ISaGRAF Getting Started

The "ISaGRAF Getting Started" is suitable for ICP DAS ISaGRAF PAC.

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Development Software

- ISaGRAF ver. 3.4x (or ver. 3.5x) support IEC 61131-3 standard language, i.e., LD, ST, FBD, SFC, IL & FC.

Reference Guide

ISaGRAF Website

www.icpdas.com/en/product/guide+Software+Development__Tools+ISaGRAF

Technical Service

Please contact local agent or email problem-report to service@icpdas.com

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Chapter 1 Software Installation

1.1 Step 1 - Installing the ISaGRAF Software

After Installing these software, the user can develop the ISaGRAF PAC system.

A. **ISaGRAF Workbench** &
B. **ICP DAS Utilities For ISaGRAF**

The user has to purchase at least one set of ISaGRAF software (ISaGRAF-256 ver. 3.4x or ver. 3.5x) and install it on a PC for editing, downloading, monitoring, and debugging the ISaGRAF program.

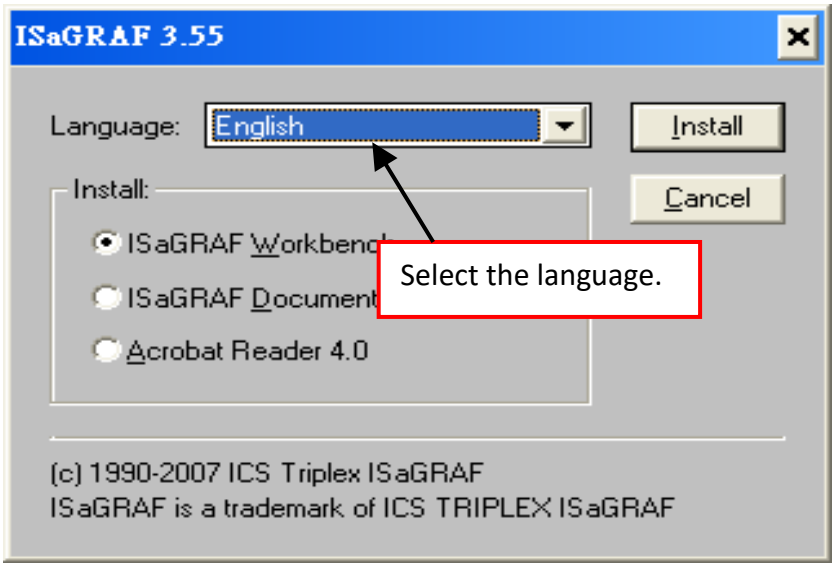
Operating System Requirements:

ISaGRAF Workbench can be installed on a PC with one of the following computer operating systems.

- Windows 95 / Windows 98 / Windows 2000
- Windows NT Version 3.51 or Windows NT Version 4.0
- Windows XP or Vista or XP mode in Windows 7 (refer to FAQ-117)

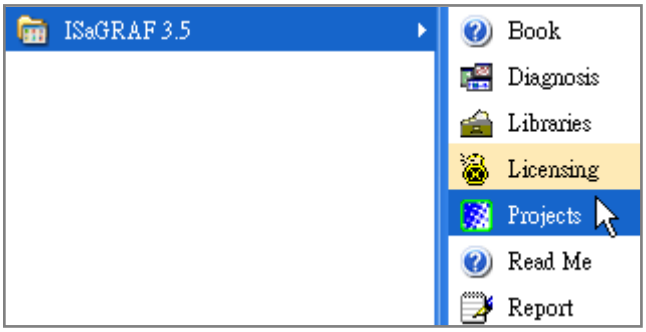
Steps to Install the ISaGRAF Workbench:

Since 2020, ICP DAS no longer provides ISaGRAF Workbench CD. Please download the software on ISaGRAF website and extract the zip file. Then, double-click on the "ISaGRAF.exe" file to start the installation process.



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To launch the ISaGRAF, click the **Start** button on the taskbar, point to **All Programs** and ISaGRAF 3.x, then click "Projects" as illustrated below.



1.2 Step 2 - Installing the ICP DAS Utilities for ISaGRAF

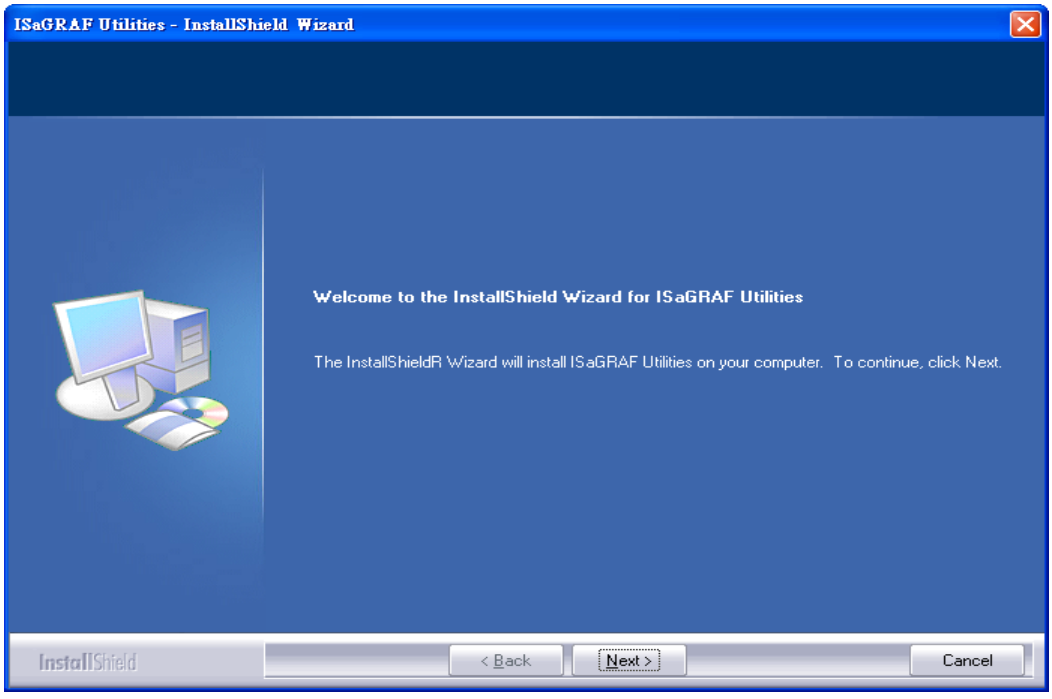
"ICP DAS Utilities For ISaGRAF" consists of 3 major items.

- I/O libraries (for all ICP DAS ISaGRAF PACs)
- Modem_Link utility
- Auto-scan I/O utility

Note:

ISaGRAF Workbench must be installed (see **step 1**) before attempting to install the "ICP DAS Utilities for ISaGRAF".

Follow the instructions in the Wizard to install ISaGRAF utilities.



Note:

Visit to ISaGRAF website to download the latest version of "ICP DAS Utilities For ISaGRAF" (io_lib.zip).

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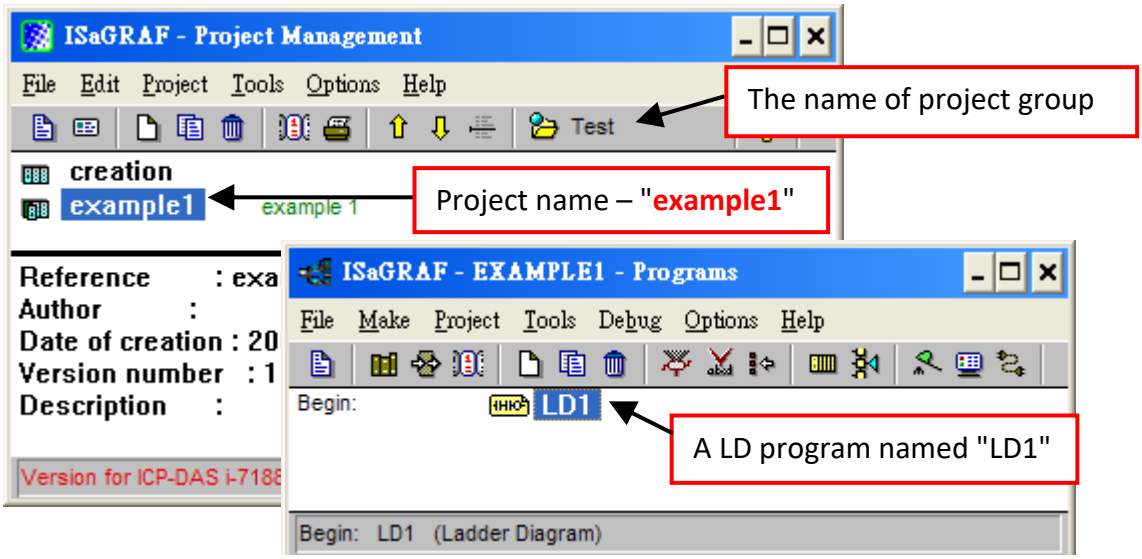
Chapter 2 Software Programming

If ISaGRAF Workbench and utilities have not yet been installed, go back to see Chapter 1.

2.1 Writing A Simple ISaGRAF Program

In the example, using ISaGRAF Workbench to write a simple program and download it to the ISaGRAF PAC that plugged with one I-87055W I/O module on slot 1.

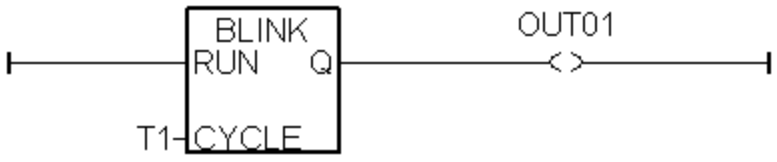
This example contains one Ladder program.



Variables Declaration:

Name	Type	Attribute	Description
OUT01	Boolean	**Output**	Output 1 of the I-87055W
OUT02	Boolean	**Output**	Output 2 of the I-87055W
K1	Boolean	**Input**	Input 1 of the I-87055W
K2	Boolean	**Input**	Input 2 of the I-87055W
T1	Timer	**Internal**	Time Period of blinking, initial value set as T#8s

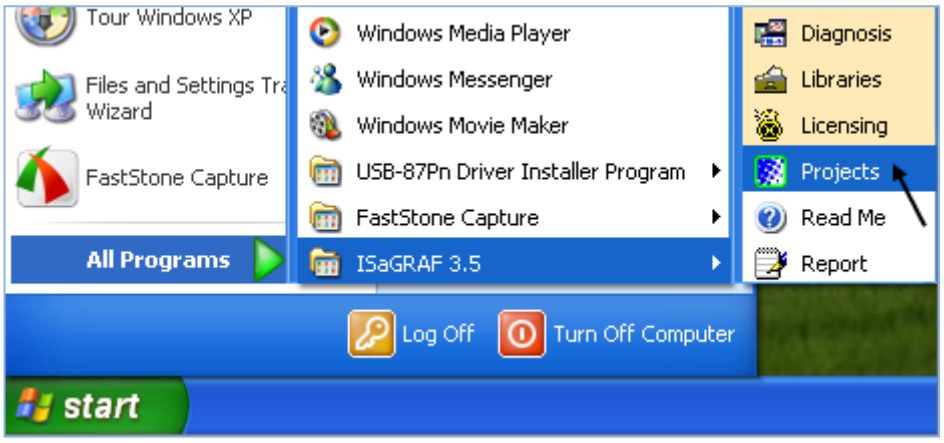
Ladder Logic Program Outline:



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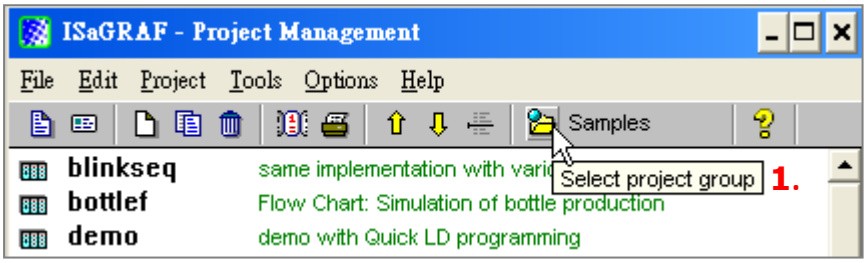
2.1.1 Open ISaGRAF-Project Management

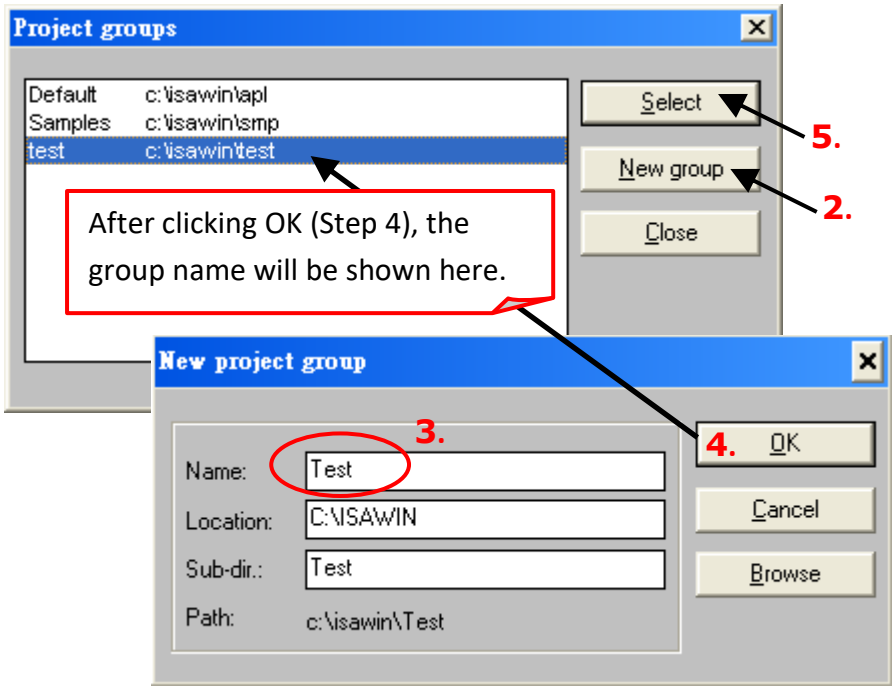
To launch ISaGRAF, click the **Start** button on the taskbar, point to **All Programs** and **ISaGRAF 3.4** (or ISaGRAF 3.5), then click **Projects** as shown in the figure.



2.1.2 Creating An ISaGRAF User's Group

Click the **Select Project Group** button. Next, click **New Group** and enter a name for the new user's group (e.g., Test) and then click **OK**. Finally, click **Select** to get into the new group.

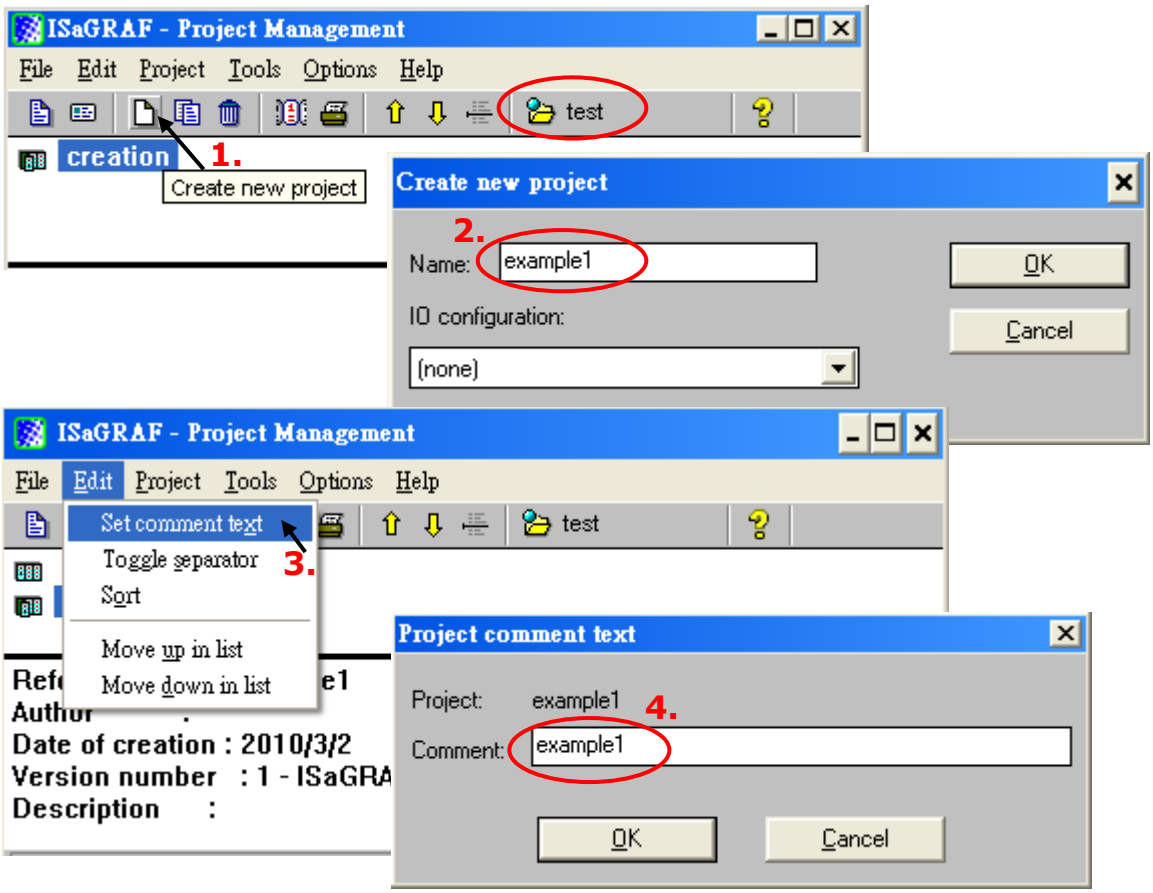




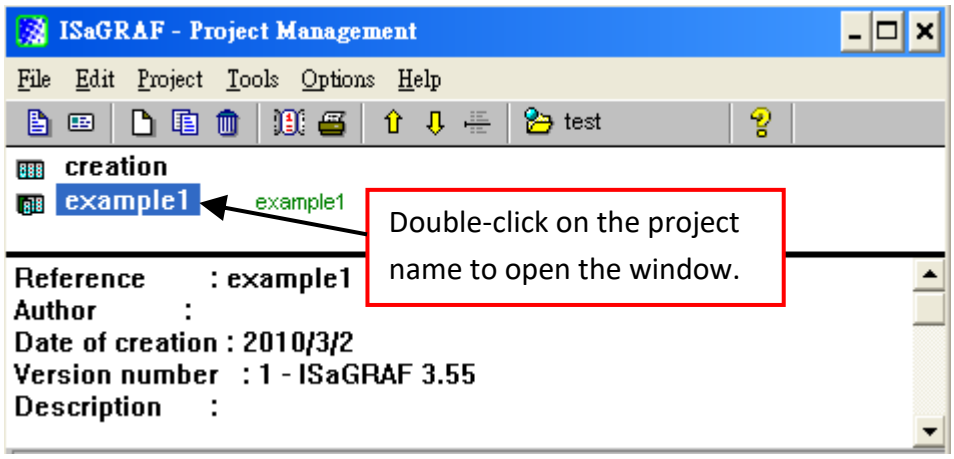
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2.1.3 Creating A New ISaGRAF Project

To add an ISaGRAF project, click the **Create New Project** button and enter the name for the new project. Also, adding notes for the project by clicking on the **Edit** menu and then **Set Comment Text.**



You will now see the new project name in the **Project Management** window. Double-click the new project name (e.g., example1) to open the project.



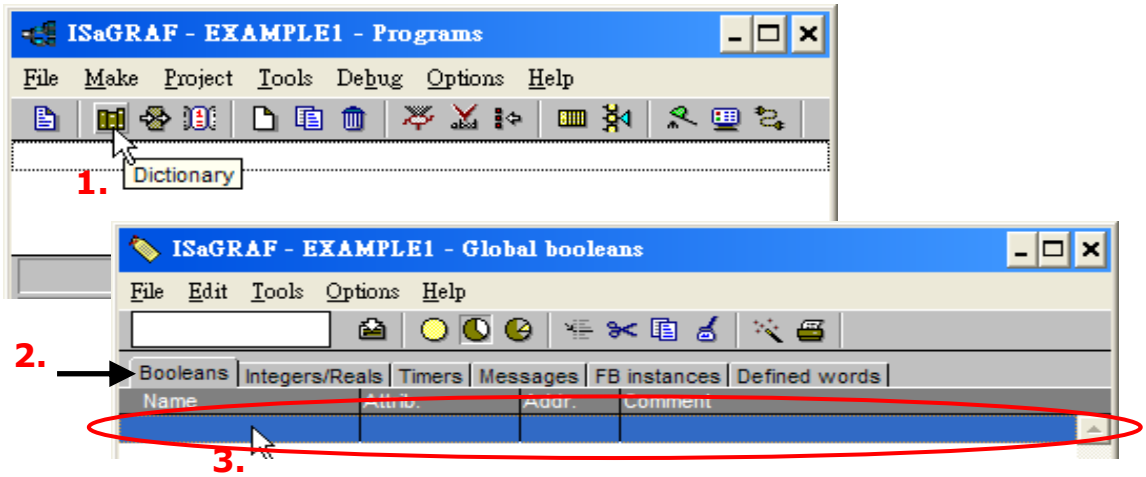
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2.1.4 Declaring the ISaGRAF Project Variables

Before editing an ISaGRAF program, you should add the needed variables.

Declare the Boolean Variables

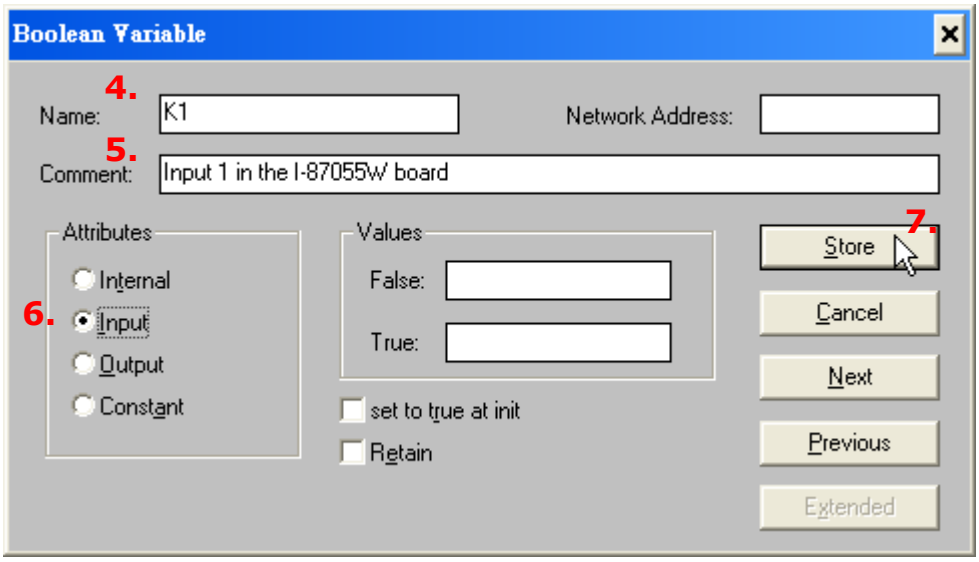
1. Click the **Dictionary** button.
2. Click the **Boolean** tab to declare the Boolean variable.
3. Double-click the colored area to open **Boolean Variable** window.



In this example,

4. Enter the variable name in **Name** text box (e.g., K1).
5. Type any notes in **Comment** text box (e.g., Input 1 in the I-87055W board).
6. Select the variable attribute in **Attribute** item (e.g., Input).
7. Press the **Store** button to save it.

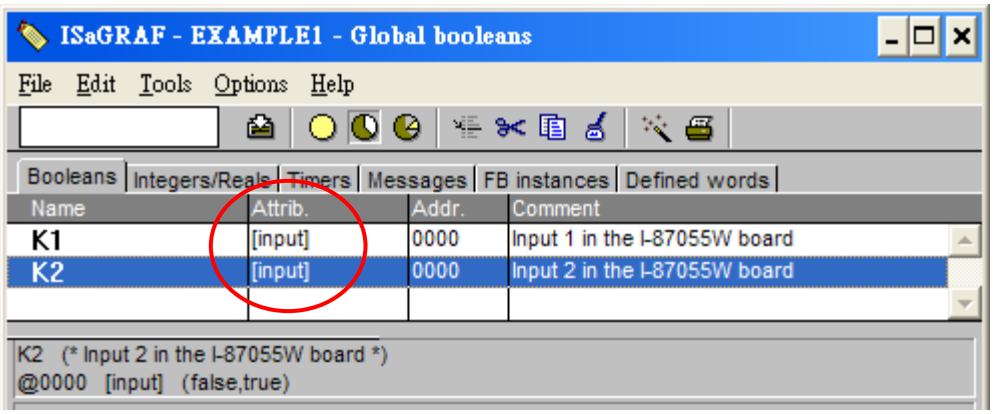
Now, a new Boolean variable has been added.



NOTE:

Make sure that the variable you have added has the correct **Attribute**. If you want to change the attribute, just double-click the variable name and reassign the attribute for the variable.

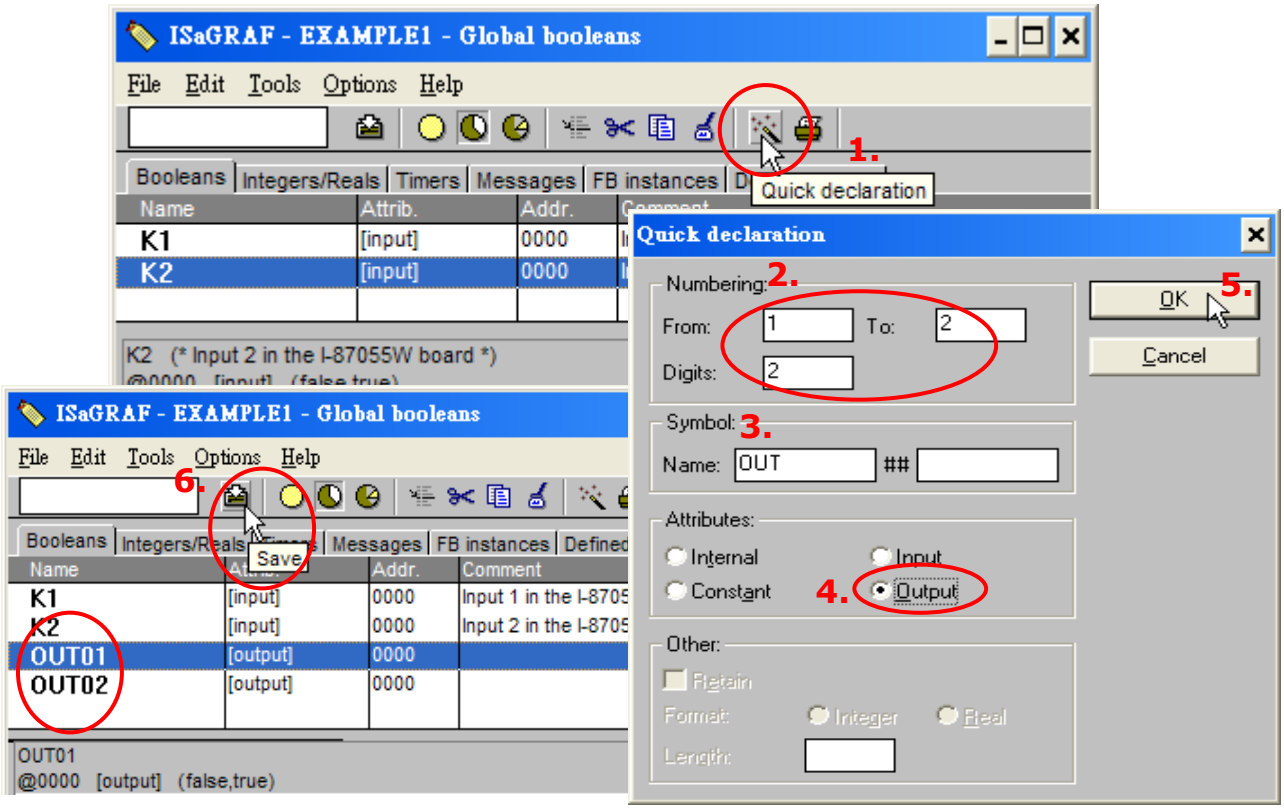
Follow the same steps as previously noted to add a "K2" Boolean variable and then you can see the figure below.



Quick way to declare variables

There are two outputs used in this example program named "OUT01 and OUT02". ISaGRAF provides a quick and easy way to add several sequentially ordered variables.

1. Click the **Quick declaration** button to open the window .
2. In the **Numbering** item, enter the start and the end number for the sequentially ordered variables in the **From** and **To** fields. (e.g., from 1 to 2). Then, enter a number in the **Digits** field (e.g., 2 stands for 01, 02, and so on)
3. In the **Symbol** item, enter a name prefix for variables (e.g., OUT).
4. In the **Attributes** item, select an attribute for variables (e.g., Output).
5. Click the **OK** button and variables are added to the **Global Booleans** window.
6. Click **Save** to save the settings.

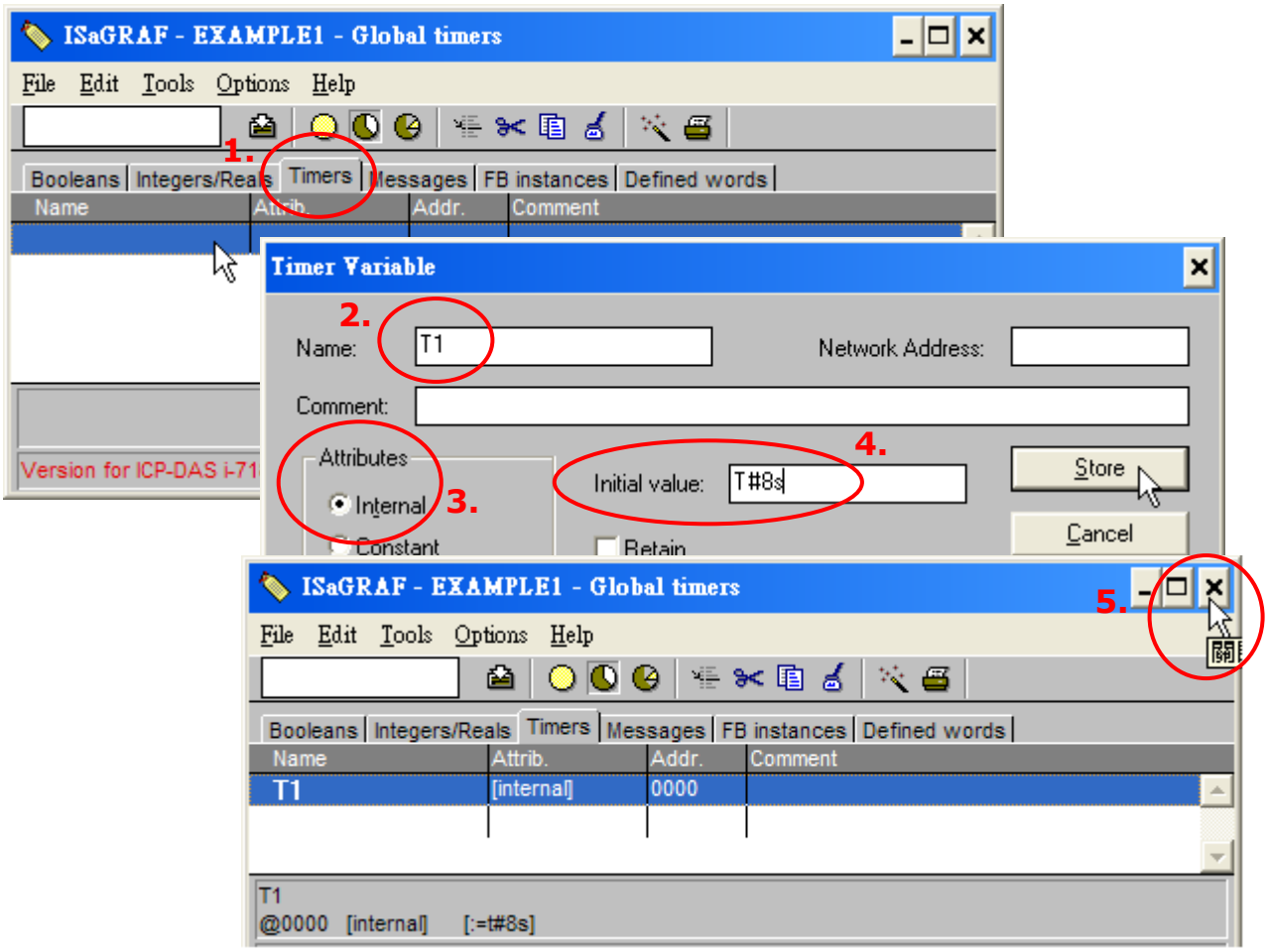


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Declare the Timer Variables

Follow the steps to add the timer (T1) variable.

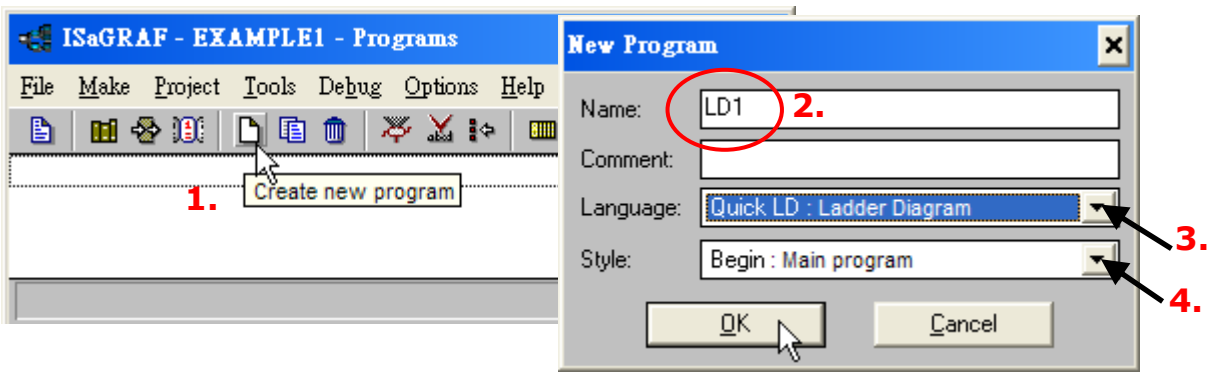
1. Click the **Timers** tab and double-click on the colored area to open the **Timer Variable** window.
2. Enter a name for the variable in the **Name** box (e.g., T1).
3. In the **Attributes** item, select an attribute for variables (e.g., Internal).
4. Set the **Initial Value** to "T#8s", then click the **Store** button.
5. Once the setting is completed, click on "**X**" to close the window.



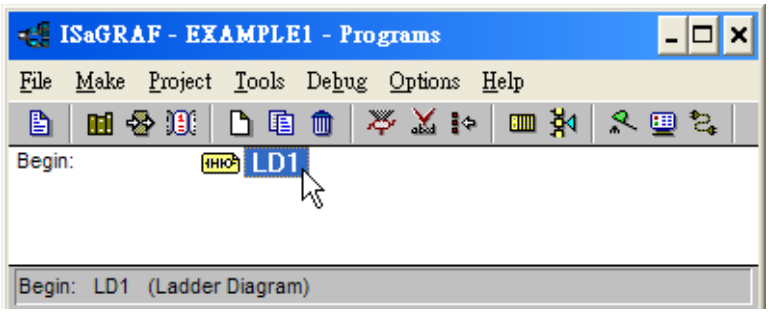
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2.1.5 Create the LD - "LD1" Program

Click the **Create New Program** button to open **New Program** window. Enter a name for the program (e.g., LD1) and select the **Quick LD: Ladder Diagram** in the **Language** drop-down menu, then make sure that **Begin: Main Program** is selected in the **Style** drop-down menu. Also, adding any notes in the **Comment** box.

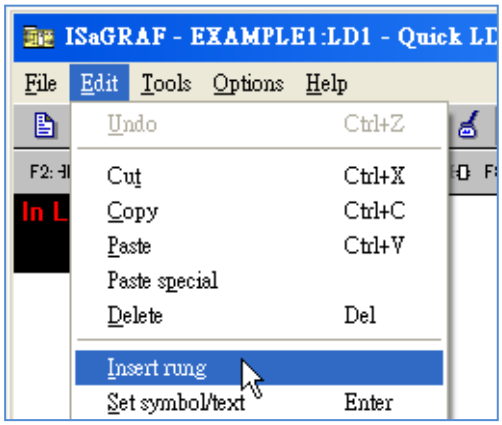


Now, the 'LD1' program is added in the project. Double-click on the **LD1** to edit the program.

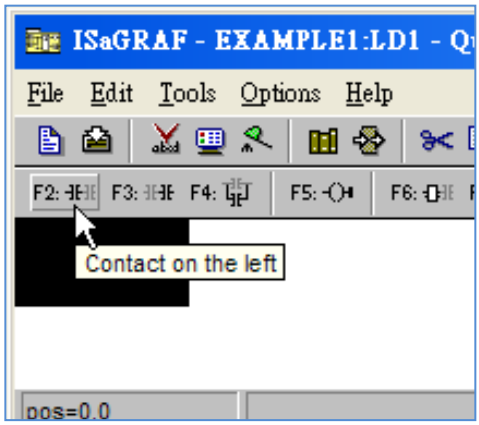


2.1.6 Edit the "LD1" Program

As noted above, double-click on the **LD1** to open the **Quick LD Program** window. To start editing the LD program, click **Edit** on the main menu bar and then click **Insert Rung** which means to insert a basic LD rung just above the current position. Also, you can just click the **F2 (Contact On The Left)** button.

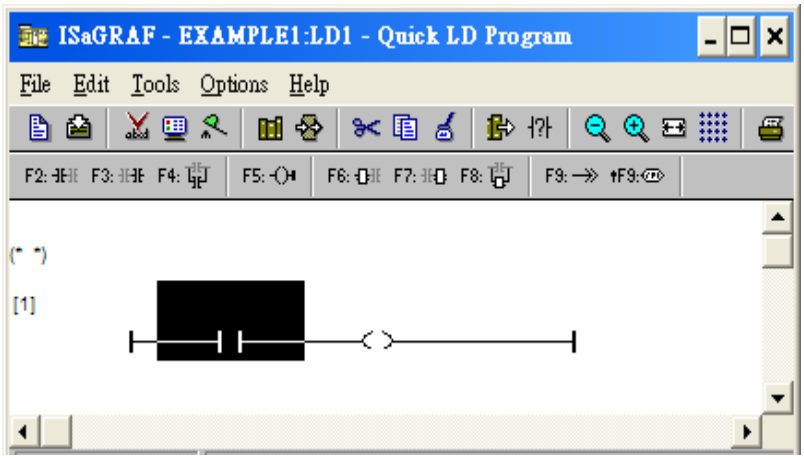


or

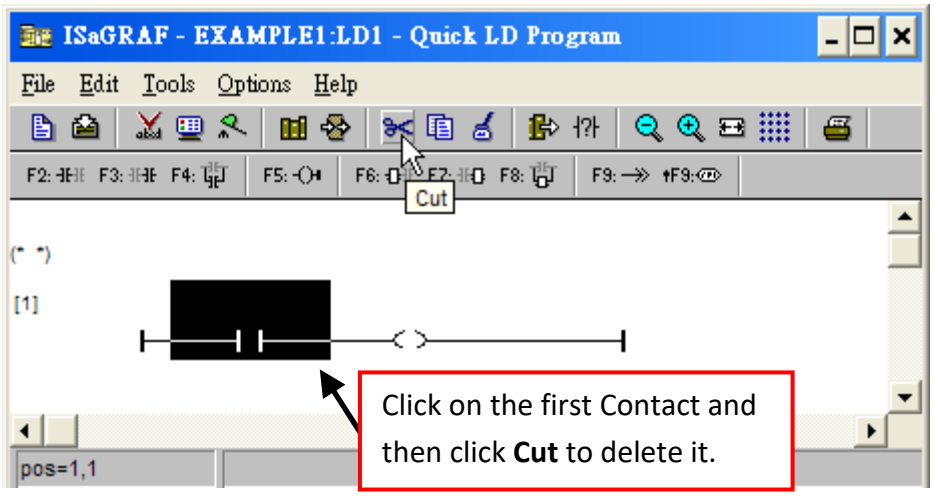


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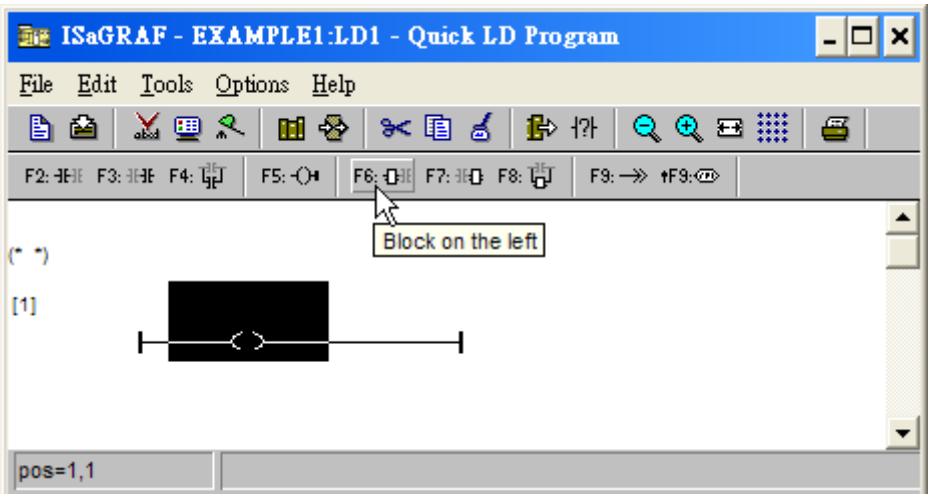
Then, you can see the results in the **Quick LD Program** window.



We are going to write the first line of the LD1 program. Click on the first Contact and then click **Cut** to delete it.

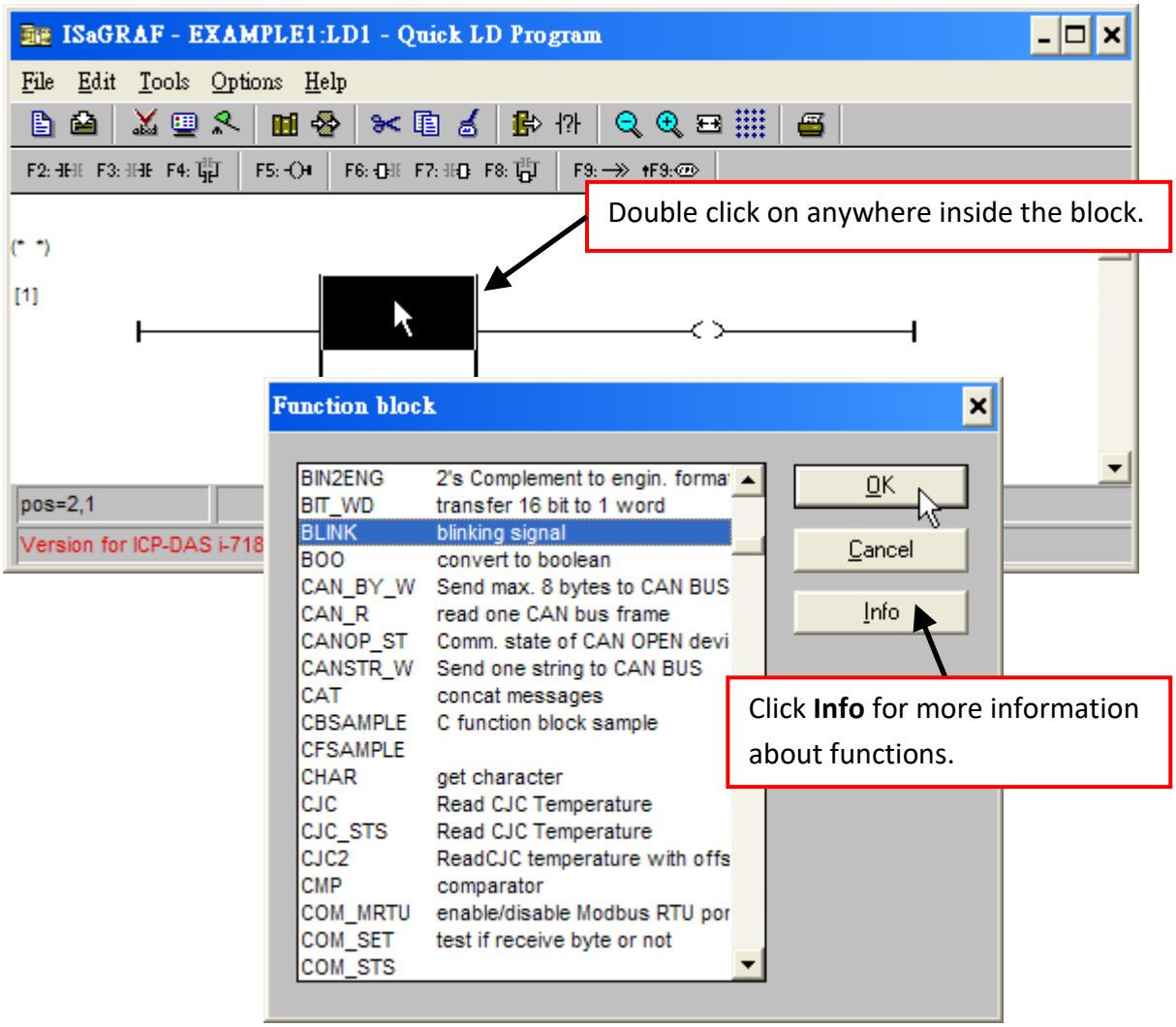


Click the **F6 (Block on the left)** button to add a block on the left of the Coil.

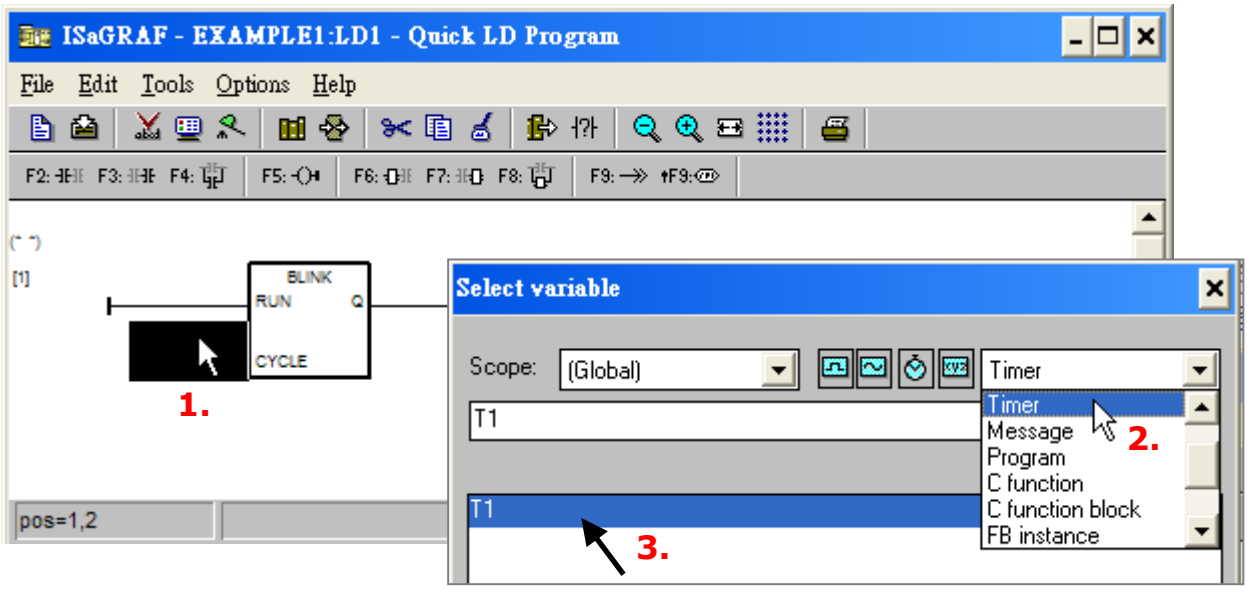


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Now we are going to assign the variable and the constant for each item. Double-click anywhere inside the block to open the **Function Block** window and then Select the function you want to use (e.g., BLINK). Note that you can click the **Info** button to learn how to use these functions.

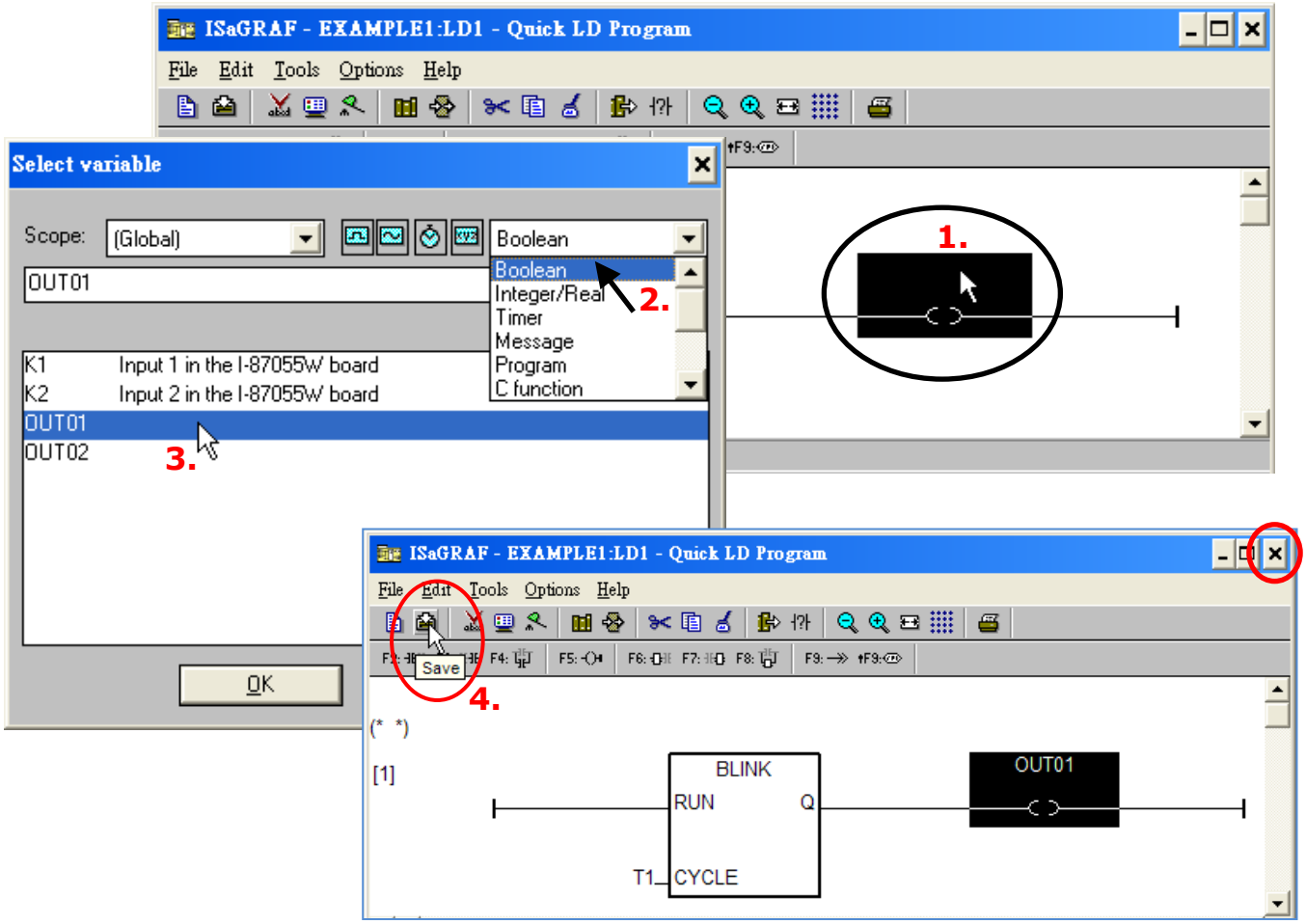


In the **BLINK** function block, double-click on the left of the **CYCLE** parameter to open the **Select variable** window. Select **Timer** from the drop-down menu and double-click **T1** to select this variable.



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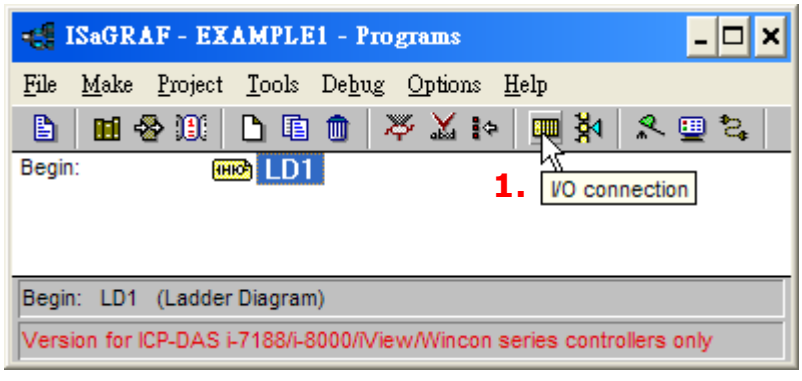
Next, double-click the Coil to open the **Select variable** window. Select **Boolean** from the drop-down menu and double-click **OUT01** to select this variable. Once you've finished editing the program, click **Save** and then click **X** to exit the window.



2.1.7 Connecting the I/O

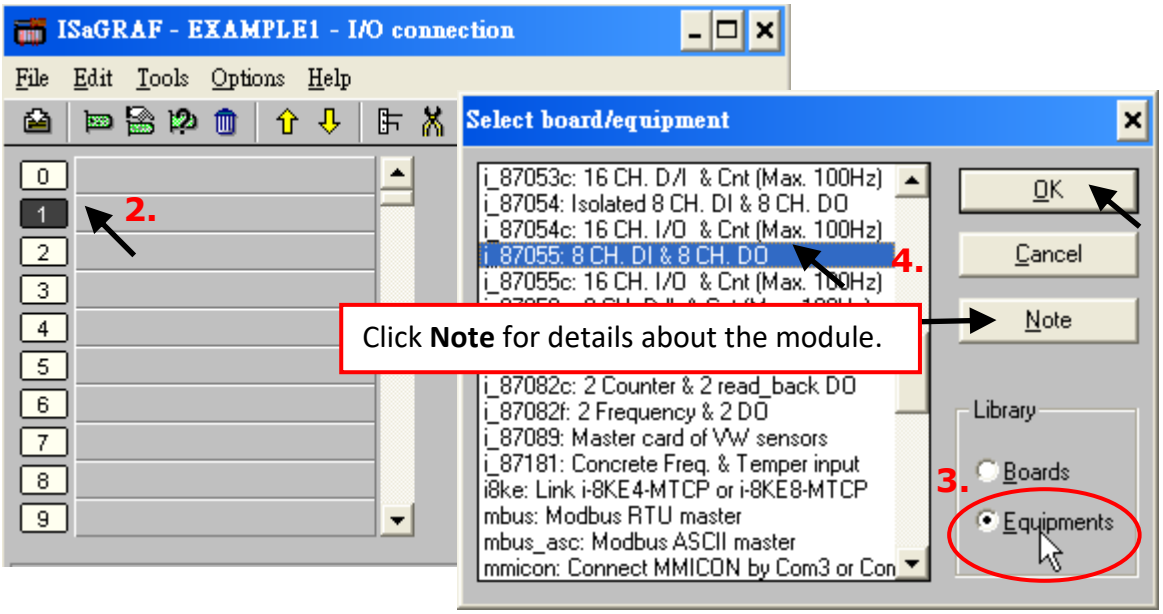
As noted in section 2.1.4, we have defined **OUT01** and **OUT02** as Output variables; **K1** and **K2** as Input variables. In addition, these variables must be assigned to the real I/O channel on the PAC to be work.

To do that, click **I/O connection** button to get into the **I/O connection** window.

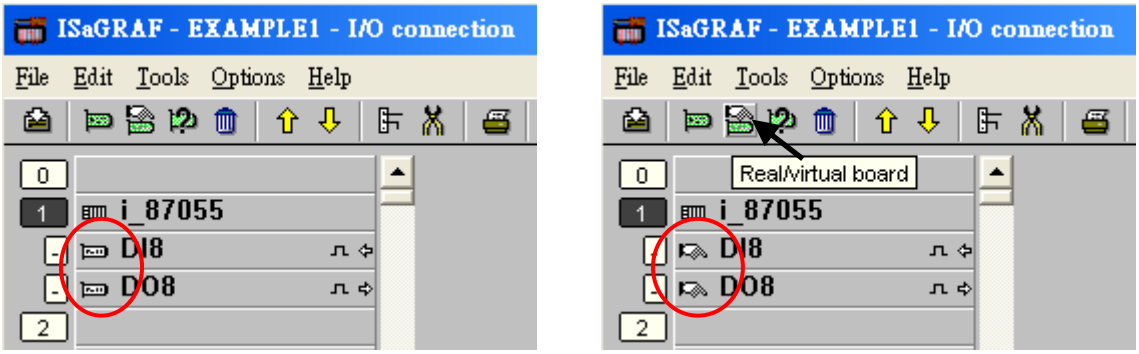


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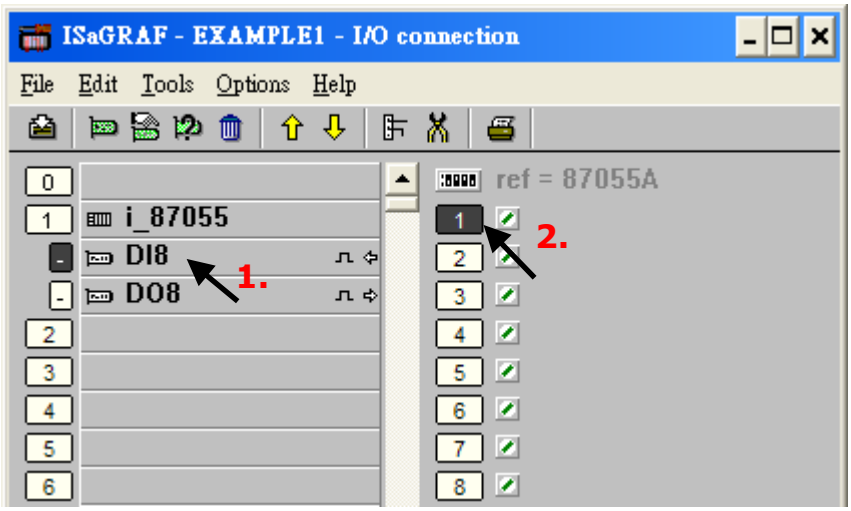
Double-click on slot1 to open **Select board/equipment** window. Select **Equipments** and double-click on the **I_87055: 8 CH. DI & 8 CH. DO** to assign the module. Make sure that the I-87055W module is plugged in slot1 on ISaGRAF PAC.



Note that if there is no module that can be used, you can also click the **Real/Virtual board** button to set it as a virtual module for testing.

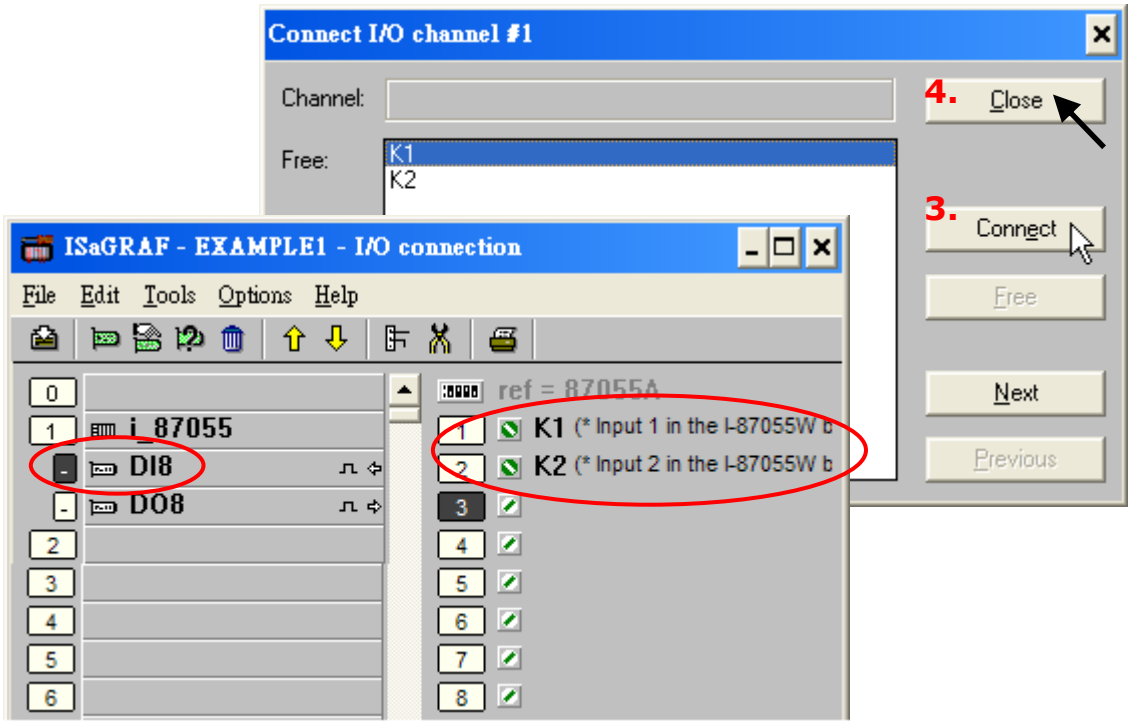


To assign input variables for the I-87055W module, click on **DI8** and double-click the channel 1 to open the **Connect I/O channel #1** window.

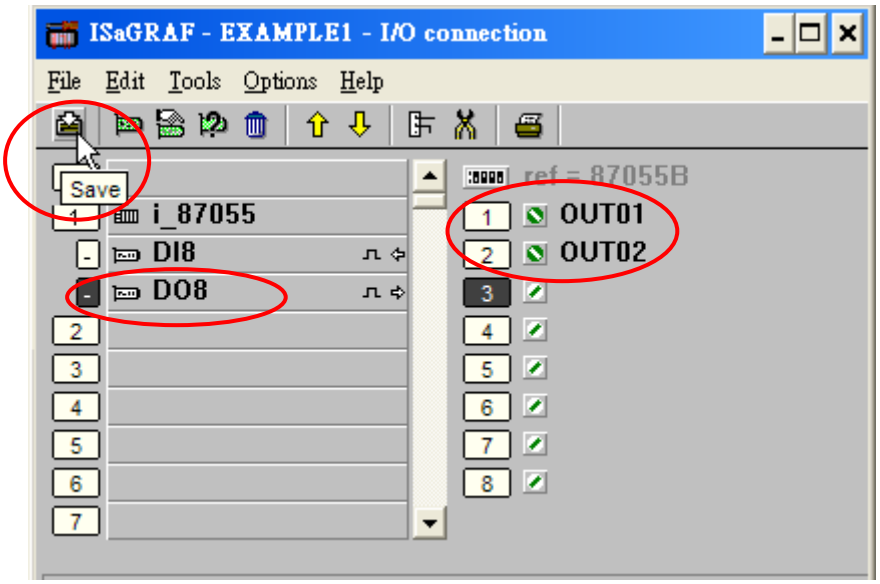


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Then, click the **Connect** button twice to connect both **K1** and **K2** variables. Note that only the Input or Output attributed variables will appear in the **Connect I/O channel #n** window. In this example, two boolean output variables (OUT01 and OUT02 and two boolean input variables (K1 and K2) are used.



Follow the same way as noted above to connect **OUT01** and **OUTPUT02** variables to output channel 1 and channel 2, then the results shown in the figure below. Click **Save** and then click **X** to exit.



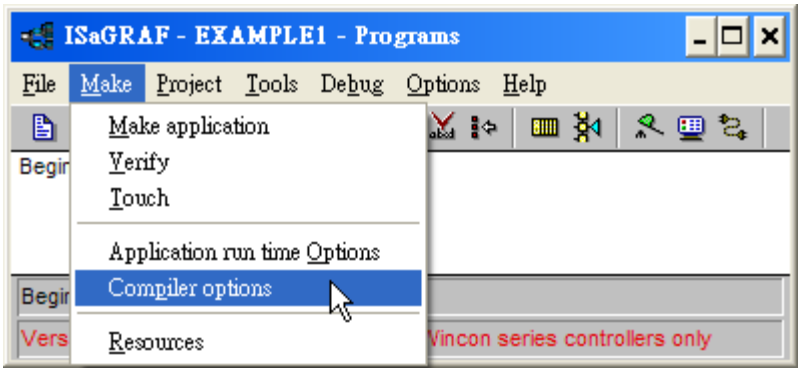
IMPORTANT NOTICE:

1. I/O Slots 0 to 7 are reserved for Real I/O boards that be used on ISaGRAF PAC, and the rest of the slots can be used for additional functionality.
2. For a successful compilation, all of the variables with **Input** or **Output** attribute MUST be assigned to the I/O board in the **I/O connection** window.

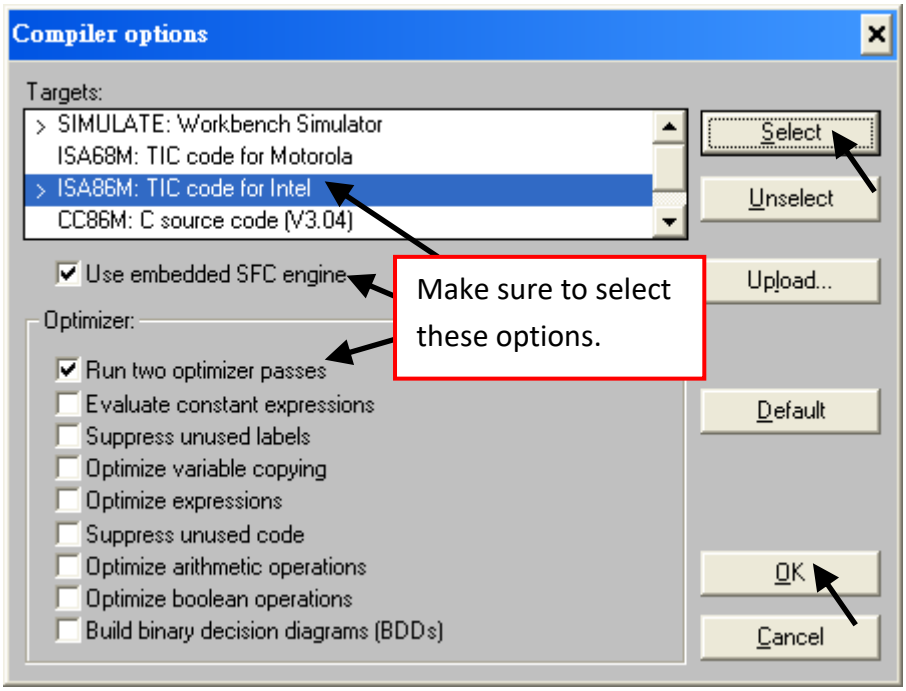
2.2 Compiling & Simulating the Example Project

For the ISaGRAF program can work properly with any of the ISaGRAF PACs (ISaGRAF µPAC, iPAC, WinPAC, ViewPAC, and XPAC), the programmer MUST select the "**ISA86M: TIC Code For Intel**" as the compiler options.

To begin the compilation process, first click the **Make** menu and then click **Compiler Options**.



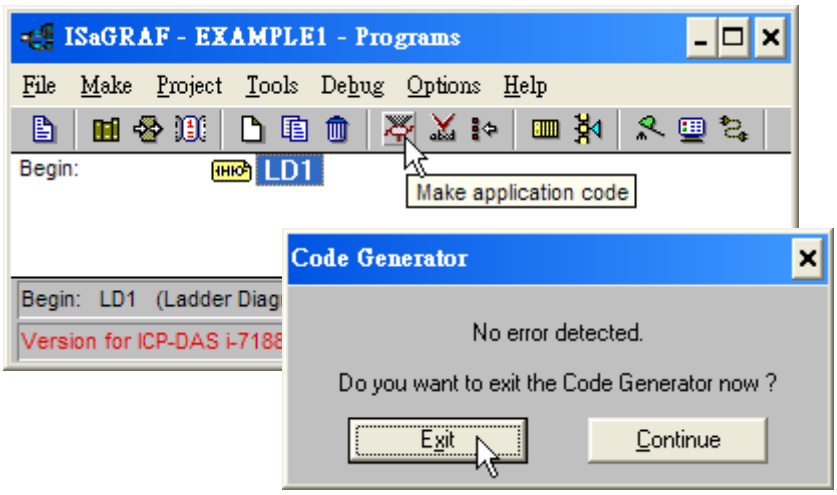
In the **Compiler Options** window, click the **ISA86M: TIC Code For Intel** option and click the **Select** button, check the **Use embedded SFC engine** box, and check the **Run two optimizer passes** box. Then, click the "OK" button to complete the settings.



Time to Compile the Project!

After selecting the proper compiler options, click the **Make Application Code** button to compile the project. If there is no compiler errors detected during the compilation process, you have done the project.

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If errors are detected during the compilation process, just click the **Continue** button to review the error messages and modify the program. Then, compiling the project again.

2.3 Download & Debug the Project

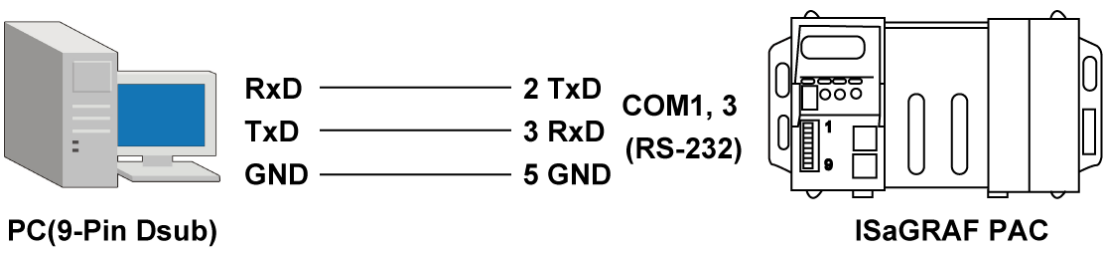
It provides two ways to download the project to ISaGRAF PAC. One is using RS-232 cable, another one is using Ethernet cable.

Model	Default Download Port
XP-8xx7-CE6	Ethernet
WP-8x37/8x47	Ethernet
VP-2xW7	Ethernet
VP-2117, iP-8x47, I-8000	COM1/Ethernet
µPAC-7186EG, I-7188 EG/XG	COM1/Ethernet

Note: CA0910 cable is needed for µPAC-7186EG, I-7188 EG/XG when using the RS-232 port.

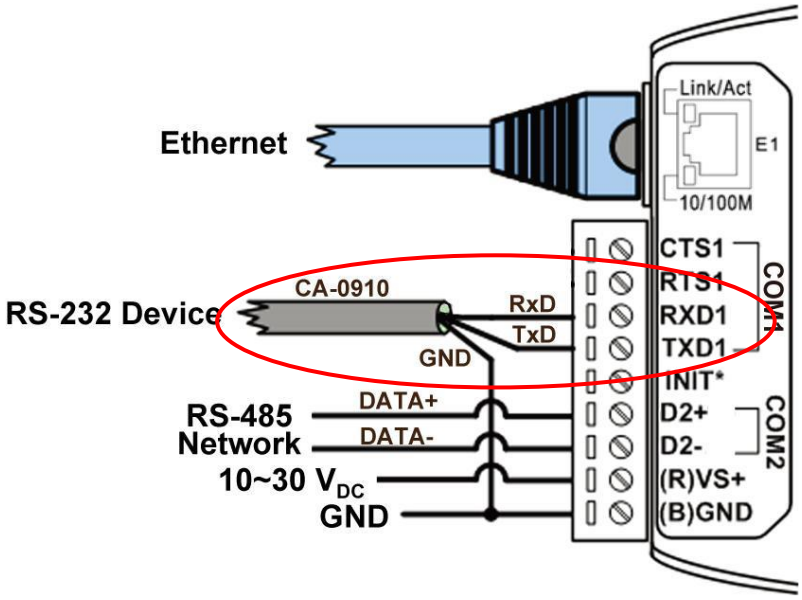
2.3.1 Using RS-232 as the Download Port

The hardware connection for using RS-232 as a download port is shown as the figure below.



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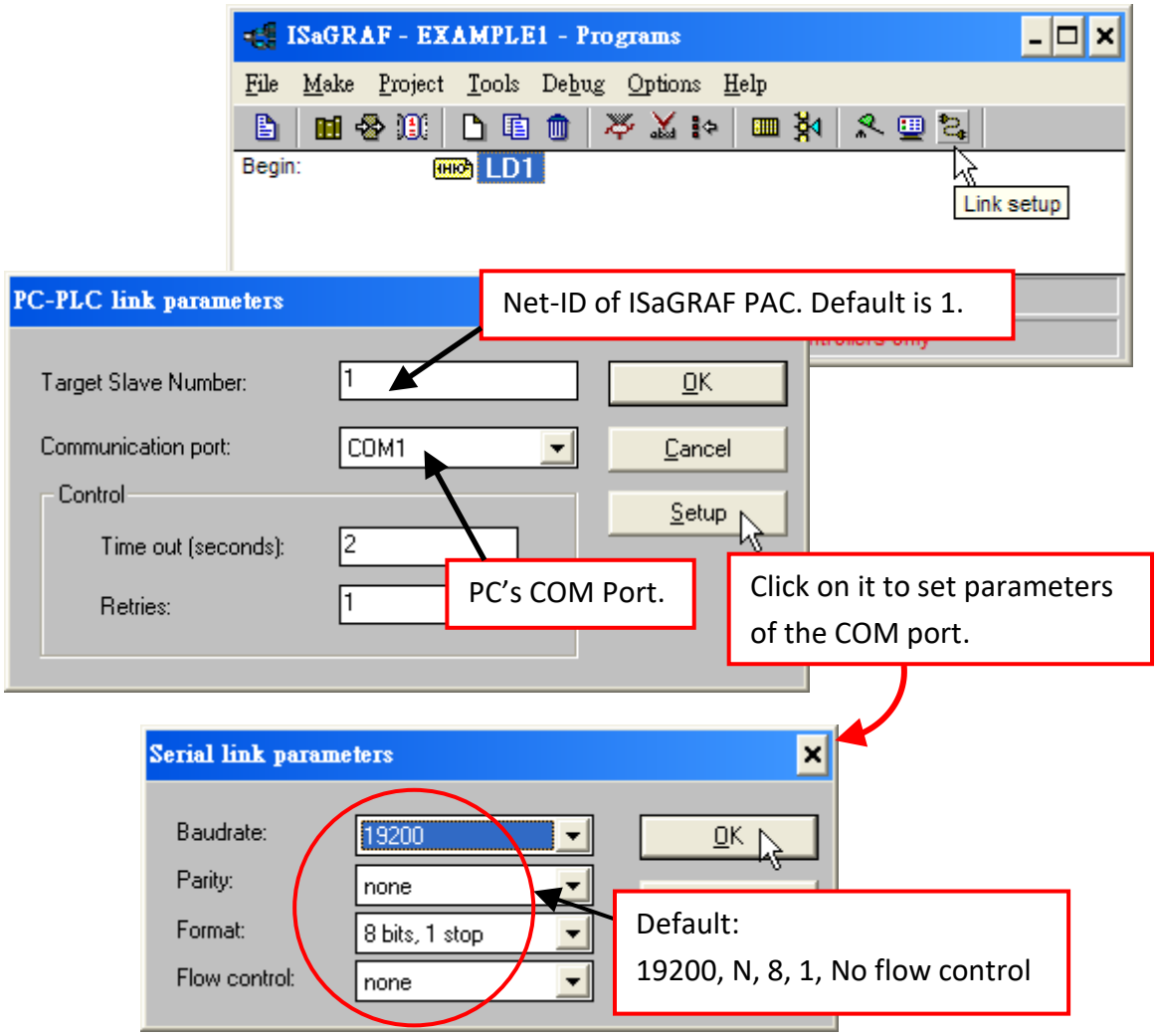
718x PAC with CA0910 :



Setup Link Parameters

Click the **Link Setup** button in the **Programs** window and the **PC-PLC link parameters** window will be displayed. Set the proper parameters.

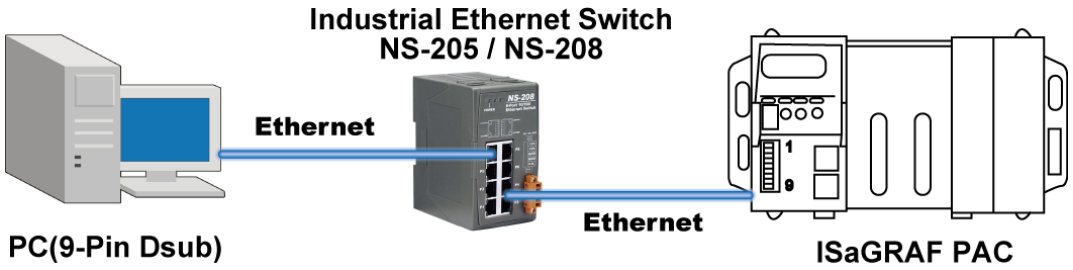
Note that both the PC and ISaGRAF PAC **MUST** be set to the same communication parameters. The default parameters for COM port are: 19200, N, 8, 1, No Flow Control.



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2.3.2 Using Ethernet as the Download Port

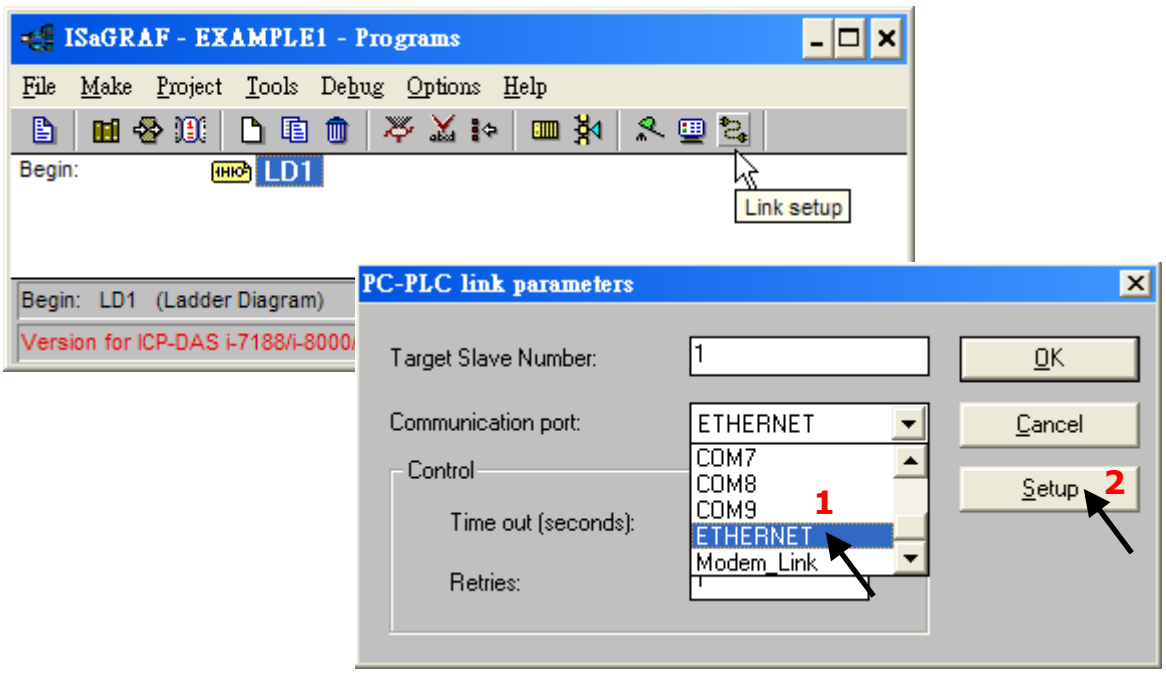
The hardware connection for using Ethernet as a download port is shown as the figure below.



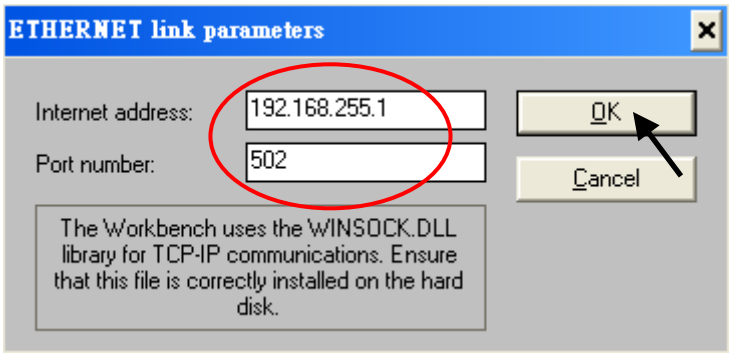
Note: I-8x17 or I-7188XG PAC has no Ethernet port, only the RS-232 port can be used for downloading.

Setup Link Parameters (Ethernet)

Click the **Link Setup** button in the **Programs** window. Select **Ethernet** as a communication port and click the **Setup** button.



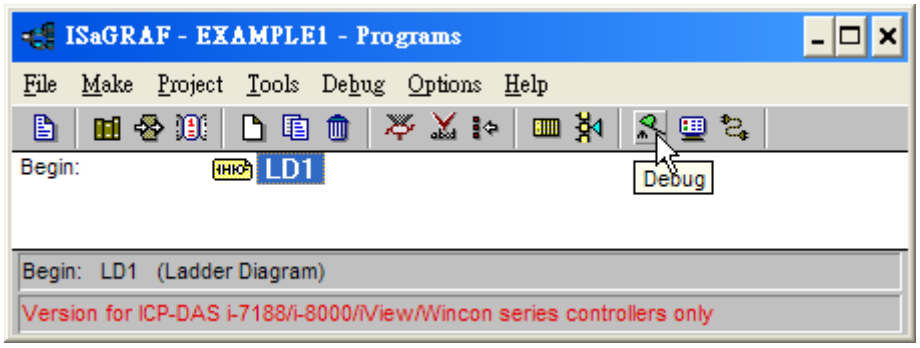
Enter the IP address of ISaGRAF PAC and set Port Number to **502**.



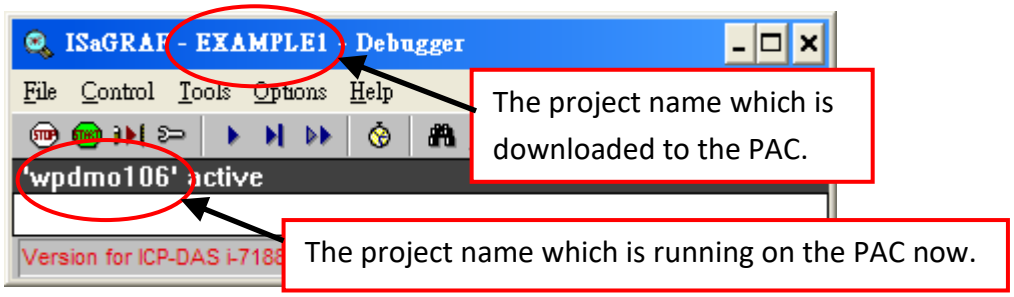
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2.3.3 Establishing a Connection between a PC and a PAC

Before downloading the project to the PAC, verifying that your PC and PAC are communicating with each other. To check the status of communication, click the **Debug** button in the **Programs** window.



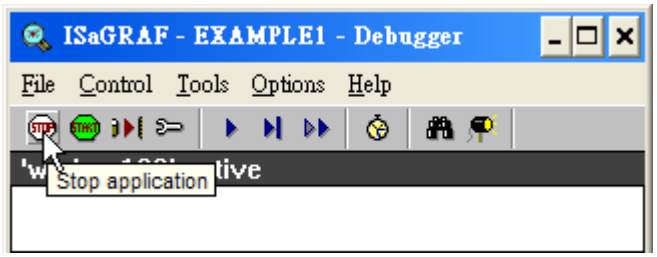
If the development PC and ISaGRAF PAC are communicating properly with each other, the **Debugger** window will be displayed as the figure below. If any project is running on ISaGRAF PAC , the project name will be shown on the screen.



If the message in the **Debugger** window says "Disconnected" which means that the communication between the development PC and the PAC have not yet been established.

1. Check the communication cable between the PC and PAC is connected properly.
2. Check the COM port or the Ethernet port setting is correct. Refer Section 2.3.1 and 2.3.2.

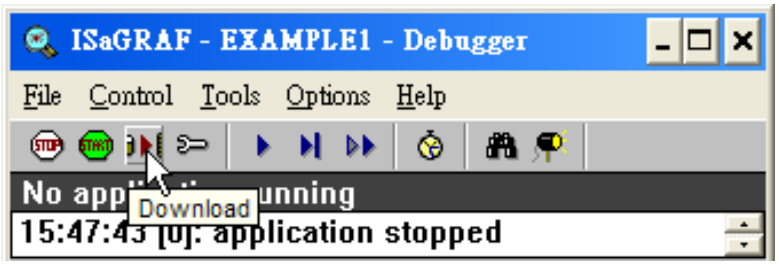
Before downloading the project, the user need to stop the running one. Click the **Stop Application** button to halt any applications that may be running.



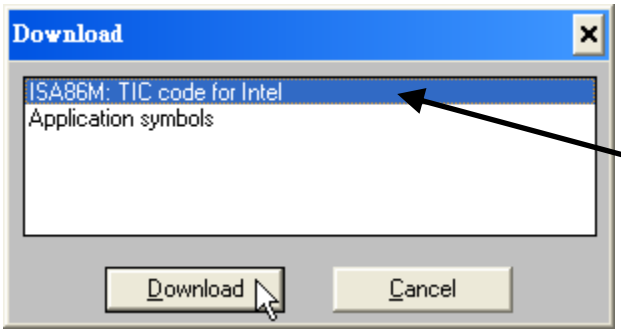
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2.3.4 Starting the Downloading Process

Click the **Download** button from the **Debugger** window.

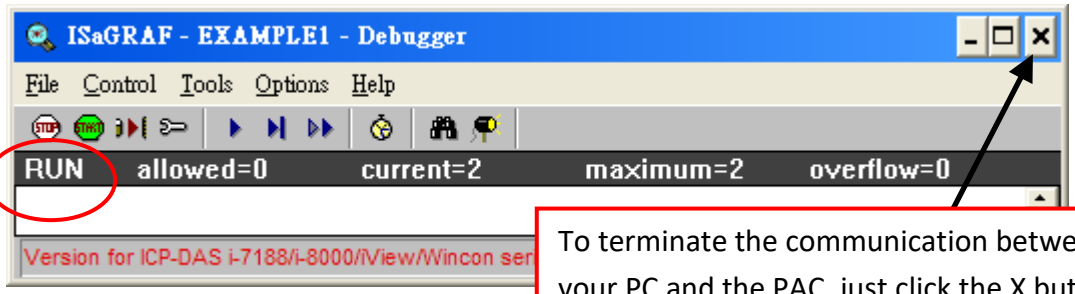


Select **ISA86M: TIC Code For Intel** and click the **Download** button.



If **ISA86M: TIC code for Intel** is not found here, go back to to section 2.2 to select this option and compile the project again.

The project will now start downloading to ISaGRAF PAC. A progress bar will appear in the **Debugger** window showing the project downloading progress.



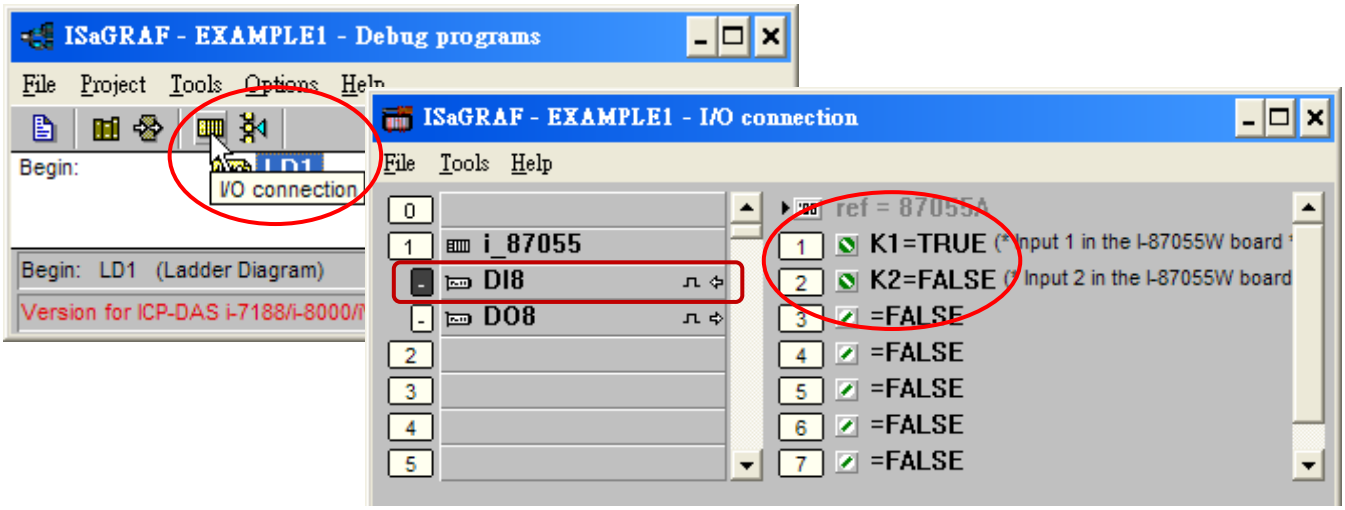
To terminate the communication between your PC and the PAC, just click the X button.

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2.3.5 Running the LD Program

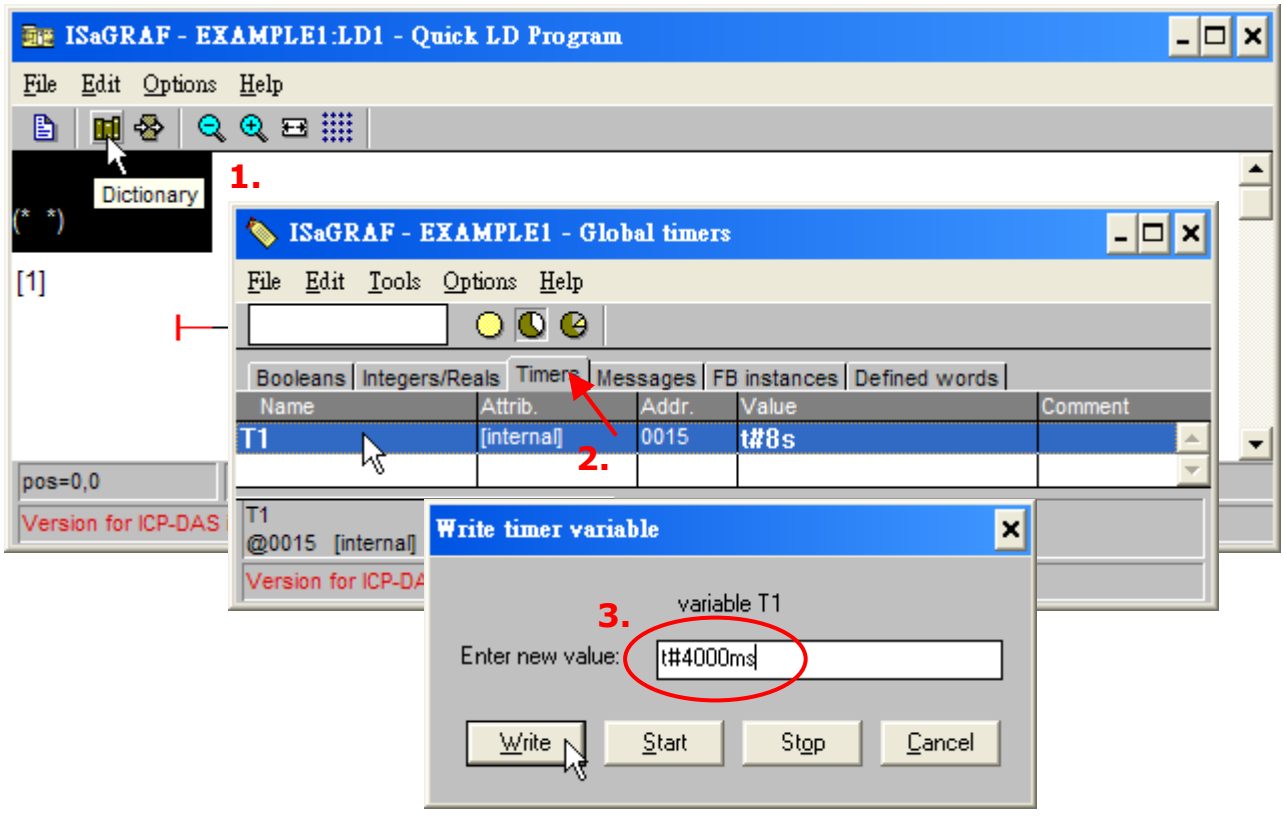
You can observe the real time I/O status from several ISaGRAF windows while you are running the example project. One of the windows is the "I/O Connections" window, which shows each of the inputs and outputs as assigned.

Click the "I/O Connections" button in the ISaGRAF Debugger window to open the "I/O Connections" window. You may switch ON/OFF the DI on the front panel of the I-87055W I/O board to see what happens about "K1" & "K2".



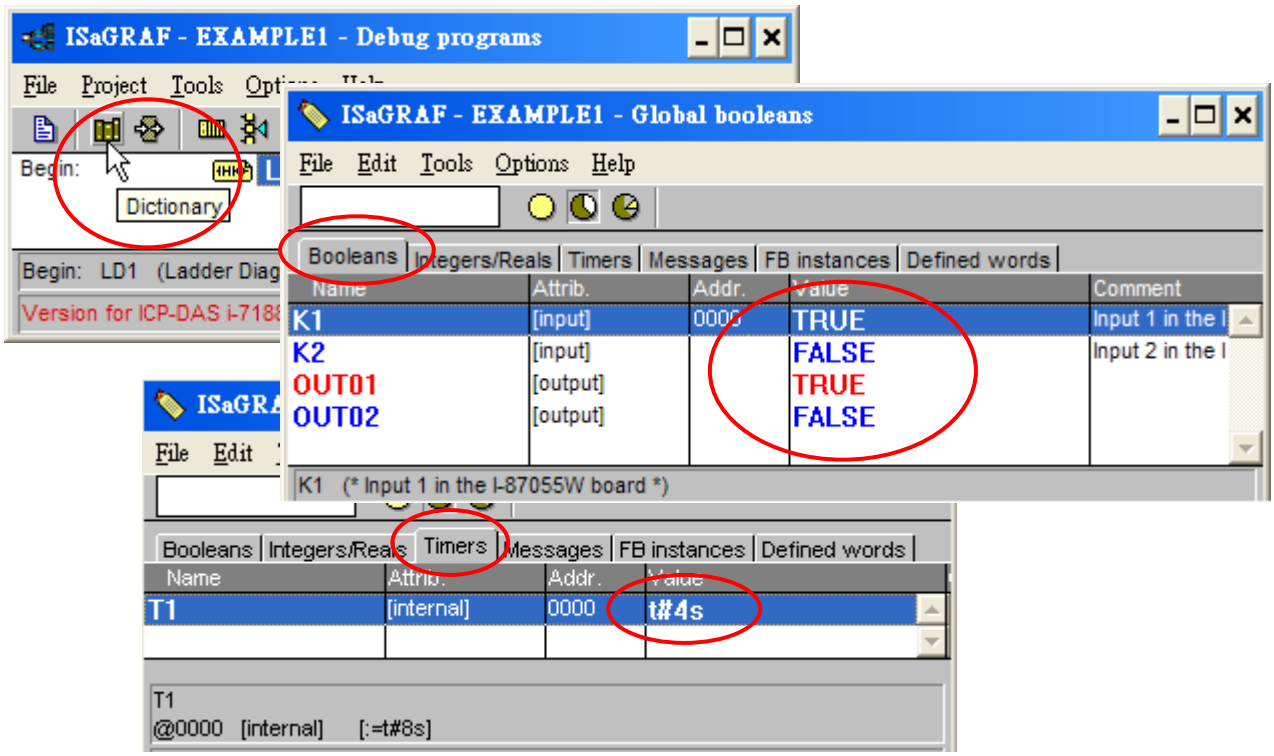
You can adjust the "T1" variable while the program is running. To accomplish this,

1. Click the "Dictionary" button to open the Global window.
2. Click the "Timer" tab and then double-click on "T1" area.
3. Set the timer value to "T#4000ms" (this means 4000 ms). Then click the "Write" button. Please observe the status of blinking interval.

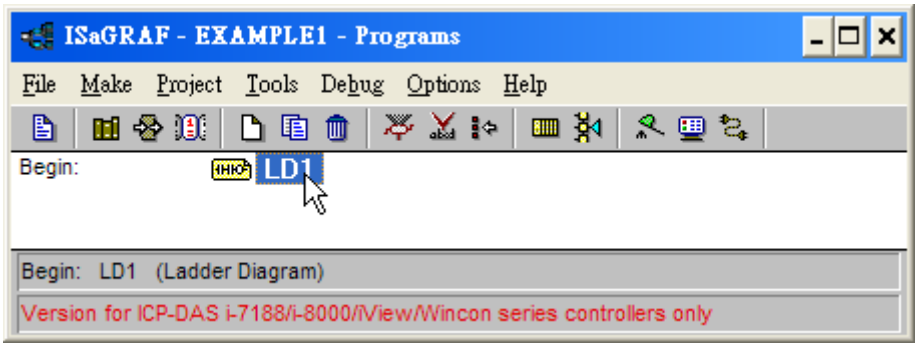


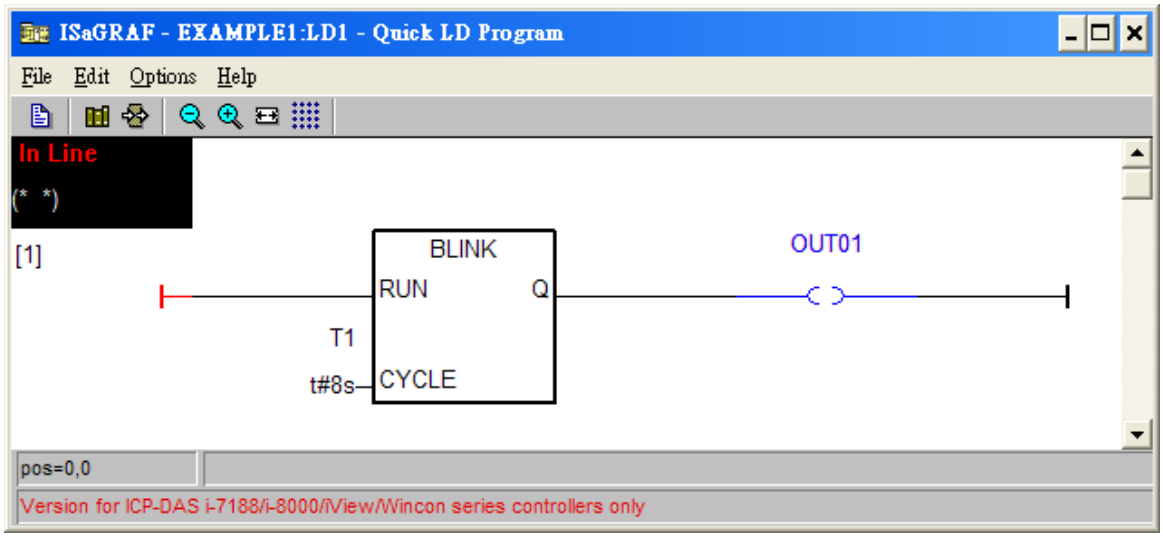
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You may also click "Dictionary" to see the real time variable state.



Another VERY helpful window you can open is the "Quick LD Program" window. From this window you can observe the LD program being executed in real time.





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