

PCIS-VEE
HP-VEE® Interfaces for
NuDAQ PCI-Bus Cards Windows-95/98/NT
User's Guide

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1

Installation

1.1 PCIS-VEE Installation

System Requirements

PCIS-VEE requires the following minimum configuration:

- An IBM PC/AT or compatible, running Windows 95/98 or Windows NT version 4.0 or later
- A hard disk with enough disk space to install PCIS-VEE
- A CD-ROM drive.
- Application development system: HP VEE 4.0 or later
- NuDAQ PCI-bus data acquisition cards that are supported by PCIS-VEE.

1.1.1 PCIS-VEE/NT Installation

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

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

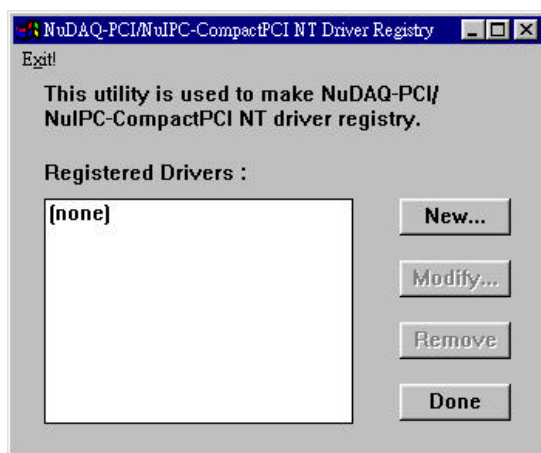
step 2. If autorun setup program is not invoked automatically, please execute **X:\Setup.exe**. (X indicates the CD ROM drive)

step 3. Select Software **Package**→**PCIS-VEE**→**Win NT** to setup PCIS-VEE/NT software.

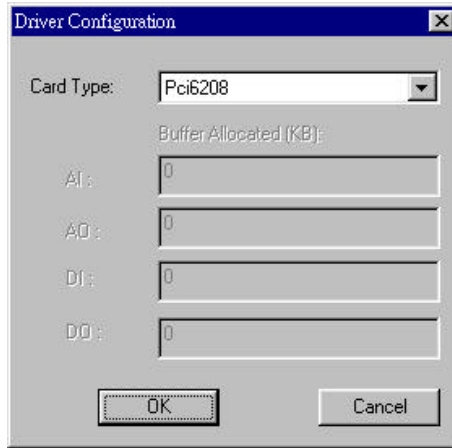
When Setup displays a User Information dialog box, please fill items in the dialog box. You have to fill the right serial number to get the valid license. Otherwise it is in 120 minutes demo mode.

When the software component installation process is completed, Setup will launch the *PCI NT Driver Registry* utility for you to make the registry of the devices drivers you need.

The *PCI NT Driver Registry* utility first shows the following window. If any NuDAQ PCI card's NT driver has been registered, it will be shown on the *Registered Driver* list.



To register one of PCI card drivers, click “New...” button and a *Device Configuration* window appears.



From this window you can select the driver you want to register. The AI, AO, DI and DO fields are used to set the sizes of driver internal buffer for continuous analog input, analog output, digital input, and digital output respectively. Its unit is Kbytes. Device driver will try to allocate these sizes of memory at system startup time. If system is not able to provide the memory as size specified, the device driver will not get started. Only the fields that are available for this card type are enabled, the others are grayed. The size of initially allocated memory is the maximum memory size that continuous AI/AO/DI/DO can be performed. It will induce an unexpected result in that continuous operation performed exceeds the initially allocated size.

After you register/configure the drivers you need, then you can select Exit! Command in the menu bar to exit the *PCI NT Driver Registry* utility. To make the registered drivers work, you have to restart Windows NT system.

When the installation process is completed, the PCIS-VEE/NT directory should contain the following files and sub-directories:

File/Sub-directory	Description
UserObj	PCIS-VEE/NT user objects
Samples <DIR>	Sample programs
Util <DIR>	PCI NT Driver Registry utility
Manual <DIR>	PDF manual files
Help <DIR>	On-line help file

The driver files are copied to Windows NT System Drivers directory (default is C:\Winnt\System32\Drivers). Driver files includes ADLDASK.SYS, PCI6208.SYS, PCI7200.SYS, PCI7230.SYS, PCI7234, PCI7250.SYS, PCI7248.SYS, PCI7296.SYS, PCI7300B.SYS, PCI7432.SYS, PCI7433.SYS, PCI7434.SYS, PCI9111.SYS, PCI9112.SYS, PCI9113.SYS, PCI9114.SYS, PCI9118.SYS, and PCI9812.SYS.

Note: If the card's own NT driver (not PCIS-VEE/NT version, the old driver accompanied with NuDAQ PCI-bus cards, such as 7200.sys, 9112.sys) has already existed in Windows NT System Drivers directory (c:\Winnt\System32\Drivers) before you install PCIS-VEE/NT , you have to remove this driver and then install PCIS-VEE/NT according to the steps mentioned above; otherwise the system will down.

1.1.2 PCIS-VEE/95/98 Installation

The Setup program provided by PCIS-VEE/95/98 performs all necessary tasks for installing the software.

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

step 2. If autorun setup program is not invoked automatically, please execute **X:\Setup.exe**. (X indicates the CD ROM drive)

step 3. Select Software **Package**→**PCIS-VEE**→**Win 95/98** to setup PCIS-VEE/95/98 software.

When the installation process is completed, the PCIS-VEE/95/98 directory should contain the following files and sub-directories:

File/Sub-directory	Description
Manual <DIR>	PDF manual files
Help <DIR>	On-line help file
7230 <DIR>	User objects and sample programs for each card
7248 <DIR>	
7250 <DIR>	
...	

1.2 PCIS-VEE Un-installation

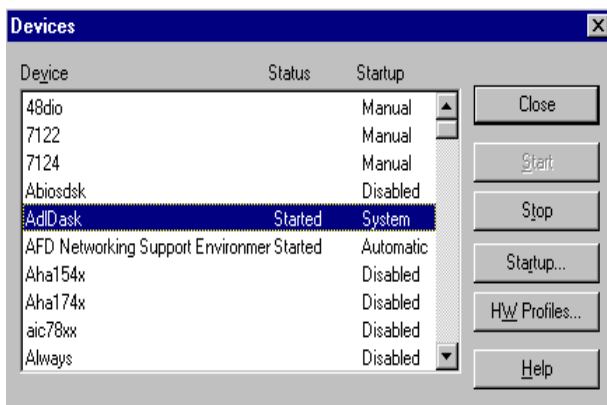
PCIS-VEE software has the capability of automatic un-installation.

To un-install PCIS-VEE, open the “Control Panel”, double-click “Add/Remove Programs”, select “PCIS-VEE/NT” or “PCIS-VEE/95” to un-install it.

NT Device Driver Handling

Driver Status

After finishing the installation and re-entering Windows NT, make sure the PCI device drivers are already started. For PCIS-VEE/NT to be able to communicate with NuDAQ PCI-bus card, device driver AdlDask as well as the card's own device driver (e.g. PCI6208, PCI7200, PCI7230, PCI7234, PCI7250, PCI7248, PCI7296, PCI7300A_RevB, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI9113, PCI9114, PCI9118, or PCI9812) must be started. You can open the "Control Panel", double-click "Devices", and a Devices window will be shown as below.

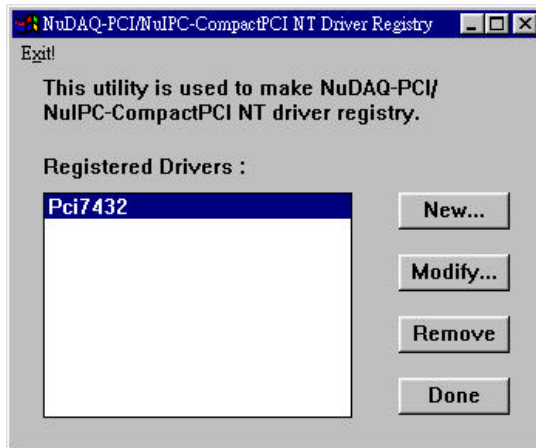


If the device status is none, you have to select the AdIDask, PCI6208, PCI7200, PCI7230, PCI7234, PCI7250, PCI7248, PCI7296, PCI7300A_RevB, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI9113, PCI9114, PCI9118, or PCI9812 device and press the “Start” button.

Note: The AdIDask driver must have been started as you press Start button to start the card’s own device driver.

Driver Utility

PCIS-VEE/NT provides a utility, *PCI NT Driver Registry* utility. This utility is used for users to register new PCI drivers, remove installed drivers and modify AI/AO/DI/DO continuous buffer of installed drivers. The *PCI NT Driver Registry* utility main window is as the following figure:



The *PCI NT Driver Registry* utility is installed with PCIS-VEE/NT setup program and located in <InstallDir>\Util directory. Using this utility to install a new driver or setting the size of continuous buffer, please refer to section 1.1.1.

PCIS-VEE/NT Overview

This chapter briefly describes each user object in PCIS-VEE/NT. For the detailed description of each user object, please refer to PCIS-VEE/NT on-line help or the PDF manual files in <Install Dir>\Manual directory.

PCIS-VEE/NT functions are grouped to the following classes:

General Configuration Function Group

- Register card function
- Release card function

Analog Input Function Group

- Analog Input Configuration functions
- One-Shot Analog Input functions
- Continuous Analog Input functions

Analog Output Function Group

- Analog output Configuration Functions
- One-Shot Analog Output Functions

Digital Input Function Group

- Digital Input Configuration functions
- One-Shot Digital Input functions
- Continuous Digital Input functions

- Asynchronous Digital Input Monitoring functions

Digital Output Function Group

- Digital Output Configuration functions
- One-Shot Digital Output functions
- Continuous Digital Output functions

DIO Function Group

- Digital Input/Output Configuration function

3.1 General Configuration Function Group

Use these functions to initialize and configure data acquisition card.

Register_Card Initializes the hardware and software states of an NuDAQ PCI-bus data acquisition card. Register_Card must be called before any other VEE library functions called for that card.

Release_Card Tells VEE library that this registered card is not used currently and can be released. This would release resources for new card to register.

GetSample This function use 16-bit as a item to divide the buffer, then get a 16 bit unsigned integer of the index *i* in the *buffer* (a memory block).

3.2 Analog Input Function Group

Analog Input Configuration Functions

AI_9111_Config Informs PCIS-VEE library of the trigger source and trigger mode selected for the analog input operation of PCI9111. You must call this function before calling function to perform continuous analog input operation of PCI9111.

AI_9112_Config Informs PCIS-VEE library of the trigger source selected for the analog input operation of PCI9112. You must call this function before calling function to perform continuous analog input operation of PCI9112.

AI_9113_Config Informs PCIS-VEE library of the trigger source selected for the analog input operation of PCI9113. You must call this function before calling function to perform continuous analog input operation of PCI9113.

AI_9114_Config Informs PCIS-VEE library of the trigger source selected for the analog input operation of PCI9114. You must call this function before calling function to perform continuous analog input operation of PCI9114.

AI_9118_Config Informs PCIS-VEE library of the trigger source, trigger mode, input mode, and conversion mode selected for the analog input operation of PCI9118. You must call this function before calling function to perform continuous analog input operation of PCI9118.

AI_9812_Config Informs PCIS-VEE library of the trigger source, trigger mode, and trigger properties selected for the analog input operation of PCI9812. You must call this function before calling function to perform continuous analog input operation of PCI9812.

One-Shot Analog Input Functions

AI_ReadChannel Performs a software triggered A/D conversion (analog input) on an analog input channel and returns the value converted.

Continuous Analog Input Functions

AI_ContReadChannel This function performs continuous A/D conversions on the specified analog input channel at a rate as close to the rate you specified.

AI_ContScanChannels This function performs continuous A/D conversions on the specified *continuous* analog input channels at a rate as close to the rate you specified. This function is only available for those cards that support auto-scan functionality.

3.3 Analog Output Function Group

Analog output Configuration Functions

AO_6208A_Config Informs PCIS-VEE library of the current range selected for the analog output operation of PCI6208A. You must call this function before calling function to perform current output operation.

One-Shot Analog Output Functions

AO_WriteChannel Writes a binary value to the specified analog output channel.

3.4 Digital Input Function Group

Digital Input Configuration Functions

DI_7200_Config Informs PCIS-VEE library of the trigger source and trigger properties selected for the digital input operation of PCI7200. You must call this function before calling function to perform continuous digital input operation of PCI7200.

DI_7300B_Config Informs PCIS-VEE library of the trigger source and trigger properties selected for the digital input operation of PCI-7300A Rev.B board. You must call this function before calling function to perform continuous digital input operation of PCI7300A.

One-Shot Digital Input Functions

DI_ReadPort Reads digital data from the specified digital input port.

Continuous Digital Input Functions

DI_ContReadPort This function performs continuous digital input on the specified digital input port at a rate as close to the rate you specified.

3.5 Digital Output Function Group

Digital Output Configuration Functions

DO_7200_Config Informs PCIS-VEE library of the trigger source and trigger properties selected for the digital input operation of PCI7200. You must call this function before calling function to perform continuous digital output operation of PCI7200.

DO_7300B_Config Informs PCIS-VEE library of the trigger source and trigger properties selected for the digital input operation of PCI-7300A Rev.B board. You must call this function before calling function to perform continuous digital output operation of PCI7300A.

One-Shot Digital Output Functions

DO_WritePort Writes digital data to the specified digital output port.

Continuous Digital Output Functions

DO_ContWritePort This function performs continuous digital output on the specified digital output port at a rate as close to the rate you specified

3.6 DIO Function Group

Digital Input/Output Configuration Functions

DIO_PortConfig This function is only used by the Digital I/O cards whose I/O port can be set as input port or output port. This function informs PCIS-VEE library of the port direction selected for the digital input/output operation. You must call this function before calling functions to perform digital input/output operation.

3.7 PCIS-VEE/NT Sample Programs

There are several sample programs provided in this software. They could help you to program your own applications by using PCIS-VEE/NT easily. These sample programs are placed in the installation directory. User can find it in Samples subdirectory.

In these sample programs, the reference DLL and its header files are referred to by relative directory. So if user uses the Windows Explorer in Windows NT to directly open the PCIS-VEE/NT sample programs, then the reference directory is correct. If user first open the VEE system, then open the sample programs, you have to change the reference directory of the DLL and header file (these reference files are located in the UserObject sub-directory). If you did not change the directory, error will occur while running the sample program.



PCIS-VEE/95 Overview

This chapter briefly describes each user object in PCIS-VEE/95. For the detailed description of each user object, please refer to PCIS-VEE/95 on-line help or the PDF manual files in <Install Dir>\Manual directory.

4.1 6208/16 User Objects

6208 Initial	Initialize PCI-6208/6216 card.
6208 Digital to Analog	Write data to D/A converters.
6208 Digital Input	Read data from digital input ports.
6208 Digital Output	Write data to digital output ports.

4.2 7230 User Objects

7230 Initial	Initialize PCI-7230 cards.
7230 Digital Input	Read 16-bit digital input data from digital input port.
7230 Digital Output	Write data to digital output ports.

4.3 7248 User Objects

7248 Initial	Initialize PCI-7248 card.
7248 Config Channel	Configure the input or output of each channel.
7248 Config Port	Configure the input or output of each port.
7248 Digital Input	Read 8-bit digital input data from digital input port.
7248 Digital Output	Write data to digital output ports.
7248 Timer Read	Read the current contents of the counter #0.
7248 Timer Start	Configure the counter #0 to operate in the specified mode.
7248 Timer Stop	Stop the event counting operation.

4.4 7250 User Objects

7250 Initial	Initialize PCI-7250 card.
7250 DI	Read digital input data from digital input port.
7250 DO	Write data to digital output port which can energized RELAY ON/OFF.
7250 DO Read back	Read-back data from digital output port.

4.5 7296 User Objects

7296 Initial	Initialize PCI-7296 card.
7296 Config Channel	Configure the input or output of each channel.
7296 Config Port	Configure the input or output of each port.
7296 Digital Input	Read 8-bit digital input data from digital input port.
7296 Digital Output	Write data to digital output port.
7296 Timer Read	Read the current contents of the counter #0.
7296 Timer Start	Configure the counter #0 to operate in the specified mode.
7296 Timer Stop	Stop the event counting operation.

4.6 7432 User Objects

7432 Initial	Initialize PCI-7432 card.
7432 DI	Read 32-bit digital input data from digital input port.
7432 DO	Write data to digital output ports.

4.7 7433 User Objects

7433 Initial	Initialize PCI-7433 card.
7433 DI (High Dword)	Read 32-bit digital input data from digital input port.
7433 DI (Low Dword)	Read 32-bit digital input data from digital input port.

4.8 7434 User Objects

7434 Initial	Initialize PCI-7434 card.
7434 DO (High Dword)	Write data to high 32 bits of the 64 isolated digital outputs.
7434 DO (Low Dword)	Write data to low 32 bits of the 64 isolated digital outputs.

4.9 9111 User Objects

9111 Initial	Initialize PCI-9111 card.
9111 AD Set Channel	Set A/D channel.
9111 AD Set Mode	Set A/D trigger and channel scan mode.
9111 AD Set Range	Set the A/D range.
9111 DA	Write data to D/A converters.
9111 DI Channel	Read data from digital input line.
9111 DI	Read data from digital input port.
9111 DO Channel	Write data to digital output port.
9111 DO	Write data to digital output port.
9111 AD FIFO INT Start	Initialize and start up A/D FIFO Half Full Interrupt Transfer.
9111 AD FFHF INT Repeat	Perform continuous A/D FIFO Half Full interrupt transfer.
9111 Reset FIFO	Reset A/D FIFO.
9111 DG AD Acquire	Trigger the A/D conversion data for PCI-9111DG by software trigger. It reads the 12-bit A/D data when the data is ready.
9111HR AD Acquire	Trigger the A/D conversion data for PCI-9111HR by software trigger. It reads the 16-bit A/D data when the data is ready.
9111 AD INT Start	Perform the AD EOC (end-of-conversion) interrupt transfer.
9111 AD INT Stop	Stop the interrupt data transfer function.

4.10 9112 User Objects

9112 Initial	Initialize PCI-9112 card.
9112 AD Acquire	Software trigger the A/D conversion, then poll the A/D conversion data.
9112 AD Set Autoscan	Set automatic hardware channel scan to be enable or disable.
9112 AD Set Channel	Set A/D channel.
9112 AD Set Mode	Set the A/D trigger and data transfer mode.
9112 AD Set Range	Set the A/D range.
9112 Alloc DMA Mem	Contact Windows 95 system to allocate a block of contiguous memory for DMA transfer.
9112 DA	Write data to D/A converters.
9112 DMA Cont AD	Perform A/D conversion N times with DMA data transfer by using the pacer trigger (internal timer trigger).
9112 Free DMA Mem	Deallocate a system DMA memory.
9112 Get Sample	Retrieve the index-th data in DMA buffer.
9112 INT Cont AD	Perform A/D conversion N times with interrupt data transfer by using the pacer trigger (internal timer trigger).
9112 DI Channel	Read data from digital input port.
9112 DI	Read data from digital input port. There are 16 digital input lines on PCI-9112. All of the 16 digital input lines can be accessed by this object directly.
9112 Timer Read	Read the count value of the Tomer#0.
9112 Timer Start	Program the Timer #0.
9112 Timer Stop	Stop the timer #0 operation.
9112 DO	Write data to digital output port.
9112 AD DMA Start	Perform A/D conversion N times with DMA data transfer by using the pacer trigger (internal timer trigger).
9112 AD DMA Status	Check the status of 9112 AD DMA Start operation.
9112 AD DMA Stop	Stop the DMA data transfer.
9112 AD INT Start	Perform A/D conversion N times with interrupt data transfer by using pacer trigger.
9112 AD INT Status	Check the status of interrupt transfer operation.
9112 AD INT Stop	Stop the interrupt data transfer operation.

4.11 9113 User Objects

9113 Initial	Initialize PCI-9113 card.
9113 AD Acquire	Trigger the A/D conversion data for PCI-9113 by software trigger. Then read the 12-bit A/D data when the data is ready.
9113 AD Acquire MUX	Trigger the A/D conversion data for PCI-9113 by software trigger. Then read the 32-bit A/D data when the data is ready
9113 AD FFHF INT Repeat	Perform continuous A/D FIFO Half Full interrupt transfer.
9113 AD FFHF INT Start	Initial and start up the interrupt transfer by using AD FIFO Half-Full Interrupt transfer mode by using internal pacer trigger.
9113 AD Set Channel	Set A/D channel.
9113 AD Set Mode	Set A/D trigger mode..
9113 AD Set Range	Set A/D range.
9113 Counter Read	Read the count value of the counter#0.
9113 Counter Start	Program the counter #0.
9113 Counter Stop	Stop the timer/counter operation of the counter #0.
9113 Reset FIFO	Reset A/D FIFO.
9113 AD INT Start	Perform the A/D EOC (end-of-conversion) interrupt transfer by using internal pacer trigger.
9113 AD INT Stop	Stop the interrupt data transfer function.

4.12 9114 User Objects

9114 Initial	Initialize PCI-9114 card.
9114 AD Acquire	Trigger the A/D conversion data for PCI-9114 by software trigger. Then read the 16-bit A/D data when the data is ready.
9114 AD Acquire MUX	Trigger the A/D conversion data for PCI-9114 by software trigger. Then read the 32-bit A/D data when the data is ready.
9114 AD FFHF INT Repeat	This object is used to perform continuous A/D FIFO Half Full interrupt transfer.
9114 AD FFHF INT Start	Initializes and starts up the interrupt transfer with AD FIFO Half-Full Interrupt transfer mode by using internal pacer trigger.
9114 AD Set Channel	Set A/D channel.
9114 AD Set Mode	Set A/D trigger and channel scan mode.
9114 AD Set Range	Set A/D range
9114 Counter Read	Read the count value of the counter#0.
9114 Counter Start	Program the counter #0.
9114 Counter Stop	Stop the timer/counter operation of the counter #0.
9114 DI	Read data from digital input ports.
9114 DO	Write data to digital output port.
9114 Reset FIFO	Reset A/D FIFO.
9114 AD INT Start	Perform the A/D EOC (end-of-conversion) interrupt transfer by using internal pacer trigger.
9114 AD INT Stop	Stop the interrupt data transfer function.

4.13 9812/10 User Objects

9812 Initial	Initialize PCI-9812/10 card.
9812 Alloc DMA Mem	Contact Windows 95 system to allocate a block of contiguous memory for DMA transfer.
9812 DMA Cont AD	Perform A/D conversion N times with DMA data transfer.
9812 Free DMA Mem	Deallocate a system DMA memory.
9812 Set Clock Rate	Specify the clock divider for ADC clock.
9812 Get Sample	Retrieve the index-th data in DMA buffer.
9812 Set Clock Source	Specify the ADC clock source.
9812 Set Trigger	Set up a trigger, including the trigger mode, trigger level (voltage), trigger source, trigger slope and post trigger count.
9812 Close	Close a previously initialized 9812 card.
9812 AD DMA Start	Start a task of A/D conversion N times with DMA data transfer by using the pacer trigger (internal timer trigger).
9812 AD DMA Status	Check the status of the DMA transfer operation.
9812 AD DMA Stop	Stop the DMA data transfer.

4.14 PCIS-VEE/95 Sample Programs

There are several sample programs provided in this software. They could help you to program your own applications by using PCIS-VEE/95 easily. The brief descriptions of these programs are specified as follows :

- 6208 Samples : The introduction about use PCIS-VEE/95 with PCI- 6208,
- 7230 Samples : The introduction about use PCIS-VEE/95 with PCI- 7230,
- 7248 Samples : The introduction about use PCIS-VEE/95 with PCI- 7248,
- 7250 Samples : The introduction about use PCIS-VEE/95 with PCI- 7250,
- 7296 Samples : The introduction about use PCIS-VEE/95 with PCI- 7296,
- 7432 Samples : The introduction about use PCIS-VEE/95 with PCI- 7432,
- 7433 Samples : The introduction about use PCIS-VEE/95 with PCI- 7433,
- 7434 Samples : The introduction about use PCIS-VEE/95 with PCI- 7434,
- 9111 Samples : The introduction about use PCIS-VEE/95 with PCI- 9111,
- 9112 Samples : The introduction about use PCIS-VEE/95 with PCI- 9112,
- 9113 Samples : The introduction about use PCIS-VEE/95 with PCI- 9113,
- 9114 Samples : The introduction about use PCIS-VEE/95 with PCI- 9114,

9812 Samples : The introduction about use PCIS-VEE/95 with
PCI- 9812,

In these sample programs, the reference DLL and its header files are referred to by relative directory. So if user uses the Windows Explorer in Windows/95/98 to directly open the PCIS-VEE/95/98 sample programs, then the reference directory is correct. If user first open the VEE system, then open the sample programs, you have to change the reference directory of the DLL and header file (these reference files are located in each cards subdirectory). If you did not change the directory, error will occur while running the sample programs.

Appendix A Support Hardware

A.PCIS-VEE/95

PCI-6208A/6208V/6216V	PCI-7432	PCI-9113
PCI-7230	PCI-7433	PCI-9114DG/HR
PCI-7248	PCI-7434	PCI-9812/10
PCI-7250/51	PCI-9111DG/HR	
PCI-7296	PCI-9112	

B.PCIS-VEE/NT

PCI-6208A/6208V/6216V	PCI-7296	PCI-9112
PCI-7200	PCI-7300	PCI-9113
PCI-7230	PCI-7432	PCI-9114DG/HR
PCI-7234	PCI-7433	PCI-9118DG/HG/HR
PCI-7248	PCI-7434	PCI-9812/10
PCI-7250/51	PCI-9111DG/HR	