

PCIS-ISG  
ISaGRAF Interfaces for  
NuDAQ PCI-Bus Cards, Win-NT  
**User's Guide**

@Copyright 1997-1999 ADLink Technology Inc.  
All Rights Reserved.

## **Manual Rev.1.00a : May 20, 1999**

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

### **Trademarks**

NuDAQ and PCIS-ISG are registered trademarks of ADLink Technology Inc. IBM PC is a registered trademark of International Business Machines Corporation. Intel is a registered trademark of Intel Corporation. Other product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

# CONTENTS

How to Use This Manual .....	i
<b>CHAPTER 1 Introduction to PCIS-ISG.....</b>	<b>1</b>
1.1 Overview of ISaGRAF.....	1
1.2 Overview of PCIS-ISG ISaGRAF Driver .....	2
1.3 Installation of PCIS-ISG ISaGRAF Driver in the ISaGRAF Target .....	3
1.3.1 <i>Check about ISaGRAF Target(Window NT                 version).....</i>	<i>3</i>
1.3.2 <i>PCIS-ISG ISaGRAF Driver Installation.....</i>	<i>4</i>
1.3.3 <i>PCIS-ISG Device Driver Handling.....</i>	<i>8</i>
1.3.4 <i>PCIS-ISG ISaGRAF Driver Un-installation.....</i>	<i>9</i>
1.4 Restore PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects in the ISaGRAF Workbench .....	9
1.4.1 <i>With ADLink's "PCIS-ISG" diskettes :.....</i>	<i>9</i>
1.4.2 <i>With "ADLink All-In-One Compact Disc":.....</i>	<i>10</i>
1.5 Restore PCIS-ISG ISaGRAF Sample Programs .....	12
1.5.1 <i>With ADLink's "PCIS-ISG" diskettes :.....</i>	<i>13</i>
1.5.2 <i>With "ADLink All-In-One Compact Disc":.....</i>	<i>14</i>
<b>CHAPTER 2 Operations with Driver and the ISaGRAF         Workbench.....</b>	<b>15</b>
2.1 Adding the Driver to the ISaGRAF Workbench .....	15
2.2 Removing the Driver from the ISaGRAF Workbench .....	17
2.3 Assign Card Channel.....	18



# How to Use This Manual

This manual is designed to help you to use the PCIS-ISG ISaGRAF software driver for NuDAQ PCI or NuIPC CompactPCI data acquisition cards in CJ International ISaGRAF software package. The manual describes how to install and configure the software driver to let your ISaGRAF application programs directly control the NuDAQ PCI or NuIPC CompactPCI data acquisition cards. This manual is organized as follows:

- Chapter 1, "Introduction to PCIS-ISG ISaGRAF Driver" describes what is the PCIS-ISG ISaGRAF Driver, how to install the driver and which kind of NuDAQ PCI and NuIPC CompactPCI cards are supported by this driver.
- Chapter 2, "Operations with Driver and the ISaGRAF workbench" describes how to add and remove the PCIS-ISG ISaGRAF driver in the ISaGRAF I/O connection dialog box Item. It also describes how to use the archive manager to restore the driver's data.



# Introduction to PCIS-ISG

## The ISaGRAF Driver for ADLink Products

---

### 1.1 Overview of ISaGRAF

ISaGRAF is a complete industrial software package consisting of Soft Logic Programming Tools, and a Runtime execution engine. ISaGRAF was designed to turn any industrial computer into a high performance, yet inexpensive Soft Logic Controller. ISaGRAF is based on the only internationally recognized industrial standard for industrial automation control languages, the IEC1131-3. With this standard, you can create your own factory automation solution in the following graphic- and text-based language, they are IL (Instruction List), ST (Structure Text), FBD (Function Block Diagram), LD (Ladder Diagram), and SFC (Sequential Function Chart) The ISaGRAF software package combine two parts. They are described below :

1. Workbench : The ISaGRAF Workbench is a Windows-based software development environment used to create control logic programs written in any or all of the five IEC1131-3 languages. It is also a fully featured set of tools providing editing, debugging, code generation, documentation, library management, archiving, on-line monitoring, off-line simulation and on-line change of projects made for execution by the ISaGRAF runtime kernel. The Workbench runs on Windows 3.1 95 or NT, OS/2. Any ISaGRAF Workbench can be used with any target system that uses the ISaGRAF runtime kernel.

2. Target : The Workbench is a authoring tool for control system development. The Target is the execution section of the control program or control system. The Workbench and Target may be installed in the same computer or different computers connected by RS-232 OR Ethernet. Now in ISaGRAF, The Target support many operation system such as DOS, Window NT, VxWORK, OS9, etc. ***PCIS-ISG ISaGRAF driver supports Windows NT ISaGRAF Target only.***

---

## 1.2 Overview of PCIS-ISG ISaGRAF Driver

The ISaGRAF provides programming environment of a control system, it also support the world wide IEC1131-3 PLC language standard. The PCIS-ISG is a driver to link the ISaGRAF control program with the physical I/O cards (NuDAQ PCI or NuIPC CompactPCI cards). With ISaGRAF software and PCIS-ISG drivers, they provide the PLC functions and are able to replace the PLC for some industry applications. This is PC-based software PLC control system.

ADLink's PCIS-ISG ISaGRAF driver is a software component to combine ISaGRAF Target and NuDAQ PCI or NuIPC CompactPCI data acquisition cards. The following steps briefly shows how users are developing a control system.

1. Develop a control program by ISaGRAF Workbench.
2. Download the program code to the ISaGRAF Target system.
3. Then the ADLink's PCIS-ISG driver and the ISaGRAF Target system can connect the control program's I/O channels to ADLink's NuDAQ/NuIPC hardware.

When system is operating, the control program will:

1. Get the outside digital or analog signals from the hardware as the data source
2. Then control programs execute the control logical in the ISaGRAF Target and produce control output to send to the hardware.

3. The control output is to control the outside machines by the form of digital or analog signals.

In the version, the PCIS-ISG can support 8 ADLink NuIPC DAQ cards and 20 NuDAQ PCI data acquisition cards. The supported I/O cards are listed as following:

cPCI-7200	cPCI-7230	cPCI-7248	cPCI-7252
cPCI-7432	cPCI-7433	cPCI-7434	cPCI-9112
PCI-7200	PCI-7230	PCI-7248	PCI-7296
PCI-7250	PCI-7432	PCI-7433	PCI-7434
PCI-9111DG	PCI-9111HR	PCI-9112	PCI-9113
PCI-9114DG	PCI-9114HG	PCI-6208A	PCI-6208V
PCI-6216V	PCI-9118DG	PCI-9118HG	PCI-9118HR

**The ISaGRAF system comprises two parts: WorkBench and Target.**

**On the ISaGRAF Target site, user has to install the PCIS-ISG ISaGRAF Driver.**

**On the Wokrbench site, user has to Restore the PCIS-ISG ISaGRAF I/O Board and I/O Equipment Object by using the Archive Manager.**

---

## 1.3 Installation of PCIS-ISG ISaGRAF Driver in the ISaGRAF Target

### 1.3.1 Check about ISaGRAF Target(Window NT version)

Before installing PCIS-ISG ISaGRAF driver, please make sure the ISaGRAF Target has been installed in your system. If your system has no ISaGRAF Target (Window NT version) installed, please install the ISaGRAF Target (Window NT version) before going to PCIS-ISG ISaGRAF driver installation. Since ADLink is one of the distributor of ISaGRAF products, you can contact ADLink for the ISaGRAF Target or Workbench product.

### 1.3.2 PCIS-ISG ISaGRAF Driver Installation

#### System Requirements

PCIS-ISG ISaGRAF Driver requires the following minimum configuration:

- An IBM PC/AT or compatible or a CompactPCI system, running Windows NT version 4.0 or later
- A hard disk with enough disk space to install PCIS-ISG
- A 1.44-MB 3.5-inch floppy disk drive, or a CD-ROM drive.
- Application development system: CJ International ISaGRAF Workbench and Target for Windows NT
- NuDAQ PCI or NuIPC CompactPCI data acquisition cards that PCIS-ISG supports.

#### Installation

The Setup program provided by PCIS-ISG performs all tasks necessary for installing the software.

#### With ADLink's "PCIS-ISG" diskettes :

**step 1.** Place the "PCIS-ISG ISaGRAF Driver Disk1" in the 3.5" floppy drive A:.

**step 2.** If Windows NT is loaded, choose Run from the taskbar.

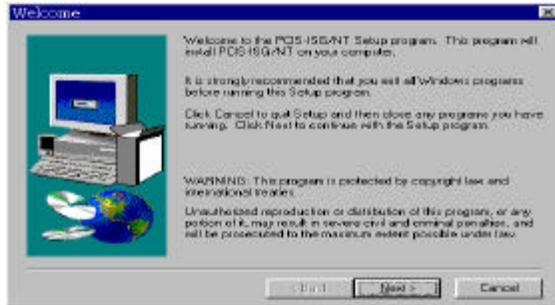
**step 3.** Type A:\SETUP in the Run dialog box.

#### With "ADLink All-in-one Compact Disc":

**step 1.** Place "ADLink All-in-one Compact Disc" in the CD-ROM drive.

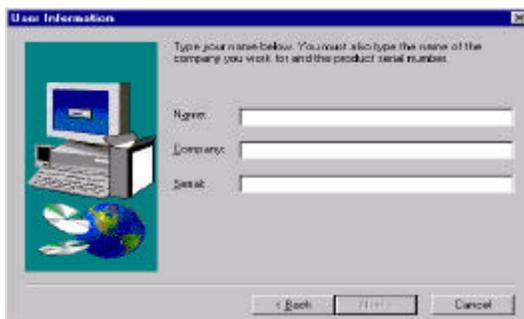
**step 2.** If autorun setup program is not invoked, execute x:\setup.exe(x indicates the CD-ROM drive).

**step 3.** Select Software Package->PCIS-ISG to install the software.



Setup first displays a Welcome dialog box. Please click Next button to go to the next step.

Then Setup will display a User Information dialog box. Please fill items in the dialog box (including the serial number data). Then click Next button to go on installation. You have to enter the valid serial number to get a valid license. Otherwise you can only use PCIS-ISG driver in 120 minutes demo mode.



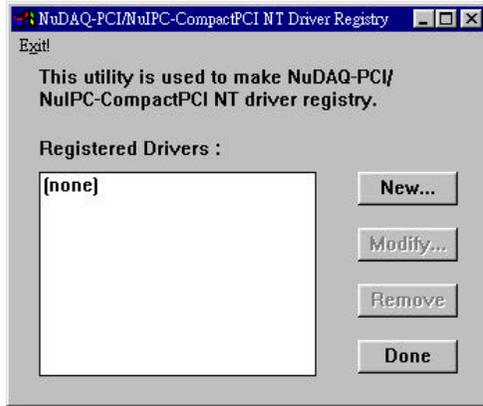
Setup then prompts the following dialog box for you to specify the destination directory for PCIS-ISG. The default path is c:\Program Files\ADLINK\PCIS-ISG. If you want to install PCIS-ISG in another directory, please enter the directory you would like to install PCIS-ISG



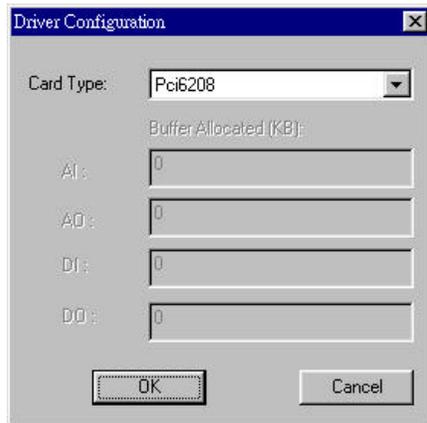
Then user can assign the “Program Folder”. The default “Program Folder” is “PCIS-ISG”.



When the software component installation process is complete, Setup launches the *Driver Registry Utility* for you to install and setup the drivers.

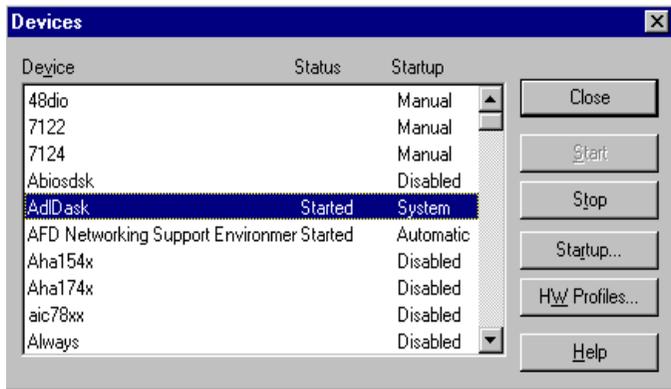


Please click New... button to add the driver you want to register. Remove button is used for removing the registry of a device driver. If you click New... button, the following window will appear for you to select the driver to register. The AI, AO, DI, and DO parameters are the buffer size of continuous data acquisition. With PCIS-ISG, you can ignore this setting.



After finishing the registry of necessary drivers, then you can select Exit! Command in the menu bar or click Done button to exit the *Driver Registry Utility*. To make the registered drivers work, you have to restart Windows NT system.

After re-entering Windows NT, make sure the PCIS-ISG device drivers for PCI/CompactPCI cards are already started. For PCIS-ISG ISaGRAF Driver to be able to communicate with PCI/CompactPCI data acquisition cards, device driver AdlDask as well as the card's own device driver (e.g. Pci7200, Pci7230, Pci7248, Pci7296, Pci7250, Pci7252, Pci7432, Pci7433, Pci7434, Pci9111, Pci9112, Pci9113, Pci9114, Pci6208, or Pci9118) must be started. You can open the "Control Panel", double-click "Devices", and a Devices window will be shown as below.



If the device status is none, you have to select the AdlDask, Pci7200, Pci7230, Pci7248, Pci7296, Pci7250, Pci7252, Pci7432, Pci7433, Pci7434, Pci9111, Pci9112, Pci9113, Pci9114, Pci6208, or Pci9118 device and press the "Start" button.

---

**Note1:** AdlDask and Pcixxxx device drivers can be used by both NuDAQ PCI and NuIPC CompactPCI cards.

**Note2:** The AdlDask driver must have been started as you set the card's own device driver status as started.

**Note3:** PCI-6208V/6216V/6208A all use Pci6208 driver.

---

### 1.3.3 PCIS-ISG Device Driver Handling

The *Driver Registry Utility* is for users to register PCI/CompactPCI data acquisition card device drivers. It is installed with PCIS-ISG software.

The *Driver Registry Utility*, PciUtil.exe, is located in <WINDOW NTDir>\SYSTEM32 directory. You can use it to register or un-register the device drivers.(user can also find it's shortcut in the "PCIS-ISG folder

### 1.3.4 PCIS-ISG ISaGRAF Driver Un-installation

PCIS-ISG ISaGRAF Driver has the capability of automatic un-installation.

To un-install PCIS-ISG ISaGRAF Driver, open the "Control Panel", double-click "Add/Remove Programs", select "PCIS-ISG/NT" to un-install it.

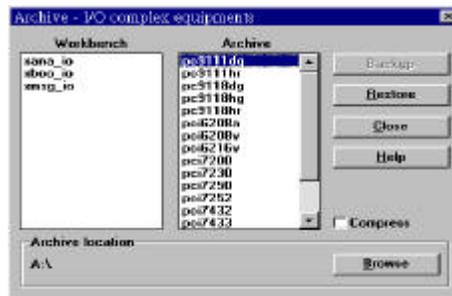
---

## 1.4 Restore PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects in the ISaGRAF Workbench

### 1.4.1 With ADLink's "PCIS-ISG" diskettes :

In order to restore PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects, user must follow the procedure:

- step 1.** Place the diskette "PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects" in the 3.5" floppy drive A:.
- step 2.** Open the ISaGRAF Archive Manager Utility for "IO Complex Equipments".
- step 3.** Click the Restore button, then PCIS-ISG ISaGRAF I/O Equipment Object will copy to the ISaGRAF Workbench.



**step 4.** When the copy operation finish, user click the Close button and exit this tool.

**step 5.** Open the ISaGRAF Archive Manager Utility for “IO Boards”.



**step 6.** Click the Restore button, then PCIS-ISG ISaGRAF I/O Board Object will copy to the ISaGRAF Workbench.

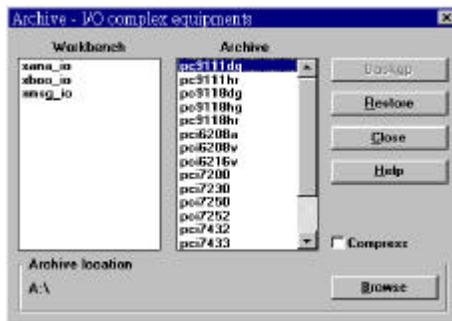
**step 7.** When the copy operation finish, user click the Close button and exit the ISaGRAF Archive Manager Utility.

#### 1.4.2 With “ADLink All-In-One Compact Disc”:

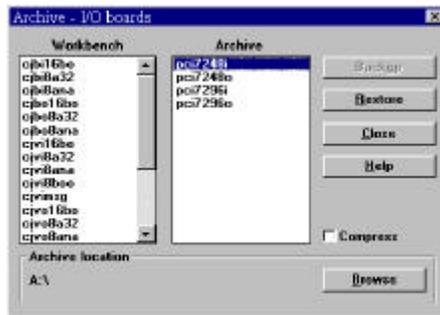
In order to restore PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects, user must follow the procedure:

**step 1.** Place “ADLink All-In-One Compact Disc” in the CD-ROM drive.

**step 2.** Open the ISaGRAF Archive Manager Utility for “IO Complex Equipments”.



- step 3.** Because in the “ADLink All-In-One Compact Disc”, the PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects are located in the “Software\PCIS-ISG\ISaGRAF I/O Board and I/O Equipment Objects” directory, so user have to click the “Browse” button, then assign the correct directory in the “ADLink All-In-One Compact Disc”.
- step 4.** Click the Restore button, then PCIS-ISG ISaGRAF I/O Equipment Object will copy to the ISaGRAF Workbench.
- step 5.** When the copy operation finish, user click the Close button and exit this tool.
- step 6.** Open the ISaGRAF Archive Manager Utility for “IO Boards”.



- step 7.** Because in the “ADLink All-In-One Compact Disc”, the PCIS-ISG ISaGRAF I/O Board and I/O Equipment Objects are located in the “Software\PCIS-ISG\I/O Board and I/O Equipment Objects” directory, so user have to click the Browse button, then assign the correct directory in the “ADLink All-In-One Compact Disc”.
- step 8.** Click the Restore button, then PCIS-ISG ISaGRAF I/O Board Object will copy to the ISaGRAF Workbench.
- step 9.** When the copy operation finish, user click the Close button and exit the ISaGRAF Archive Manager Utility.

---

## 1.5 Restore PCIS-ISG ISaGRAF Sample Programs

There are several sample programs provided in this diskette. they could help you program your own applications by using PCIS-ISG ISaGRAF driver easily. The brief descriptions of these programs are specified as follows :

Pci6208 : The introduction about use ISaGRAF with PCI-6208/6216 PCIS-ISG driver,

Pci7200 : The introduction about use ISaGRAF with PCI-7200/cPCI-7200 PCIS-ISG driver,

Pci7230 : The introduction about use ISaGRAF with PCI-7230/cPCI-7230 PCIS-ISG driver,

Pci7248 : The introduction about use ISaGRAF with PCI-7248/cPCI-7248 PCIS-ISG driver,

Pci7250 : The introduction about use ISaGRAF with PCI-7250, PCI-7251 PCIS-ISG driver,

Pci7252 : The introduction about use ISaGRAF with cPCI-7252 PCIS-ISG driver,

Pci7296 : The introduction about use ISaGRAF with PCI-7296 PCIS-ISG driver,

Pci7432 : The introduction about use ISaGRAF with PCI-7432/cPCI-7432 PCIS-ISG driver,

Pci7433 : The introduction about use ISaGRAF with PCI-7433, PCI-7434/cPCI-7433, cPCI-7434 PCIS-ISG driver,

Pci9112 : The introduction about use ISaGRAF with PCI-9112/cPCI-9112 PCIS-ISG driver,

Pci9113 : The introduction about use ISaGRAF with PCI-9113 PCIS-ISG driver,

Pci9114 : The introduction about use ISaGRAF with PCI-9114 PCIS-ISG driver,

Pci9111dg : The introduction about use ISaGRAF with PCI-9111DG PCIS-ISG driver,

Pci9111hr : The introduction about use ISaGRAF with PCI-9111HR PCIS-ISG driver,

Pci9118dg : The introduction about use ISaGRAF with PCI-9118DG PCIS-ISG driver,

Pci9118hg : The introduction about use ISaGRAF with PCI-9118HG PCIS-ISG driver,

Pci9118hr : The introduction about use ISaGRAF with PCI-9118HR PCIS-ISG driver,

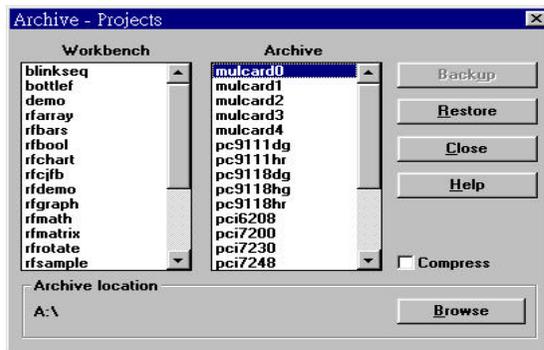
### 1.5.1 With ADLink's "PCIS-ISG" diskettes :

In order to restore PCIS-ISG ISaGRAF sample program, user must follow the procedure:

**step 1.** Place the diskette "PCIS-ISG ISaGRAF Sample program" in the 3.5" floppy drive A:.

**step 2.** Open the ISaGRAF Archive Manager Utility for Project.

**step 3.** Select the sample program user want to use, then click the Restore button, then PCIS-ISG ISaGRAF sample program will copy to the ISaGRAF Workbench.

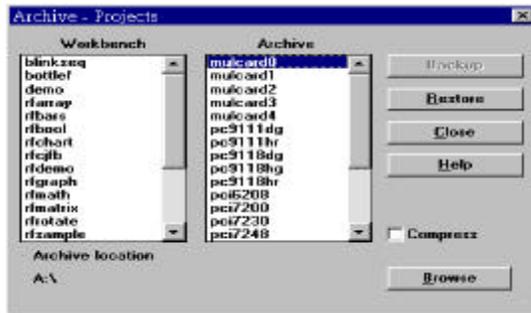


**step 4.** When the copy operation finish, user click the Close button and exit this tool.

### 1.5.2 With “ADLink All-In-One Compact Disc”:

In order to restore PCIS-ISG ISaGRAF sample program, user must follow the procedure:

- step 1.** Place “ADLink All-In-One Compact Disc” in the CD-ROM drive.
- step 2.** Open the ISaGRAF Archive Manager Utility for Project.



- step 3.** Because in the “ADLink All-In-One Compact Disc”, the PCIS-ISG ISaGRAF Sample program are located in the “Software\PCIS-ISG ISaGRAF Sample program” directory, so user have to click the “Browse” button, then assign the correct directory in the “ADLink All-In-One Compact Disc”.
- step 4.** Click the Restore button, then PCIS-ISG ISaGRAF sample program will copy to the ISaGRAF Workbench.
- step 5.** When the copy operation finish, user click the Close button and exit this tool.

# 2

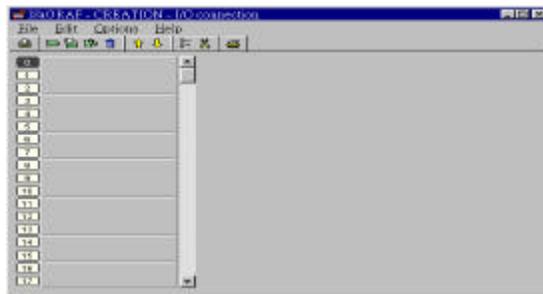
## Operations with Driver and the ISaGRAF Workbench

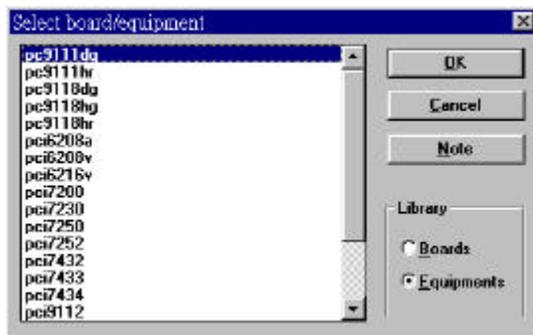
---

### 2.1 Adding the Driver to the ISaGRAF Workbench

After installing the ADLink PCI/CompactPCI data acquisition cards and PCIS-ISG ISaGRAF Driver, if users want to add the PCIS-ISG ISaGRAF Driver to the ISaGRAF Project to control ADLink NuDAQ PCI or NuIPC CompactPCI data acquisition cards, the following procedures must be done:

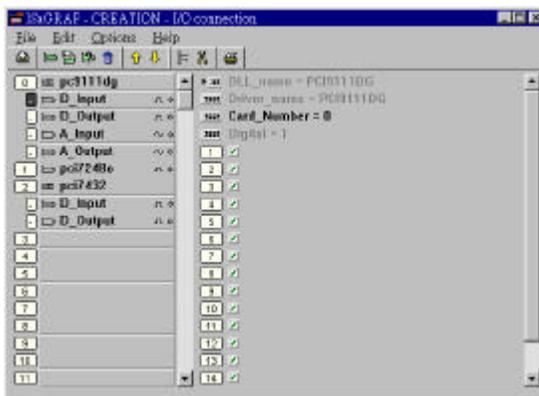
1. On the Program Management window, click the "I/O connection" button, then the I/O Connection Editor will appear.
2. On the I/O Connection Editor, choose a empty slot, double click this slot, then Select Board/Equipment dialog box will appear.



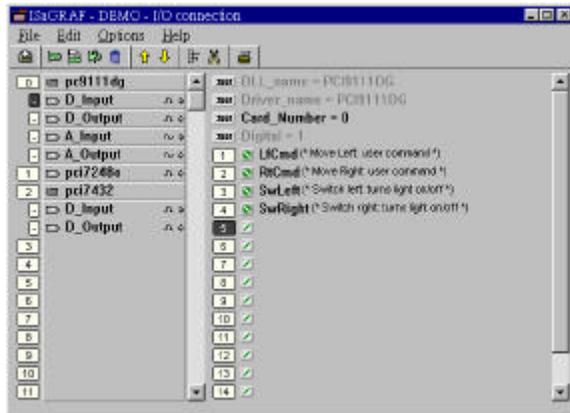


Depending on user's requirement, user can choose Boards type or Equipments type as this project's hardware configuration (In this version, PCIS-ISG ISaGRAF Driver configures the PCI-7248, PCI-7296 card drivers as the Board type and the other card drivers as the Equipment type).

3. After user completed the hardware configuration of the project, the I/O Connection dialog box will appear as below. (For example, in this project user defines three cards pc9111dg, pci7248o and pci7432 as the hardware configuration)



4. Now what user has to do is to connect every card's channels to the project variables.



---

## 2.2 Removing the Driver from the ISaGRAF Workbench

You can remove the driver from the ISaGRAF Project. Any variables that mapped to the I/O points on the Board or Equipment can be deleted as the following procedure:

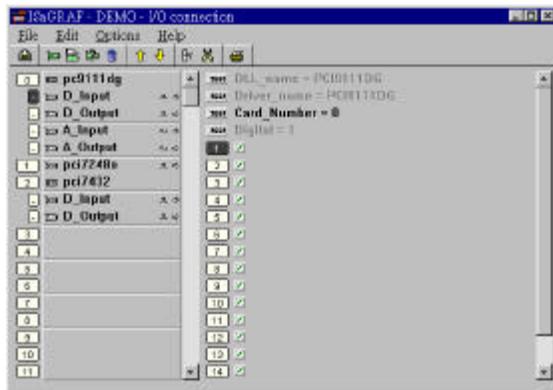
1. On the Program Management Window, click the "I/O connection" button, then the I/O Connection Editor will appear.
2. On the I/O Connection Editor, select the slot which you want to delete, click this slot, then select "Clear Slot" button. The slot now is empty and the driver is removed.

---

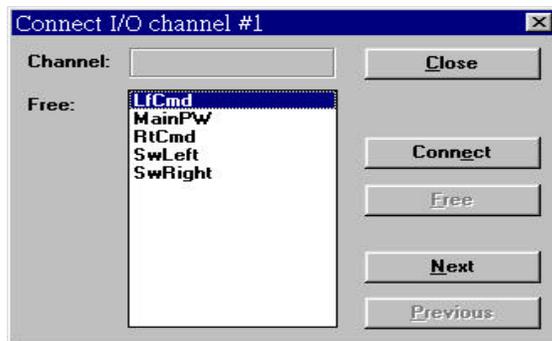
## 2.3 Assign Card Channel

Because each card can provide different function, the channels it provides is also different(Depend on card function, it may provide AI, AO, DI or DO channels). When user has completed the choice of card for his project, the next he has to do is to assign the card's channels to the variable in the project. The procedures are described as follows:

1. On the I/O connection dialog box, user selects a channel of the card which will be assigned to the variable.(For example, user selects the D\_Input Channel 1 of the Card pc9111dg)



2. Then user clicks the channel, Connect I/O Channel dialog box will appear.



3. Now user has to do is to select a variable in the project. Then the real card channel will connect to the project variable.

