** toolbar, shown in Figure 6-24, displays in bargraph form the percentage of station (controller) memory available in a configuration. The color of the bar will change as the percentage of available resources decrease. From 100% to 50% the bar is green, from 50% to 35% the bar is yellow, and below 35% the bar is red. It is good practice to leave resources available for future changes.
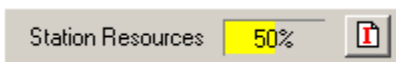
Figure 6-24 Station Resources toolbar

6.6.1 Station Resources

Station Resource Information can be viewed by selecting the **Information** button on the **Station Resources** toolbar while in the station view.

➢ **To view station resources**:

1.   Click the **Information** button while in the station view. The Station Resource Information dialog displays. See Figure 6-25
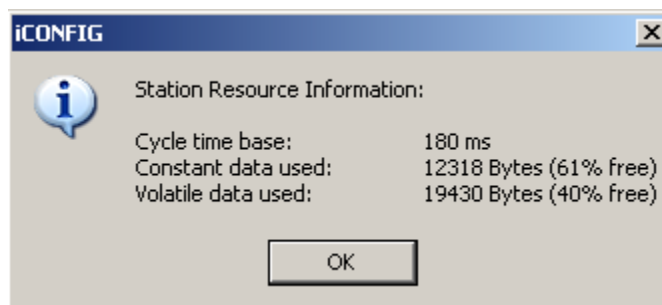
Figure 6-25 Station Resource Information

2.   Click **[OK]**. The Station Resource Information dialog closes.

6.6.2 Station and Loop Resources

Station and Loop Resource Information can be viewed by selecting the **Information** button on the **Station Resources** toolbar while in a function block or ladder logic view.

➢ **To view station (controller) and loop resources**:

1.   Click the **Information** button while in a function block or ladder logic view. The Loop Resource Information dialog displays. See Figure 6-26
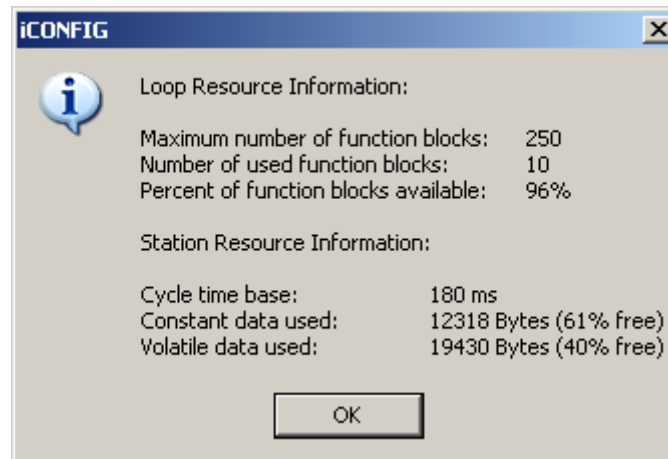
Figure 6-26 Loop Resource Information

2.   Click **[OK]**. The Loop Resource Information dialog closes.

6.7 Using the Graphic Primitives Toolbar

The **Graphic Primitives** toolbar, shown in Figure 6-27, adds shapes and text to the configuration for documentation purposes. Graphic items can be cut, copied, and pasted, into the same or other function block or ladder logic views. See Chapter 8 for more information on cutting, copying, and pasting.

Figure 6-27 Graphic Primitives toolbar

Graphic items can be created and moved anywhere within the workspace of a view. The creation of each item is explained in the appropriate button selection to follow. Moving, copying, and resizing an item, in general, are the same for all graphic items.

➢   **To move a graphic item**:

Select a graphic item, drag to a new location, and release the mouse button. The item displays in the new location.

➢   **To copy a graphic item**:

Hold **<Ctrl>**, select a graphic item, drag it to a new location, and release the mouse button. A copy of the selected item displays in the new location.

Note: The <Ctrl> key must be held down until after the mouse button is released.

➢   **To size a graphic item**:

1.   Select a graphic item.

2.   Click a selection handle, drag the cursor in any direction, and release the mouse button.

The cursor displays with a directional arrow when the handle point is clicked. The selected graphic item is sized when the cursor is dragged and the mouse button is released.

Note: Certain size boxes only size in particular directions. Pressing the <Ctrl> and <Shift> keys while sizing a graphic item, sizes the item differently. See the appropriate section for each item button for more information on sizing.

6.7.1 Multiple Create

 The **Multiple Create** button creates multiple graphic items without clicking on the item button multiple times. This option is available in the function block and ladder logic views.

➢ **To create graphic items multiple time consecutively**:

1.   Click the **Multiple Create** button on the **Graphic Primitives** toolbar. The button appears pressed in.

2.   Click a graphic item button on the **Graphic Primitives** toolbar.

3.   Click the workspace, drag the cursor to create the selected item, and release the mouse button.

     The selected graphic item is created. The cursor remains prepared to create that same item until the user clicks the **Multiple Create** button again or the user selects another graphic tool.

     Note: To stop placing the selected item any time during the procedure, press <ESC> or click the Multiple Create button.

6.7.2 Reshape

The **Reshape** button changes individual points of a line, freeform item, or polygon. This option is available in the function block and ladder logic views.

➢ **To reshape a line, freeform item, or polygon**:

1.   Click the **Reshape** button on the **Graphic Primitives** toolbar.

2.   Select a line, freeform item, or polygon on the view to reshape

     Selection handles display on each point in the item. They indicate a point to size.

3.   Click a selection handle on the item, drag the cursor in any direction, and release the mouse button. The item is reshaped.

6.7.3 Selection Mode

The **Selection Mode** button selects one or more graphic items, function blocks, and ladder logic elements on which to perform an operation. This option is available in the function block and ladder logic views.

➢ **To select a graphic item to edit**:

1. Click the **Selection Mode** button on the **Graphic Primitives** toolbar.

2. Do one of the following to select workspace items

   - Click on an item. The item is highlighted. If already highlighted, the item is deselected.

     OR

   - **<Shift>**-click on one or more items. If the item was not previously selected, it is added to the list of selected items. If previously selected, it will be deselected.

     OR

   - Click an item near where it overlays another item. The Choose Items to Select dialog displays a list of items near the location point. See Figure 6-28.

     OR

   - <Shift>-click an item near where it overlays another item. The Choose Items to Select dialog displays a list of items near the location point. See Figure 6-28.

     OR

   - Click items to highlight or Click **[Select All]** then Click **[OK]**.
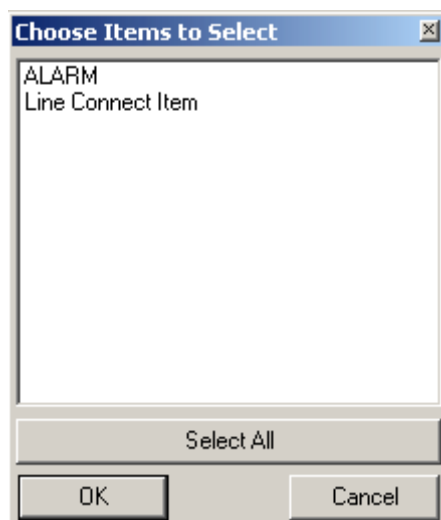
Figure 6-28 Choose Items to Select dialog

   - Click and drag a box across multiple items. All items within the dragged area are selected.

     OR

- Select **Edit > Select All** from the menu. All items in the workspace are selected.

  OR

- Right-click on selected items and select [Select All] from the pop-up menu. All items in the workspace are selected.

  OR

- Press **<Ctrl+A>** items in the workspace are selected.

3. Do one of the following to edit selected items.

- Select an editing toolbar button or menu option.

  OR

- Right-click on the selected items and select an edit operation from the pop-up menu.

  OR

- Move the selected item to a new valid location.

  OR

- **<Ctrl>**-click on an item where the cursor displays with a "plus" (+) sign and drag the item to a new location. The item is copied and placed in the location.

  OR

- Select a selection handle on the selected item, drag the cursor in any direction, and release the mouse button. The item is resized according to the movement of the cursor.

6.7.4 Text Edit Mode

The **Text Edit Mode** button adds text to a function block or ladder logic loop and it edits previously entered text in a text box. It is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To add or edit text in a text box**:

1. Do one of the two following:

- Click the **[Text Edit Mode]** button on the **Graphic Primitives** toolbar.

  OR

- Right-click on a text item and, from the pop-up menu, select **Edit > Text**. The cursor becomes an |-bar when it is over a text item.

2. Place (click) the cursor in the text item to edit.

3. Edit the text as you would using any word processing program.

4. Click outside the item. The text is deselected.

6.7.5 Text

The **Text** button creates a rectangle text item. This option is available in the function block and ladder logic views.

➢ **To create a text item**:

1. Click the **[Text]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Click on the active view where the text is to begin, drag the cursor to create a text item, and release the mouse button. A text box displays with a blinking cursor. Type the desired text.

   Note: If the Multiple Create button is active, the user cannot directly enter text into the newly created text box. Click the Multiple Create button to turn off the feature

6.7.6 Pencil

The **Pencil** button creates freeform items. This option is available in the function block and ladder logic views.

➢ **To create a freeform item**:
1. Click the **[Pencil]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Click on the active view and move the cursor in any direction. The item displays as a dashed line on the screen as you move the cursor.

3. When finished creating the item, double click. The item displays as defined by its Item Attributes.

6.7.7 Line

The **Line** button creates a line that may contain line segments. This option is available in the function block and ladder logic views.

➢ **To create a line**:

1. Click the **[Line]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Click on the active view, release the mouse button, and drag the cursor.

   If the workspace is clicked while the cursor is dragged, the click area becomes a point in the line, know as a segment.

3. Double-click when you are finished creating the line. The line segment displays on the screen.

➢ **To create a straight line segment at a predetermined angle:**

1. Click the **[Line]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Hold **<Shift>**, click on the active view, release the mouse button, and drag the cursor. The line is drawn as a dashed line.

    If the workspace is clicked more than once, each click represents a point added to the line. Each line segment may be drawn at any angle or length.

3. Double-click when you are finished creating the line. The line segments display on the screen.

6.7.8 Arc

The **Arc** button creates an arc. This option is available in the function block and ladder logic views.

➢ **To create an arc**:

1. Click the **[Arc]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

    - Click on the active view, drag the cursor to create an arc, and release the mouse button. The arc displays on the view.

        OR

    - **<Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. An arc is created from a circle in the direction of the mouse.

        OR

    - **<Ctrl>**-click on the active view, drag the cursor in any direction, and release the mouse button. An arc is created in the direction of the cursor and mirrored in the opposite direction.

        OR

    - **<Ctrl + Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. An arc is proportionately created in the direction of the cursor and mirrored in the opposite direction.

6.7.9 Rectangle

The **Rectangle** button creates rectangles, including squares. This option is available in the function block and ladder logic views.

➢ **To create an rectangle**:

1. Click the **[Rectangle]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

   - Click on the active view, drag the cursor in any direction, and release the mouse button. A rectangle is created.

     OR

   - **<Ctrl>**-click on the active view, drag the cursor in any direction, and release the mouse button. A rectangle is created in the direction of the cursor and mirrored in the opposite direction.

➢ **To create an Square**:

1. Click the **[Rectangle]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

   - **<Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. A square is created.

     OR

   - **<Ctrl + Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. A square is created in the direction of the cursor and mirrored in the opposite direction.

6.7.10 Round Rectangle

The **Rounded Rectangle** button creates rectangles, including squares that have rounded corners. This option is available in the function block and ladder logic views.

➢ **To create a rounded rectangle**:

1. Click the **[Rounded Rectangle]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

   - Click on the active view, drag the cursor in any direction, and release the mouse button. A rectangle with rounded corners is created.

     OR

- **<Ctrl>**-click on the active view, drag the cursor in any direction, and release the mouse button. A rectangle with rounded corners is created in the direction of the cursor and mirrored in the opposite direction.

➢ **To create a rounded square:**

1. Click the **[Rounded Rectangle]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

   - **<Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. A square with rounded corners is created.

     OR

   - **<Ctrl + Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. A square with rounded corners is created in the direction of the cursor and mirrored in the opposite direction.

6.7.11 Ellipse

The **Ellipse** button creates an ellipse or a circle. This option is available in the function block and ladder logic views.

➢ **To create an ellipse**:

1. Click the **[Ellipse]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

   - Click on the active view, drag the cursor in any direction, and release the mouse button. An ellipse is created.

     OR

   - **<Ctrl>**-click on the active view, drag the cursor in any direction, and release the mouse button. An ellipse is created in the direction of the cursor and mirrored in the opposite direction.

➢ **To create a circle**:

1. Click the **[Ellipse]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Do one of the following:

   - **<Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. A circle is created.

     OR

   - **<Ctrl + Shift>**-click on the active view, drag the cursor in any direction, and release the mouse button. A circle is created in the direction of the cursor and mirrored in the opposite direction.

6.7.12 Polygon

The **Polygon** button creates a polygon. This option is available in the function block and ladder logic views.

➢ **To create a polygon**:

1. Click the **[Polygon]** button on the **Graphic Primitives** toolbar. The cursor becomes crossbars.

2. Click on the active view, release the mouse button, and drag the cursor in any direction to create the first side of the polygon. Click to anchor the first side, then drag the cursor to create a three sided polygon, click to anchor the point, continue to drag and click as required.

3. Double-click when you are finished creating the polygon. The polygon displays on the screen.

6.7.13 Button

The **[Button]** button creates a button. This option is unavailable in this version of the software.

6.7.14 Edit Item Attributes

The **Edit Item Attributes** button displays a dialog of attributes for the **Pen**, **Brush**, **Background**, **Button**, **Text**, **Font**, **Frame**, **Selection**, **Grid Snap**, and **Paper** tabs when no items are selected. When an item is selected, only the tabs specific to that item are displayed. Most tabs have either a Preview box or a Sample box. For items that are selected in the tab, the Preview or Sample box displays the result of the selections. If no items are selected, nothing displays in the Preview or Sample box.

The user can change the tab parameters that display on the Item Attributes dialog. Changes do not apply to the configuration until **[OK]** is clicked. All changes made in the dialog are cancelled if **[Cancel]** is clicked.

Item Attributes is also an **Edit** menu option. This option is available in the function block and ladder logic views.

Sections 6.5.14.1 through 6.5.14.11 describe the setting of individual attributes.

➢ **To edit item attributes**:

1. Do one of the following:

   • Click the **[Edit Item Attributes]** button on the Graphic Primitives toolbar.

   OR

   • Right-click on the workspace and select **Edit Item Attributes** from the pop-up menu.

   The Item Attributes dialog is displayed.

> **Note: If items (function blocks, ladder logic elements, and connection lines) are selected first, the tabs included only those attributes that relate to the item.**

2. Make necessary changes to the tab. Details on each tab are discussed in the following sections.

3. Click **[OK]**. The changes for the selected items display in the configuration.

6.7.14.1 Custom Colors

Most **Item Attributes** tabs have color attributes. This section discusses the Colors dialog and provides information on creating custom colors. See Figure 6-29.
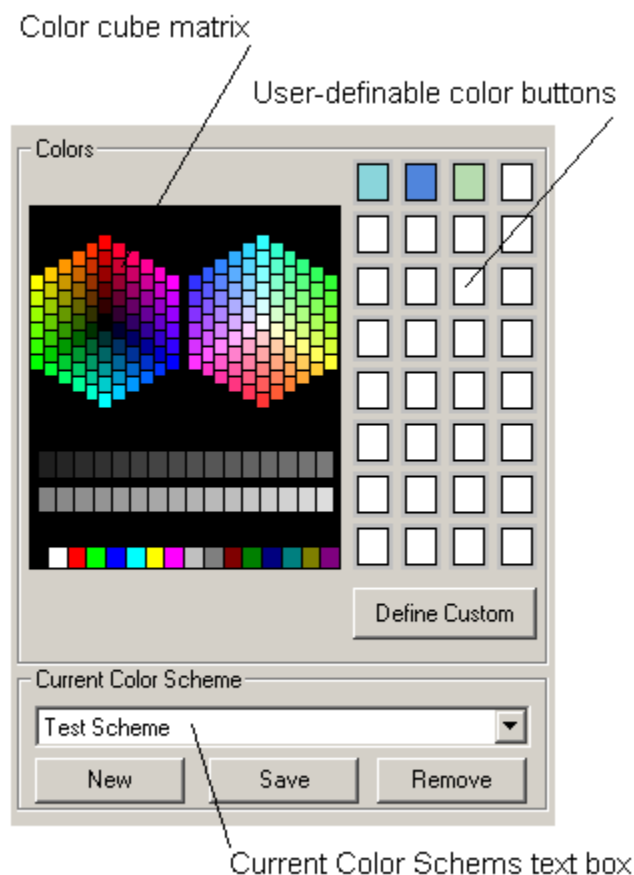
Figure 6-29 Colors attribute

The left side of the Colors attribute contains a color cube matrix. The right side contains 32 user definable color buttons. The **[Define Custom]** colors button is active if the computer's graphic controller is set for a color mode that displays more that 256 colors and supports palettes. It is NOT active in a 256 colors mode. Reconfigure the graphics mode to a mode other than 256 colors to enable the **[Define Custom]** function.

➢ **To create a custom color scheme**:

1. Select **[New]** in the Color dialog.

2. Do the following for each custom color button desired.

- Select one of the 32 custom color buttons.

- Right-click a color from the color cube matrix or select **[Define Custom]**. Using the **Define Custom** color function is defined below. Repeat as needed for each user defined color button required.

3. Click **[Save]**. The **Save Scheme** dialog displays.

4. Enter a name for the new scheme.

5. Click **[OK]**. The color scheme is saved.

➢ **To define a custom color as part of a custom color scheme**:

1. Select one of the 32 custom color buttons.

2. Select **[Define Custom]** in the Color dialog. The Define Custom Color dialog displays. See Figure 6-30.
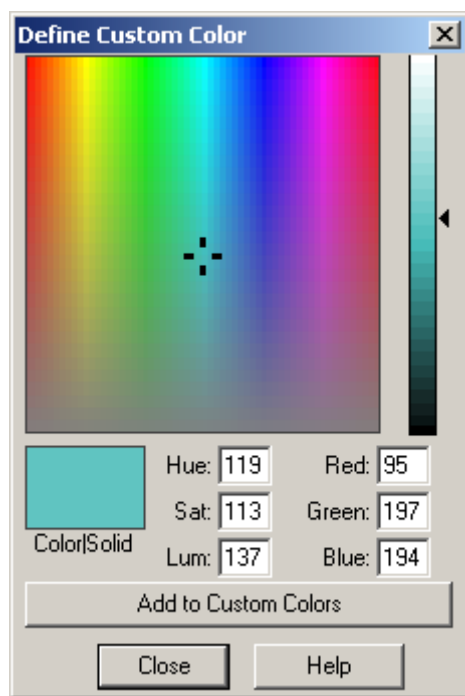

Figure 6-30 Define Custom Color dialog

3. Select a color using the mouse to position the crosshairs and luminance slider. The color displays in the Color|Solid display box.

4. Click **[Add to Custom Colors]**.

5. Click **[Close]**. The color is added to the selected color button.

6. Follow previous instructions to save the scheme.

6.7.14.2 Pen tab

Pen refers to the border of user-drawn graphic items. The user can view and change the current pen color, and select the style, weight, end cap, and joints of the pen. See Figure 6-31. The Preview box is inactive.
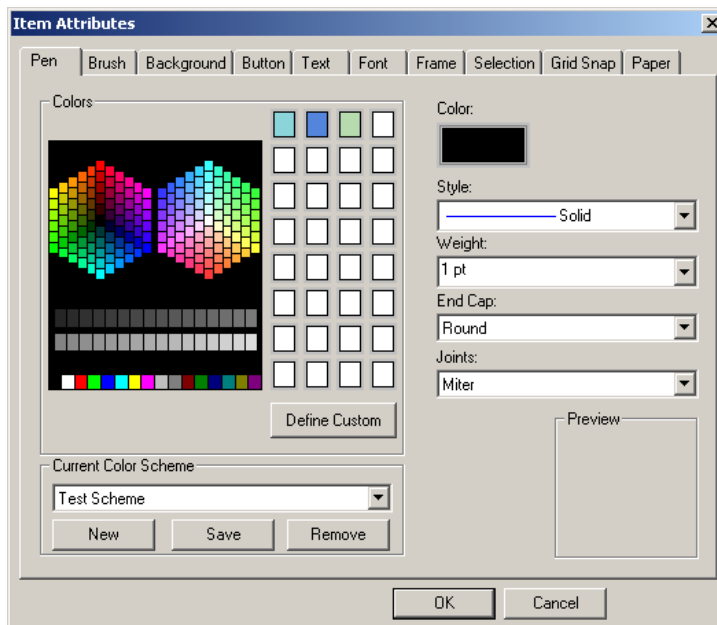

Figure 6-31 Item Attributes dialog – Pen tab

➢ **To change the pen color**:

1. Select the **Color** box

2. Select a color from the color cube matirix or from a user-defined color button. The color in the Color box will change to match the selection.

3. Click **[OK]**. The new Pen color will be saved.

➢ **To change the pen style**:

1. Click the drop down arrow in the Style box

2. From the drop down list, select a style. The new style displays in the Style box.

3. Click **[OK]**. The new Pen style will be saved.

   Note: Pen style refers to the type of line (e.g. solid, dotted etc.)

➢ **To change the pen weight**:

1. Click the drop down arrow in the Weight box

2. From the drop down list, select a weight. The new weight displays in the Weight box.

3. Click **[OK]**. The new Pen weight will be saved.

   Note: Pen Weight refers to the thickness of a line.

> ➢ **To change the end cap shape**:

1. Click the drop down arrow in the End Cap box.

2. From the drop down list, select an end cap type. The new end cap type displays in the End Cap box.

3. Click **[OK]**. The new Pen end cap shape will be saved.

   Note: End Caps refer to the shape at the end of a line. End caps are viewed best with thick lines.

> ➢ **To change the joint shape**:

1. Click the drop down arrow in the Joints box.

2. From the drop down list, select a joint type. The new joint type displays in the Joints box.

3. Click **[OK]**. The new Pen joint type will be saved.

   Note: Joints refer to the shape of the corners of rectangles and junctions of lines.

6.7.14.3 Brush tab

Brush refers to the fill of user-created graphic item. The user can view and change the current brush color, and select a pattern for the brush. See Figure 6-32. The Preview box is inactive.
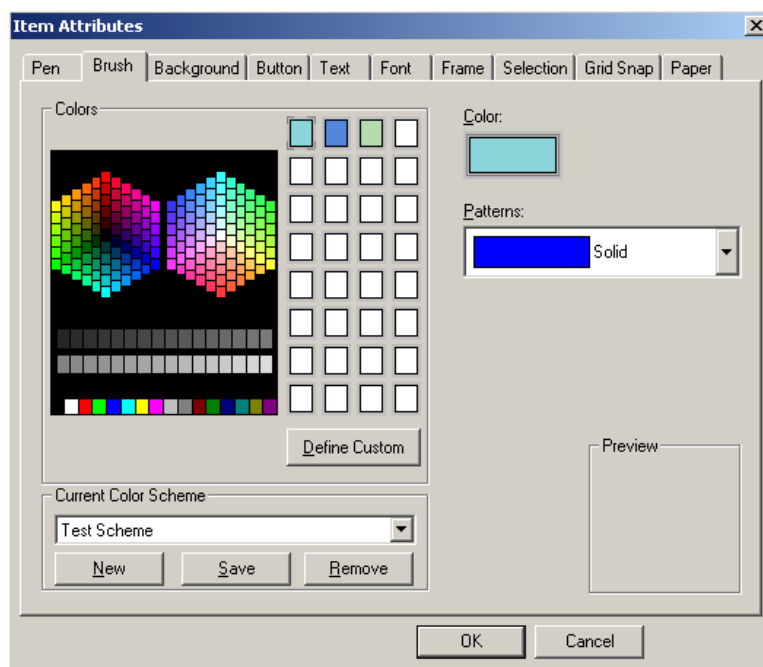

Figure 6-32 Item Attributes dialog – Brush tab

> ➢ **To change the brush color**:

1. Select the **Color** box.

2. Select a color from the color cube matrix or from a user-defined color button. The color in the Color box will change to match the selection.

3. Click **[OK]**. The new brush color will be saved.

➢ **To change the pattern style**:

1. Click the drop down arrow in the Patterns box.

2. From the drop down list, select a pattern type. The new pattern type displays in the Patterns box.

3. Click **[OK]**. The new Pattern type will be saved.

> Note: Patterns refer to the fill background of a graphic item.

6.7.14.4 Background tab

Background refers to the fill of a user-created graphic item whose brush or pen is not solid. The user can view and change the current background color, and select an opaque or transparent mode. The Preview box is inactive. See Figure 6-33.
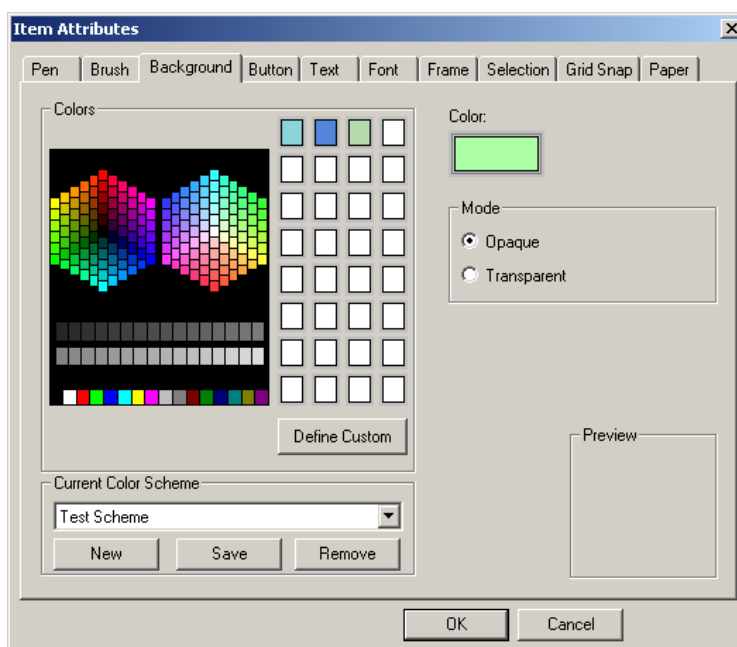

Figure 6-33 Item Attributes dialog – Background tab

➢ **To change the background color**:

1. Select the **Color** box.

2. Select a color from the color cube matrix or from a user-defined color button. The color in the Color box will change to match the selection.

3. Click **[OK]**. The new background color will be saved.

➢ **To change the background mode**:

1. Click the appropriate radio button

2. Click **[OK]**. The new background mode will be saved.

6.7.14.5 Button tab

This tab is not applicable since the button function is not available

6.7.14.6 Text tab

Text refers to the characters used in user-created text items. The user can view and change the current color of a text item, and select a background color and mode, and choose horizontal or vertical text alignment. An example is displayed in the Sample box. See Figure 6-34. Changes made will affect all future text items. To change an existing text item, first select the item, and then open the Item Attributes dialog. Changes will appear in the selected item as well as future items.
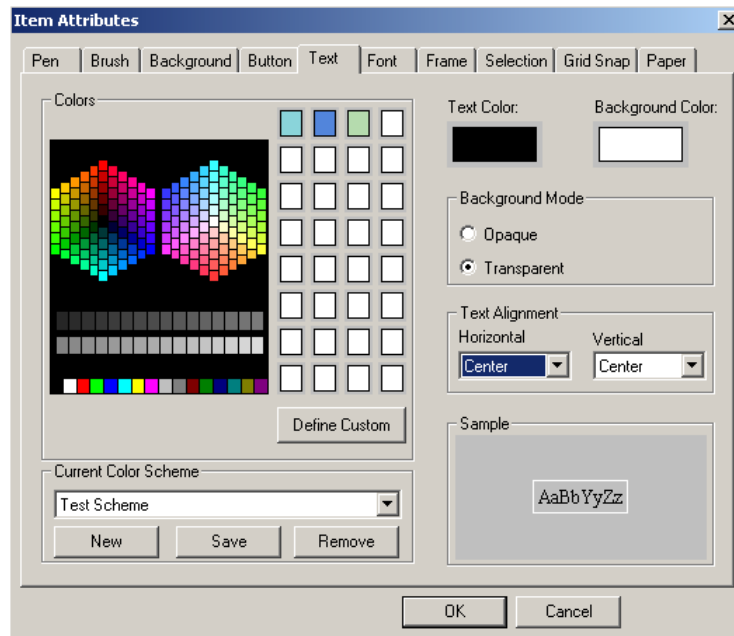

Figure 6-34 Item Attributes dialog – Text tab

➢ **To change the text or background color**:

1. Select the appropriate **Color** box.

2. Select a color from the color cube matrix or from a user-defined color button. The color in the Color box will change to match the selection.

3. Click **[OK]**. The new background color will be saved.

Note: The text color refers to the fill color of a text item. The background color refers to the area behind the text characters.

➢ **To change the background mode**:

1. Click the appropriate radio button.

2. Click **[OK]**. The new background mode will be saved.

Note: Background mode refers to the display status of the background color. It can be opaque where the background color is visible or transparent where the background color is invisible.

> ➢ **To align text**:

   1.   Click on the down arrow of the Horizontal box.

   2.   From the drop down list select an option. The selected option displays in the Horizontal box.

   3.   Click on the down arrow on the Vertical box.

   4.   From the drop down list select an option. The selected option displays in the Vertical box.

   Note: Text alignment refers to the vertical and horizontal alignment of text within a text item.

6.7.14.7 Font tab

The user can select the font, font style, size, and effect of text in a text item. An example is displayed in the Sample box. See Figure 6-35.
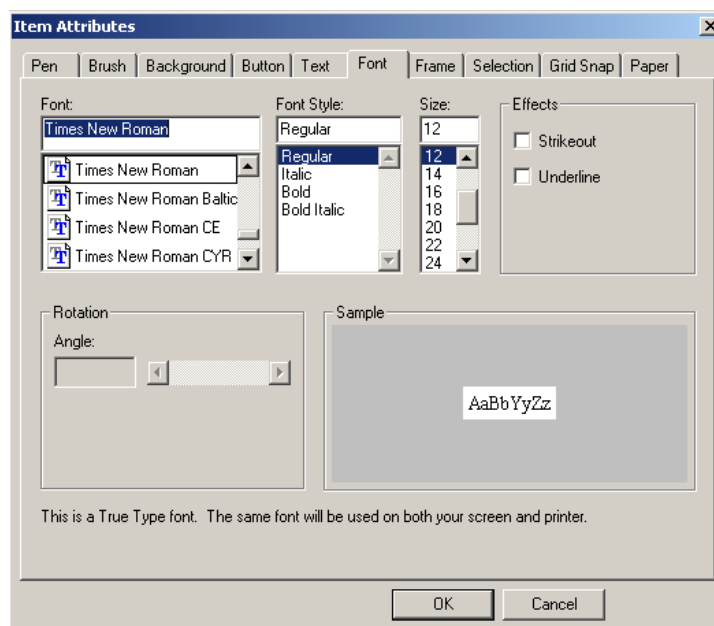
Figure 6-35 Item Attributes dialog – Font tab

> ➢ **To change the font**:

   1.   Scroll through the Font list box and select the desired font.

   2.   Click **[OK]**. The new font will be saved.

> ➢ **To change the font style**:

   1.   Select the desired font style from the Font Style list box

   2.   Click **[OK]**. The new font style will be saved.

> ➢ **To change the font size**:

   1.   Select the desired size from the Size list box

   2.   Click **[OK]**. The new font size will be saved.

Note: Rotation refers to placing text at an angle. This option is not available in this version of software.

6.7.14.8 Frame tab

The user can view and change the current color of the text frame of a text item, and select a text frame color, background color, and mode, style and weight of a frame. An example of the output is displayed in the Sample box. See Figure 6-36.
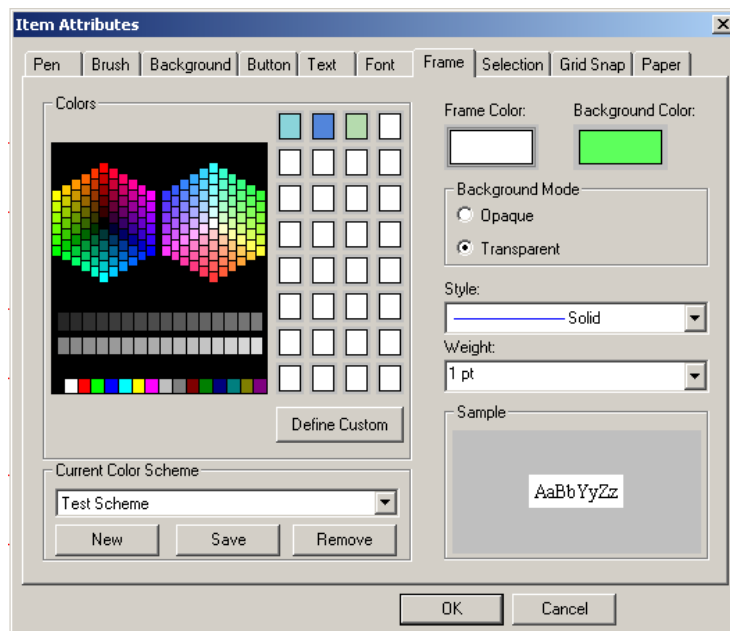
Figure 6-36 Item Attributes dialog – Frame tab

➢ **To change the frame or background color**:

1.   Select the Appropriate **Color** box.

2.   Select a color from the color cube matrix or from a user-defined color button. The color in the Color box will change to match the selection.

3.   Click **[OK]**. The new color will be saved.

Note: The frame color refers to the color of the frame of the text item. The background color refers to the fill color of the text item.

➢ **To change the background mode**:

1.   Click the appropriate radio button.

2.   Click **[OK]**. The new background mode will be saved.

Note: The Background Mode refers to the display status of the fill of the text item. It can be opaque (visible) or transparent (invisible).

> ➢ **To change the frame style**:

   1. Click the drop down arrow on the Style list box.

   2. From the drop down list, select a style. The new style displays in the Style box.

   3. Click **[OK]**. The new frame style will be saved.

   Note: Style refers to the type of line for the outside of the text item.

> ➢ **To change the frame weight**:

   1. Click the drop down arrow on the Weight list box.

   2. From the drop down list, select a line weight. The new line weight displays in the
       Weight box.

   3. Click **[OK]**. The new line weight will be saved.

   Note: Weight refers to the thickness of the lines that create the frame.

6.7.14.9 Selection tab

The user can view and change the current color of the outline that indicates a selected item
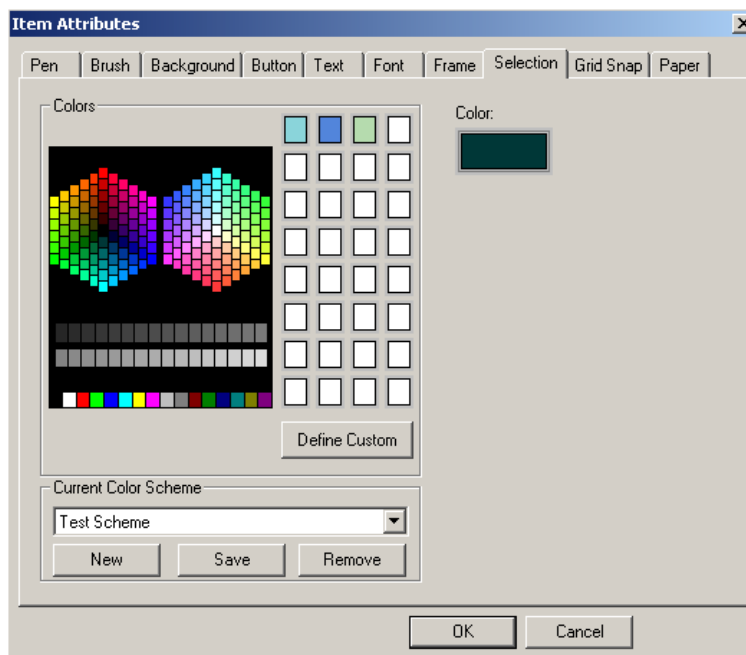in the Selection tab. See Figure 6-37.

Figure 6-37 Item Attributes dialog – Selection tab

> ➢ **To change the frame or background color**:

   1. Select the **Color** box

   2. Select a color from the color cube matrix or from a user-defined color button. The color
       in the Color box will change to match the selection.

   3. Click **[OK]**. The new color will be saved.

6.7.14.10 Grid Snap tab

Grid Snap is the placement of an item when it is created. The user can place it in one area, but if the grid snap is active, the item will snap to the nearest grid point. The user can select a color for the grid, enable grid snap, show the grid points, select spacing and origin of the grid, and select a unit of measure for the grid. See Figure 6-38.
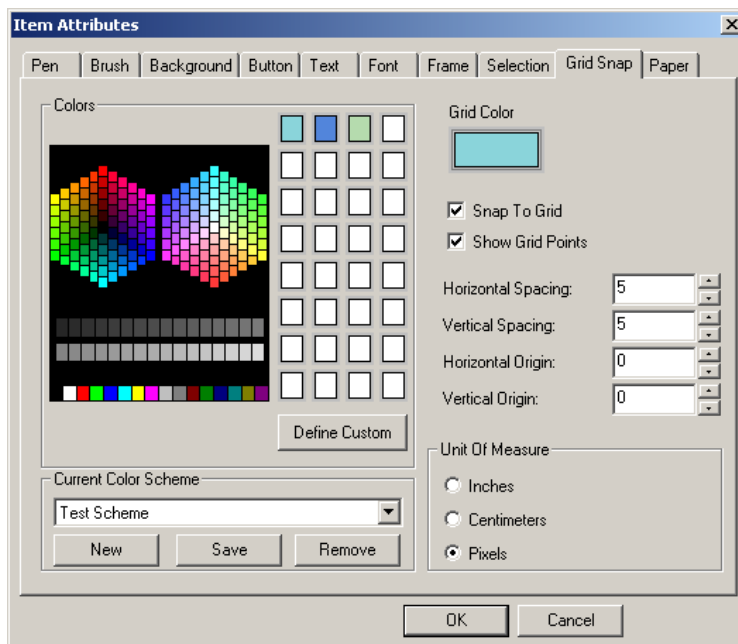
Figure 6-38 Item Attributes dialog – Grid Snap tab

➢ **To change the grid color**:

1. Select the **Color** box.

2. Select a color from the color cube matrix or from a user-defined color button. The color in the Color box will change to match the selection.

3. Click **[OK]**. The new color will be saved.

   Note: The grid color refers to the color of the grid points when the grid is visible.

➢ **To toggle grid snap on and off**:

1. Click the Snap to Grid check box.

2. Click **[OK]**. The change will be saved.

➢ **To toggle the grid on and off**:

1. Click the Show Grid Points check box.

2. Click **[OK]**. The change will be saved.

➢ **To change horizontal and vertical spacing**:

1. Click the Up or Down arrows to change the number in the list box or enter a number in the box.

2. Click **[OK]**. The change will be saved.

Note: The horizontal and vertical spacing refers to the spacing between grid points.

➢ **To change horizontal and vertical origin**:

1. Click the Up or Down arrows to change the number in the list box or enter a number in the box.

2. Click **[OK]**. The change will be saved.

Note: The horizontal and vertical origin refers to the horizontal and vertical offset from the top left hand corner of the workspace where the grid starts.

➢ **To change the unit of measure**:

1. Click the radio button next to the appropriate unit.

2. Click **[OK]**. The change will be saved.

Note: The unit of measure refers to the units used to describe the horizontal and vertical spacing and the horizontal and vertical offset when numbers are entered in the relative list boxes.

6.7.14.11 Paper tab

The user can select the color of the paper (color of the workspace), the background color, and unit of measure for the paper. A sample of the paper color is shown in the Sample box. See Figure 6-39.
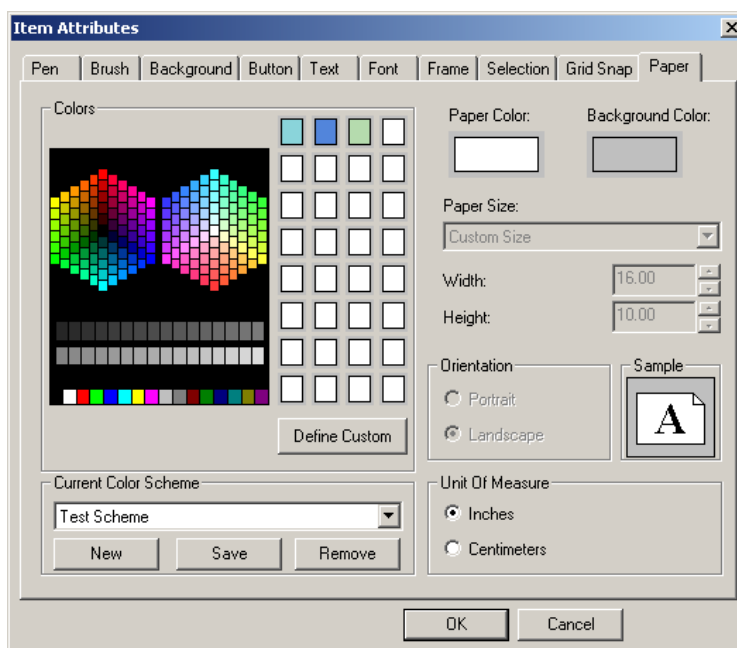

Figure 6-39 Item Attributes dialog – Paper tab

➢ **To change paper color**:

1. Select the appropriate **Color** box.

2. Select a color from the color cube matrix or from a user-defined color button. The color in the Color box will change to match the selection.

3. Click **[OK]**. The new color will be saved.

➢ **To change the unit of measure**:

1. Click the radio button next to the appropriate unit.

2. The paper width and height will display in the units selected.

6.7.15 Zoom Page

The **Zoom Page** button toggles between current view and the page view. This function is also an option in the **View** menu. See the "Zoom In" section in Chapter 9 Using the View Menu. This option is available in the function block and ladder logic views.

➢ **To zoom in/out**:

1. Click the **Zoom Page** button on the **Graphic Primitives** toolbar.

2. The workspace toggles between the current view and the page view.

6.7.16 Zoom Area

The **Zoom Area** button zooms in to a selected area of the screen. This function is also an option in the **View** menu. See the "Zoom Area" section in Chapter 9 Using the View Menu. This option is available in the function block and ladder logic views.

➢ **To zoom an area**:

1. Click the **Zoom Area** button on the **Graphic Primitives** toolbar. The cursor becomes a dotted box attached to a magnifying glass.

2. Do one of the following.

   • Click the view at one corner of the workspace area to be enlarged, drag the cursor over the area, and release the mouse button. The view displays the selected area.

   OR

   • Click the left mouse button in the center of the workspace area to be enlarged. Each left click will increase the zoom. Each right click will decrease the zoom.

6.8 Using the Graphic Operations Toolbar

The **Graphic Operations** toolbar (i.e. automatic placement), shown in Figure 6-40, is used to reposition overlapping graphic items, rotate or flip graphic items, and group and ungroup graphic items.
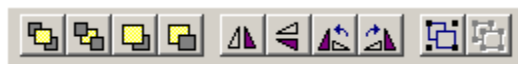
Figure 6-40 Graphic Operations toolbar

6.8.1 Send to Front

The **Send to Front button** moves a selected item to the front of two or move overlapping graphic symbols/text in the view. Send to Front is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To send an item to the front**:

1. Select an item to send to the front.

2. Click the **[Send to Front]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Send/Move > Send to Front**. The item moves to the front of other items in the view.

6.8.2 Send to Back

The **Send to Back button** moves a selected item to the back of two or more overlapping graphic symbols/text in the view. Send to Back is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To send an item to the back**:

1. Select an item to send to the front.

2. Click the **[Send to Back]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Send/Move > Send to Back**. The item moves to the back of other items in the view.

6.8.3 Move Forward

The **Move Forward** button moves a selected item forward one level when there are two or move overlapping graphic symbols/text in the view. Move Forward is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To move an item forward**:

1. Select an item to move forward.

2. Click the **[Move Forward]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Send/Move > Move Forward**. The item moves forward one level in the view.

6.8.4 Move Back

The **Move Back** button moves a selected item back one level when there are two or more overlapping graphic symbols/text in the view. It is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To move an item back**:

1. Select an item to move back.

2. Click the **[Move Back]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Send/Move > Move Back**. The item moves back one level in the view.

6.8.5 Flip Horizontal

The **Flip Horizontal** button flips a selected item from left to right. Flip Horizontal is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To flip an item horizontally**:

1. Select an item to flip horizontally.

2. Click the **[Flip Horizontal]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Flip/Rotate > Flip Horizontal**. The item flips horizontally.

6.8.6 Flip Vertical

The **Flip Vertical** button flips a selected item from top to bottom. Flip Vertical is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To flip an item vertically:**

1. Select an item to flip vertically.

2. Click the **[Flip Vertical]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Flip/Rotate > Flip Vertical**. The item flips vertically.

6.8.7 Rotate Left

The **Rotate Left** button rotates a selected item counterclockwise. Rotate Left is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To rotate an item to the left**:

1. Select an item to rotate counterclockwise.

2. Click the **[Rotate Left]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Flip/Rotate > Rotate Left**. The item rotates counterclockwise.

6.8.8 Rotate Right

The **Rotate Right** button rotates a selected item clockwise. Rotate Right is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To rotate an item to the right**:

1.   Select an item to rotate clockwise.

2.   Select the **[Rotate Right]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Flip/Rotate > Rotate Right**. The item rotates clockwise.

6.8.9 Group

The **Group** button groups two or more items into one item. Group is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To group two or more items**:

1.   Select the items to group.

2.   Click the **[Group]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Group**. The items are grouped.

6.8.10 Ungroup

The **Ungroup** button separates a grouped item into one or more individual items. Ungroup is also a pop-up menu option. This option is available in the function block and ladder logic views.

➢ **To ungroup a grouped item**:

1.   Select the grouped item.

2.   Select the **[Ungroup]** button on the **Graphic Operations** toolbar or right-click on the item, and from the pop-up menu, select **Ungroup**. The items are separated into individual items.

6.9 Using the Alignment Toolbar

The **Alignment** toolbar, shown in Figure 6-41, aligns two or more user created graphic items. Function blocks and ladder logic symbols cannot be aligned, flipped or rotated using these tools. The toolbar also includes grid and snap buttons.

Figure 6-41 Alignment toolbar

Items are aligned according to the last item selected. The last item selected is the dominant item. The remaining selected items are non-dominant items. The dominant item has solid selection handles. Non-dominant items have hollow selection handles.

6.9.1 Align Left

The **Align Left** button aligns selected items to the left side of the dominant item. Align Left is also a pop-up menu option. This option is available in the function block and ladder logic views.

> ➢ **To align items on their left sides**:

1. Select two or more items to align.

2. Click the **[Align Left]** button on the **Alignment** toolbar or right-click on the item, and from the pop-up menu, select **Alignment > Align Left**. The items are aligned to the left side of the dominant item.

6.9.2 Align Right

The **Align Right** button aligns selected items to the right side of the dominant item. Align Right is also a pop-up menu option. This option is available in the function block and ladder logic views.

> ➢ **To align items on their right sides**:

1. Select two or more items to align.

2. Click the **[Align Right]** button on the **Alignment** toolbar or right-click on the item, and from the pop-up menu, select **Alignment > Align Right**. The items are aligned to the right side of the dominant item.

6.9.3 Align Top

The **Align Top** button aligns selected items to the top side of the dominant item. Align Top is also a pop-up menu option. This option is available in the function block and ladder logic views.

➤ **To align items on the top**:

1. Select two or more items to align.

2. Click the **[Align Top]** button on the **Alignment** toolbar or right-click on the item, and from the pop-up menu, select **Alignment > Align Top**. The items are aligned to the top side of the dominant item.

6.9.4 Align Bottom

The **Align Bottom** button aligns selected items to the bottom side of the dominant item. Align Bottom is also a pop-up menu option. This option is available in the function block and ladder logic views.

➤ **To align items on the bottom**:

1. Select two or more items to align.

2. Click the **[Align Bottom]** button on the **Alignment** toolbar or right-click on the item, and from the pop-up menu, select **Alignment > Align Bottom**. The items are aligned to the bottom side of the dominant item.

6.9.5 Toggle Grid Snap

The **Toggle Grid Snap** button enables or disables the currently configured grid snap settings. This option is also available on the **Grid Snap** tab of the **Item Attributes** dialog.   This option is available in the function block and ladder logic views.

➤ **To toggle the grid snap on and off**:

Click the **[Toggle Grid Snap]** button on the **Alignment** toolbar. Grid snap is active if the button appears pressed in.

6.9.6 Show Grid

The **Show Grid** button toggles the display of grid points in the view. This option is also available on the **Grid Snap** tab of the **Item Attributes** dialog.   This option is available in the function block and ladder logic views.

➤ **To toggle the grid points on and off**:

Click the **[Show Grid]** button on the **Alignment** toolbar. The grid displays if the button appears pressed in.

6.9.7 Grid Snap Attributes

The **Grid Snap Attributes** button displays the **Grid Snap** tab of the **Item Attributes** dialog. The function of this dialog is described in the **Item Attributes** section. This option is available in the function block and ladder logic views.

➢ **To change grid snap attributes**:

Click the **[Grid Snap Attributes]** button on the **Alignment** toolbar. The Grid Snap tab of the Item Attributes displays.

Chapter 7 - Using the File Menu

Use the **File** menu, shown in Figure 7-1, to create a new configuration, open an existing configuration, save a configuration and print a configuration or an individual loop. It is also used to download a configuration to a controller and to upload a configuration from a controller. These and other features are discussed in this chapter.

File		**File**	
New...	Ctrl+N	New...	Ctrl+N
New FCO...		New FCO...	
Open...	Ctrl+O	Open...	Ctrl+O
Close		Close	
Delete...		Delete...	
Save	Ctrl+S	Save	Ctrl+S
Save As...		Save As...	
Upload		Upload	
Download	▶	Download	▶
Compare Files	▶	Compare Files	▶
Upgrade to..	▶	Upgrade to..	▶
Print Setup...		Print	Ctrl+P
Screen to Clipboard		Print Preview	
Image to Clipboard		Print Setup...	
		Print Options	▶
1 Reactor65_240LL.353		Screen to Clipboard	
2 Reactor65.353		Image to Clipboard	
3 CF353_125.353		1 Reactor65_240LL.353	
4 CF353_109.353		2 Reactor65.353	
Exit		3 CF353_125.353	
		4 CF353_109.353	
		Exit	

File Menu, Station View   **File Menu, Loop View**

Figure 7-1 File menus

7.1 New

New creates a new configuration. It starts with a blank station view. This option is available in the station, function block, ladder logic, and all report views.

➢   **To create a new configuration**:

   1.   Select **File > New** or **<Ctrl+N>**. The Database Revision dialog opens. See Figure 7-2.
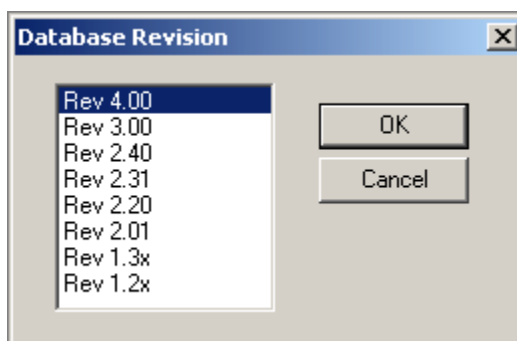
Figure 7-2 Database Revision dialog

2. Select the database revision of the controller(s) to which the configuration will be downloaded.

3. Select **[OK]**. A new station view appears.

7.2 New FCO

New FCO creates a new configuration using a preconfigured Factory Configured Option (FCO). This option is available in all views. FCOs are described and illustrated in the controller User's Manual.

➢ **To create a new FCO configuration**:

1. Select **File > New FCO**. The Database Revision dialog opens.

2. Select the database revision of the controller(s) to which the configuration will be downloaded.

3. Click **[OK]**. The Factory Configured Options dialog displays. See Figure 7-3.
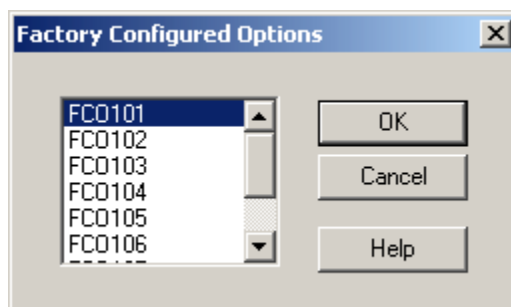
Figure 7-3 Factory Configured Options

4. Select a Factory Configured Option.

5. Click **[OK]**. A new station workspace appears with the selected preconfigured factory option.

7.3 Open

This option opens an existing configuration. Open is also a Standard toolbar option as described in Chapter 6 Using the Toolbars. A graphical configuration file contains a configuration as it existed when it was last edited and saved. The file will open in the station view. This option is available in the station, function block, ladder logic, and all report views.

➢ **To open a file**:

1. Select **File > Open** or press **<Ctrl+O>**. The Select Database File dialog displays for opening a configuration. See Figure 7-4.
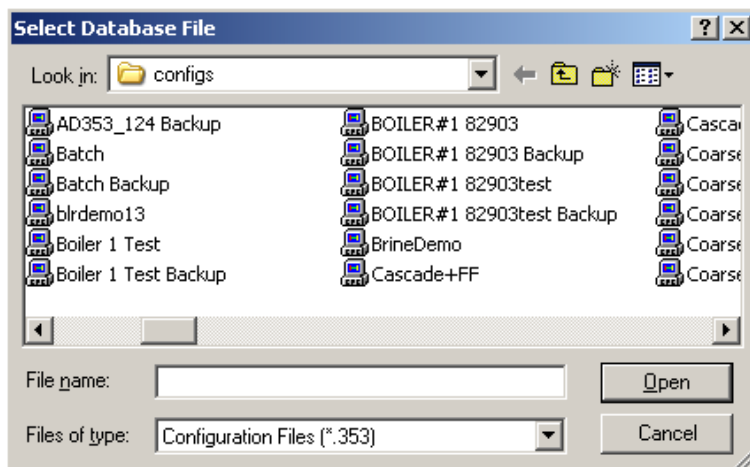
Figure 7-4 Select Database File dialog

2. Select a Configuration (.353) file from the dialog.

3. Click **[Open]**. The selected configuration will open at the station view. You can also double click on the file name to open the file.

7.4 Close

This option closes the active configuration. This option is available in the station, function block, ladder logic, and all report views.

➢ **To close a configuration**:

Select **File > Close**. If you have saved the configuration, it will close.

If you have not saved the configuration, the dialog in Figure 7-5 appears. Click **[Yes]** to save and close the configuration – see the Note below; click **[No]** to close the configuration without saving it; or click **[Cancel]** to cancel the Close operation and return to the configuration.
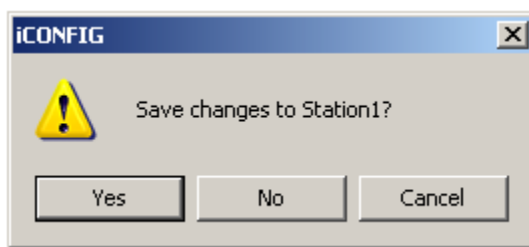
Figure 7-5 Save file warning message.

Note: If you did not save a new configuration, the Select Database dialog will be displayed so that you can save it as different name. Otherwise the file will be saved as the current file name.

7.5 Delete

This option deletes a configuration file. Both the .353 and .V3C files are deleted. **Delete** is also a key on the keyboard. This option is available in the station, function block, ladder logic, and all report views.

➢ **To delete a file**:

1. Select **File > Delete.** The Select Database File dialog displays for deleting a configuration. See Figure 7-6.
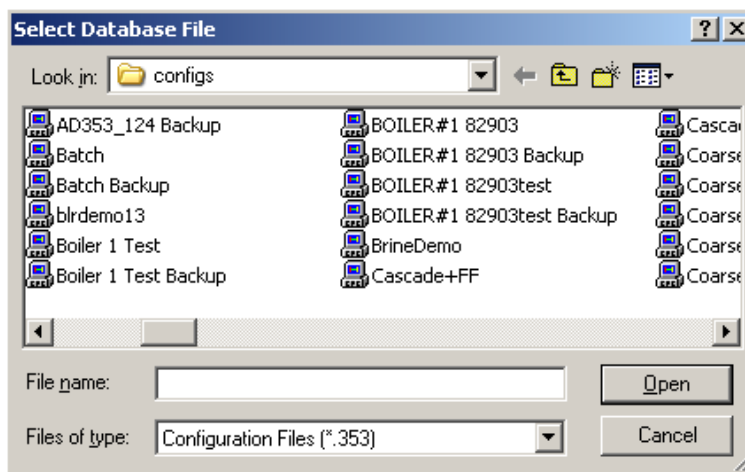
Figure 7-6 Select Database File dialog

2. Select a Configuration (.353) file name from the dialog to delete.

3. Click **[Open]**. You can also double-click on the file name.   A confirm deletion dialog message will display. See Figure 7-7.
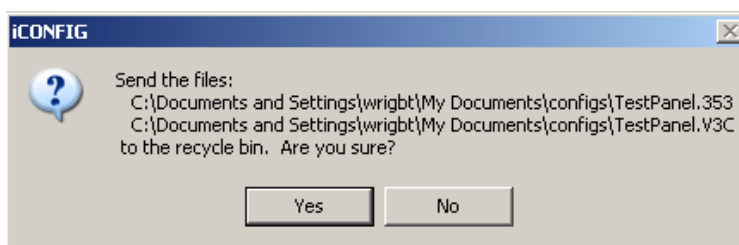
Figure 7-7 Confirm deletion message

4.   Select **[Yes]**. Files are deleted.

7.6 Save

This option saves the active configuration. For each configuration, i|config™ saves a graphical file (.353) and a database file (.V3C). **Save** is also a **Standard** toolbar button. This option is available in the station, function block, ladder logic, and all report views.

➢   **To save a configuration**:

1.   Select **File > Save** or press **<Ctrl+S>**. If the configuration was previously saved, it will save immediately and the save operation is complete. If not, i|config will open the Select Database File dialog. See Figure 7-8.
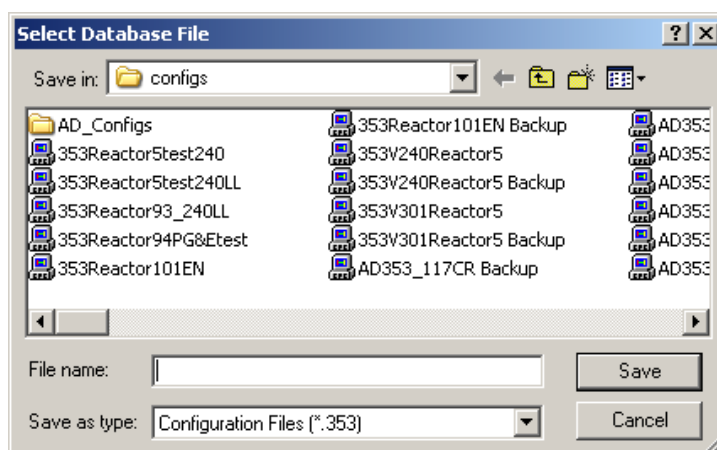
Figure 7-8 Select Database File dialog

2.   Type a new file name in the File name text box.

3.   Click **[Save]**. The selected configuration will be saved as the name entered in the File name text box.

7.7 Save As

This option saves the active configuration with a new file name. For each configuration, i|config saves a graphical file (.353) and a database file (.V3C). This option is available in all views.

➢ **To save a configuration with a new file name**:

1. Select **File > Save As**. The Select Database File dialog will display. See Figure 7-9.
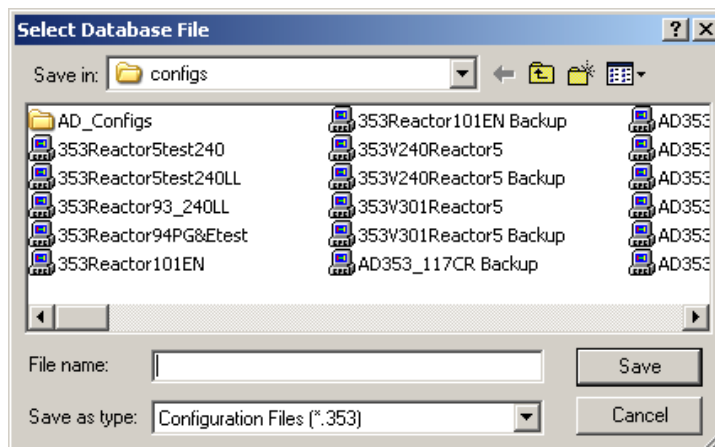
Figure 7-9 Select Database File dialog

2. Type a new file name in the File name text box.

3. Click **[Save]**. The selected configuration will be saved as the name entered in the File name text box.

7.8 Upload

Upload transfers a configuration from the controller (station) to the computer. The computer and controller communication ports must be set correctly to upload a configuration. See Chapter 5 Communicating with the Controller for detailed information on Port Configuration and for more information on uploading a configuration. This option is available all views.

➢ **To upload a configuration**:

1. Select **File > Upload.** The Station Selection dialog will display to enter or confirm communication settings. See Figure 7-10.

2. Select the communication port from the Port drop down menu.

3. Select Configure Port, if necessary, to set communication options.

4. Click **[OK]**. The configuration database will upload and merge with the graphical file on the computer. If the database can not merge with a graphic file, i|config will request a file name in order to save a new graphic file that will be created.
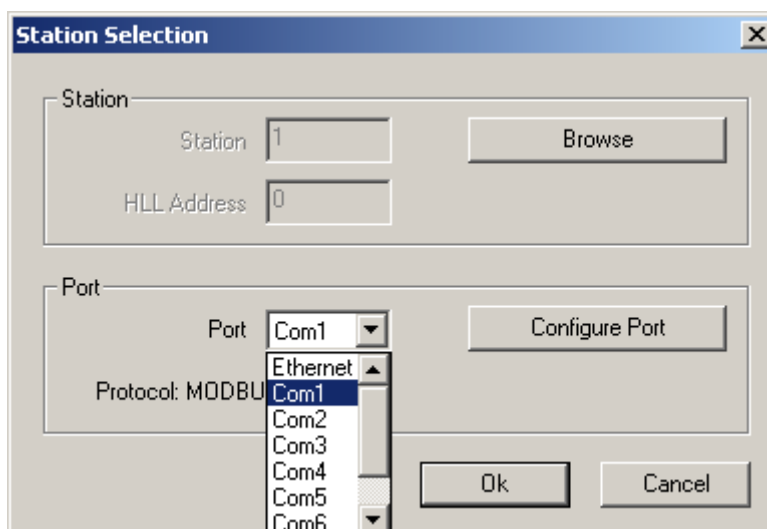
Figure 7-10 Station Selection dialog

7.9 Download

Download transfers a configuration from the computer to the controller (station). The computer and controller communication ports must be set correctly to download a configuration. See Chapter 5 Communicating with the Controller for detailed information on Port Configuration and for more information on downloading a configuration. You can download the current (active) configuration or download a configuration from a file; see Figure 7-11. This option is available in the station, function block, ladder logic, and all report views.
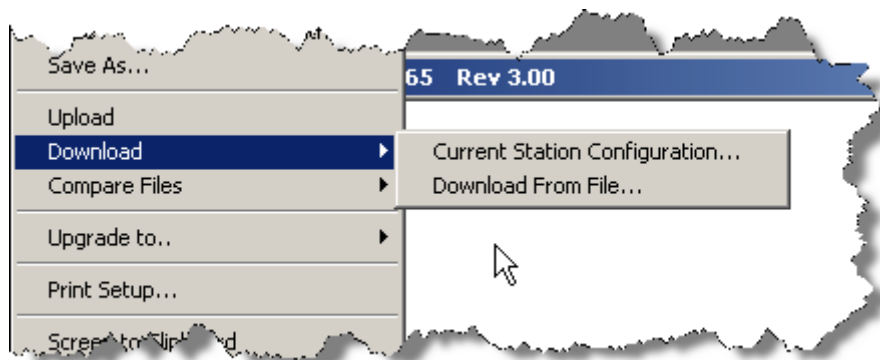
Figure 7-11 Download configuration selections

➢ **To download the current configuration**:

See Section 5.3 Downloading to the Controller.

➢ **To download from a file**:

See Section 5.3.3 Downloading from a File.

7.10 Compare Files

Use **Compare Files** to compare a selected configuration file to a second configuration file. See Figure 7-12.
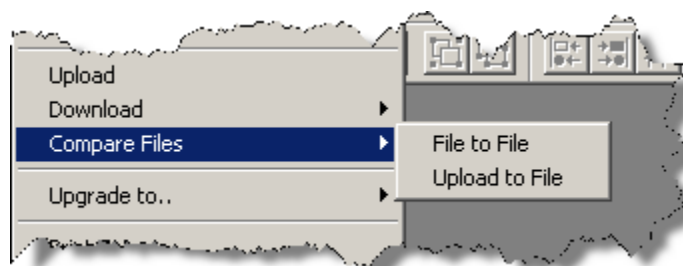
Figure 7-12 Compare Files Options

➢ **To compare two local[9] configurations (File to File)**:

1. Select **File > Compare Files > File to File**. The Select Database File to Compare opens. See Figure 7-13.
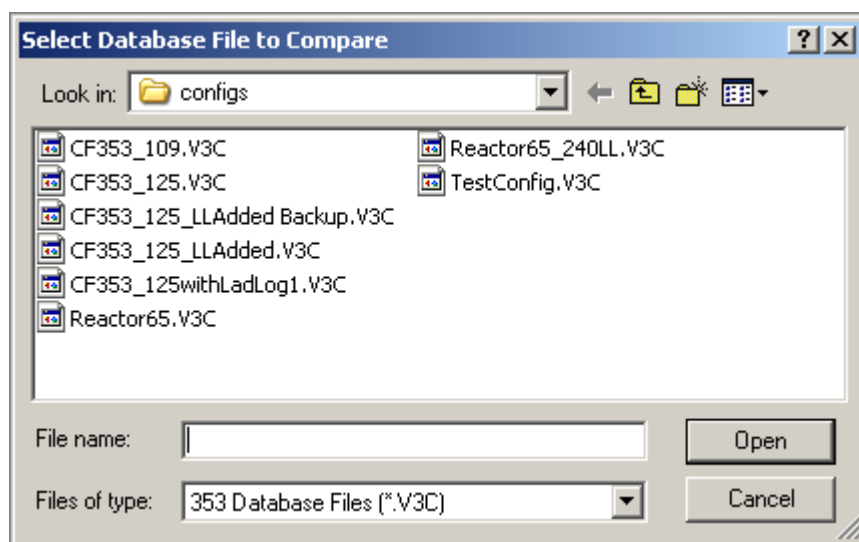
Figure 7-13 Select Database File to Compare

2. Select a file to compare and click **[Open]**. The dialog in Figure 7-13 again appears.

3. Select the file to compare to and click **[Open]**. The result of the comparison is displayed: The two files are identical! or The two files are different!

---

[9] Local refers to a configuration stored on the PC.
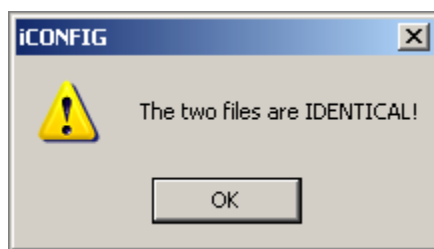
➢ **To compare a local file to an uploaded file (Upload to File)**:

1. Select **File > Compare Files > Upload to File**. The Station Selection dialog appears. See Figure 7-14.
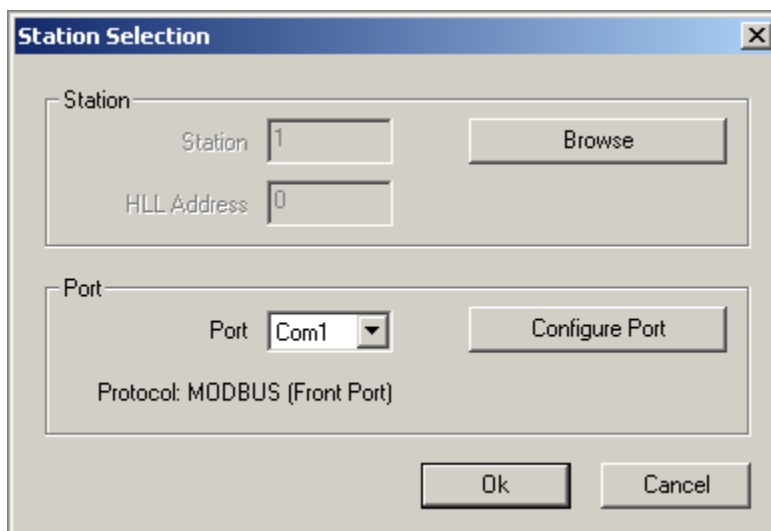
Figure 7-14 Station Selection dialog

2. Configure the communication ports as described in Chapter 5 Communicating with the Controller.

3. Browse to the station from which the configuration will be uploaded.

4. Click **[OK]**. The Select Database File to Compare dialog opens.

5. Select the file to compare to and click **[Open]**. The result of the comparison is displayed: The two files are identical! or The two files are different!

7.11 Upgrade to...

Use **Upgrade to...** to change the database revision of a configuration to a higher level, for example, from 2.01 to 4.00; see Figure 7-15. When developing a configuration for several controllers with different database revisions, create the configuration for the controller with the lowest revision and save the file.
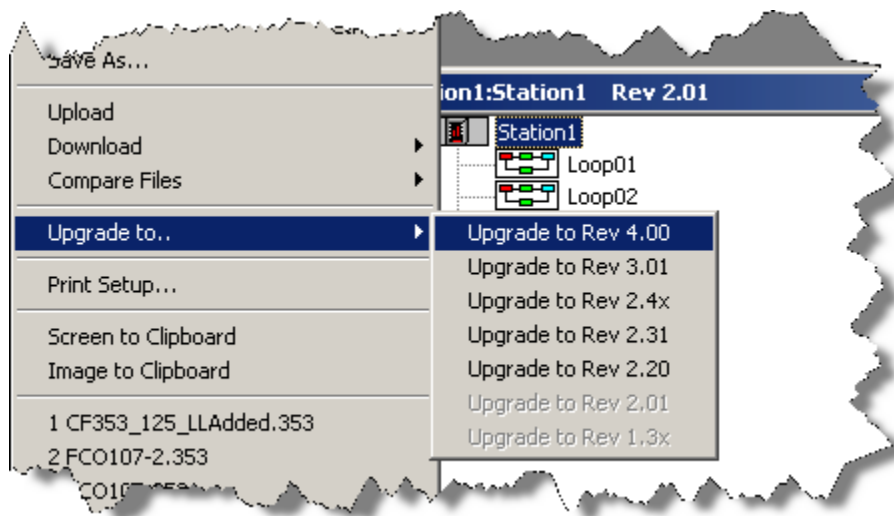
Figure 7-15 Upgrade to... selections

➢ **To upgrade a database revision**:

1. Open the configuration that is to be downloaded to two or more controllers with different database revisions. Close all function block and ladder logic loops to show the station view of the configuration.

2. Select **File > Upgrade to...**.

3. Select the database revision of the controller to which the configuration will be downloaded. The message in Figure 7-16 will appear when the conversion is finished. (All loops will be maximized after conversion.)
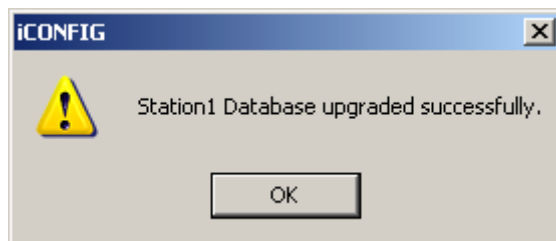
Figure 7-16 Station Database upgraded successfully

4. Save the upgraded file with a different file name.

Note: Incorporating the database revision into the file name can help identify files in the future.

7.12 Print

This menu option prints the active view as specified in the Print Option submenu. Print is also a Standard toolbar option and a key combination on the keyboard. See the Section 6.1.4 Print for additional information. This option is available in the station, function block, ladder logic, and report reference views.

➢ **To print a function block or ladder logic view of the active configuration**:

1. Open the view to be printed.

2. Select **File > Print** or **<Ctrl+P>**. The print dialog displays. See Figure 7-17. The Print dialog displays the name of the printer and enables setting of printer properties.
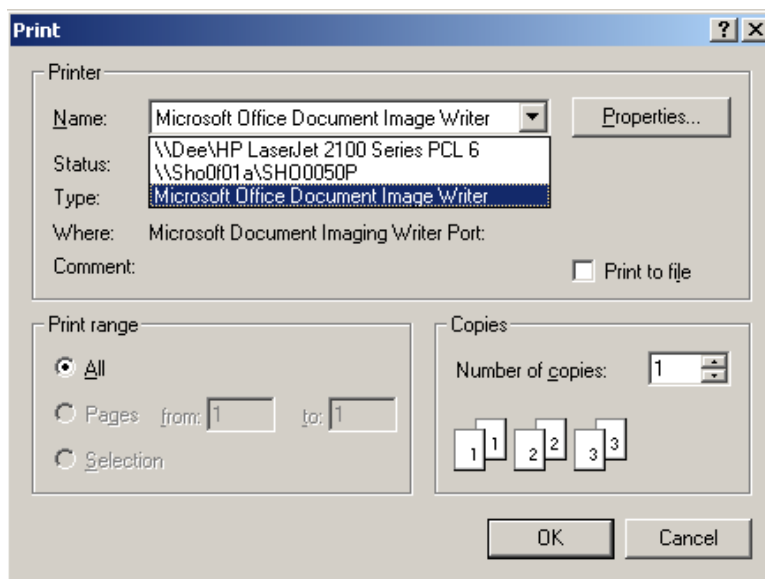
Figure 7-17 Print dialog

3. Select Properties. See Figure 7-18. This dialog may be different, depending on the computer operating system and the printer selected.

4. Normally, select Landscape for printing the function block view and Portrait for printing the ladder logic views. A Paper Size can also be selected.
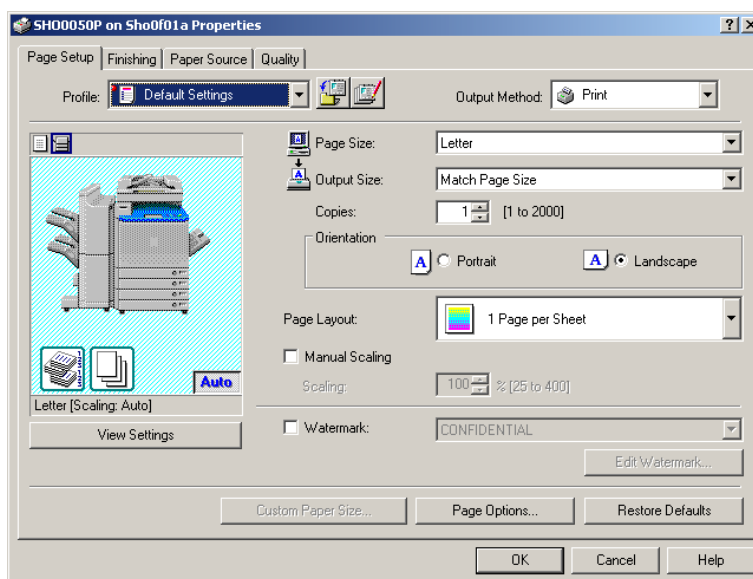
Figure 7-18 Printer Properties dialog

5. Click **[OK]**. The Print dialog returns.

6. The Print dialog enables you to choose the number of copies and the pages to print if the view is ladder logic. Make the choices as required.

7. Click **[OK]**. The view is sent to the printer.

7.13 Print Preview

Print Preview displays an accurate image of the view as it will be printed based on the selections in the Print Options submenu. This option is available in the function block and ladder logic views.

➢ **To preview a view to be printed**:

1. Select **File > Print Preview**. A preview of the printed view is displayed on the screen. See Figure 7-19. The preview page displays several buttons:

[Print] displays the Print dialog as shown in Figure 7-11.

[Next Page] and **[Previous Page]** display with multiple ladder logic pages.

[Two Pages] displays the configuration as two pages when multiple pages are

available.

[Zoom In] views the configuration at a closer range.

[Zoom Out] views the configuration at a wider range.

[Close] closes the Print Preview mode.
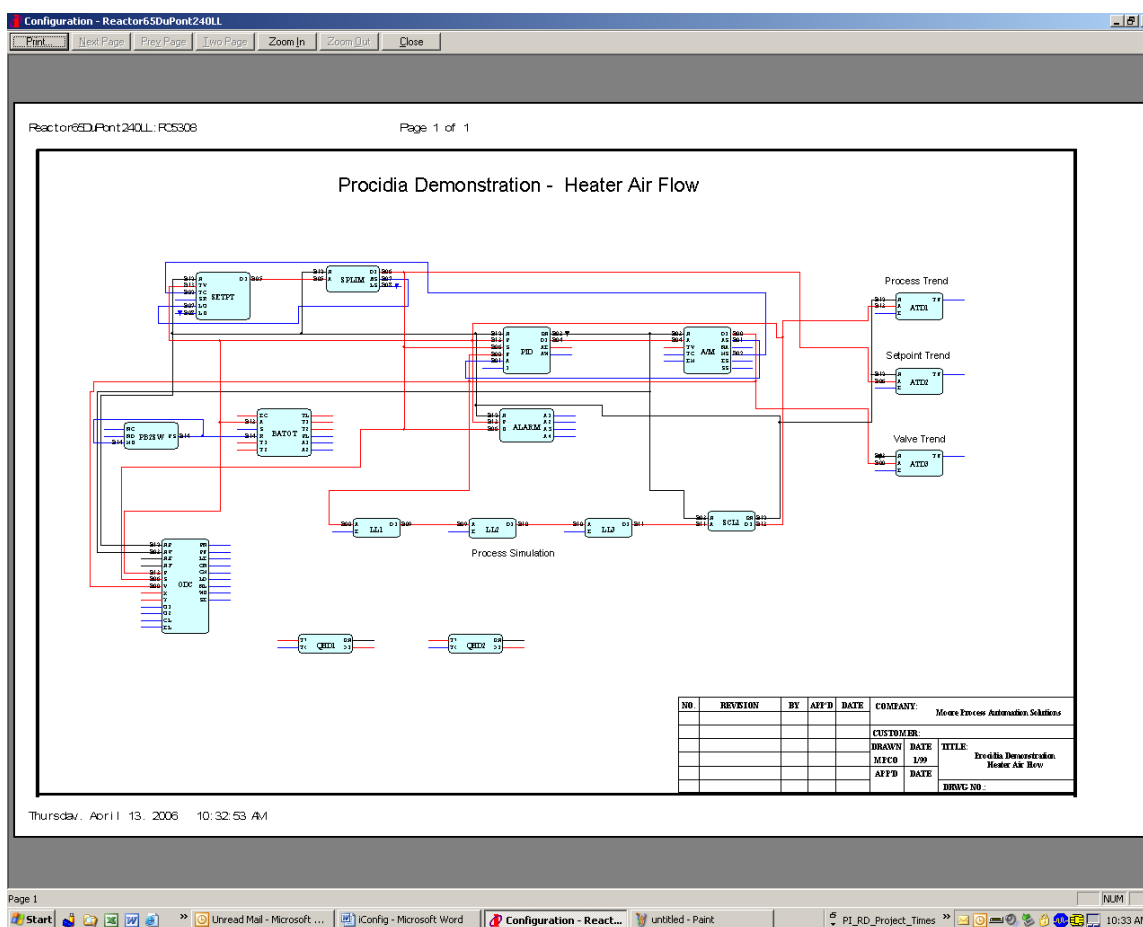
Figure 7-19 Print preview mode

2.   After viewing the image, click **[Print]**, to send the image to the printer or click **[Close]** to close the Print Preview dialog.

7.14 Print Setup

Print Setup displays a preview of the output, the default paper Size, Orientation, and Margins of the workspace. See Figure 7-20. This option is available in the station, function block, ladder logic, and reference views.

➢   **To set up a configuration for printing**:

1.   Select **File > Print Setup**. The Page Setup dialog displays as shown in Figure 7-14.
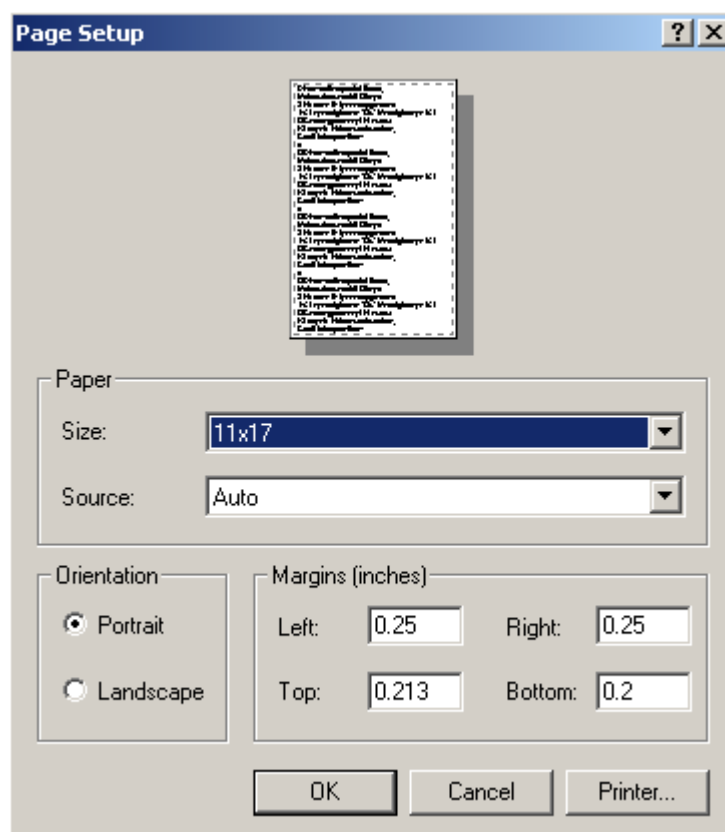
Figure 7-20 Page Setup dialog

2. If the correct paper size is not displayed, click the down arrow button on the Size text box and select a paper size from the drop down list.

3. If the correct paper source is not displayed, click the down arrow button on the Source text box and select a source from the drop down list.

4. If the orientation is not correct, select the other Orientation radio button in the Orientation box.

5. Click **[Printer]**. The Page Setup dialog for the printer displays. See Figure 7-21. This permits setting the printer Name and Properties. See previous Print section for additional information.
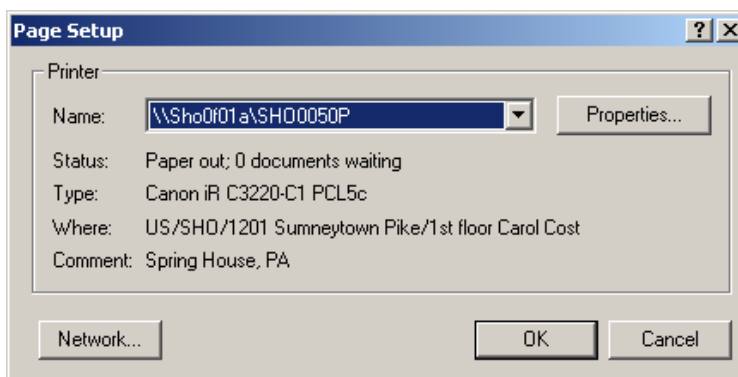
Figure 7-21 Page Setup dialog for the printer

7.15 Print Options

Print Options configures the manner in which a file is printed. The arrowhead to the right of this menu option indicates that additional options are available. See Figure 7-22 for the menu.
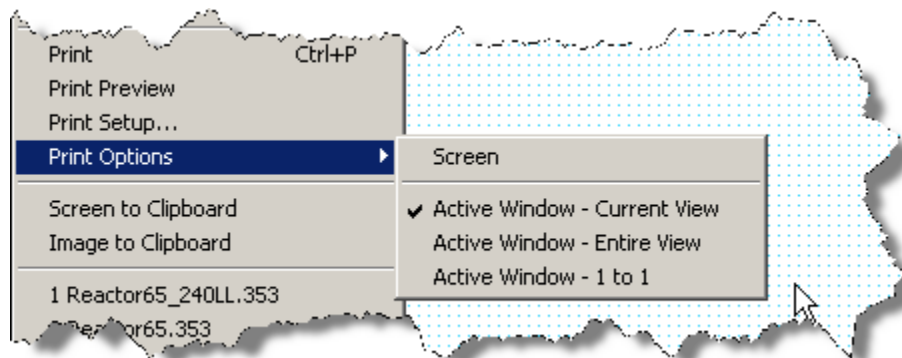
Figure 7-22 Print Options menu selections

    Screen – captures the entire display area. This option is available in the function block, ladder logic, and reference views.

    Active Window – Current View – captures the currently displayed contents of the active view. This option is available in the function block, ladder logic, and reference views.

    Active Window – Entire View – captures all the contents of the active view. This option is available in the function block, ladder logic, and reference views.

    Active Window – 1 to 1 View – captures all the contents of the active view, including multiple pages, if needed. This option is available in the function block, ladder logic, and reference views.

➢ **To configure the printed output**:

    Select **File > Print Options > "Print Option"**. See Figure 7-22.

7.16 Screen to Clipboard

Screen to Clipboard copies the entire screen image, including toolbars, the menu bar, and status bar, to the Clipboard for use by another program. This option is available in all views.

➢ **To copy a screen to the Clipboard**:

    Select **File > Screen to Clipboard.** The image is copied to the clipboard.

7.17 Image to Clipboard

Image to Clipboard copies the entire current view image to the Clipboard for use by another program. This option is available in all views.

➢ **To copy a image to the Clipboard**:

    Select **File > Image to Clipboard**. The image is copied to the clipboard.

7.18 Exit

This option closes i|config.

➢ **To close i|config**:

   Select **File > Exit**. The program closes.

Chapter 8 - Using the Edit Menu

The **Edit** menu, shown in Figure 8-1, provides the ability to perform operations on graphic items (such as graphic symbols and lines), edit graphic item attributes, and edit user-defined references in a configuration
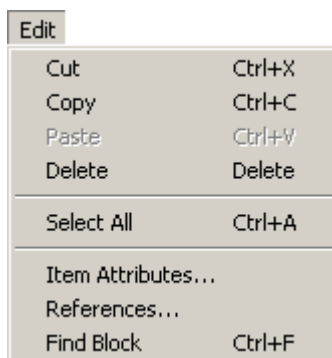
Figure 8-1 Edit menu, Function Block View

8.1 Cut

The **Cut** menu option moves selected graphic items, function block loops, or ladder logic loops to the Clipboard. It is used in combination with the Paste option to move items from one location to another.

Cut is also a **Standard** toolbar button, pop-up menu option, and key combination on the keyboard. See Section 6.1.5 Cut for more information.

For more information on cutting function block loops, see Section 2.8.1 Cutting Loops.

This option is available in the station view for cutting loops and in the function block and ladder logic views for cutting graphic items.

Note: Function blocks and ladder logic elements cannot be cut.

➢ **To cut a graphic item or a loop**:
1. Select the item(s) you want to cut.
2. Select **Edit >Cut** or **<Ctrl+X>**. The selected item is removed from the configuration and placed in the clipboard.
3. To place the item in another location, use the **Paste** function.

8.2 Copy

The **Copy** menu option copies selected items to the Clipboard. It can be used in combination with the Paste option to duplicate items.

Copy is also a **Standard** toolbar button, pop-up menu option, and key combination on the keyboard. See the Section 6.1.6 Copy for more information.

This option is available in the station view for copying loops and in the function block and ladder logic views for copying graphic items.

Note: Function blocks and ladder logic elements cannot be copied.

➢ **To copy a graphic item or a loop**:

1. Select the item you want to copy.

2. Select **Edit >Copy** or **<Ctrl+C>**. The selected item is copied and placed in the clipboard.

3. To place the item in another location, use the **Paste** function.

8.3 Paste

The **Paste** menu option moves the contents of the Clipboard to the active view. This option is used with the Cut and Copy options to move items to a different location or to duplicate items.

Paste will insert the most recently cut or copied item into a view. Paste is also a Standard toolbar button, pop-up menu option, and a key combination on the keyboard. See Section 6.1.7 Paste for more information.

This option is available in the station view to paste function block or ladder logic loops and in the function block and ladder logic views to paste graphic items. For more information on pasting, see Section 2.8.3 Pasting Loops.

➢ **To paste a graphic item or a loop**:

1. Cut or copy the items from the configuration.

2. Click on the new location.

3. Select **Edit >Paste** or **<Ctrl+V>.** The selected item is placed in the selected location.

8.4 Delete

The **Delete** menu option deletes (erases) a portion or all of a loop.

➢ **To delete all or part of a loop**:

1. If deleting a loop, close all loops to display the station view. Select the loop to be removed.

    If deleting a portion of a loop, open the loop and select the portion (or items) to be deleted.

2. Select **Edit > Delete** or press **<Delete>.** If deleting a loop, the message in Figure 8-2 will appear. If deleting a function block or ladder logic element, the message in Figure 8-3 will appear.
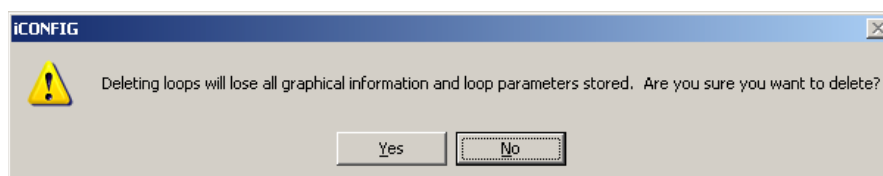
Figure 8-2 Loop deletion confirmation message
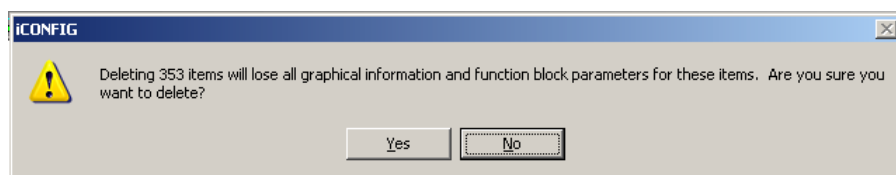
Figure 8-3 Function block or ladder logic element deletion confirmation

Note: No confirmation message appears when deleting a user-created graphic item.

3. Click **[Yes]**. The selected items are deleted.

8.5 Select All

This option selects all the items associated with the current selection mode. This option is available in the function block and ladder logic views.

If the Item Selection Mode is active, all the following items are selected:

- Connection Lines

- Function Blocks

- Ladder Logic Elements

If the Graphics Selection Mode is active, all items on the page are selected.

➢ **To select all items associated with the selection mode**:

Select **Edit >Select All**. All items, associated with the current selection mode, are selected.

8.6 Item Attributes

Item Attributes allows the editing of attributes pertaining to the selected item(s). This option is also a Graphic Primitives toolbar button. It is available in the function block and ladder logic views. Refer to Section 6.7.14 Edit Item Attributes for details.

➢ **To edit item attributes**:

1. Select **Edit > Item Attributes** or right-click on the workspace and select **Edit Item Attributes** for the pop-up menu.

    The Item Attributes dialog displays tabs specific to the selected items. See Figure 8-4 for the Item Attributes dialog when graphic items are selected and Figure 8-5 when station, function blocks, or ladder logic elements and/or connection lines are selected.
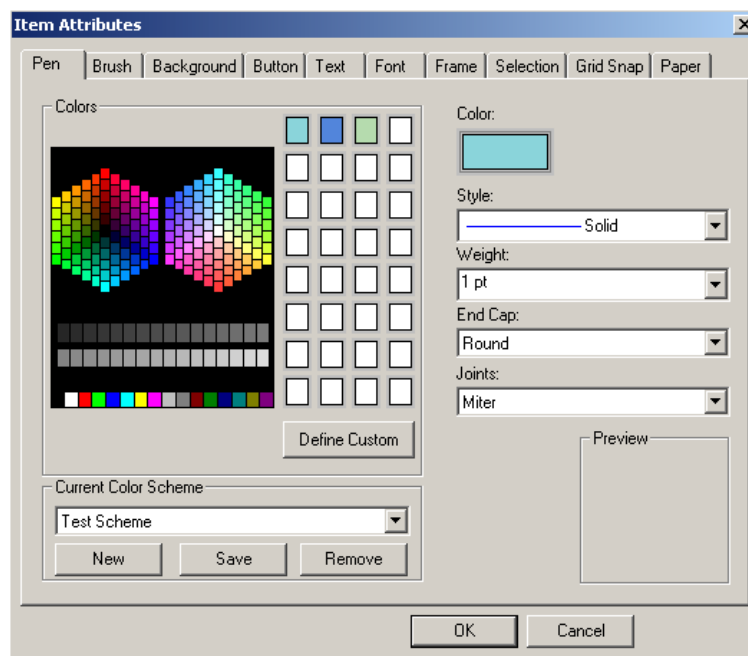
Figure 8-4 Item Attributes dialog with graphic items selected
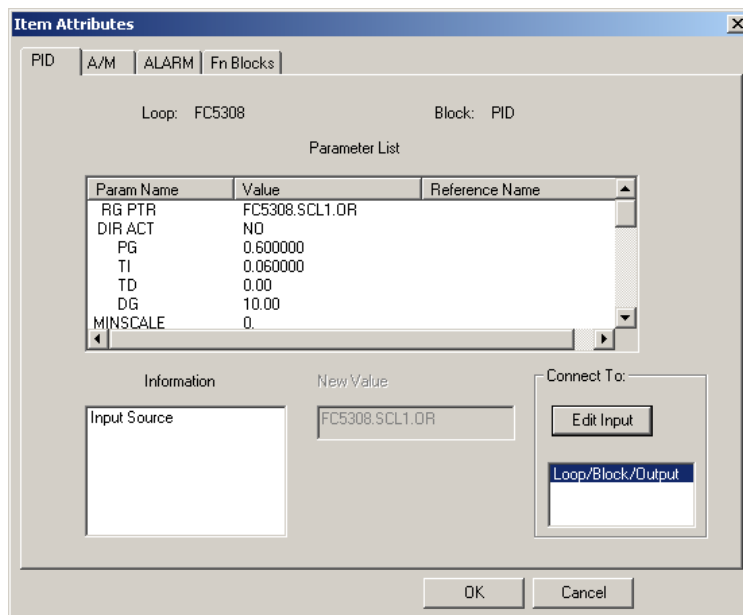
Figure 8-5 Item Attributes dialog with function blocks selected

2.   Select the tab desired. Make changes as necessary.

3.   Click **[OK]**. The changes are stored in the configuration.

   Note: Graphic item attribute changes are reflected in newly created items.

8.7 References

There are two types of **References**: function block references, which are user-defined references, and coil references, which are fixed references (see Section 2.16 Creating and Editing References and Section 4.1.2 Ladder Logic Configuration). References are the names assigned to the digital outputs of function blocks and ladder logic elements. References are automatically created for coils in ladder logic. References can be created manually for digital function block outputs.

When a connection is made to a reference, a connection identifier is not automatically created. If the reference has a value, an off screen connection symbol (a triangle) is displayed to show that there is a connection. See Figure 8-6.
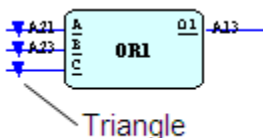
Figure 8-6 Triangle representing a connection

> **Note: When downloading a configuration that includes ladder logic, unconfigured references may cause the configuration to function improperly in the controller. Configure unconfigured references (Edit > References) before downloading.**

➢ **To create a configured reference**:

1.   Select **Edit > References.** The Edit References dialog displays a list of references for the active configuration. See figure 8-7.
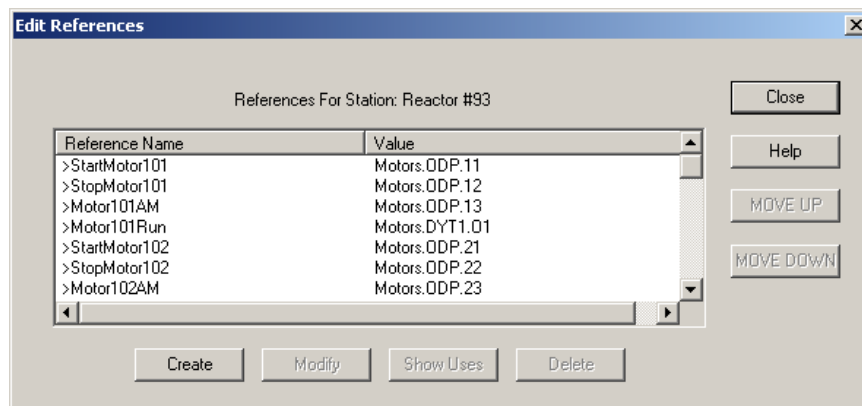
Figure 8-7 Edit References dialog

2.   Click **[Create]**. The Create/Modify dialog displays. See Figure 8-8.
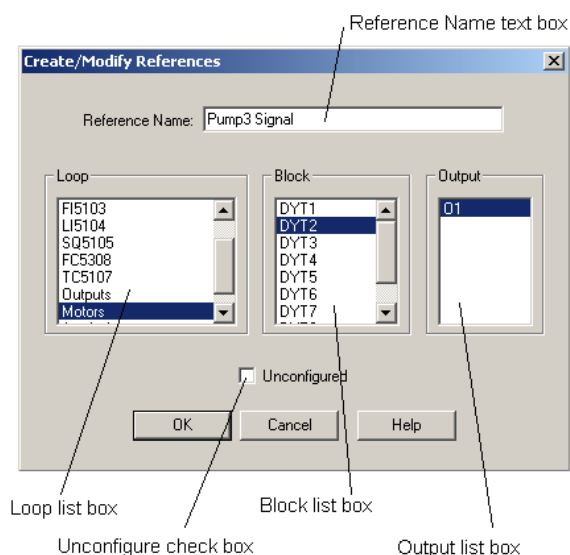
Figure 8-8 Create/Modify References dialog

3. Enter a meaningful name in the Reference name text box. The name must be unique and have no more than 16 characters.

4. Select a loop name from the Loop list text box. A list of blocks within the selected loop is displayed in the Block list text box.

5. Select a block from the Block list text box. A list of outputs within the selected block is displayed in the Output list text box.

6. Click **[OK]**.

    The new reference name and value appear on the Edit References dialog. The connection line is configured. A percent sign (%) displays before the name to indicate that the reference is for a physical I/O point.

7. Select **[Close]** to close the Edit References dialog.

➢ **To unconfigure a reference**:

1. Select **Edit >References.** The Edit References dialog displays a list of references for the active configuration. See figure 8-7.

2. Select a reference name.

3. Click **[Modify]**. The Create/Modify dialog displays. See Figure 8-8.

4. The Loop/Block/Output for the selected reference is displayed.

5. Check the Unconfigure box.

6. Click **[OK]**. The reference is unconfigured. The reference name is not removed from the reference list.

7. Click **[Close]** to close the Edit References dialog.

➢ **To modify a reference**:

1. Select **Edit >References.** The Edit References dialog displays a list of references for the active configuration. See figure 8-7.

2. Select a reference name.

3. Click **[Modify]**. The Create/Modify dialog displays, including the Name and Value (if any). See Figure 8-8.

4. Modify the Reference Name or Loop/Block/Output as desired.

5. Click **[OK]**. The reference is changed, and the Edit Reference dialog is displayed.

6. Click **[Close]** to close the Edit References dialog.

➢ **To show the uses of a reference**

1. Select **Edit >References.** The Edit References dialog displays a list of references for the active configuration. See figure 8-7.

2. Select a reference name.

3. Click **[Show Uses]**. The Show Uses of Reference dialog displays. See Figure 8-9.
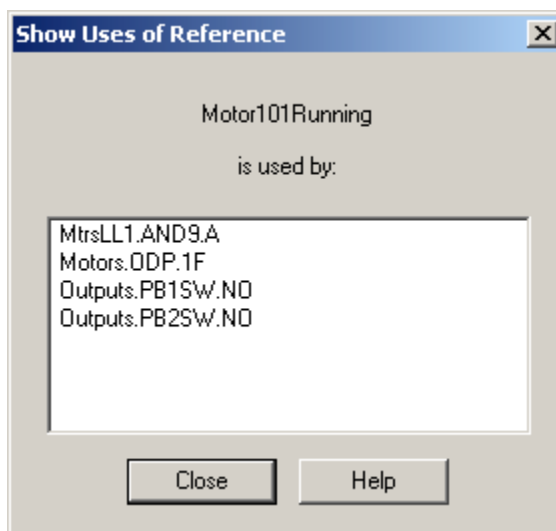
Figure 8-9 Show Uses of Reference dialog

4. Modify the Reference Name or Loop/Block/Output as desired.

5. Click **[Close]**. The Show Uses of Reference dialog is closed and the Edit Reference dialog is displayed.

6. Click **[Close]** to close the Edit References dialog.

➢ **To delete a reference**:

Important: Only references that were created manually can be deleted. Deleting a reference unconfigures all inputs using that reference.

1. Select **Edit >References.** The Edit References dialog displays a list of references for the active configuration. See figure 8-7.

2.   Select a reference name or **<Shift>**-click to select more continuous references, or **<Ctrl>**-click to select multiple random references.

3.   Click **[Delete]**. The deletion message displays. See Figure 8-10.
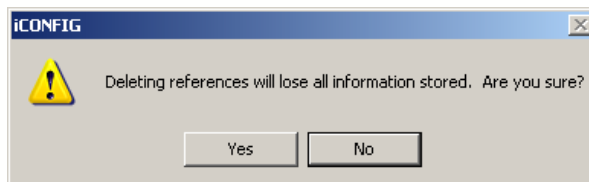
Figure 8-10 Deletion confirmation message

4.   Click **[Yes]**. The reference is deleted.

5.   Click **[Close]** to close the Edit References dialog.

8.8 Find Block

The Find Block entry in the View Menu appears when a Function Block Loop is displayed.

➢   **To find a function block**:

1.   Select **Edit >Find Block.** The Select a block to find dialog contains a list of the function blocks used in the presently open function block loop. See figure 8-11.

2.   Select a function block type and, as appropriate, instance number.

3.   Click **[Find]** to highlight the sought function block or click **[Parameter]** to highlight the sought function block and display the Item Attributes dialog (refer to Section 2.6 Editing the Station or Loop Attributes and Section 8.6 Item Attributes).
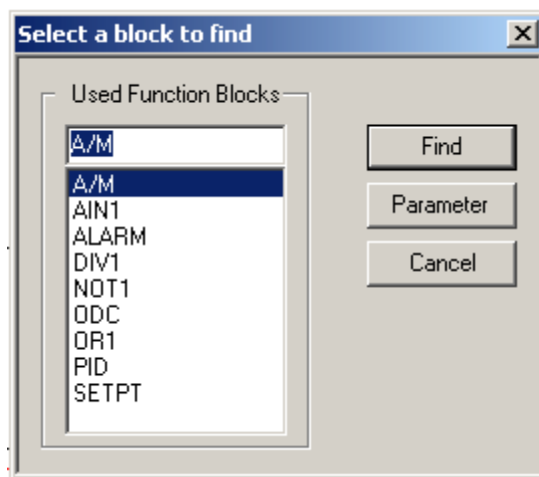
Figure 8-11 Select a block to find dialog

Chapter 9 - Using the View Menu

The **View** menus are shown in Figure 9-1. View menus display selections needed to develop a configuration. Note that the selections vary with the previous selection: function block loop, ladder logic loop or references.

Function Block Loop   **Ladder Logic Loop**   **Report/References**
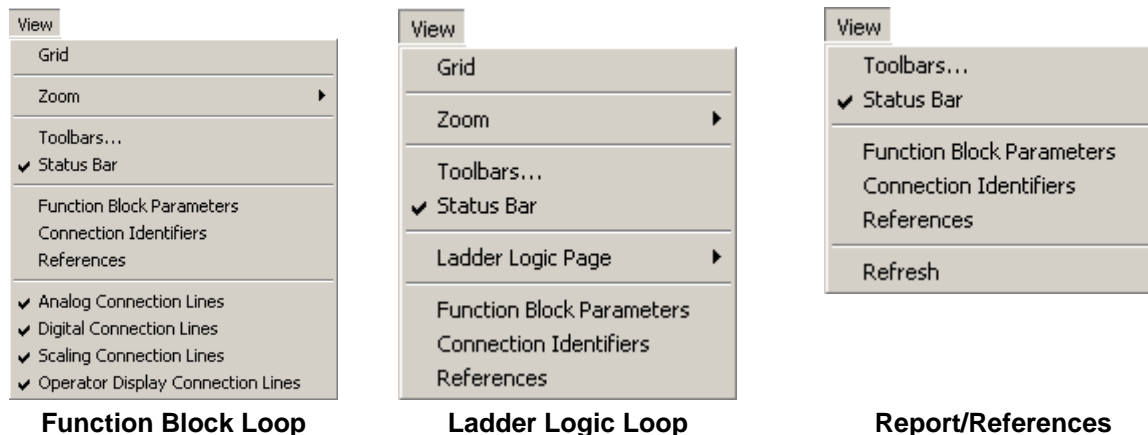
Figure 9-1 View menus

9.1 Grid

Grid toggles the display of grid points over the entire view. Grid is also an option of the Alignment toolbar and in the Grid Snap tab of the Item Attributes dialog. Refer to Section 6.9 Using the Alignment Toolbar for more information. This option is available in the function block and ladder logic views.

➢ **To display the grid**:

   Select **View > Grid.** The grid displays in the active view.

9.2 Zoom

Zoom toggles the amount of information displayed in the view. Zoom has four options and 16 levels. This option and its submenu options are available in the function block and ladder logic views. Refer to Section 9.2 Zoom for more information.

9.2.1 Zoom In

Zoom In displays a closer view of a portion of the configuration on the screen. This is also a Graphic Primitives toolbar option.

➢ **To zoom in**:

   Select **View >Zoom > In** or click **<Alt+I>**. A closer view of a portion of the configuration is displayed.

   Note: Repeating the above steps will zoom in until the desired viewing size is reached.

9.2.2 Zoom Out

Zoom Out reduces the size of the configuration on the screen to the point whole the entire view is displayed. This is also a Graphic Primitives toolbar option.

➢ **To zoom out**:

Select **View >Zoom > Out** or click **<Alt+O>**. A wider view of the configuration is displayed.

Note: Repeating the above steps will zoom out until the desired viewing size is reached or the entire view displays on the screen.

9.2.3 Zoom Area

Zoom Area enlarges a selected area of the configuration. This is also a Graphic Primitives toolbar option.

➢ **To enlarge an area of the configuration**:

1. Select **View >Zoom > Area** or click **<Alt+A>**. The cursor turns into a magnifying glass with a dotted line.
2. Click and drag on an area of the configuration, release the mouse button.

9.2.4 Zoom Level

Zoom has up to 16 levels. The user can select the appropriate level using the **View** menu.

➢ **To select a zoom level**:

Select **View > Zoom > Level #**. The view zooms to the level number selected.

9.3 Toolbars

The toolbars are used to perform most i|config™ operations. The toolbars automatically display when the software is installed. A menu option allows the user to toggle the toolbars on and off. This option is available in all views. Refer to Chapter 6 Using the Toolbars for more information on toolbars.

➢ **To toggle the display of the toolbars**:

1. Select **View > Toolbars**. The Toolbars dialog displays. See Figure 9-2.
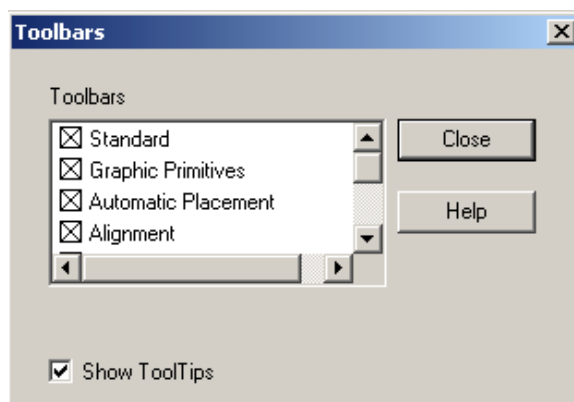
Figure 9-2 Toolbars dialog

2. Click the check box for the toolbar to toggle on or off. If an X displays in the check box, the corresponding toolbar will display.

3. Click **[Close]**. The Toolbar dialog closes.

➢ **To move a toolbar**:

Click on the gray area surrounding a toolbar and drag it to a new location.

9.3.1 The Standard Toolbar

The Standard toolbar contains buttons for manipulating a configuration file. These buttons include New, Open, Save, Print, Cut, Copy, Paste, About, and Help.   Refer to Section 6.1 Using the Standard Toolbar for more information.

9.3.2 The 353 Objects Toolbar

The 353 Objects Toolbar contains buttons that are used to create loops in a configuration or create a new configuration from a factory configured option. These buttons include Function Block Loop, Ladder Logic Loop, and New FCO. Refer to Section 6.2 Using the 353 Objects Toolbar for more information.

9.3.3 The Line Connection Toolbar

The Line Connection tools are used to connect inputs and outputs in a loop. These buttons include Multiple Create, Line Connection Mode, Item Selection Mode, and Line Connection Attributes. For more information, refer to Section 6.3 Using the Line Connection Toolbar.

9.3.4 The Function Block Toolbar

The Function Block Toolbar provides tools to select new function blocks and place them in a function block view. A tool is provided to find a specific function block type and instance in an existing function block loop. In addition, a line connect tool and a line erase tool are included. Refer to Chapter 3 Working with Function Block Loops and Section 6.4 Using the Function Block Toolbar for details.

9.3.5 The Ladder Logic Toolbar

The Ladder Logic Toolbar provides tools to select new ladder logic elements and place them in a ladder logic view. Tools in the Line Connection Toolbar are used to interconnect contacts and coils. Refer to Chapter 4 Working with Ladder Logic Loops and Section 6.5 Using the Ladder Logic Toolbar for details.

9.3.6 The Station Resources Toolbar

This toolbar displays the total number of function blocks available to place. The Available Block Information button displays resource information in the dialog. Refer to Section 6.6 Using the Station Resources Toolbar for more information.

9.3.7 The Graphic Primitives Toolbar

The Graphic Primitives tools are used to create graphic items. These buttons include: Multiple Create, Reshape, Selection Mode, Text Edit Mode, Text, Pencil, Line, Arc, Rectangle, Round Rectangle, Ellipse, Polygon, Button, Item Attributes, Zoom Mode, and Zoom Page Mode. Refer to Section 6.7 Using the Graphic Primitives Toolbar for more information.

9.3.8 The Graphic Operations Toolbar

The Graphic Operations (i.e. automatic placement) tools are used to manipulate graphic items. These buttons include: Send to Front, Send to Back, Move Forward, Move Backward, Flip Horizontal, Flip Vertical, Flip Left, Flip Right, Group, and Ungroup. Refer to Section 6.8 Using the Graphic Operations Toolbar for more information.

9.3.9 The Alignment Toolbar

The Alignment tools are used to align items with each other. These buttons include: Align Left, Align Right, Align Top, Align Bottom, Toggle Grid Snap, Show Grid, and Grid Snap Properties. Refer to Section 6.9 Using the Alignment Toolbar for more information.

9.4 Status Bar

The Status Bar displays messages in the bottom left corner of the screen, above the Windows® Start button. If the cursor is over a button, it displays the function of that button. The bottom right corner displays whether the number, caps, and scroll lock are on or off.

The Status Bar menu option toggles the display of the status bar. The status bar automatically displays when the software is installed. This option is available in all views.

➢ **To toggle the status bar**:

1. Select **View > Status Bar**.   A checkmark next to the menu option indicates that the status bar is displayed.

2. Click to toggle the display of the status bar.

9.5 Ladder Logic Page

Ladder Logic Page is used to view each page of a ladder logic loop. Four pages are available for each ladder logic loop. Each page contains a power rail with up to 38 connection points. A ladder logic loop uses function blocks to implement the ladder logic. This option is available in the ladder logic view. For more information on ladder logic, see Chapter 4 Working with Ladder Logic Loops.

➢ **To view ladder logic pages**:

1. Select **View > Ladder Logic Pages**. The Ladder Logic Pages submenu is displayed.

2. Select the page you wish to view.

➢ **To print the pages of a ladder logic loop**:

1. Open the ladder logic loop to print.

2. Select the appropriate print option.

3. Select **File > Print**. The Print dialog displays.

9.6 Function Block Parameters

This option displays the function block parameters report view. The report view displays a list of the function block parameters for the active configuration. This option is available in all views. For more information, see Chapter 2 Working with the Station View.

➢ **To view function block parameters**:

Select **View > Function Block Parameters**. The Function Block Parameters report view is displayed in Notepad.

➢ **To print the function block parameters**:

1. Display the report view.

2. Select **File > Print**. The Print dialog is displayed.

3. Make any necessary changes to the Print dialog.

4. Click **[Print]**. The report is sent to the selected printer.

9.7 Connection Identifiers

When connections are made between inputs and outputs in a function block loop, connection identifiers are created. This option allows a user to view these identifiers for the active configuration. This option is available in all views.

➢ **To view the connection identifiers report**:

Select **View > Connection Identifiers**. The Connection Identifiers report view is displayed in Windows Notepad.

➢ **To print the function block parameters**:
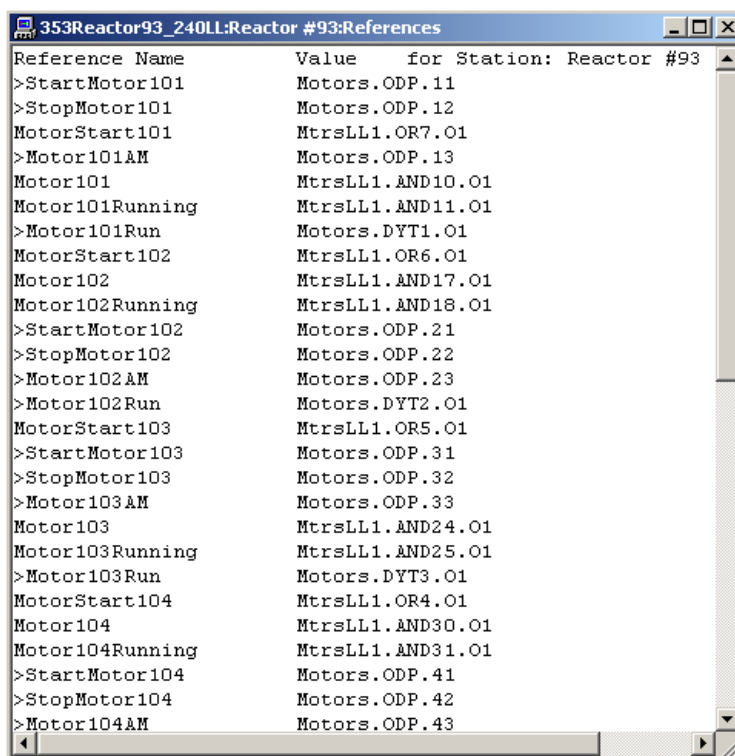
1. Display the report view.

2. In Notepad, select **File > Print**. The Print dialog is displayed.

3. Make any necessary changes to the Print dialog.

4. Click **[Print]**. The report is sent to the selected printer.

9.8 References

References include the names and values for user defined and fixed value references for the active configuration. This option allows the user to view a list of references in a single report. This option is available in all views.

➢ **To view the references report**:

Select **View > References**. The References report view is displayed in i|config. See Figure 9-3.

Figure 9-3 References report view

➢ **To print the references report view**:

1. Display the report view.

2. Select **File > Print**. The Print dialog is displayed.

3. Make any necessary changes to the Print dialog.

4. Click **[OK]**. The report is sent to the selected printer.

9.9 Refresh

Refresh updates the References report view. This option is available in References report view.

➢ **To refresh the references report view**:

Select **View > Refresh**. The References report view is updated.

9.10 Analog Connection Lines

Analog Connection Lines are lines that connect analog inputs and outputs. This option toggles the display of these connection lines in a function block loop. They are on as the default setting. This option is available in the function block view.

➢ **To toggle analog connection lines on and off**:

1. Select **View > Analog Connection Lines**. A checkmark next to the menu item indicates that the connection lines are displayed.

2. Repeat step 1 to toggle the display of the analog connection lines.

9.11 Digital Connection Lines

Digital Connection Lines are lines that connect digital inputs and outputs. This option toggles the display of these connection lines in a function block loop. They are on as the default setting. This option is available in the function block view.

➢ **To toggle digital connection lines on and off**:

1. Select **View > Digital Connection Lines**. A checkmark next to the menu item indicates that the connection lines are displayed.

2. Repeat step 1 to toggle the display of the digital connection lines.

9.12 Scaling Connection Lines

Digital Connection Lines are lines that connect scaling inputs and outputs. This option toggles the display of these connection lines in a function block loop. They are on as the default setting. This option is available in the function block view.

➢ **To toggle scaling connection lines on and off**:

1. Select **View > Scaling Connection Lines**. A checkmark next to the menu item indicates that the connection lines are displayed.

2. Repeat step 1 to toggle the display of the scaling connection lines.

9.13 Operator Display Connection Lines

Operator Display Connection Lines are lines that connect signals to the operator display block. This option toggles the display of these connection lines in a function block loop. They are on as the default setting. This option is available in the function block view.

➢ **To toggle operator display connection lines on and off**:

1. Select **View > Operator Display Connection Lines**. A checkmark next to the menu item indicates that the connection lines are displayed.

2. Repeat step 1 to toggle the display of the operator display connection lines.

Chapter 10 - Using the Loop Menu

This chapter discusses the options on the Loop menu. Figure 10-1 displays the Loop menu options. The user can develop two types of loops: a function block loop or a ladder logic loop. Either loop type is accessed from the station view. For more information on the station view, see Chapter 2 Working with the Station View.

Figure 10-1   Loop menu

10.1 New

The **New** option allows the user to create a new function block loop or ladder logic loop. **Function Block** and **Ladder Logic** are submenus of **New**.

New is also a **353 Objects Toolbar** option. Refer to Chapter 6 Using the Toolbars for more information. This option is available in the station view.

> ➢ **To create a new loop**:
>
> 1. Go to the station view.
>
> 2. Select **Loop > New > Function Block** or **Ladder Logic**. The Enter Loop Name dialog displays. See Figure 10-2.
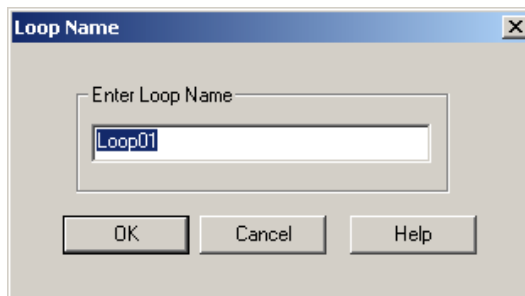
Figure 10-2 Loop Name dialog

3. Enter a meaningful, unique loop name, up to a maximum of 12 characters, in the Enter Loop Name text box.

4. Click **[OK]**. An icon representing the loop is placed in the station tree.

10.1.1 Creating Function Block Loops

Creating a function block loop involves placing and connecting function blocks. Function blocks can be placed only in a function block view. For more information on function block loops, refer to Chapter 3 Working with Function Block Loops.

10.1.2 Creating Ladder Logic Loops

Creating a ladder logic loop involves placing and connecting ladder logic elements. Ladder logic elements can be placed only in a ladder logic view. For more information on ladder logic loops, refer to Chapter 4 Working with Ladder Logic Loops.

10.2 Open

This option opens the view of a selected loop in the station view and is only available in the station view. See Chapter 2 Working with the Station View for more information.

➢ **To open a function block or ladder logic loop**:

1. Select a ladder logic or function block loop in the station tree.

2. Select **Loop > Open** or right-click on the loop in the tree and from the pop-up menu select **Open**, or double-click on the loop. The loop view opens.

Chapter 11 - Using the Communications Menu

The **Communications** menu enables you to configure the communication ports on the computer. See Figure 11-1. For more information on communications, refer to Chapter 5 Communicating with the Controller.
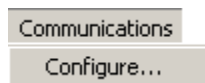
Figure 11-1 Communications menu

11.1 Configure

The Communication Configuration dialog is used to configure the communication ports. This option is available in all views. For more information on communicating with the controller, refer to Chapter 5 Communicating with the Controller.

➢ **To configure the communication ports**:

1. Select **Communications > Configure**. The Communication Configuration dialog is displayed. See Figure 11-2.
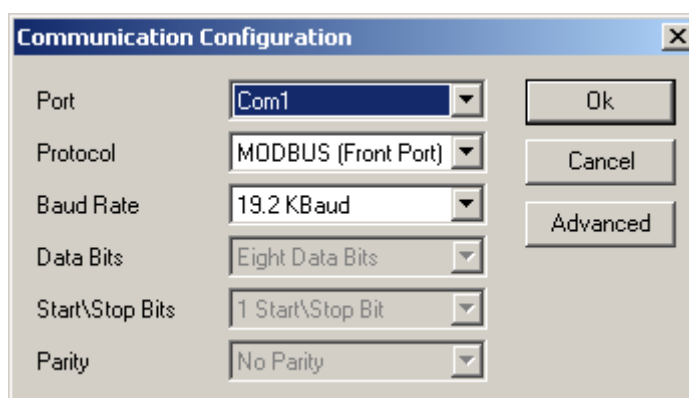
Figure 11-2 Communication Configuration dialog

2. Select the Port, Protocol, Baud Rate, Data Bits, Start/Stop Bits, and Parity as required. The Ethernet Port Protocol is fixed as Modbus TCP/IP. Modbus has fixed settings for Data Bits, Start/Stop Bits, and Parity. Fixed settings appear grayed out.

    Note: The above communication configuration values must agree with equivalent values in the STATN - Station Parameters function block in the controller.

3. Click **[OK]**. The communication settings are saved and used for all future communications

.

Chapter 12 - Using the Tools Menu

The **Tools** menu provides access to the Upload File Path dialog where the File path can be set. The Loop Resources dialog enables viewing the available station and loop resources. Active process data uploaded from a controller can be viewed in Monitor Mode. See Figure 12-1.

Program or Station View   Function Block or Ladder Logic Loop View

Figure 12-1 Tool menu

12.1 Upload File Path

The **Upload File Path** dialog enables you to configure the Default Configuration File Upload Path. The path precedes the file name stored in the database when uploaded.

The default upload path may need to be set manually if the configuration was saved to a different directory than was set using the install program. For more information, refer to Chapter 5 Communicating with the Controller.

➢ **To configure a new default path**:

1.   Select **Tools > Upload File Path**. The Options dialog is displayed. See Figure 12-2.
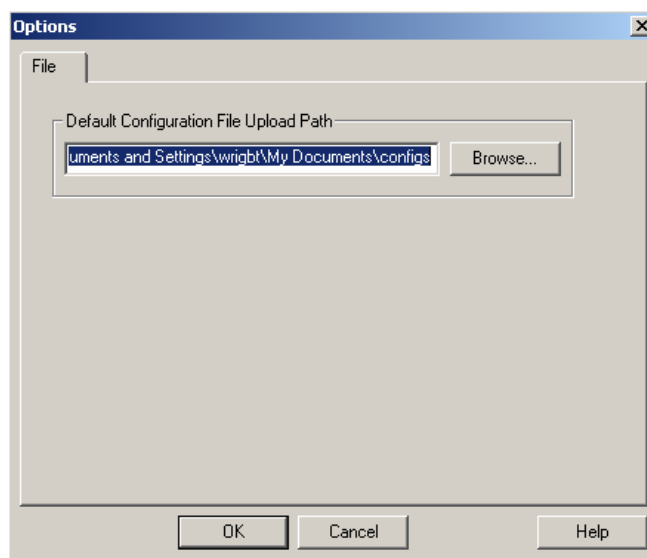
Figure 12-2 Options dialog

2.   Click Browse. The Select a Directory dialog displays. See Figure 12-3
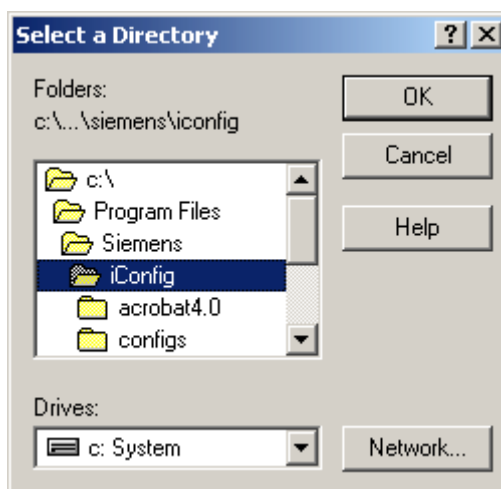
Figure 12-3 Select a Directory dialog

3.   Select a file path.

4.   Click **[OK]**. The Select a Directory dialog closes.

5.   Click **[OK]**. The Options dialog closes and the upload path is saved.

12.2 Loop Resources

The **Loop Resource** dialog shows the maximum number of blocks available and the number used in the selected loop as well as the total amount of memory being used by the controller configuration and the cycle time of the controller. For additional information, refer to Section 6.6 Using the Station Resources Toolbar.

➢   To view loop resources:

1.   Select **Tools > Loop Resources**. The iCONFIG dialog is displayed showing the loop, if in a loop view, and the station resources. See Figure 12-4.
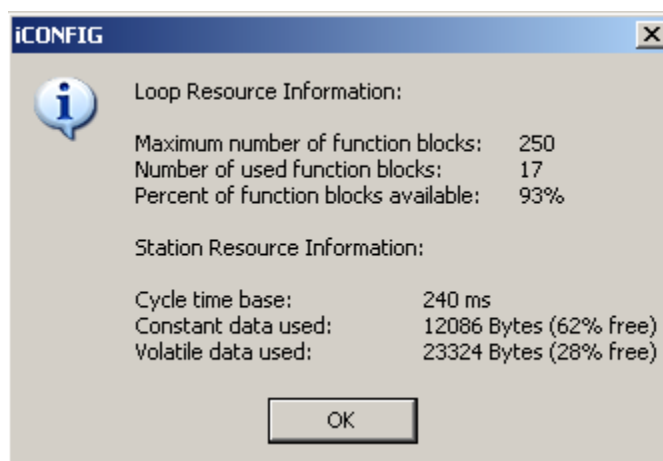
Figure 12-4 i|config resource dialog

2.   View the information

3.   Click **[OK]**. The dialog closes.

12.3 Monitor Mode

When a function block loop or ladder logic loop is displayed in i|config™ and Monitor Mode is then selected, active process data can be uploaded from the controller in which that loop is operating. The active data is highlighted and shown in the loop display.

➢ To monitor live variables:

  1. Open the function block or ladder logic loop that is to be monitored.

  2. Click **View > Monitor Mode** to display the dialog in Figure 12-5. Select the Station and Port as described in Chapter 5 Communicating with the Controller.
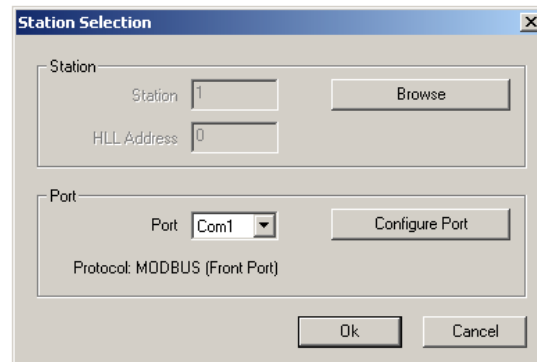
Figure 12-5 Station Selection dialog

  3. As needed, zoom in on the loop to allow the live variables to appear. Variables will appear when the display is zoomed to a size that permits reading the variables.

Chapter 13 - Using the Window Menu

The **Window** menu, shown in Figure 13-1, provides options for opening a new window, closing an open window, and arranging windows or icons on the screen. It also provides access to any open window. These options are standard in most Windows compatible programs.
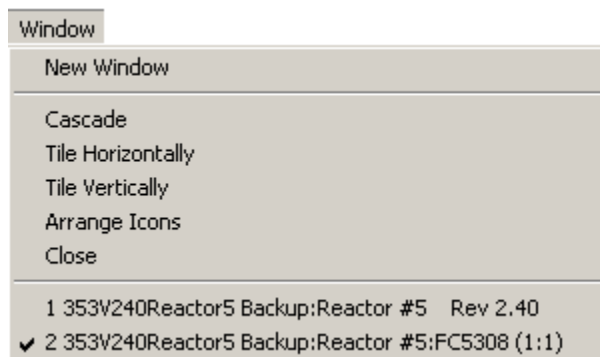
Figure 13-1 Window menu

13.1 New Window

The **New Window** menu makes a duplicate of the active view. This option is available in the function block and ladder logic views.

➢ **To open a new window**:

Select **Window > New Window**. A copy of the active view is displayed. See Figure 13-2.
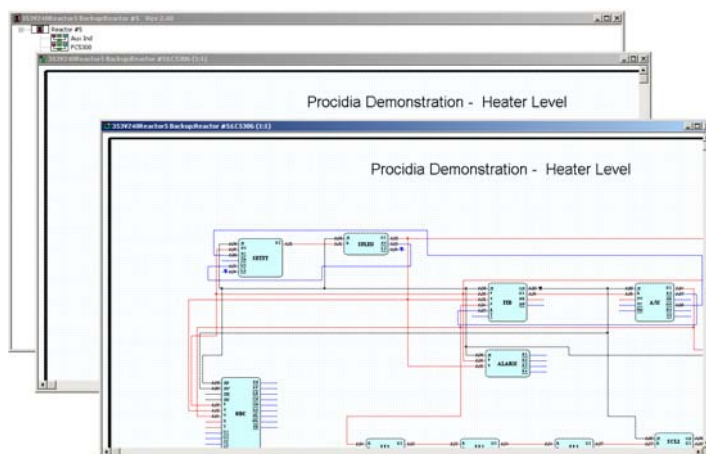
Figure 13-2 Duplicate of active view

13.2 Cascade

The **Cascade** option arranges windows in a fan like order with the title bars visible. The active view is always layered on top. This option is available in all views.

➢ **To cascade the windows**:

Select **Window > Cascade**. All open views will cascade as shown in Figure 13-3.
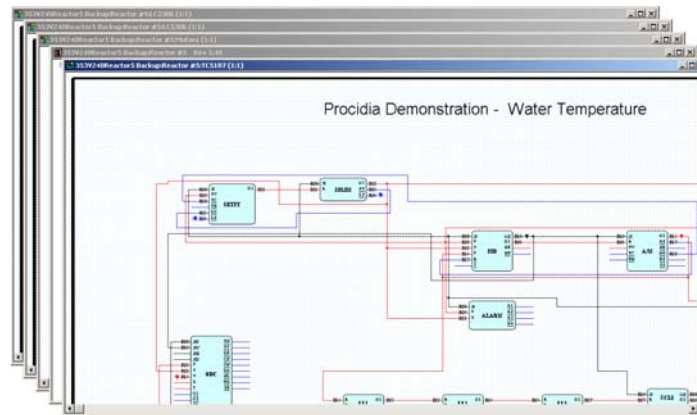
Figure 13-3 Cascaded views

13.3 Tile Horizontally

The **Tile Horizontally** option resizes and arranges windows from top to bottom so that all are completely visible on the screen. This option is available in all views.

➢ **To tile the windows horizontally**:

Select **Window > Tile Horizontal**. All open views will tile horizontally as shown in Figure 13-4.
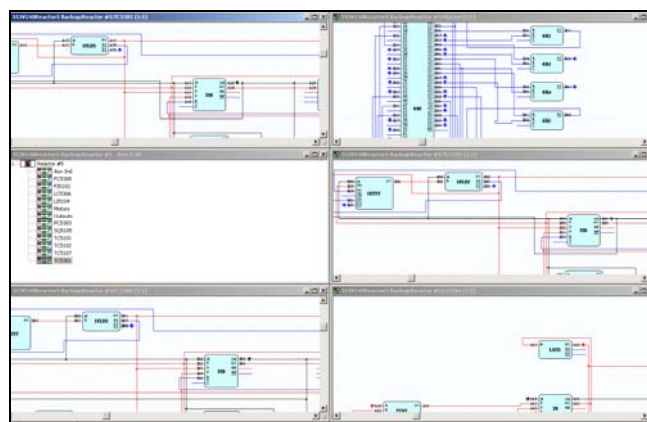
Figure 13-4 Windows tiled horizontally

13.4 Tile Vertically

The **Tile Vertically** option resizes and arranges windows from left to right so that all are completely visible on the screen. This option is available in all views.

➢ **To tile the windows vertically**:

Select **Window > Tile Vertically**. All open views will tile vertically as shown in Figure 13-5.
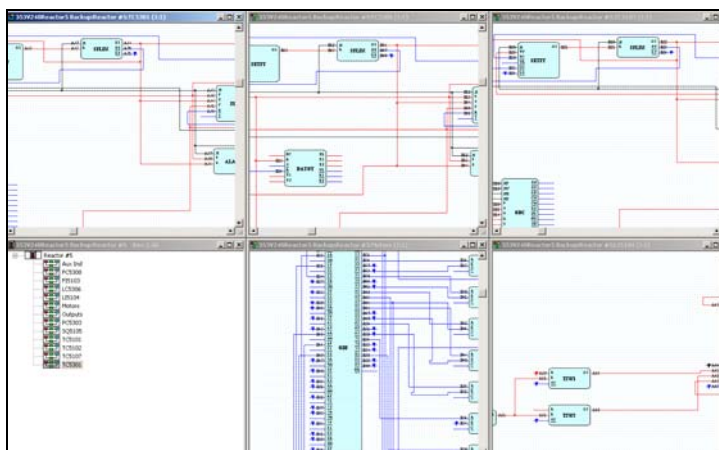
Figure 13-5 Windows tiled vertically

13.5 Arrange Icons

The **Arrange Icons** option reorganizes a group of loop icons on the background screen. This option is available in all views.

➤ **To arrange the icons**:

Select **Window > Arrange Icons**. The Window Icons are reorganized. See Figure 13-6.
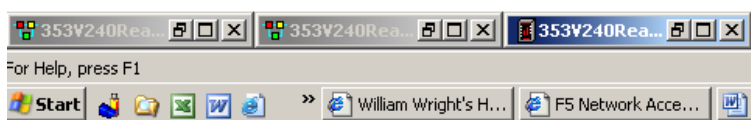
Figure 13-6 Arranged window icons

13.6 Close

The **Close** option closes the active window. This option is available in all views.

➤ **To close a window**:

Select **Window > Close**. The active window closes.

13.7 Open Window List

The names of all open windows are displayed at the bottom of the Window menu. A checkmark displays next to the name of the active window. This option is available in all views.

➤ **To access a particular open window**:

Select **Window > "Window Name"**. The selected window becomes the active window. See Figure 13-7.
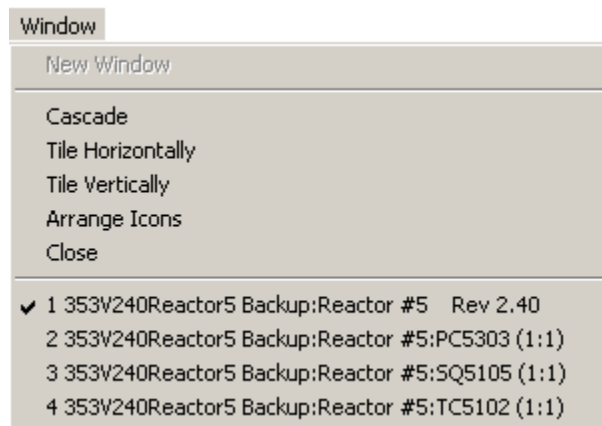
Figure 13-7 Open Window List

Chapter 14 - Using the Help Menu

Help for i|config™ is available in the form of an online manual accessible through Adobe Reader. The Help menu may also provide additional information in the form of release notes, etc.
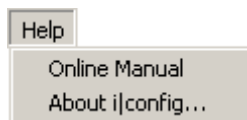
Figure 14-1 Help menu

14.1 Online Manual

The online manual is SG15939-64V400 and is in Portable Document Format (PDF). The current version of the manual is available for download from the Siemens Internet site. Refer to Section 1-10 Customer/Product Support for the URL.

14.2 About i|config

The About i|config option displays a dialog box containing information about i|config software including copyright notice, software version number, and part number. The part number and software version number are necessary when contacting technical support.

➢ **To view information about i|config**:

1. Select **Help > About i|config**. The About i|config dialog is displayed. See Figure 14-2. The software version number is located in the center of the dialog.
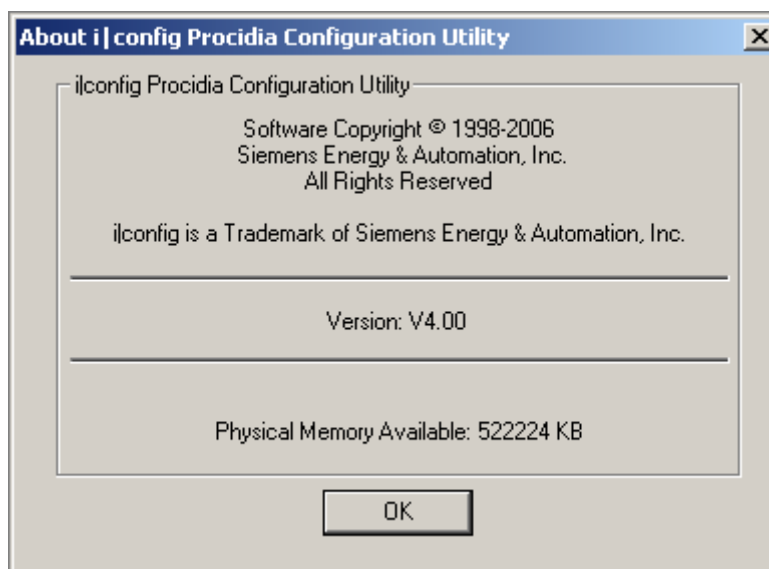
Figure 14-2 About i|config dialog

2. Click **[OK]**. The dialog closes.

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Siemens **Energy & Automation**	**Software Release Memo**

# i|config™ Graphical Configuration Utility, Version 4.00

Product Involved

i|config Graphical Configuration Utility, version 4.00, for creating and editing configurations for Procidia™ controller Models 352P, 353, 353R, 354, 354N and i|pac™; product part numbers are:

   TGX:iConfigV4.00 – Single installation (node) license[1]
   TGX:15939-79V4.00 – Site license for multiple installations (nodes)
   TGX:15939-88V4.00 – Upgrade from previous i|config version
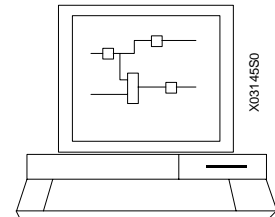
Introduction

This Software Release Memo discusses the enhancements in i|config version 4.00. Enhancements include new features and resolutions to several operational considerations in earlier versions. Known V4.00 operational considerations are described. i|config is supplied on CD-ROM.

Software Compatibility

i|config V4.00 is compatible with the following MPU Controller board firmware versions.

Controller Model	MPU Controller Board Firmware
Procidia i|pac	2.01 through 3.00
353R	3.00
352P, 353 Design Level A, 354, and 354N	1.20 through 3.00
353 Design Level B	4.00

The i|config database revision number, shown in the Station view, must match the MPU Controller board firmware revision number of the controller to which that configuration will be downloaded.[2] Compatibility is checked during a configuration download. i|config will display an "Incompatible database revision" error message when an incompatible database is encountered. To insure compatibility between controllers and configurations:

- Create a new configuration by selecting **File** > **New** or **File** > **New FCO** from the menu bar. A dialog box will appear requesting the database revision number (i.e. 4.00, 3.00, 2.40, 2.31, 2.20, 2.01, 1.3x or 1.2x). Select the database revision of the MPU Controller board firmware. The configuration database revision appears in the title bar of the Station View.

- When a configuration is uploaded from a controller, the database revision is automatically determined by i|config, which shows the revision number in the title bar in the Station View.

---

[1] Refer to the Siemens Software License Agreement for additional information.

[2] The firmware revision of a controller's MPU Controller board can be viewed on the controller faceplate. Enter configuration and navigate to the STATN – Station Parameters function block. Select the HardWare PRESent parameter. Refer to the appropriate controller User's Manual.

- When the controller's MPU Controller board firmware revision is upgraded, the configuration resident in the controller is automatically converted. Use i|config to upgrade the graphical configuration(s) for that controller by opening a configuration and selecting the **File** > **Upgrade to...** feature.

Personal Computer Requirements

Install i|config on a personal computer that meets the following minimum requirements.

- Microsoft® Windows® 95, 98, 2000, NT 4.0 Service Pack 5, or XP Professional operating system
- 600 MHz or better microprocessor
- 256 MB of RAM minimum; 512 MB or more will improve performance
- Mouse or other pointing device
- 1 GB of available hard disk space for the program
- CD-ROM drive
- VGA (800x600) or higher display capability
- Windows supported printer (optional)
- MultiMediaCard slot or external MMC card reader (optional)

Software Installation

If upgrading an installed earlier version of i|config, perform steps 1 through 6. If this is a new installation, perform steps 3, 4 and 6.

1. Uninstall the earlier i|config version. Perform either A or B below.

    A. V2.31 or earlier:

    During the uninstall process you may be asked about removing .dll and .ocx files. Answer those questions as follows:

    - Answer No to any question concerning removal of .dll files
    - Answer Yes to any question concerning removal of .ocx files

    To uninstall, click **Start** and select **Programs** > **Moore Products** > **uninstallShield**. Respond to the displayed prompts.

    B. V3.0 and later:

    To uninstall, click **Start** and select **Settings** > **Control Panel** > **Add or Remove programs and Windows Components** > **i|config** > **Change/Remove**. Respond to the displayed prompts.

2. If V2.31 or earlier was uninstalled, after running the uninstall program, start Windows Explorer and go to C:\iCONFIG. Verify that the OCX folder with its contents has been deleted.

    Do not delete the Configs folder because it contains your controller configurations.

3. Install i|config V4.00 by inserting the i|config CD-ROM in the PC's CD drive. If Windows autorun is enabled, the welcome screen will appear.

    Otherwise, in the **Start** menu, select **Run** and in the Run dialog box type the path to the CD-ROM and "setup." For example, D:\setup. Click **OK**.

4. Follow the instructions displayed on the screen to complete the installation of i|config and Adobe® Reader®.

5. If updating from i|config V2.31 or earlier:

    Start Windows Explorer.

    Copy the configuration files stored in the earlier version's default Configs folder to the new Configs folder in the new directory. Default directories are:

    -   V2.31 and earlier - C:\iCONFIG

    -   V3.00 and later - C:\Program Files\Siemens\iCONFIG

    After transferring the configuration files, delete the V2.31 or earlier iConfig folder and subfolders.

6. Complete and mail the Software Registration Form to register your software. Alternatively, i|config can be registered online at http://www.sea.siemens.com/instrbu/support/swregistration2.htm.

To run i|config, select **Start** > **Programs** > **Siemens** > **i|config** or double-click the i|config icon on the desktop.

i|config toolbars can be located in a row across the top of the screen or in a column on the right side of the screen. Move a toolbar by simply dragging it to the desired location.

Hardware Compatibility

Each controller model supports certain I/O expansion and communication boards. The controller model designation (on the controller case) indicates the options installed. Listed below is the hardware supported for each base controller model. Refer to the Configuration Overview section of the controller's User's Manual for the function blocks associated with each circuit board option and communication option listed in the table below.

Option → Model ↓	I/O Expander	Ubus i/o	LonWorks	LIL	Ethernet	RTC/CB
i|pac	✓	✓	---	✓	✓	✓
352P	✓	---	✓	✓	---	✓
353 Design Level A	✓	---	✓	✓	✓	✓
353 Design Level B	✓	---	---	---	✓	✓*
353R	✓	✓	---	✓	✓	✓
354/354N	✓	---	✓	✓	---	✓

* Configuration backup on MultiMediaCard

Hardware Compatibility Notes

- When the first Ubus block or LonWorks block is selected, a message identifying the controller model(s) is displayed and the other function block type is no longer available for that configuration.

- Downloading a configuration to a controller that lacks the necessary hardware to support that configuration will cause an error message to be displayed. The message identifies the missing hardware by name.
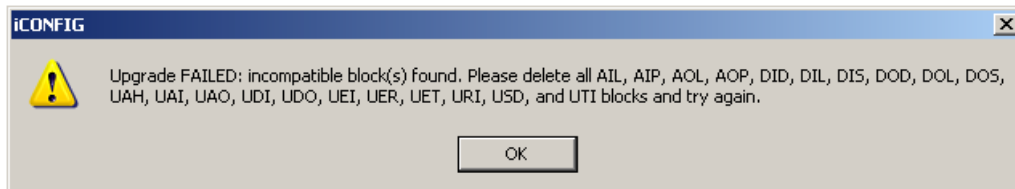
Enhancements

- i|config V4.00 features compatibility with Model 353 Design Level B firmware revision 4.00.

- In the Tools menu, the 'Options' selection has been changed to 'Upload File Path.'

- In the Tools menu, a 'Monitor Mode' selection has been added.

- When controller memory resources are low, a Station Resource Indicator alarm message is now displayed.

- After performing a configuration Upgrade, a 'Select Database File' dialog will be displayed to prompt saving the upgraded configuration.

- Upon successful completion of a configuration download, a confirming 'Successful Download' message is now displayed.

Operational Considerations

- The Button (create) button is inactive.

- The RTT block now includes Clock Status (CS) and Battery Status (BS) outputs. When upgrading a configuration to V4.00, the CS and BS outputs will not appear in the RTT graphic, although they are present and can be connected to other blocks as described in online Help (SG15939-64V400) Section 3.7 Connecting Function Blocks without Connection Lines. To correct the graphic, open the affected loop, delete the RTT block, click the New Function Block button, select RTT, and place the new RTT block in the configuration. Add needed connections to the block.

- During the installation of the Graphical Configuration utility, if insufficient hard drive space is available the install program may go into an infinite loop.

- The ladder logic reference name is preceded by a % symbol if the reference is connected to the output of a discrete input function block. The symbol is missing from the reference name when connected to a DIE, DIS, UDI, or UEI block. The coil reference is preceded by a % symbol if it is connected to a discrete output block. The symbol is missing from the coil reference when connected to a DOE, DOS, UDO, or UDS block.

- Changing a loop name when Ethernet function blocks AWE, CWE, or DWE are configured in the loop will cause all block inputs to be set to "unconfigured." However, input graphic lines are not deleted.

i|config user notes

- Specify the number of PRSEQ and ODS function block parameters that will scale the block size (e.g. "STEPS", "GROUPS"...) about 20% larger than required to leave room for future configuration revisions. The number of input parameters available in a PRSEQ or ODS function block is variable depending on the number of steps, groups and conditional messages specified. The database can be corrupted if the size of the variable data structure is changed after inputs have been configured.

- Limit ladder logic loops to two pages per loop and leave sufficient contacts free for future configuration revisions. Ladder logic is a graphical representation of the function block logic in a controller. Contact symbols become AND blocks when the configuration is downloaded to the controller. There is a limit of 95 AND blocks available per converted ladder logic loop. In a complex ladder logic application, it is easy to use all available AND blocks.

- Ladder logic configurations should be uploaded to the folder in which the ladder logic configuration is stored. The uploaded database will then be MERGED with the graphical database. If this is not done, auto-draw will not reconstruct ladder logic loops. The loops are instead reconstructed as function block loops.

- Uploading and auto-drawing a configuration with a ladder logic loop that contains more function blocks that can physically be laid on a single sheet will cause the upload to be aborted. Ladder logic configurations should be uploaded to the folder in which the ladder logic configuration is stored. The uploaded database will then be MERGED with the graphical database.

- On-line monitoring over the LIL experiences frequent time outs. For controllers on a LIL network, it is recommended to do on-line monitoring through the front port.

- When upgrading a configuration to a higher version and that configuration contains function blocks not supported by the higher version, the configuration will be updated to the *highest possible* version and the message shown below displayed. Delete the incompatible block(s) and update the configuration to the desired version. For example, if a V2.01 configuration containing Local Instrument Link (LIL) function blocks is to be updated to V4.00, the configuration will be updated to V3.01 and a prompt to remove the LIL function blocks will be displayed. Once the blocks are removed, the configuration can be updated to version 4.

iCONFIG

⚠ Upgrade FAILED: incompatible block(s) found. Please delete all AIL, AIP, AOL, AOP, DID, DIL, DIS, DOD, DOL, DOS, UAH, UAI, UAO, UDI, UDO, UEI, UER, UET, URI, USD, and UTI blocks and try again.

[OK]

Customer/Product Support

For the location of your local Siemens representative, visit the Siemens Process Instrumentation product support page at http://www2.sea.siemens.com/Products/Process-Instrumentation/Support/Customer-Support.htm.

For technical support refer to the following table and click the appropriate link.

Technical Support	
Online Support Request	http://www.siemens.com/automation/support-request
Telephone	1 800 333 7421
Hours of Operation	8 a.m. to 4:45 p.m. eastern time, Monday through Friday (except holidays)
Technical Publications in PDF	http://www2.sea.siemens.com/Products/Process-Instrumentation/Support/PI-User-Manuals.htm then click the product line (e.g. Control Solutions)
Public Internet Site	http://www2.sea.siemens.com/Products/Process-Instrumentation
Repair Service	1 800 365 8766 extension 3187 (for warranty and non-warranty service)

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