PCI-1763UP

8-Channel Relay & 8-Channel Isolated Digital Input Low Profile Card

User Manual

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This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.

2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.

3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.

4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

Technical Support and Assistance

Step 1. Visit the Advantech web site at **www.advantech.com/support** where you can find the latest information about the product.

Step 2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

1 × PCI-1763UP card

1 × Companion CD-ROM (DLL driver included)

1 × User Manual (this manual)

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

1. To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Introduction

Sections include:

- Feature
- Application
- Installation Guide
- Software OverView
- DLL Driver Programming Roadmap
- Accessories

Chapter 1 Introduction

Thank you for buying the Advantech PCI-1763UP. The Advantech PCI-1763UP is a 8-channel relay actuator and 8-channel isolated digital input card for the PCI bus.

Its eight on-board SPDT relays are ideal for applications such as device ON/OFF control or small power switched. For easy monitoring, each relay is equipped with one red LED to show its ON/OFF status.

The PCI-1763UP's eight optically-isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.

The following sections of this chapter will provide further information about features, installation guide, together with some brief information on software and accessories for the PCI-1763UP card.

1.1 Features

PCI-1763UP offers the following main features:

❏ 8 isolated digital input channels
❏ LED indicators to show activated relays
❏ 8 Form C-type relay output channels
❏ Output status read-back
❏ Keep relay output values when hot system reset
❏ High-voltage isolation on input channels (2,500 V_{DC})
❏ High ESD protection (2,000 V_{DC})
❏ High over-voltage protection (70 V_{DC})
❏ Wide input range (10 ~ 50 V_{DC})
❏ Interrupt handling capability
❏ BoardID Switch
❏ Low profile
❏ Universal PCI slot, accepts both 3.3 and 5 V

1.1.1 Robust Protection

The PCI-1763UP digital input channels feature a robust isolation protection for industrial, lab and machinery automation applications. It durably withstands voltage up to 2,500 V_{DC}, preventing your host system from any incidental harms. If connected to an external input source with surge-protection, the PCI-1763UP can offer up to a maximum of 2,000 V_{DC} ESD (Electrostatic Discharge) protection. Even with an input voltage rising up to 70 V_{DC}, the PCI-1763UP can still manage to work properly albeit only for short period of time.

1.1.2 Wide Input Range

PCI-1763UP has a wide range of input voltage from 10 to 50 V_{DC}, and it is suitable for most industrial applications with 12 V_{DC}, 24 V_{DC} and 48 V_{DC} input voltage.

1.1.3 Reset Protection

When the system has undergone a hot reset (i.e. without turning off the system power), the PCI-1763UP can either retain outputs values of each channel, or return to its default configuration as open status, depending on its on-board jumper setting. This function protects the system from wrong operations during unexpected system resets.

1.1.4 Plug-and-Play Function

PCI-1763UP is a Plug-and-Play device, which fully complies with PCI Specification Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug-and-Play function.

1.1.5 BoardID Switch

PCI-1763UP has a built-in DIP Switch that helps define each card's ID when multiple PCI-1763UP cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple PCI-1763UP cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Note:

✎ For detailed specifications of the PCI-1763UP, please refer to *Appendix* A, Specifications.

1.2 Applications

❏ Industrial On/Off control
❏ Switch status sensing
❏ Digital I/O control
❏ Industrial and lab automation
❏ SMT/PCB machinery
❏ Semi-conductor machinery
❏ PC-based Industrial Machinery
❏ Testing & Measurement
❏ Laboratory & Education
❏ External relay driving

1.3 Installation Guide

Before you install your PCI-1763UP card, please make sure you have the following necessary components:

❏ **PCI-1763UP card**
❏ **PCI-1763UP User's Manual**
❏ **Driver software**   Advantech DLL drivers (included in the companion CD-ROM
❏ **Wiring cable**   PCL-10144 (optional)
❏ **Wiring board**   ADAM-3944 (optional)
❏ **Computer**   Personal computer or workstation with a PCI-bus slot (running Windows 98/ 2000/XP)

Some other optional components are also available for enhanced operation:

❏ **Application software**   ActiveDAQ, ADAQ-VIEW or other third-party software packages

After you get the necessary components and maybe some of the accessories for enhanced operation of your DAS card, you can then begin the Installation procedures. Figure 1-1 provides a concise flow chart to give users a broad picture of the software and hardware installation procedures.
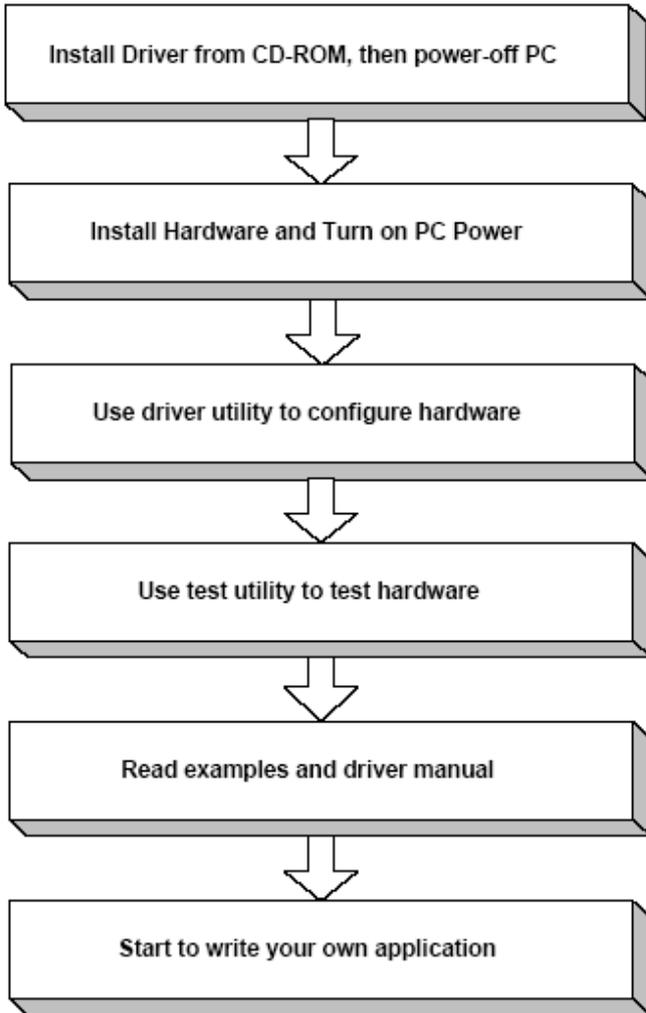
Figure 1.1: Installation Flow Chart

1.4 Software Overview

Advantech offers a rich set of DLL drivers, third-party driver support and application software to help fully exploit the functions of your PCI-1763UP card:

- DLL driver (on the companion CD-ROM)
- LabVIEW driver
- Advantech ActiveDAQ
- Advantech ADAQ-VIEW

Programming choices for DA&C cards: You may use Advantech application software such as Advantech DLL driver. On the other hand, advanced users are allowed another option for register-level programming, although not recommended due to its laborious and time-consuming nature.

1.4.1 DLL Driver

The Advantech DLL Drivers software is included on the companion CD-ROM at no extra charge. It also comes with all the Advantech DA&C cards. Advantech's DLL driver features a complete I/O function library to help boost your application performance. The Advantech DLL driver for Windows 98/2000/XP works seamlessly with development tools such as Visual C++, Visual Basic, Borland C++ Builder and Borland Delphi.

1.4.2 Register-level Programming

Register-level programming is reserved for experienced programmers who find it necessary to write codes directly at the level of device registers. Since register-level programming requires much effort and time, we recommend that you use the Advantech DLL drivers instead. However, if register-level programming is indispensable, you should refer to the relevant information in *Appendix C, Register Structure and Format*, or to the example codes included on the companion CD-ROM.

1.5 DLL Driver Programming Roadmap

This section will provide you a roadmap to demonstrate how to build an application from scratch using Advantech DLL driver with your favorite development tools such as Visual C++, Visual Basic, Delphi and C++ Builder. The step-by-step instructions on how to build your own applications using each development tool will be given in the *DLL Drivers Manual*. Moreover, a rich set of example source codes are also given for your reference.

1.5.1 Programming Tools

Programmers can develop application programs with their favorite development tools:

❏ **Visual C++**
❏ **Visual Basic**
❏ **Delphi**
❏ **C++ Builder**

For instructions on how to begin programming works in each development tool, Advantech offers a *Tutorial* Chapter in the *DLL Drivers Manual* for your reference. Please refer to the corresponding sections in this chapter on the *DLL Drivers Manual* to begin your programming efforts. You can also take a look at the example source codes provided for each programming tool, since they can get you very well-oriented.

The *DLL Drivers Manual* can be found on the companion CD-ROM. Or if you have already installed the DLL Drivers on your system, The *DLL Drivers Manual* can be readily accessed through the ***Start*** button:

Start\Programs\Advantech Automation\Device Manager\Device Driver's Manual

The example source codes could be found under the corresponding installation folder such as the default installation path:

\Program Files\Advantech\ADSAPI\Examples

For information about using other function groups or other development tools, please refer to the *Creating Windows 98/2000/XP Application with DLL Driver* chapter and the *Function Overview* chapter in the *DLL Drivers Manual.*

1.5.2 Programming with DLL Driver Function Library

Advantech DLL driver offers a rich function library to be utilized in various application programs. This function library consists of numerous APIs that support many development tools, such as Visual C++, Visual Basic, Delphi and C++ Builder.

According to their specific functions or services, those APIs can be categorized into several function groups:

❏ **Digital Input/Output Function Group**
❏ **Counter Function Group**
❏ **Port Function Group (direct I/O)**
❏ **Event Function Group**

For the usage and parameters of each function, please refer to the *Function Overview* chapter in the *DLL Drivers Manual.*

1.5.3 Troubleshooting DLL Driver Error

Driver functions will return a status code when they are called to perform a certain task for the application. When a function returns a code that is not zero, it means the function has failed to perform its designated function. To troubleshoot the DLL driver error, you can pass the error code to **DRV_GetErrorMessage** function to return the error message. Or you can refer to the *DLL Driver Error Codes* Appendix in the *DLL Drivers Manual* for a detailed listing of the Error Code, Error ID and the Error Message.

1.6 Accessories

Advantech offers a complete set of accessory products to support the PCI-1763UP card. These accessories include:

1.6.1 Wiring Cable
❑ **PCL-10144**   The PCL-10144 shielded cable is specially designed for PCI-1763UP cards to provide high resistance to noise. To achieve a better signal quality, the signal wires are twisted in such a way as to form a "twisted-pair cable", reducing cross-talk and noise from other signal sources. Furthermore, its analog and digital lines are separately sheathed and shielded to neutral ize EMI/EMC problems.

1.6.2 Wiring Boards
❏ **ADAM-3944**   The ADAM-3944 is a 44-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be readily connected to the Advantech PC-Lab cards and allow easy yet reliable access to individual pin connections for the PCI-1763UP card.

Installation

Sections include:

- Unpacking
- Switch and Jumper Setting
- I/O connectors
- Driver Installation
- Hardware Installation
- Device Setup & Configuration

Chapter 2 Installation

This chapter has a package item checklist, proper instructions about unpacking and step-by-step procedures for both driver and card installation.

2.1 Unpacking

After receiving your PCI-1763UP package, please inspect ita contents first. The package should contain the following items:

☑ PCI-1763UP card
☑ Companion CD-ROM (DLL driver included)
☑ User's Manual

The PCI-1763UP card harbors certain electronic components vulnerable to *electrostatic discharge* (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to.

Before removing the card from the antistatic plastic bag, you should take the following precautions to ward off possible ESD damage:

● Touch the metal part of your computer chassis with your hand to dis charge static electricity accumulated on your body. Or one can also use a grounding strap.

● Touch the anti-static bag to a metal part of your computer chassis before opening the bag.

● Take hold of the card only by the metal bracket when removing it out of the bag.

After taking out the card, you should first:

● Inspect the card for any possible signs of external damage (loose or damaged components, etc.). If the card is visibly damaged, please notify our service department or our local sales representative immediately. Avoid installing a damaged card into your system.

Also pay extra caution to the following aspects to ensure proper instal-lation:

✗ Avoid physical contact with materials that could hold static electric ity such as plastic, vinyl and Styrofoam.

✗ Whenever you handle the card, grasp it only by its edges. DO NOT TOUCH the exposed metal pins of the connector or the electronic components.

Note:

✎ Keep the anti-static bag for future use. You might need the original bag to store the card if you have to remove the card from PC or trans port it elsewhere.

2.2 Switch and Jumper Settings

The PCI-1763UP card has one function switch settings.
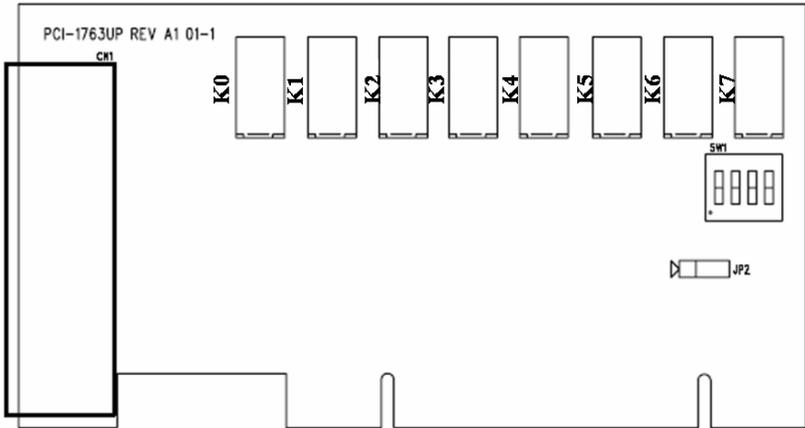
Figure 2.1: Card Connectors, Jumper & Switch Locations

Table 2.1: Summary of jumper settings		
Names of Jumpers	**Function description**	
JP2	▷ ◦ ● ●	Keep last status after hot reset
	▷ ● ● ◦	Default configuration

2.2.1 Setting the time to reset the relay outputs

Some users will want the capability of clearing each relay output when the system (or PC) issues a reset signal on the PCI bus. Some users will want to clear their relays only as part of system power-on. The PCI-1763UP satisfies both these needs by providing jumper JP2. Depending on the application, this capability may allow relay outputs to be "OFF" without requiring a complete shutdown of processes controlled by the card.

2.3 I/O connectors

2.3.1 Pin Assignments

Figure 2-2 shows the pin assignments for the 44-pin I/O connector on PCI-1763UP
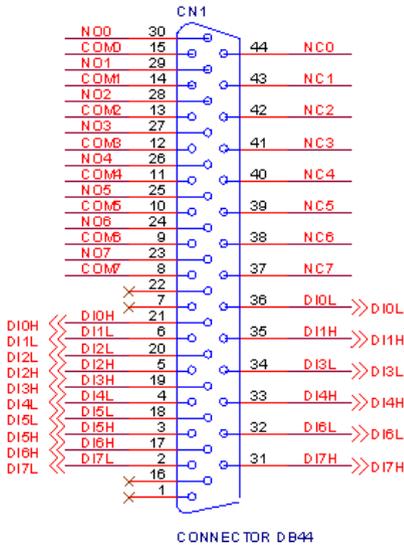
DInL:
Digital Input Low, Channel n

DInH:
Digital Input High, Channel n

NC n:
Normal close pin of relay n

NO n:
Normal open pin of relay n

COM n:
Common pin of relay n

Figure 2.2: I/O Connector Pin Assignments

2.4 Driver Installation

Note:

✎ We recommend you to install the driver before you install the PCI-1763UP card into your system, since this will guarantee a smooth installation process.

The 32-bit DLL driver Setup program for the PCI-1763UP card is included on the companion CD-ROM that is shipped with your DA&C card package. Please follow the steps below to install the driver software:

Step 1: Insert the companion CD-ROM into your CD-ROM drive.

Step 2: The Setup program will be launched automatically if you have the autoplay function enabled on your system. When the Setup Program is launched, you'll see the following Setup Screen.

Note:

✎ If the autoplay function is not enabled on your computer, use Windows Explorer or Windows *Run* command to execute Autorun.exe on the companion CD-ROM.

Figure 2.3: Screen of Advantech Automation Software

Step 3: Select the individual driver.

Step 4: Follow the installation instructions step by step to complete your DLL driver setup.

Figure 2.4: Different Options for Driver Setup

For further information on driver-related issues, an online version of *DLL Drivers Manual* is available by accessing the following path:

Start\Programs\Advantech Automation\Device Manager\Device Driver's Manual

2.5 Hardware Installation

Note:

✎ Make sure you have installed the driver first before you install the card (please refer to *2.4 Driver Installation*)

After the DLL driver installation is completed, you can now go on to install the PCI-1763UP card in any PCI slot on your computer. But it is suggested that you should refer to the computer user manual or related documentation if you have any doubt. Please follow the steps below to install the card on your system.

Step 1: Turn off your computer and unplug the power cord and cables. TURN OFF your computer before installing or removing any components on the computer.

Step 2: Remove the cover of your computer.

Step 3: Remove the slot cover on the back panel of your computer.
Step 4: Touch the metal part on the surface of your computer to neutral
ize the static electricity that might be on your body.
Step 5: Insert the PCI-1763UP card into a PCI slot. Hold the card only by
its edges and carefully align it with the slot. Insert the card firmly
into place. Use of excessive force must be avoided, otherwise the
card might be damaged.
Step 6: Fasten the bracket of the PCI card on the back panel rail of the
computer with screws.
Step 7: Connect appropriate accessories (44-pin cable, wiring terminals,
etc. if necessary) to the PCI card.
Step 8: Replace the cover of your computer chassis. Re-connect the
cables you removed in step 2.
Step 9: Plug in the power cord and turn on the computer .

Note:

✎ In case you installed the card without installing the DLL driver first,
Windows 98 will recognize your card as an "unknown device"
after rebooting, and will prompt you to provide the necessary driver.
You should ignore the prompting messages (just click the ***Cancel***
button) and set up the driver according to the steps described in *2.4
Driver Installation.*

After the PCI-1763UP card is installed, you can verify whether it is prop-
erly installed on your system in the *Device Manager*:

1. Access the *Device Manager* through *Control Panel/System/Device
Manager.*
2. The *device name* of the PCI-1763UP should be listed on the *Device
Manager* tab on the System *Property* Page.
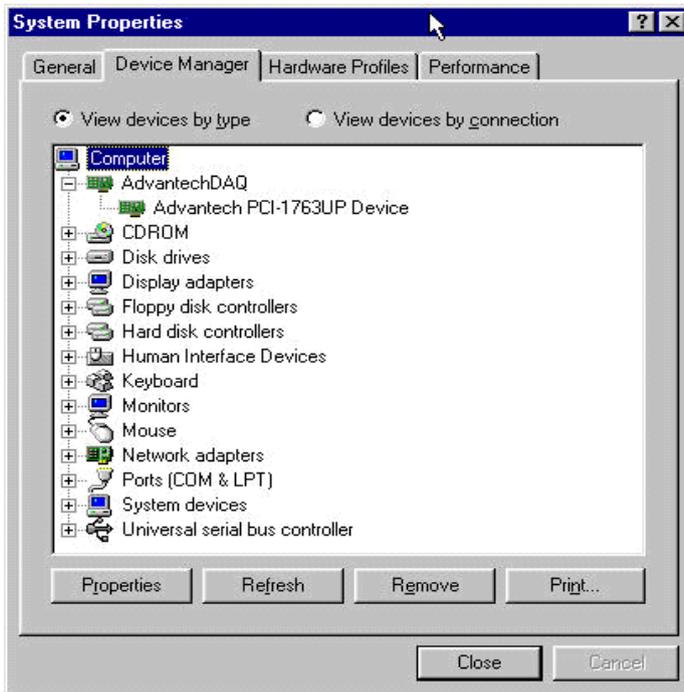
Figure 2.5: Devices Listed on the Device Manager

Note:

✎ If your card is properly installed, you should see the *device name* of your card listed on the *Device Manager* tab. **If you do see your device name listed on it but marked with an exclamation sign "!", it means your card has not been correctly installed.** In this case, remove the card device from the *Device Manager* by select ing its device name and press the *Remove* button. Then go through the driver installation process again.

After your card is properly installed on your system, you can now configure your device using the *Device Manager Program* that has itself already been installed on your system during driver setup. A complete Device Manager procedure should include *device setup, configuration and testing.* The following sections will guide you through the Setup, Configuration and Testing of your device.

2.6 Device Setup & Configuration

The *Device Manager* program is a utility that allows you to set up, con-
figure and test your device, and later stores your settings on the system
registry. These settings will be used when you call the APIs of Advantech
32-bit DLL drivers.

2.6.1 Setting Up the Device

Step 1: To install the I/O device for your card, you must first run the
Device Manager program (by accessing ***Start/Programs/
Advantech Automation/Device Manager/***

Step 2: On the *Device Manager* program window, you can see the *I/O
Device Manager* dialog box (Fig. 2-6).
You can then view the device(s) already installed on your system
(if any) on the *supported Devices* list box.
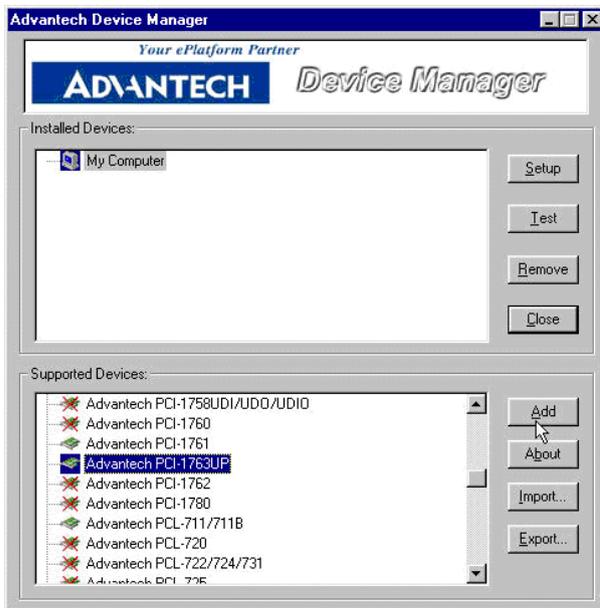
Figure 2.6: The I/O Device Manager Dialog Box

Step 3: Scroll down the *List of Devices* box to find the device that you
wish to install, then click the ***Add***… button to evoke the *Device(s)*

found dialog box such as one shown in Fig. 2-7. The *Device(s)*
found dialog box lists all the installed devices on your system.
Select the device you want to configure from the list box and
press the **OK** button. After you have clicked **OK**, you will see a
Device Setting dialog box such as the one in Fig. 2-7.
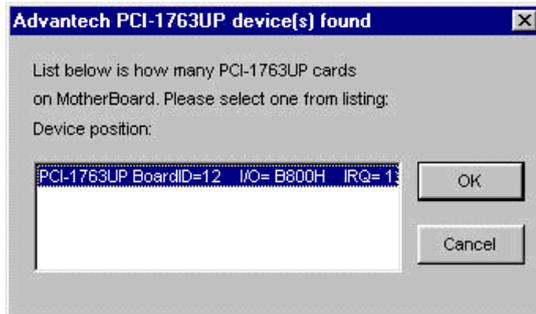
Figure 2.7: The "Device(s) Found" Dialog Box

2.6.2 Configuring the Device

Step 4: On the *Device Setting* dialog box (Fig. 2-8), you can configure
the ID0 ~ ID7 Interrupt trigger mode either as *Rising Edge* or
Falling Edge, and *Enable or Disable* the ID0 ~ ID7.
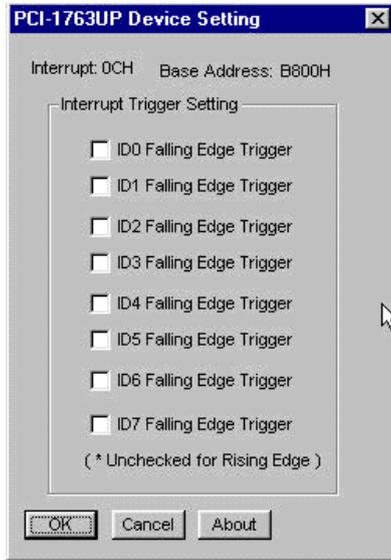
Figure 2.8: The Device Setting Dialog Box

Step 5: After you have finished configuring the device, click *OK* and the *device name* will appear in the *Installed Devices* box as seen in Fig. 2.9
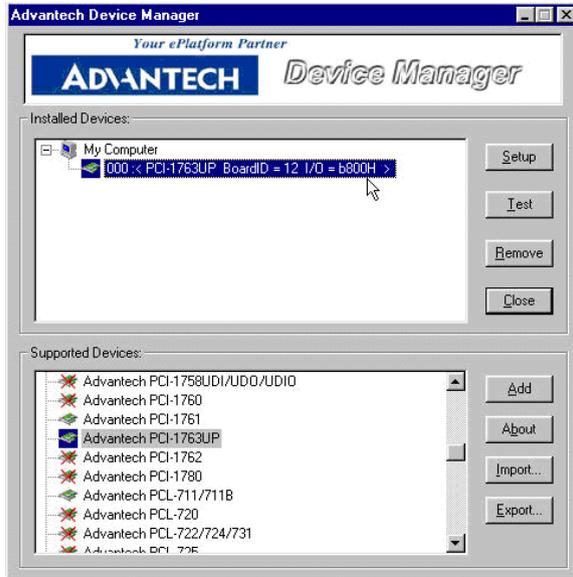
Figure 2.9: The Device Name Appearing on the List of Devices Box

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Note:

✎ As we have noted, the *device name*
   "000:<PCI-1763UP BoardID = 12 I/O = b800H >"
   begins with a *device number* **"000"**, which is specifically assigned to
   each card. The *device number* is passed to the driver to specify
   which device you wish to control.

After your card is properly installed and configured, you can click the
Test… button to test your hardware by using the testing utility we sup-
plied. For more detailed information, please refer to the *DLL Drivers
Manual*.
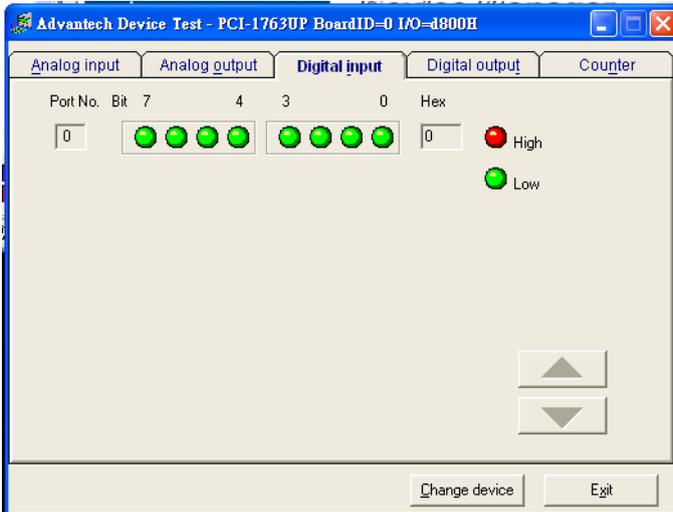
Figure 2.10: The Test Dialog Box for Digital Input
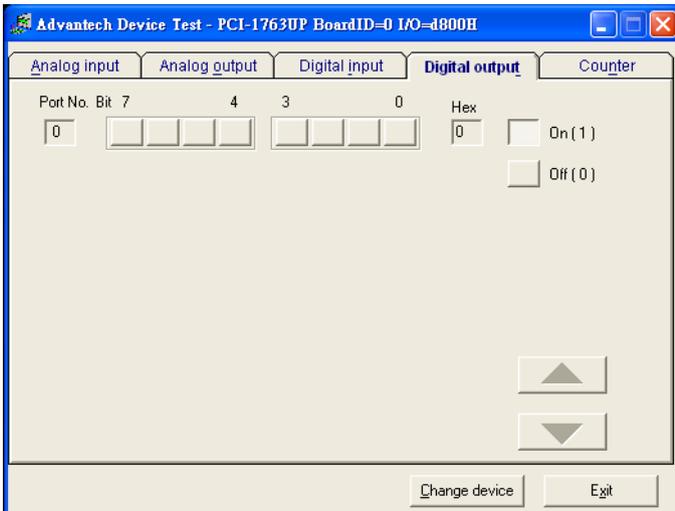
Figure 2.11: The Test Dialog Box for Digital Output

You can also find the useful examples on the CD-ROM to speed up your programming.

Signal Connections

Sections include:

- Overview
- Isolated Digital Input Connections
- Relay Connections

Chapter 3 Signal Connections

3.1 Overview

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter provides useful information about how to connect input and output signals to the PCI-1763UP via the I/O connector.

3.2 Isolated Digital Input Connections

The PCI-1763UP has 8 isolated digital input channels designated DI0~DI7.

Each of isolated digital input channel accepts 10~50 V_{DC} voltage inputs, and accept bi-directional input. It means that you can apply positive or negative voltage to an isolated input pin (Vin). The figure below shows how to connect an external input source to one of the card's isolated input channels
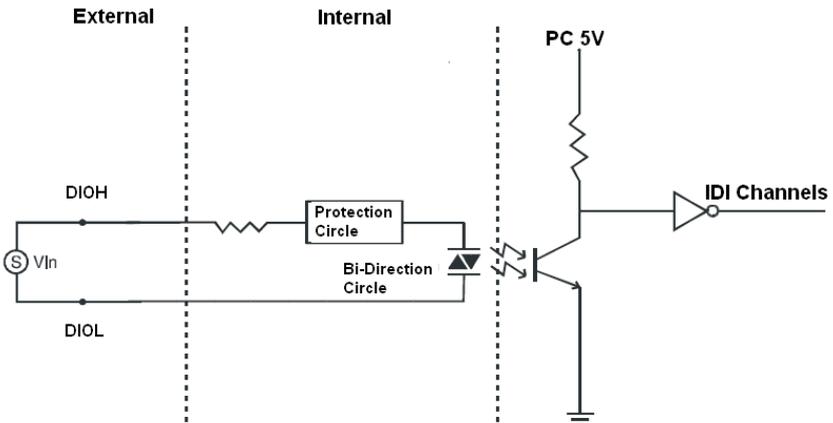
Figure 3.1: Isolated Digital Input Connections

3.3 Relay Connections

After power on, the initial relay output status of PCI-1763UP is shown as below:
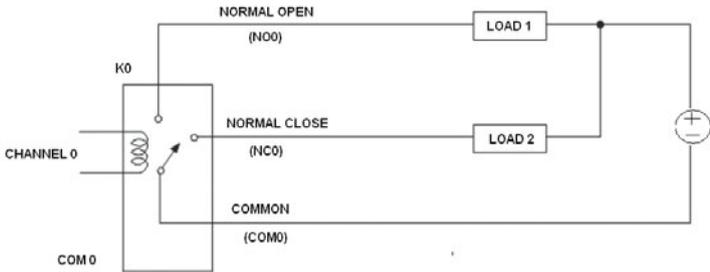
Figure 3.2: Relay Output Connection

A write operation to I/O address, BASE +0, will change the output status of each relay. For example, if Bit 0 of BASE +0 is set "1" (logic high), relay 0, K0, will switch from position "NORMALLY CLOSED", R0_NC, to position "NORMALLY OPEN", R0_NO. This means that LOAD2 will be de-energized, while LOAD1 is energized.

To summarize, the "COMMON" line connect to the "NORMALLY CLOSED" line, if the corresponding bit is set as 0 (power-on initial status). Otherwise, if the corresponding bit is set as 1, then the "COMMON" line will connect to the "NORMALLY OPEN" line.

Specifications

Appendix A Specifications

Table 1: Isolated Digital Input

Number of Input Channels	8	
Optical Isolation	2500 V DC	
Opto-isolator response time	25 µs	
Over-voltage Protect	70 VDC	
Input Voltage	VIH (max.)	50 VDC
	VIH (min.)	5 VDC
	VIL (max.)	3 VDC
Input Current	10 VDC	3.16mA (typical)
	15 VDC	4.94 mA (typical)
	24 VDC	8.13 mA (typical)
	48 VDC	16.6 mA (typical)
	50 VDC	17.3 mA (typical)

Table 2: Relay Output

Number of Output Channels	8	
Relay Type	DPDT (8 Form C)	
Rating (resistive)	0.25 A* 240 VAC or 1 A* 30 VDC	
Max. Switching Power	62.5 AV, 60 W	
Max. Switching Voltage	250 VAC, 220 VDC	
Max. Switching Current	5 A	
Operate time	5 ms max.	
Release time	4 ms max.	
Insulation Resistance	>1X10e9 . (at 500 VDC)1,000 M min. (at 500 VDC)	
Life Expectancy	Mechanical	1X10e8 ops. min.
	Electrical	2x10 e5 ops. min.(contact rating)

Table 3: General

I/O Connector Type	44-pin D-type female	
Dimensions	120 x 64.4 mm (4.7" x 2.5")	
Power Consumption	+5V @ 107.5 mA (typical) +5V @ 301.3 mA (max.)	
Temperature	Operating	0 ~ 60 °C (32 ~ 140°F) (refer to IEC 68-2-1,2)
	Storage	-20 ~ 70 °C (-4 ~158 °F)
Relative Humidity	5 - 95 % RH non-condensing (refer to IEC 68-2-3)	
Certification	CE Class A certified	

Block Diagram

Appendix B Block Diagram
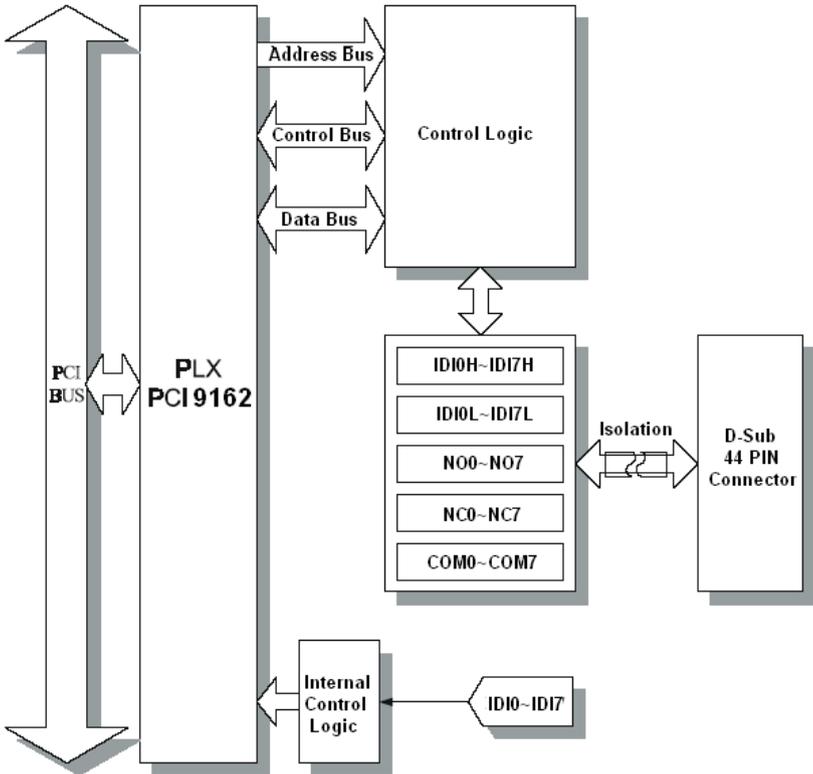
Figure B.1: System Block Diagram

APPENDIX **C**

Register Structure and Format

Appendix C Register Structure and Format

C.1 Overview

The PCI-1763UP is delivered with an easy-to-use 32-bit DLL driver for user programming under the Windows 98/2000/XP operating system. We advise users to program the PCI-1763UP using the 32-bit DLL driver provided by Advantech to avoid the complexity of low-level programming by register.

The most important consideration in programming the PCI-1763UP the register level is to understand the function of the card's registers. The information in the following sections is provided only for users who would like to do their own low-level programming.

C.2 I/O Port Address Map

The PCI-1763UP requires 32 consecutive addresses in the PC's I/O space. The address of each register is specified as an offset from the card's base address. For example, BASE+0 is the card's base address and BASE+7 is the base address plus seven bytes.

Table C-1 shows the function of each register of the PCI-1763UP or driver and its address relative to the card's base address.

Table C.1: Register Function

Base Addr, + Hex		7	6	5	4	3	2	1	0
0H	**R**	Relay Output Status							
		RS7	RS6	RS5	RS4	RS3	RS2	RS1	RS0
	W	Relay Output							
		RO7	RO6	RO5	RO4	RO3	RO2	RO1	RO0
1H	**R**	Isolated Digital Input							
		IDI7	IDI	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
	W	N/A							
2H	**R**	Board ID Register							
						BD3	BD2	BD1	BD0
	W	N/A							
3H	**R**	Interrupt Enable Status							
		IDI7EN	IDI6EN	IDI5EN	IDI4EN	IDI3EN	IDI2EN	IDI1EN	IDI0EN
	W	Interrupt Enable Register							
		IDI7EN	IDI6EN	IDI5EN	IDI4EN	IDI3EN	IDI2EN	IDI1EN	IDI0EN
4H	**R**	Interrupt Triggering Status							
		IDI7RF	IDI6RF	IDI5RF	IDI4RF	IDI3RF	IDI2RF	IDI1RF	IDI0RF
	W	Interrupt Triggering Register							
		IDI7RF	IDI6RF	IDI5RF	IDI4RF	IDI3RF	IDI2RF	IDI1RF	IDI0RF
5H	**R**	Interrupt Flag							
		IDI7F	IDI6F	IDI5F	IDI4F	IDI3F	IDI2F	IDI1F	IDI0F
	W	Interrupt Clear Register							
		IDI7CLR	IDI6CLR	IDI5CLR	IDI4CLR	IDI3CLR	IDI2CLR	IDI1CLR	IDI0CLR

C.3 Relay I/O Registers - BASE+0H

The PCI-1763UP offers 8-ch relay actuators. These I/O channels use the input and output ports at addresses **BASE+0H.**

Table C.2: Register for Relay Output Status

Read	Relay Output Status							
Bit #	7	6	5	4	3	2	1	0
BASE +0H	RS7	RS6	RS5	RS4	RS3	RS2	RS1	RS0

Table C.3: Register for Relay Output

Write	Relay Output							
Bit #	7	6	5	4	3	2	1	0
BASE +0H	RO7	RO6	RO5	RO4	RO3	RO2	RO1	RO0

Note:
✎ The default configuration of the digital output channels is a logic 0.

This avoids damaging external devices during system start-up or reset since the power on status is set to the default value.

C.4 Isolated Digital Input Registers - BASE+1H

The PCI-1763UP offers 8-ch isolated digital input channels. These channels use the input ports at addresses **BASE+1H**.

Table C.4: Register for isolated digital input

Read	Isolated Digital Input							
Bit #	7	6	5	4	3	2	1	0
BASE +1H	IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0

C.5 Board ID - BASE+2H

The PCI-1763UP offers Board ID register **BASE+2H**. With correct Board ID settings, user can easily identify and access each card during hardware configuration and software programming.

Table C.5: Register for Board ID

Read	Board ID							
Bit #	7	6	5	4	3	2	1	0
BASE +2H					BD3	BD2	BD1	BD0

BD3 ~ DB0   **Board ID**
                     BD0 LSB of the Board ID
                     BD3 MSB of the Board ID

C.6 Interrupt Status Register - BASE+3H/4H/5H

The ***Interrupt Status Register*** control the status of eight interrupt signal sources (IDI0 ~ IDI7).

Table C.6: Register for Interrupt Status

Read	Interrupt Status Register							
Bit #	7	6	5	4	3	2	1	0
BASE +3H	IDI7EN	IDI6EN	IDI5EN	IDI4EN	IDI3EN	IDI2EN	IDI1EN	IDI0EN
BASE +4H	IDI7RF	IDI6RF	IDI5RF	IDI4RF	IDI3RF	IDI2RF	IDI1RF	IDI0RF
BASE +5H	IDI7F	IDI6F	IDI5F	IDI4F	IDI3F	IDI2F	IDI1F	IDI0F

IDInF   **Interrupt flag bits (n = 0 ~ 7)**
This bit is a flag indicating the status of an interrupt.
User can read this bit to get the status of the interrupt
0   No interrupt
1   Interrupt occurred

IDInRF   **Interrupt enable control bits (n = 0 ~ 7)**
Read this bit to Enable/Disable the interrupt.
0   Disable
1   Enable

IDInEN   **Interrupt triggering control bits (n = 0 ~ 7)**
The interrupt can be triggered by a rising edge or
falling edge of the interrupt signal, as determined by
the value in this bit.
0   Rising edge trigger
1   Falling edge trigger

C.7 Interrupt Control Register - BASE+3H/4H/5H

The *Interrupt Control Register* control the status of two interrupt signal sources (IDI0 ~ IDI7). The user can clear the interrupt by writing its corresponding value to the *Interrupt Control Register*, as shown in below table.

Table C.7: Register for Interrupt Control

Write	Interrupt Control Register							
Bit #	7	6	5	4	3	2	1	0
BASE +3H	IDI7EN	IDI6EN	IDI5EN	IDI4EN	IDI3EN	IDI2EN	IDI1EN	IDI0EN
BASE +4H	IDI7RF	IDI6RF	IDI5RF	IDI4RF	IDI3RF	IDI2RF	IDI1RF	IDI0RF
BASE +5H	IDI7CLR	IDI6CLR	IDI5CLR	IDI4CLR	IDI3CLR	IDI2CLR	IDI1CLR	IDI0CLR

IDInCLR **Interrupt clear control bits ($n = 0 \sim 7$)**
This bit must first be cleared to service the next inter rupt.
0 Ignore
1 Clear the interrupt

IDInRF **Interrupt enable control bits ($n = 0 \sim 7$)**
Read this bit to Enable/Disable the interrupt.
0 Disable
1 Enable

IDInEN **Interrupt triggering control bits ($n = 0 \sim 7$)**
The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.
0 Rising edge trigger
1 Falling edge trigger