

Pinnacle Quick Start Guide

Introduction

ScadaWorks is a suite of software tools that help you quickly and easily configure your ICL controller for SCADA (Supervisory Control and Data Acquisition) and other applications.

The Quick Start Guide walks you through the essentials of installing the software, creating and running your first application.

Once you have the ScadaWorks software installed on your PC, additional information is available in the form of on-line help. The help files may be accessed directly through the ScadaBuilder Workbench “Help” menu. You can also get help on a specific setup parameter by pressing the F1 key when the parameter is selected. The same help can be accessed by clicking on the parameter with the “What’s this?”  pointer (use the button found in the upper right corner of most of the windows).

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Typographical Conventions

Before you start using this guide, it is important to understand the terms and typographical conventions used in the documentation. For more information on specialized terms used in the documentation, see the Glossary at the end of this document. The following kinds of formatting in the text identify special information.

Formatting convention	Type of Information
<i>Emphasis</i>	Use to emphasize the importance of a point or for variable expressions such as parameters.
CAPITALS	Names of keys on the keyboard. For example, SHIFT, CTRL, or ALT.
KEY+KEY	Key combinations for which the user must press and hold down one key and then press another, for example, CTRL+P, or ALT+F4.
Menu Menu Item	<p>The (pipe) symbol is used to show menu and tab selections. For example, "Tools File Transfer... menu" means to click on the Tools menu and select the File Transfer... menu option.</p> <p>When discussing a configuration dialog, this will define where the dialog exists and how to get to it.</p> <p>For example, if a parameter is found at "Node Settings Ethernet / Serial IP tab", you can navigate to that parameter by clicking the Node menu and selecting the menu option Settings, then clicking on the Ethernet / Serial IP tab.</p>



This kind of box means it contains information that could be very useful to you.



This kind of box means that this is something to watch out for or has been a support issue in the past, be careful!

Contents

Introduction	2
Copyright Notice	2
Typographical Conventions.....	3
Section I Installing ScadaWorks	5
Installing the Software.....	5
Registering ScadaBuilder	6
Registering ISaGRAF v5.....	7
Section II Sample Application Walkthrough	9
Creating an Etherlogic Pinnacle Project.....	9
ISaGRAF v5 Control Logic.....	14
Building (Compiling) The Application	19
Preparing The Pinnacle Target Controller	21
Debugging and Testing The Application.....	24
Modbus Setup.....	28
Section III ScadaBuilder Concepts	31
Projects and Nodes	31
Registers	32
I/O Mapping	32
I/O Scaling.....	32
Exploring the Setup	33
Pinnacle I/O Configuration.....	34
Scaling.....	35
Index	39

SECTION I

Installing ScadaWorks

In This Section

Installing the Software.....	5
Registering ScadaBuilder	5
Registering ISaGRAF v5.....	7

Installing the Software

The ScadaWorks software suite consists of the components listed below. The minimum operating system requirements are Windows 2000 Pro, Windows XP or Vista.

There are two primary packages with ICL ScadaWorks suite: ScadaWorks and ISaGRAF v5

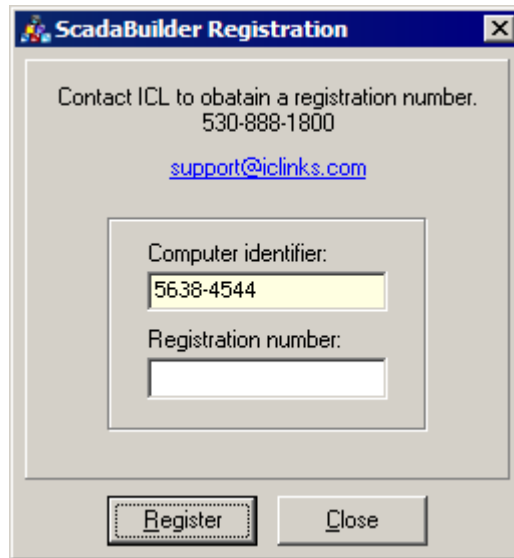
- ScadaWorks – ScadaWorks ties all the components together and provides the tools to help you configure ICL controller(s) for your applications. Using ScadaWorks WITHOUT ISaGRAF v5 is free and only requires an email or telephone registration. This is for your benefit so you may be notified of updates in the future.
- ISaGRAF 5 Support – The ISaGRAF v5 package allows you to develop control logic that will be executed on the target Pinnacle controllers. This component consists of the ISaGRAF v5 workbench and a 32 bit runtime kernel. The ISaGRAF v5 Workbench is an IEC-61131-3 standards-compliant development tool that supports 6 development languages. The ISaGRAF Runtime Kernel and supplemental functions allow you to create ISaGRAF v5 projects that take advantage of ICL controller hardware. ISaGRAF v5 requires the purchase of ScadaWorks with ISaGRAF v5 and is registered separately from the ScadaBuilder package.

Install the software by running the setup.exe on the root of your CD. If you downloaded the InstallImage.zip, extract (unzip) the InstallImage.zip file to a local hard drive. Run the setup.exe from the resulting InstallImage directory.

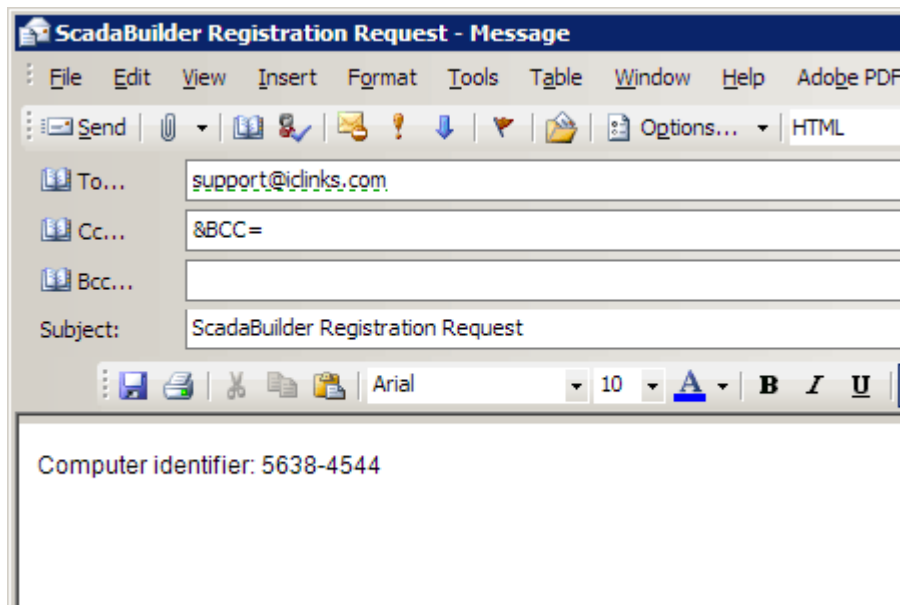
Click the button for each install package and follow the on screen instructions. It is recommended that you leave the install paths at default unless absolutely necessary.

Registering ScadaBuilder

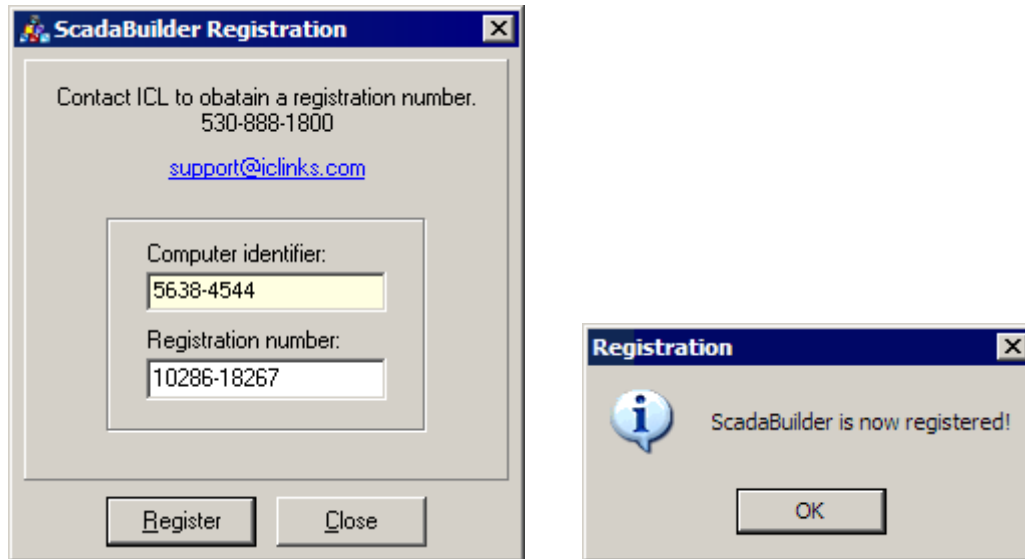
When you start ScadaBuilder you will first be prompted to register the software. If your ScadaBuilder software is already registered you may skip this section. You will see this window (the number will vary)...



If you click on the support@iclinks.com link, the system will place your Computer identifier into the body of the email. When emailing ICL, please include your company name and phone number.



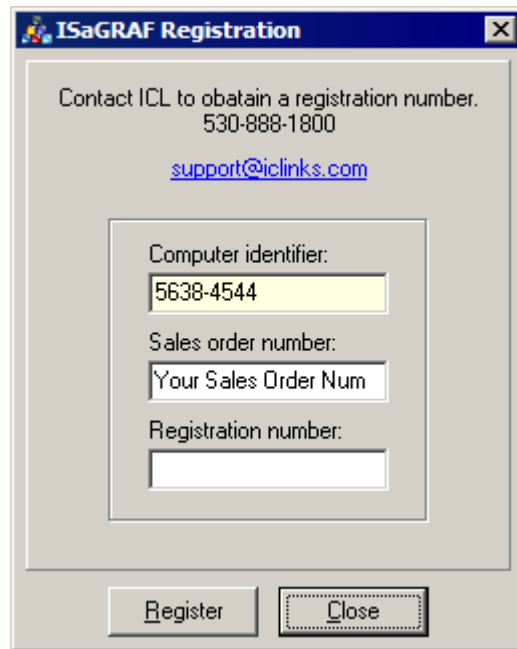
You may also call ICL for a registration number at 530 888-1800 during business hours PST. Type or paste the registration number into the Registration number field and click register (your number will be different than the one shown). You should get the following pop-up:



Registering ISaGRAF v5

If you don't register ISaGRAF, all software will work properly but after 30 minutes of running on the controller, the application will disconnect and turn off all I/O on the units.

Registering ISaGRAF is much the same as registering ScadaBuilder. Click on the Help | Register ISaGRAF menu. You will see the following:



Email or phone in the Computer identifier shown in the dialog (it will be different from the picture above).

ICL will also require the Sales order number that the complete ScadaWorks package was purchased under. If you don't have the number, ICL Tech Support can look it up for you.

Enter the Sales order number and the Registration number that ICL gives you into the appropriate fields. You should see this pop-up:



! *If you don't register ISaGRAF, all software will work properly but after 30 minutes of running on the controller, the application will disconnect and turn off all I/O on the units.*

SECTION II

Sample Application Walkthrough

To show you the basic steps you will use to develop a ScadaBuilder application, we will walk you through creating, transferring and running a simple application. This application will set up the target controller to do some simple control logic and to act as a Modbus slave. (“Modbus” is a serial communications protocol that is commonly used in industrial automation systems.)

After we go through the mechanics of using ScadaBuilder, we’ll spend a little time talking about ScadaBuilder concepts and look more closely at the application you have created.

The hardware required for this tutorial is one ICL controller with some built-in digital inputs and digital outputs. The I/O on the controller will be mapped to registers that are accessible via Modbus.

We will assume at this point that you already have the following ScadaWorks software components installed on your PC:

- ScadaWorks
- ISaGRAF 5

If you do not already have these components, they are available on the ScadaWorks CD. They are also available for download via ICL’s web site www.iclinks.com <http://www.iclinks.com>

Let’s get started, shall we?

In This Section

Creating an Etherlogic Pinnacle Project.....	9
ISaGRAF v5 Control Logic	14
Building (Compiling) The Application	19
Preparing The Pinnacle Target Controller.....	21
Debugging and Testing The Application	24
Modbus Setup.....	27

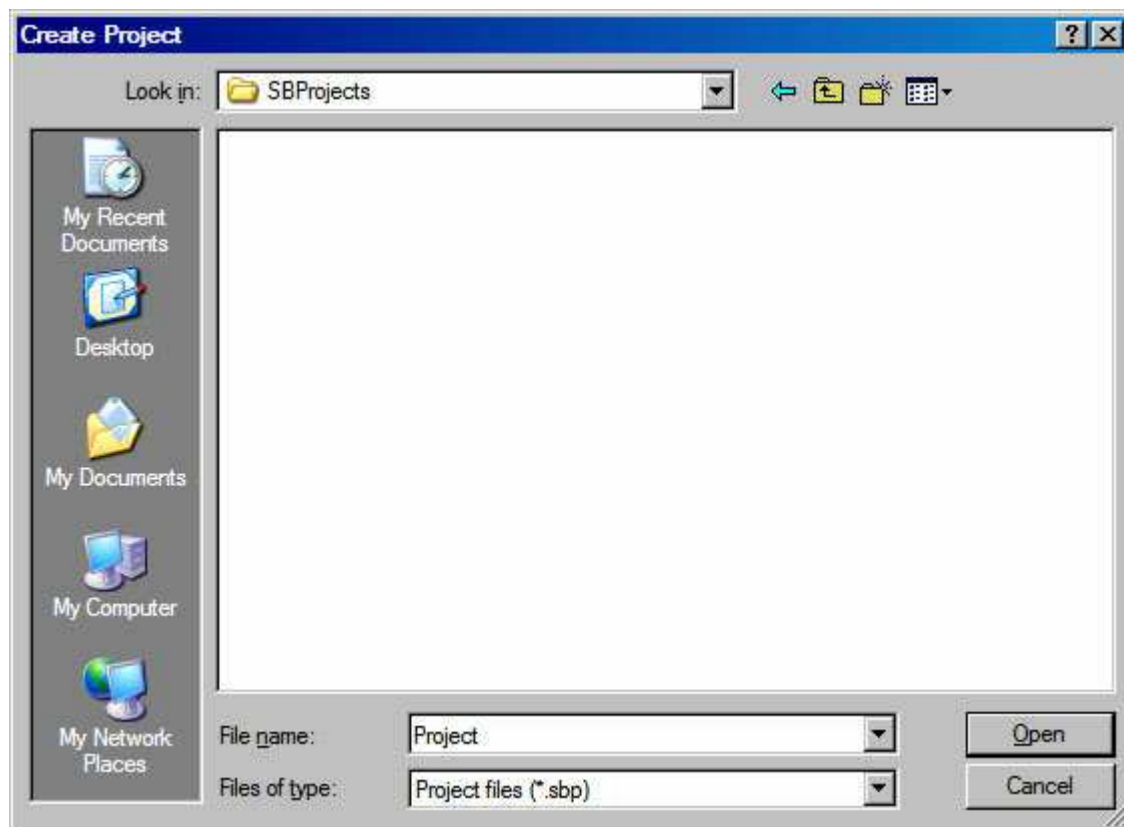
Creating an Etherlogic Pinnacle Project

Follow the steps below to create a basic ScadaBuilder Project (which we will then build upon):


- Start ScadaBuilder. It will be found in the Start menu under **Programs | ICL Tools | ScadaBuilder**. If this is the first time you have run ScadaBuilder, you will see the following Quick Start window:



- This allows you to get started quickly with ScadaBuilder by helping you set up your first project. You can also start this dialog using the **File | Quick Project...** menu.
- Click “OK” to continue. ScadaBuilder then prompts you to select a directory for your project. You will see the following:



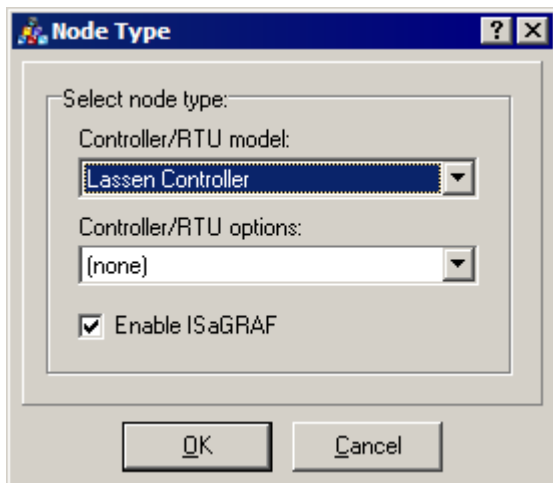
You can store your projects wherever you like, but the default folder is “C:\SBProjects”. Each project must be in its own folder (typically a sub-folder of “SBProjects”).

- Create a sub-folder for your first project by clicking on the  button.

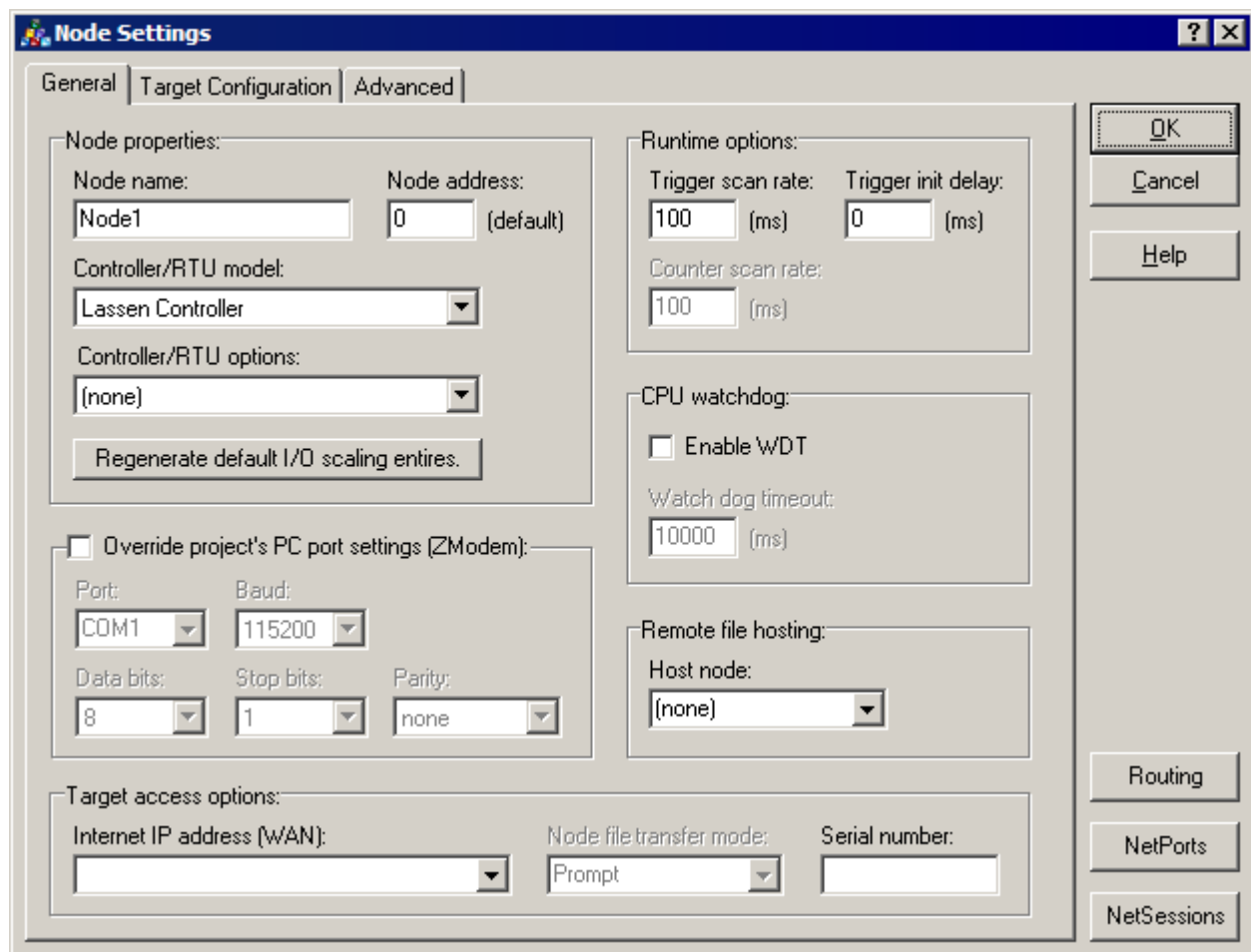
- Type in the name “FirstProject” as shown below:



- Double-click the new folder name to go into that folder.
- Click “Open” to accept the default project file name (“Project”).
- On the next window that appears, select the controller model and any options that represent the controller you have (or the one you are pretending to have). The window below shows a standard Pinnacle Lassen controller selected:



- Leave the “Enable ISaGRAF” option checked and click “OK.” You will see a window that looks like this:



This is your **Node | Settings** window. All controller configuration for debugging, IP configuration, servers and communication options are done here. There are a few basic configurations that we need for a Pinnacle controller such as the Lassen to ease the application development cycle. We need to configure an IP address (mandatory), configure ISaGRAF v5 for debugging over Ethernet and enable the FTP server on the controller.

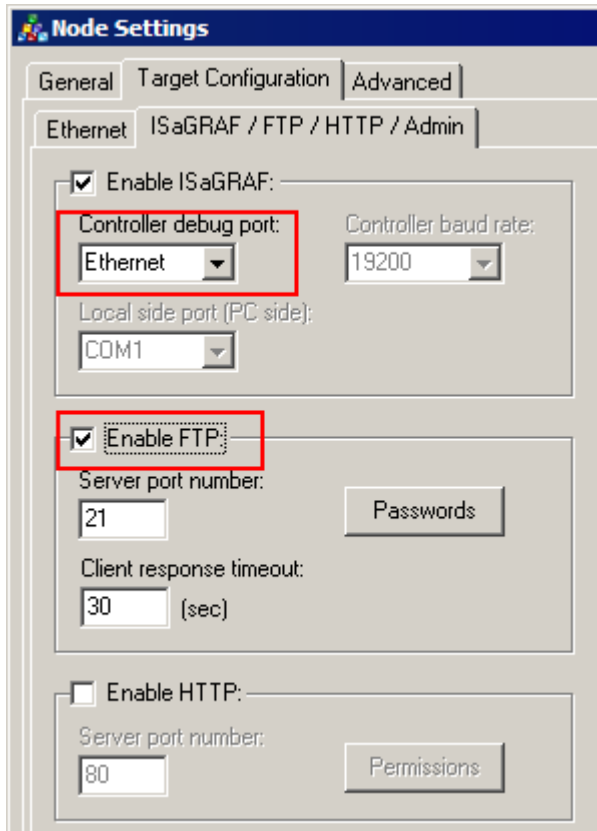
Click on the Target Configuration tab:

The screenshot shows the 'Node Settings' dialog box with the 'Target Configuration' tab selected. The 'Ethernet' sub-tab is also active. The 'Enable Ethernet 1' section is checked, and the 'Specify IP address' radio button is selected. The 'Node IP address (LAN)' field contains '192 . 168 . 237 . 199', the 'Network mask' is '255 . 255 . 255 . 0', and the 'Include servers in routing table' checkbox is checked. The 'Enable Ethernet 2' section is unchecked. At the bottom, there are three buttons: 'Query Target', 'Apply to Target', and 'Restart Target'.

Section	Enable	Automatic IP (DHCP)	Specify IP	Node IP (LAN)	Use address segment from switch	Network mask	Network gateway	Domain name servers	Include servers in routing table
Ethernet 1	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>	192 . 168 . 237 . 199	<input type="checkbox"/>	255 . 255 . 255 . 0			<input checked="" type="checkbox"/>
Ethernet 2	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>		<input type="checkbox"/>	255 . 255 . 255 . 0			<input checked="" type="checkbox"/>

Check the Enable Ethernet 1 and put in a Node IP address (LAN) that is compatible to your network. If you don't know what is compatible, ask your IT person what would be a good address to use for your computer to talk to this controller. If you are connecting straight to the Ethernet port on your computer, the above address will work fine. You will be asked to change the IP on your computer to a compatible address when we attempt to download.

Click on the ISaGRAF /FTP /HTTP /Admin tab.



Then Enable ISaGRAF checkbox should already be checked. Set the Controller debug port to "Ethernet".

Check the Enable FTP checkbox.

Click Ok.

You have successfully created a new ScadaWorks Pinnacle project using the Lassen controller.


ISaGRAF v5 Control Logic

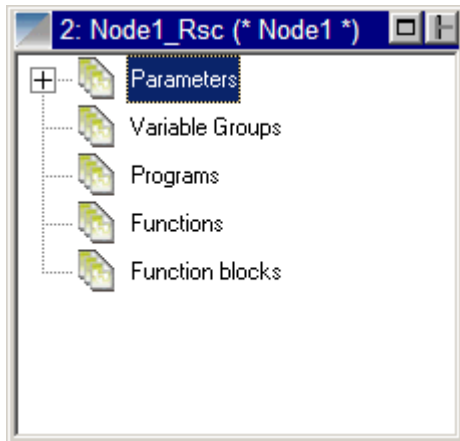
Let's add some basic logic. If you wanted to describe the desired logic as a sentence, you could write:

"If digital input 1 or digital input 2 is ON, turn digital output 5 ON, otherwise turn digital output 5 OFF."

We will use ISaGRAF to represent this logic in a form that the controller can understand. ISaGRAF is a standards-compliant tool that is integrated with ScadaBuilder, and can be used to create logic of just about any level of complexity. With ISaGRAF, you have the choice of 6 different "languages" to tell the controller what you want it to do. For the most part, any of the languages can be used to accomplish a task, but the language or languages you choose will be based on your preferences and the types of tools

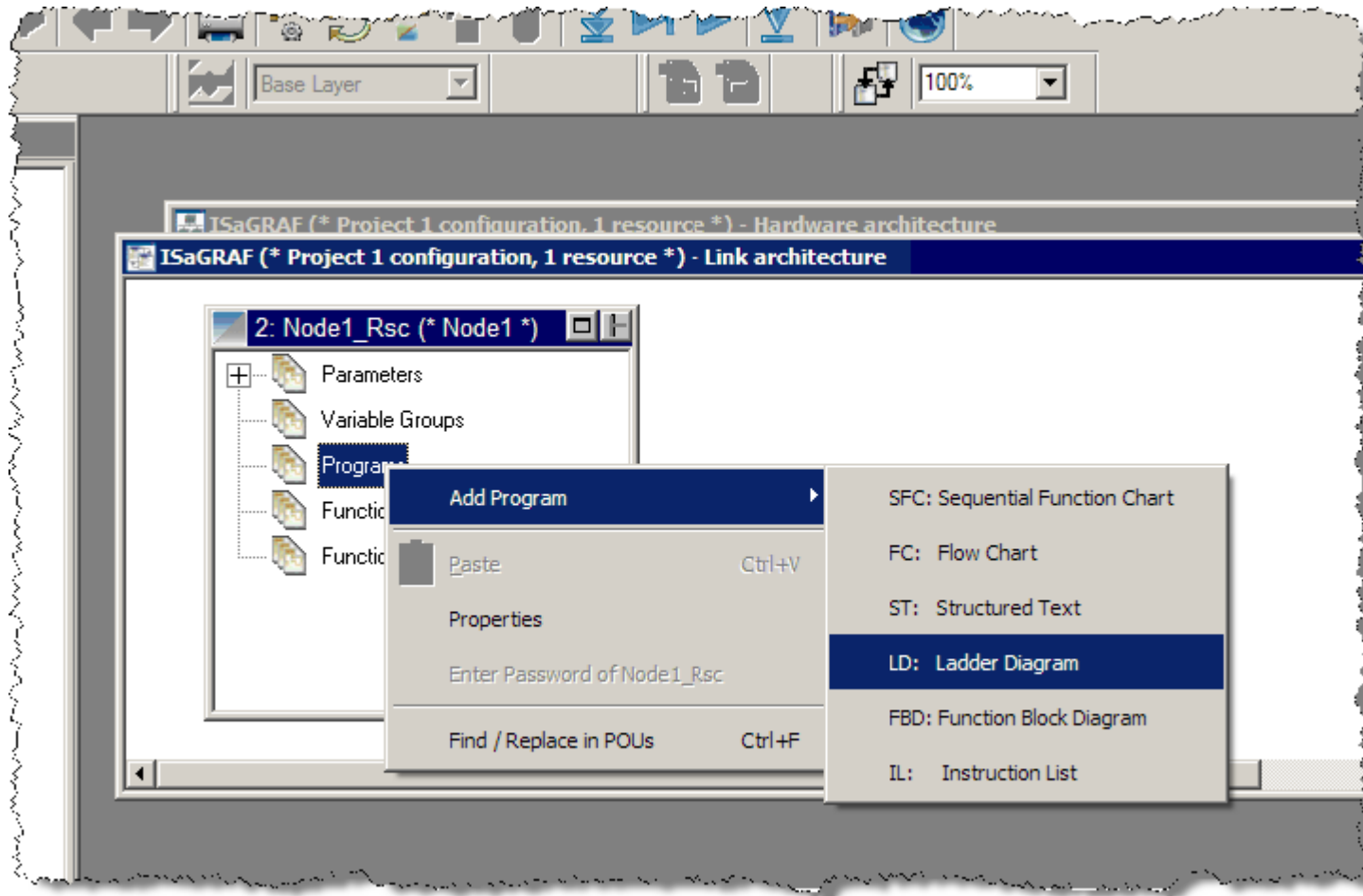
that you are already familiar with. The languages are both graphical and text-oriented and you can use multiple languages within the same Node.

- For this introduction, we will use “Ladder Diagram,” or LD. Let’s continue:
- Make sure that “Node1” is selected in the ScadaBuilder project window.
- Click the  button to bring up ISaGRAF. You should see an empty “Programs” window:

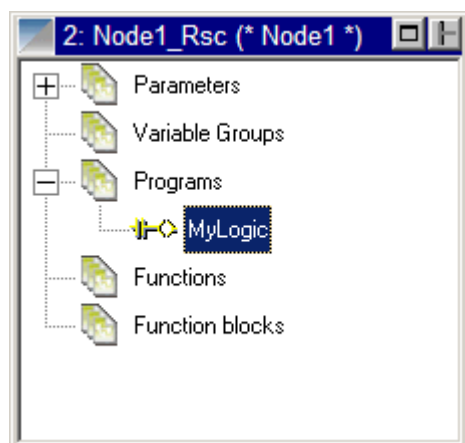


- Multiple “Programs” can be created to represent different portions of your control logic. We will create just one simple Program.

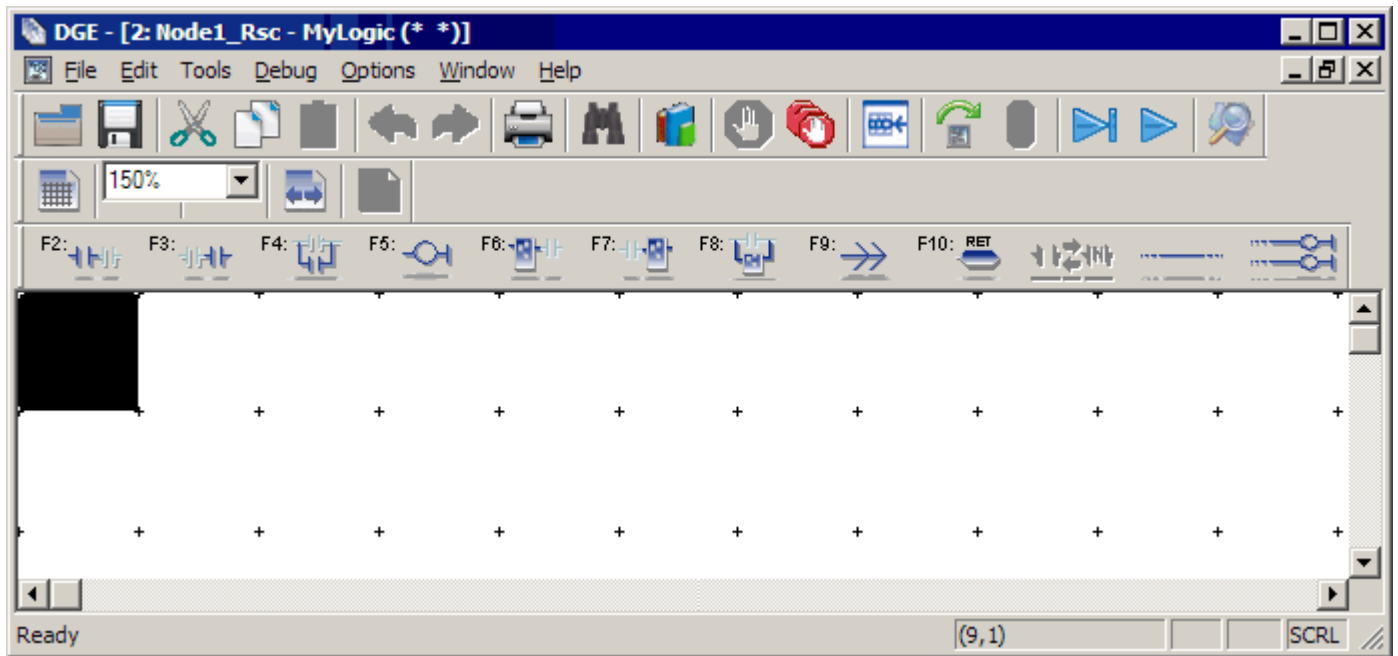
- Right Click on the Programs item within the Resource window. The window below will appear. Type in a name and (optionally) a comment. Make sure “Quick LD” and “Begin” are selected, then click “OK.”

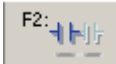


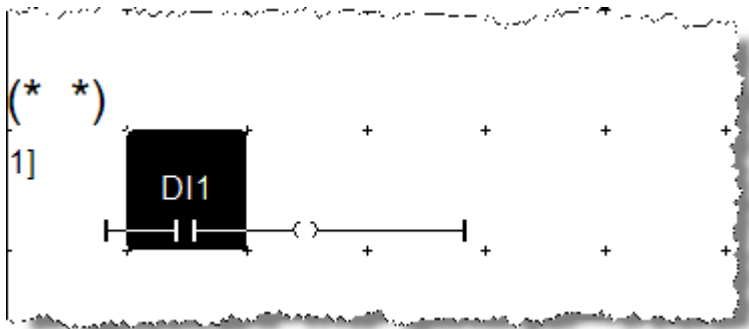
- Now your Resource window will look like this:



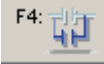
- Double-click on the “mylogic” program, to bring up a blank Quick LD program editor window:

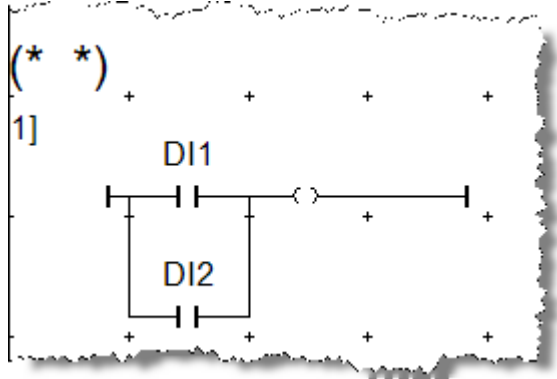


- Click on the  button (or press F2) to tell ISaGRAF that you would like to place a contact. Select DI1 as your first register assigned to the contact. The window will then look like this:

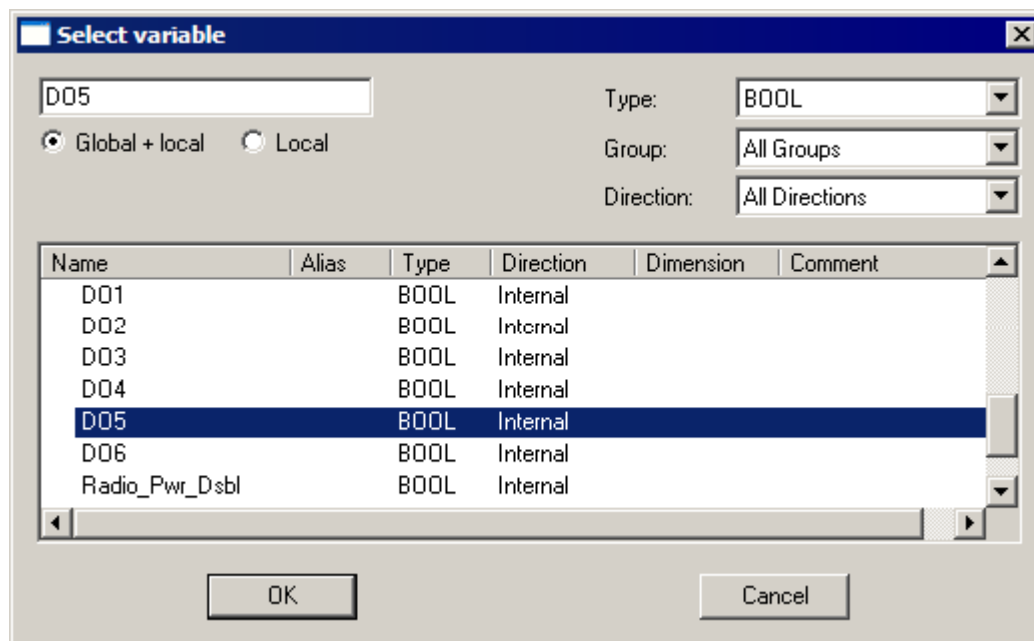


- Notice that the Quick LD editor automatically makes a complete “rung,” including a coil.

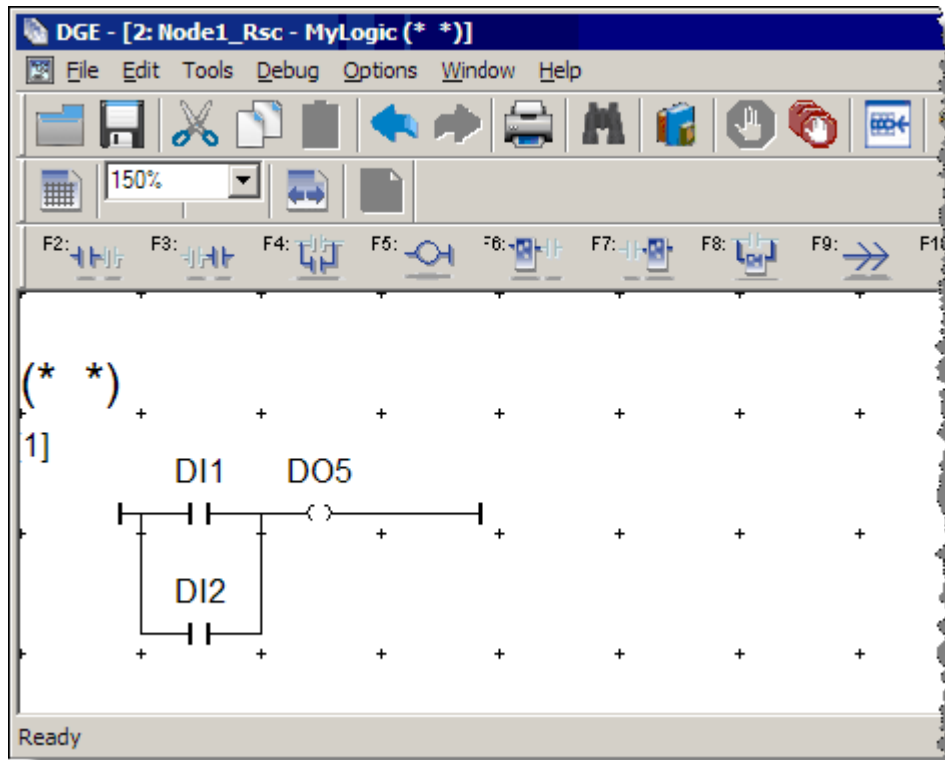
- Click the  button (or press F4) to add a parallel contact below the first contact and select DI2 as the register assigned to the contact. The result will look like this:



- Double click the coil at the top of the diagram. The following window will appear, which allows you to select a register (also known as a “variable” in ISaGRAF) to be associated with the contact. Select D05 and click okay:



- Your program should look like this:





- We are using DI1 and DI2 for simplicity. On Pinnacle controllers, DO5 is a common point to all the controller types but is a slightly different piece of hardware on the Lassen

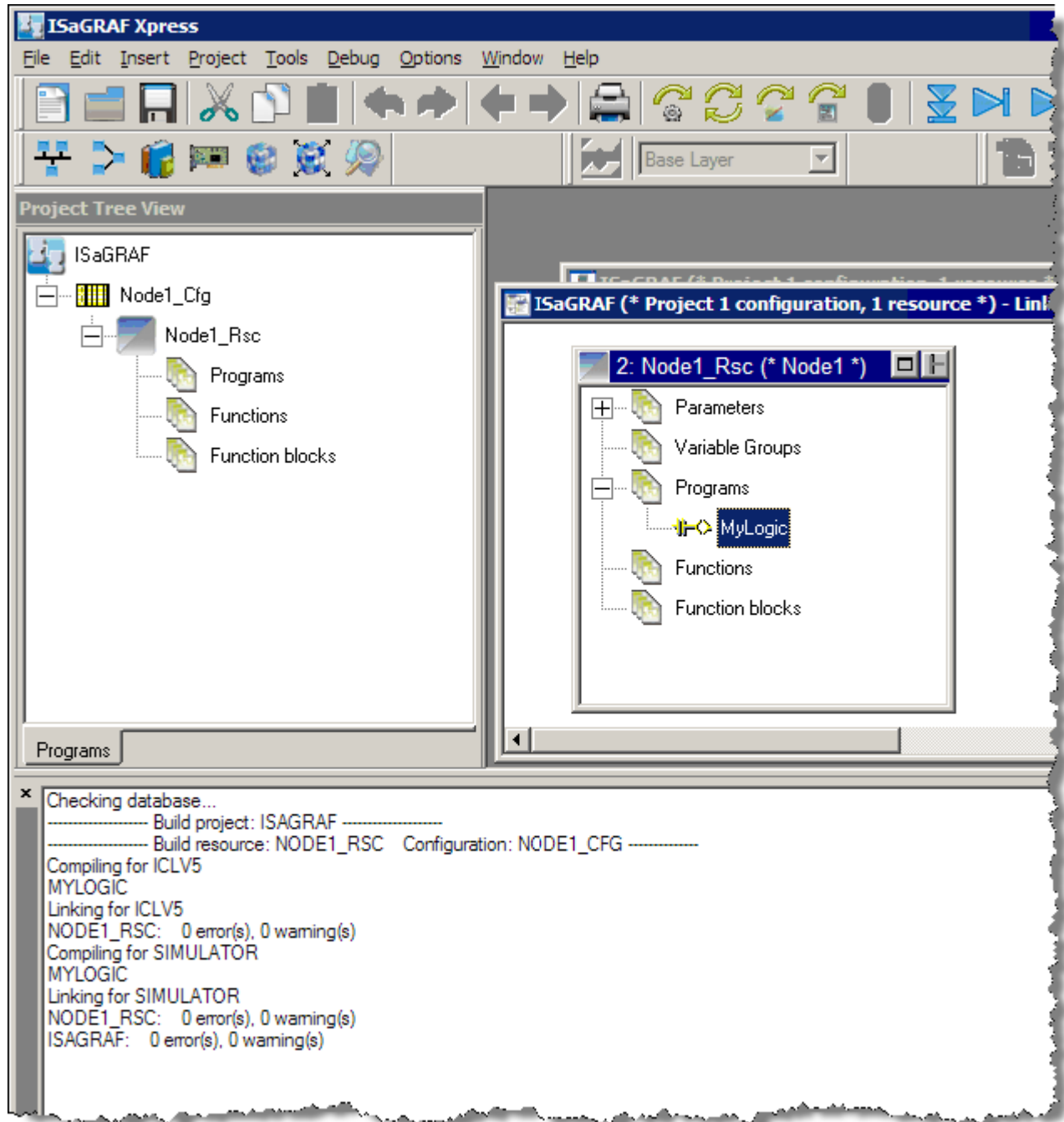
Building (Compiling) The Application

Before you try to load your application onto the target controller, you must first “make” it. This will take the application in its “source” form and compile it into a form necessary for execution. Both your ScadaBuilder setup and ISaGRAF control logic will be combined into a single program image.



The terms "make", "build" and "compile" are used interchangeably throughout both the ICL and ISaGRAF documentation and help. They all mean the same thing.

- From the ISaGRAF Workbench, click the Build  button. (You can alternatively use the “Make ISaGRAF Project”  button in ScadaBuilder.) After the application makes, you will see something like this:



- You may now close the ISaGRAF Workbench.





ScadaBuilder often needs to open the ISaGRAF v5 Workbench to accomplish some of the work of compiling and downloading. This is normal. It might be a good idea for you to put ScadaBuilder and the ISaGRAF Workbench side by side on the screen to prevent lost windows.

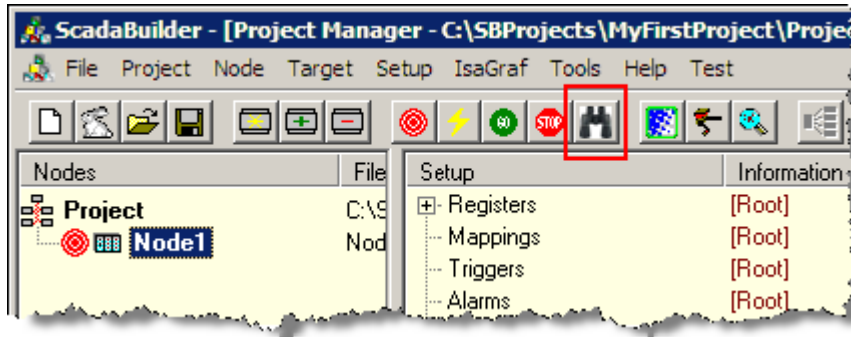
Your application is now in the form needed for execution on the target controller.

Preparing The Pinnacle Target Controller

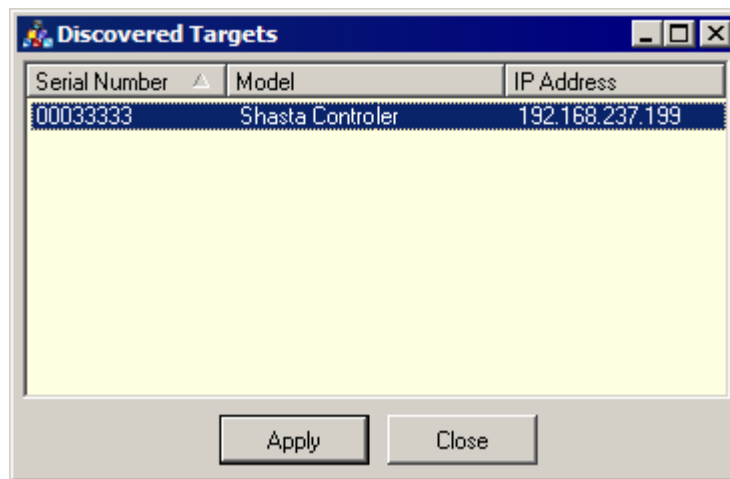
Now let's prepare the target controller so it is ready to accept and run your newly created application. Refer to the appropriate hardware reference manual for power supply requirements and other connection details.

While all programming task may be accomplish via a serial port, we are going to use Ethernet exclusively to prep the controller and then download and debug the application. The following process (termed a Complete Control Setup...) only needs to be done the first time the Node in the ScadaBuilder project and the corresponding controller are configured to work together. This should also be done on any ScadaWorks software update. After the initial setup, you may download the application via the Target  button or the Lightning Bolt  button. Any changes to Node Settings will require a Complete Controller Setup... again or you can alternatively download the Node Settings from the Node Settings dialog under the Target Configuration tab.

- Connect an Ethernet cable to the controller. This may be a point to point connection or a connection over a switch to a local network. If you are going to use your local network, be sure that the static IP address you define in the creating project section is compatible with you network. (see Appendix A, An Ethernet/Internet Primer for TCP/IP in the ScadaWorks Technical Reference Manual for more details)
- Press and hold the "System" button (located in the "trough" next to the STAT LED and the USB connectors) and power cycle the unit. Continue to hold the button until you see "SB Loader v1.xx..." on the front HMI display. When this operation is completed, you should see the unit's serial number (important to note for later), the IP address that is either provided by DHCP or is the controllers default.
- In ScadaBuilder, click the Discovery button shown below:



- If prompted answer yes to use the network.
- Select your unit's serial number if there is more than one controller and click apply.



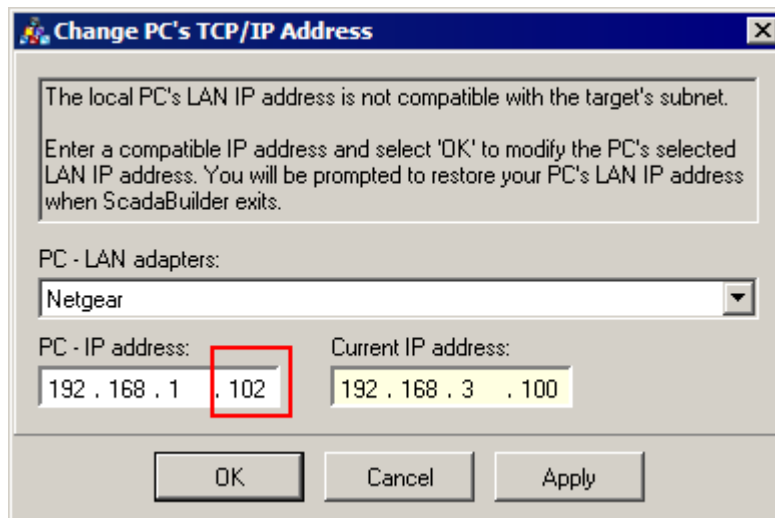
ScadaBuilder associates the node serial number with the node in the project and configure. The Discover process may be used at any time to reconfigure which node ScadaBuilder associates with which controller.

- Click the Target | Send Complete Controller Setup... menu.

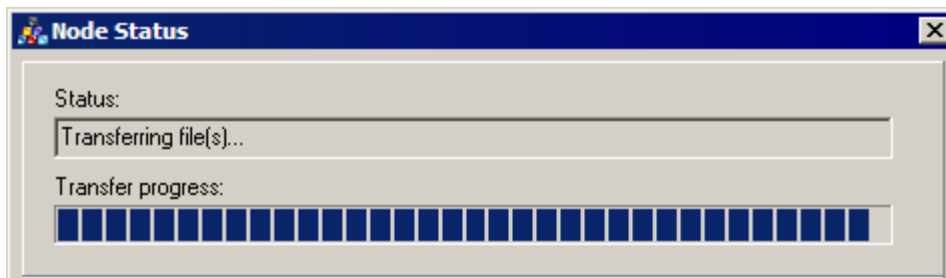


Do not remove power during program updates. Should that occur, it will be necessary to repeat the Complete Control Setup... process.

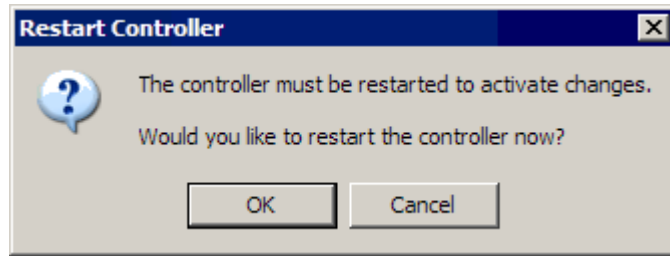
You may be prompted to change the IP address on your computer temporarily if your network interface's subnet does not logically match up with the node's IP address. If your computer is connected to a LAN through this interface, your network services may be disabled during your download and debugging session. Select the adaptor the controller is connected to and pick an unused address in the last octet of the IP address.






- You should see the following dialog on a successful download:




- Click OK to restart the controller automatically.



As mentioned earlier, after the initial setup, you may download the application via the Target  button or the Lightning Bolt  button. You may also download the application from the ISaGRAF v5 Workbench using the Download  button.

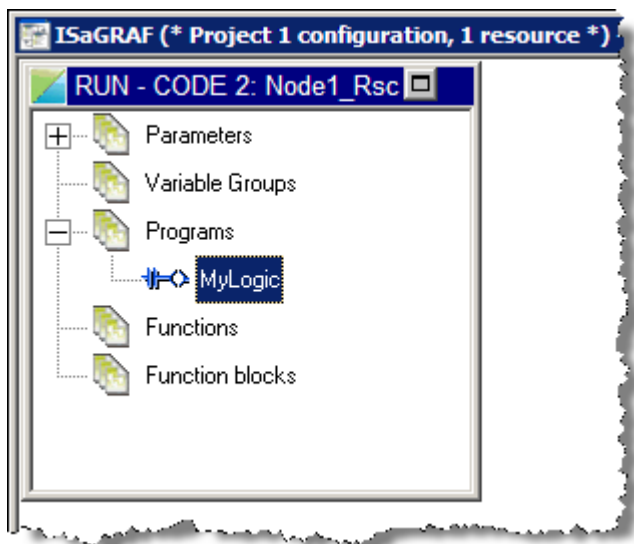
Each of these mechanisms is a little different and you should try them all to see which one fits your needs best. You are now ready to debug the application.

Debugging and Testing The Application

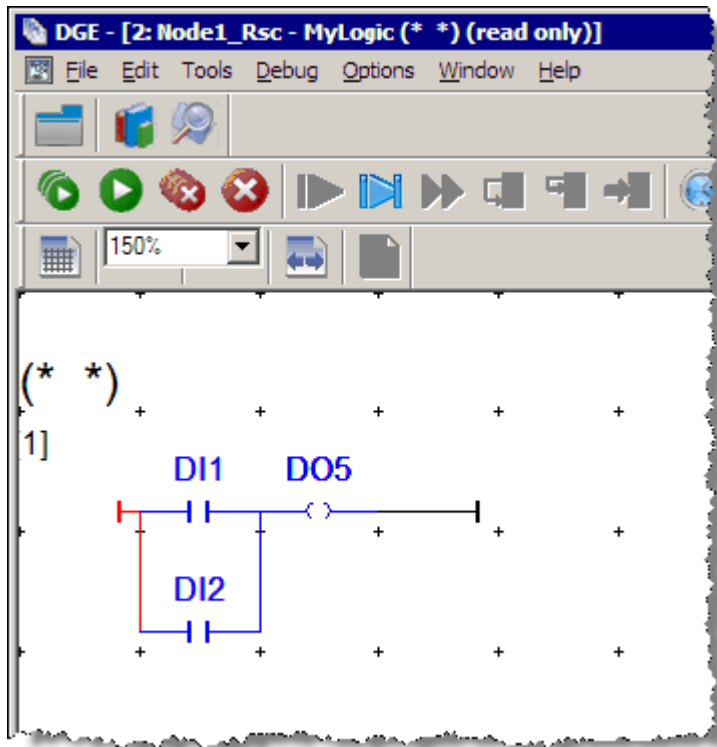
We are now ready to launch the Debugger. This can be accomplished by pressing the “Debug the ISaGRAF project”  button. (Also known as the “Spyglass”)


The ISaGRAF v5 workbench will open and go immediately into debug mode. Your Ethernet cable must be connected and controller configured for this to work.

- Double Click on the MyLogic POU (Program Organizational Unit):



- You should see your logic live with real values:



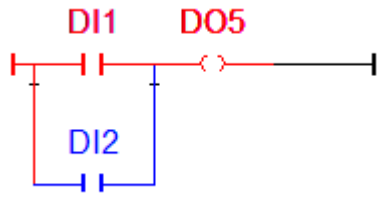
- You may also look at the data in the Dictionary live--just click on the Dictionary  button.
- Scroll down until you can see the data you want. You may need to resize some of the ISaGRAF windows to do this:

on, 1 resource *) - Dictionary - Variables						
MyLogic						
Name	Alias	Locked	Logical ...	Physical...	Type	()
DI1		No	FALSE		BOOL	
DI10		No	FALSE		BOOL	
DI11		No	FALSE		BOOL	
DI12		No	FALSE		BOOL	
DI13		No	FALSE		BOOL	
DI14		No	FALSE		BOOL	
DI15		No	FALSE		BOOL	
DI16		No	FALSE		BOOL	
DI17		No	FALSE		BOOL	
DI18		No	FALSE		BOOL	
DI2		No	FALSE		BOOL	
DI3		No	FALSE		BOOL	
DI4		No	FALSE		BOOL	
DI5		No	FALSE		BOOL	
DI6		No	FALSE		BOOL	
DI7		No	FALSE		BOOL	
DI8		No	FALSE		BOOL	
DI9		No	FALSE		BOOL	
DO1		No	FALSE		BOOL	
DO2		No	FALSE		BOOL	
DO3		No	FALSE		BOOL	
DO4		No	FALSE		BOOL	
DO5		No	FALSE		BOOL	
DO6		No	FALSE		BOOL	
DO7		No	FALSE		BOOL	
DO8		No	FALSE		BOOL	

- You should be able to connect signals to the input terminals on the controller and have the corresponding value appear in the register window. To turn on DI 1 or DI 2 on the Pinnacle, jumper the DI to the closest C (common) pin on the terminal block.
- The operation of digital output 1 should reflect the logic that you put into ISaGRAF:

DI 1	DI 2	DO 5
FALSE	FALSE	FALSE
TRUE	FALSE	TRUE
FALSE	TRUE	TRUE
TRUE	TRUE	TRUE

- When a boolean point is TRUE, it will show up in red in both the debugger and the Dictionary:

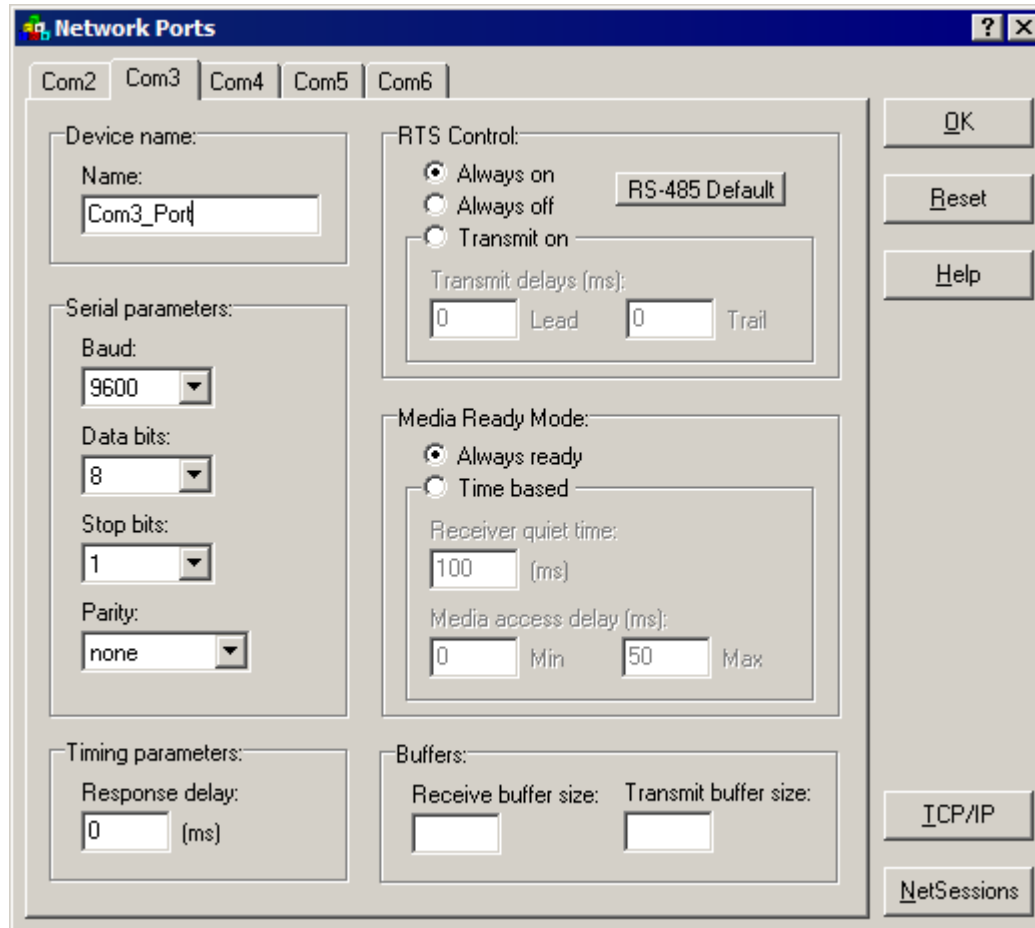



If you have gotten this far, you are on your way to writing applications for the Pinnacle series of controllers.

Let's setup some simple communications...

Modbus Setup

We will now add the Modbus protocol setup to our sample application. With Modbus protocol, there are “masters” and “slaves.” There is only one master on a given Modbus network. The master originates messages to the slaves and the slaves respond. Slaves do not originate messages. We are going to make our controller a slave on the “Com3” serial port. First let’s define the characteristics of the port:

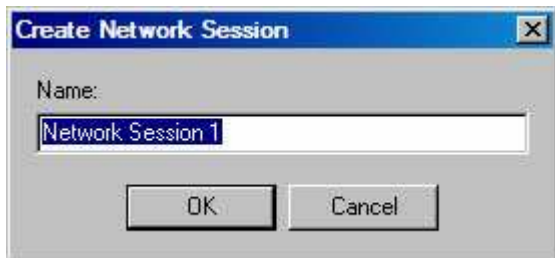


- In this example we are setting up a Network port for use with RS-232. If you need to use RS-485 you will need to click on the **RS-485 Default** button.
- Make sure that “Node1” is selected in the ScadaBuilder project window so that we can access its setup parameters. You should see a “target” icon  next to the Node.
- Choose “Setup” and select “Network Ports” from the menu.
- If the “Com3” tab is not already selected, click on it to select settings for the Com3 serial port.
- Type the name as shown below for the port. By default all ports are available to use in the Network Ports window. If you do not see the correct ports please go back and double-check the options that you selected when creating the project.

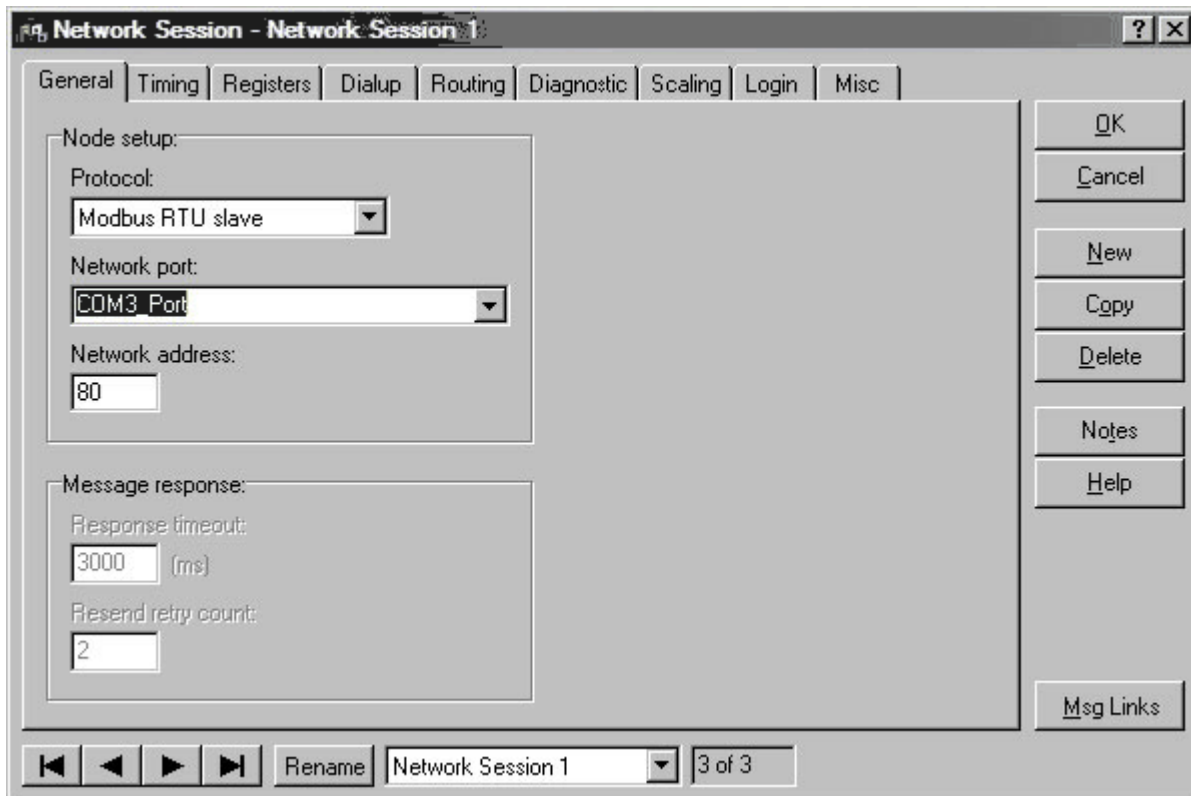
- Select a baud rate of 9600.
- Leave all the other settings at their default as shown below, then click “OK.”

Next, you will create a Network Session. A Network Session specifies a protocol and related parameters. Network Sessions are applied to a specific Network Port. That makes the protocol run on the port. For this sample application, you will create a Network Session for the Modbus RTU Slave protocol.

- Choose “Setup” and select “Network Sessions” from the menu.
- Enter the name as shown below, then click “OK”



- Set all the parameters as shown below on the “General” tab (most systems can use the defaults--you do not need to change settings on any of the other tabs)



The “Network Address” is used to unique identify the slave. When the master has a message to send to the slave, it uses this address.

- Click “OK” to accept your changes. You have now completed the Modbus slave setup.

- You should be able to communicate with the controller using a Modbus master (such as a SCADA or MMI software package running on a PC). Set the communications parameters to match the settings on Com3 of the controller (9600 baud, Modbus address 1). Use a null-modem cable between a test PC and Com3 of the controller.

The I/O should be available in the following Modbus registers:

- digital inputs—starting at Modbus register 104001
- digital outputs—starting at Modbus register 004101

Please Note: These are default Modbus registers and not ICL registers. Modbus appends a 0, 1, 3, or 4 to the front of the register index in order to specify what bank a message is reading/writing.

SECTION III

ScadaBuilder Concepts

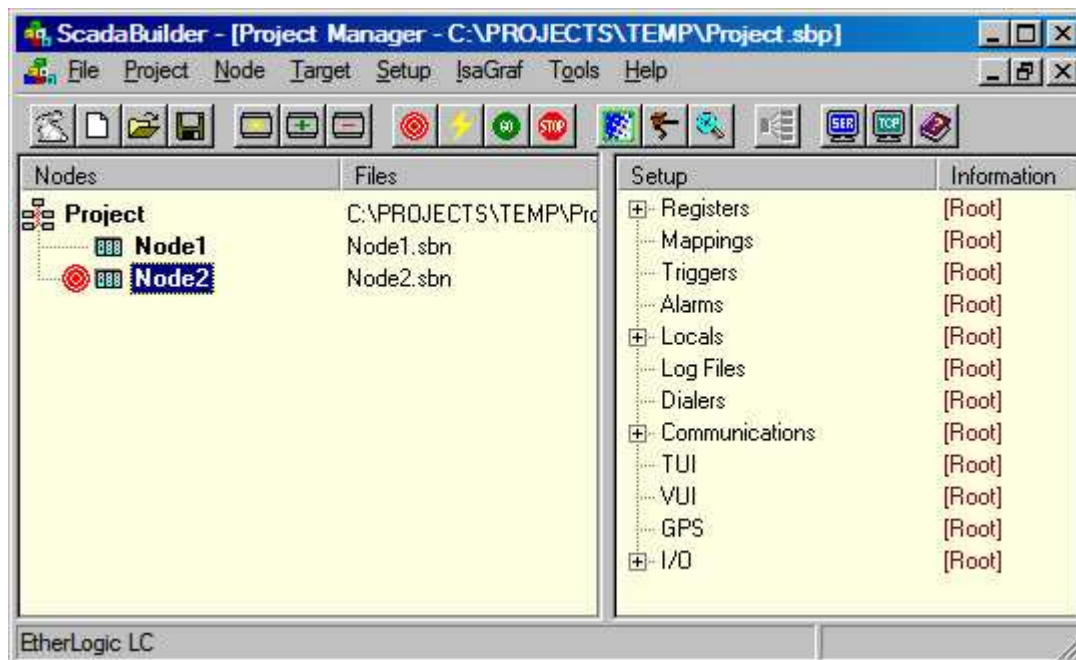
In This Section


Projects and Nodes	31
Registers	32
I/O Mapping	32
I/O Scaling.....	32
Exploring the Setup.....	33
Pinnacle I/O Configuration	34
Scaling.....	35

Projects and Nodes

ScadaBuilder lets you work with “Projects” and “Nodes.” A ScadaBuilder Project is a collection of one or more Nodes. Each Node represents one physical ICL controller and its corresponding ScadaBuilder setup.

- The example Project below has two Nodes (“Node1” and “Node2”):



- To work on a specific Node, you must first click on it to select it. The currently selected Node has a “target” icon  to the left of its name. In the example above, “Node2” is selected.
- The options under the “Setup” menu apply to the selected Node. If a Node is not selected, you can’t modify any Node setup items (the items of the “Setup” menu will be disabled).
- Setting up a Node consists of creating and modifying configuration items using the “Setup” menu.
- Some operations can be performed using the tool lbar buttons at the top of the Workbench window. To see what the function of each button is, move your mouse pointer over the button of interest and wait a moment for the handy “tool-tip” to appear.
- Setup items are shown on the right side of the Project Manager window. You can expand/contract a branch of the tree by clicking on the “+” and “-“ symbols. To view or edit a setup item, double-click on it in the tree view. If no setup items exist, you may create one by double-clicking the corresponding tree root or using the “Setup” menu. A newly created Node will contain the roots of the setup tree, as shown above.
- To access the ISaGRAF tools for developing control logic, select a node and click the ISaGRAF button or choose “Tools” and select “ISaGRAF Workbench” from the menu.

Registers

ScadaBuilder uses “registers” to store information. Registers can store different types of information, such as integers, floating point/real numbers and on/off Boolean values. Values can be written to registers from various sources including analog inputs, digital inputs and communications protocols. Likewise, registers can be read by analog outputs, digital outputs and communications. Registers are handy little places to store things and are essential to everything in ScadaBuilder - without them, you can’t do anything.


I/O Mapping

The link between registers and physical inputs and outputs (I/O) is created through “I/O mapping.” When a register is mapped to an input, the input state/value is automatically stored in the associated register. When a register is mapped to an output, the value in the register is automatically reflected on the output.

I/O Scaling

ScadaBuilder allows you to scale analog inputs and outputs to engineering or “real world” units. For instance, an analog input could be scaled to represent flow in gallons per minute, liters per minute or just about any other unit of measure you can dream up.

What the Quick Project Feature Does

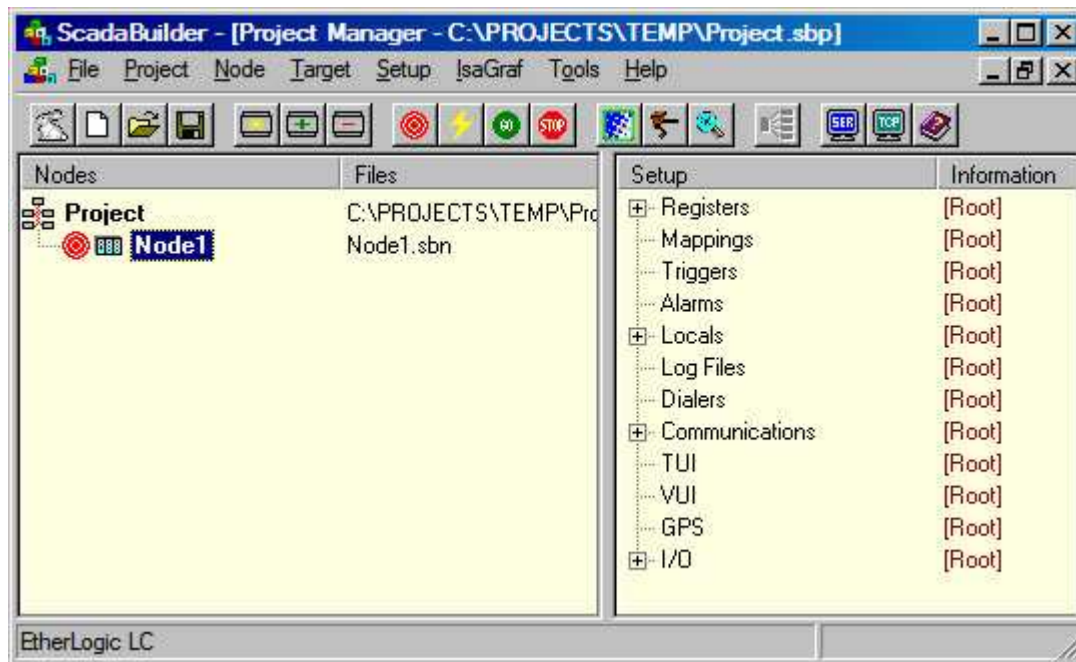
When you create a Project for a fixed I/O count controller or RTU (such as an EtherLogic or ScadaFlex Plus) using the “Quick Project” feature, a Project with one Node is created. In the Node setup, I/O registers are automatically created and mapped to the appropriate I/O channels. An I/O Scaling entry is created for each supported analog I/O mode, and the default 0-20mA Scaling entry is applied to each analog I/O channel. The Quick Project feature (or “ScadaBunny”, as we affectionately call it!) can be run by clicking on the  button on the toolbar.

Now, armed with some new concepts, let’s take a tour around the application you have created in order to more fully understand it.

Exploring the Setup

Let’s take a moment to explore some of the items that the Quick Project feature created for us in our sample application.

- Click on “Node1” in the Project window, as shown below, to make sure it is selected:



- Now click on the “+” sign to the left of “Registers” (in the right-hand window pane), to expand the register tree. Click on the “+” signs next to the “Boolean” and “Integer” branches as well to fully expand that branch of the tree. (Feel free to resize the window and move the dividing line that separates the two panes of the window)
- The items listed are register names, such as “DI1” and “AI5.” In most cases, you will see that a number of registers have been automatically created for you - one for each I/O channel.

Pinnacle I/O Configuration

Next, expand the “I/O” section of the tree and then double-click “Configuration” to open the following window:

The screenshot shows the "I/O Configuration" window for a "CPU: Shasta Controller". The window has tabs for CPU, Slot 1 through Slot 6, and sub-tabs for UI, AI, AO, DI, DO, and PI. The "UI" sub-tab is selected, showing a table of 8 channels. Each channel is mapped to a register (UIA1-UIA8) with a scale of 0 to 20mA, 4 samples average, and 72.72 ms speed. The "I/O options" section at the bottom includes fields for Card, Watch dog timer (0 x10 ms), DI gate time (0 sec), PI gate time (0 sec), and DO flash rate (0 x10 ms).

Channel	UI	UI_Scale	UI_Average	UI_Speed
1	UIA1	0 to 20mA	4 samples	72.72 ms
2	UIA2	0 to 20mA	4 samples	72.72 ms
3	UIA3	0 to 20mA	4 samples	72.72 ms
4	UIA4	0 to 20mA	4 samples	72.72 ms
5	UIA5	0 to 20mA	4 samples	72.72 ms
6	UIA6	0 to 20mA	4 samples	72.72 ms
7	UIA7	0 to 20mA	4 samples	72.72 ms
8	UIA8	0 to 20mA	4 samples	72.72 ms

Conv freq: 1.72 Hz

I/O options:

Card: Watch dog timer: (x10 ms) DI gate time: (sec) PI gate time: (sec) DO flash rate: (x10 ms)

- This window shows (and allows you to change) how I/O channels are mapped to registers. The columns show the I/O types, and the rows show the channels. For instance, the register “AI1” is mapped to analog input 1. We just picked simple register names—you could call them something more suited to your application (like “Pressure” or “Flow”).
- The icon indicates that a given channel has been mapped to a register. If the icon were present, this would indicate that the channel is not mapped. If a channel has been scaled, the icon appears.
- To change the mapping or scaling, click on the channel you are interested in and then click the “Map” or “Scale” button that appears on the right side of the window.

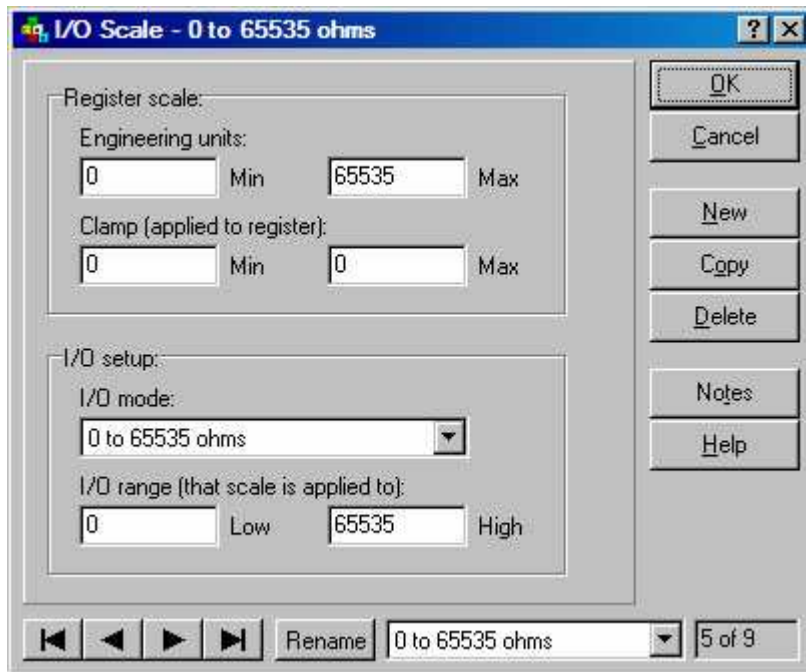
Scaling

Now let's take a closer look at scaling.

- Close the I/O Configuration window.
- Click the “+” sign next to the “Scaling” entry in the setup tree. You will see a listing similar to the following list of scaling entries. (This is the default listing for Pinnacle Lassens):

I/O	[Root]
Scaling	[Root]
(raw)	(I/O Scale)
0 to 20mA	(I/O Scale)
-300 to 300mV	(I/O Scale)
0 to 5V	(I/O Scale)
0 to 65535 Ohms	(I/O Scale)
J Thermocouple (C)	(I/O Scale)
J Thermocouple (F)	(I/O Scale)
K Thermocouple (C)	(I/O Scale)
K Thermocouple (F)	(I/O Scale)
T Thermocouple (C)	(I/O Scale)
T Thermocouple (F)	(I/O Scale)
E Thermocouple (C)	(I/O Scale)
E Thermocouple (F)	(I/O Scale)
R Thermocouple (C)	(I/O Scale)
R Thermocouple (F)	(I/O Scale)
S Thermocouple (C)	(I/O Scale)
S Thermocouple (F)	(I/O Scale)
B Thermocouple (C)	(I/O Scale)
B Thermocouple (F)	(I/O Scale)
N Thermocouple (C)	(I/O Scale)
N Thermocouple (F)	(I/O Scale)
10 Ohm Pt RTD 427 (C)	(I/O Scale)
10 Ohm Pt RTD 427 (F)	(I/O Scale)
100 Ohm Pt RTD 385 (C)	(I/O Scale)
100 Ohm Pt RTD 385 (F)	(I/O Scale)
100 Ohm Pt RTD 392 (C)	(I/O Scale)
100 Ohm Pt RTD 392 (F)	(I/O Scale)
1000 Ohm Pt RTD 385 (C)	(I/O Scale)
1000 Ohm Pt RTD 385 (F)	(I/O Scale)
10K Ohm Thermistor II (C)	(I/O Scale)
10K Ohm Thermistor II (F)	(I/O Scale)
10K Ohm Thermistor III (C)	(I/O Scale)
10K Ohm Thermistor III (F)	(I/O Scale)
Configuration	[Root]
CPU	(Slot 0)

- One Scaling entry has been automatically created for each analog I/O mode supported by the EtherLogic. The names are arbitrary, but have been chosen to indicate the mode.
- Double-click on the “0 to 65535 ohms” entry to see its parameters:



- Just for the fun of it click on the **?** button, then click on the “Max” parameter. You will see a help window appear for that parameter. Almost every window has this feature, use it to your advantage when you need to find out what a particular parameter means.
- This Scaling entry is a simple 1:1 type
- The units that come out of the EtherLogic are already in Ohms when 0 to 65535 ohm mode is selected (with the “I/O mode” setting). “What use is it then?” you might understandably ask.
- Although the actual scaling in this case is not very exciting, it turns out that the Scaling entry also selects the operational mode of the I/O channel, if we did not attach a Scaling entry to a channel, it would by default operate in “raw” mode, which would give us numbers in the range of 0-65,535.
- Also, these Scaling entries were created in order for you to use as a starting point, you can easily change them to suit your needs.
- For example, if you wanted the engineering units to be 0 to 100 percent, you would plug those numbers in to the “Engineering units” “Min” and “Max” parameters.
- You could also click the “Rename” button to choose a more meaningful Scaling entry name for your application (such as “Valve opening -percent”).
- If you want to create another Scaling entry with the same mode and different engineering units or other parameters, use the “Copy” button. Use the “New” button to create a Scaling entry “from scratch.”

That completes our tour of ScadaBuilder. There are many more features that we haven’t touched on, but you should know enough now to at least be able to get started. Feel free to explore some more on your own, and don’t forget about the **?** button to access parameter-specific help. Help is also available from the “Help” menu and many windows have a “Help” button.

Index

T

Typographical Conventions • 3

B

Building (Compiling) The Application • 19

C

Copyright Notice • 2

Creating an Etherlogic Pinnacle Project •

9

D

Debugging and Testing The Application • 24

E

Exploring the Setup • 33

I

I/O Mapping • 32

I/O Scaling • 32

Installing ScadaWorks • 5

Installing the Software • 5

Introduction • 2

ISaGRAF v5 Control Logic • 14

M

Modbus Setup • 27

P

Pinnacle I/O Configuration • 34

Preparing The Pinnacle Target Controller • 21

Projects and Nodes • 31

R

Registering ISaGRAF v5 • 7

Registering ScadaBuilder • 5

Registers • 32

S

Sample Application Walkthrough • 9

ScadaBuilder Concepts • 31

Scaling • 35