PCIS-VEE

HP VEE® Interfaces of

NuDAQ PCI Cards for Windows 95/98/2000/NT/XP

Manual Rev. 3.21: August 14, 2002

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Contents

How to Use This Manual

This manual is designed to help you install the PCIS-VEE, the HP VEE driver for NuDAQ PCI-bus data acquisition cards. For the detail description of PCIS-VEE functions, please refer to PCIS-VEE on-line help or PDF file format Function Reference. This manual is organized as follows:

- Chapter 1, "Device Driver Handling in Windows NT/2000/98/XP" describes how to configure the NuDAQ PCI cards NT/2000/98 device driver.
- Chapter 2, "PCIS-VEE NT/2000/98/XP Utilities" describes the utilities included in PCIS-VEE NT, Win2000/XP, or Win98 version.
- Chapter 3, "PCIS-VEE NT/2000/98/XP Overview" briefly describes each function in PCIS-VEE NT, Win2000/XP, and Win98 versions.
- Chapter 4, "PCIS-VEE/95 Overview" briefly describes each function in PCIS-VEE/95.

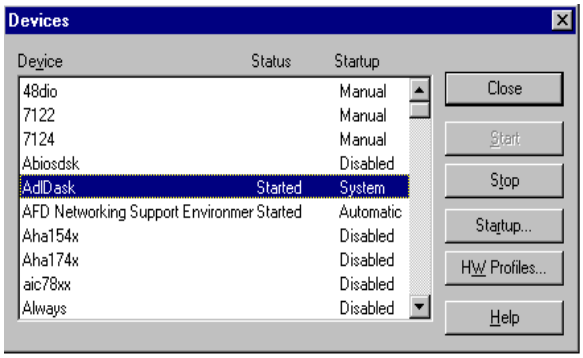
1

Device Driver Handling in Windows NT/2000/98/XP

1.1 NT 4.0 Device Driver

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, PCI6308, PCI7200, PCI7230, PCI7233, PCI7234, PCI7250, cPCI7252, PCI7248, cPCI7249, PCI7296, PCI7300, PCI7396, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI9113, PCI9114, PCI9118, or PCI9812, etc.) 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, PCI6208, PCI6308, PCI7200, PCI7230, PCI7233, PCI7234, PCI7250, cPCI7252, PCI7248, cPCI7249, PCI7296, PCI7300, PCI7396, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI9113, PCI9114, PCI9118, or PCI9812 device and press the “Start” button.

Note: The AdlDask 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 Configuration utility (*PciUtil*). This utility is used to register new PCI drivers, remove installed drivers and modify AI/AO/DI/DO continuous buffer of installed drivers. The allocated buffer sizes of AI, AO, DI, DO represent the sizes of contiguous Initially Allocated memory for continuous analog input, analog output, digital input, digital output respectively. Its unit is page *KB*, i.e. 1024 bytes. Device driver will try to allocate these sizes of memory at system startup time. If this size of memory is not able to get, driver will allocate as much memory as system can provide. The size of initially allocated memory is the maximum memory sizes that DMA or Interrupt transfer can be performed. It will induce an unexpected result in that DMA or Interrupt transfer performed exceeds the initially allocated size.

The PCI Configuration utility is installed with PCIS-VEE/NT setup program and located in <InstallDir>\Util directory.

Using this utility to install a new driver or set the size of continuous buffer, please refer to the section “NuDAQ PCI Configuration Utility” in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide*.

1.2 Win2000/XP or Win98 Device Driver

Once Windows 98/2000/XP has started, the Plug and Play function of Windows 98/2000/XP system will find the new NuDAQ/NuIPC cards. If this is the first time to install NuDAQ/NuIPC cards in your Windows 98/2000/XP system, you will be informed to install the device driver. Please follow the procedures described in the section “Device Installation in Windows 2000/XP” or “Device Installation in Windows 98” in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide* to install the device.

Driver Utility

PCIS-VEE provides a PCI Configuration Utility (*PciUtil*). This utility is used to ***set/change*** the allocated buffer sizes of AI, AO, DI and DO. The allocated buffer sizes of AI, AO, DI, DO represent the sizes of contiguous Initially Allocated memory for continuous analog input, analog output, digital input, digital output respectively. Its unit is page *KB*, i.e. 1024 bytes. Device driver will try to allocate these sizes of memory at system startup time. If this size of memory is not able to get, driver will allocate as much memory as system can provide. The size of initially allocated memory is the maximum memory size that DMA or Interrupt transfer can be performed. It will induce an unexpected result in that DMA or Interrupt transfer performed exceeds the initially allocated size.

The *PciUtil* is installed with PCIS-VEE, and located in <InstallDir>\Util directory.

Using *PciUtil* to ***set/change*** the buffer size, please refer to the section “NuDAQ PCI Configuration Utility” in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide*.

2

PCIS-VEE NT/2000/98/XP Utilities

2.1 NuDAQ Registry/Configuration utility (PciUtil)

PciUtil is used to ***register*** NuDAQ PCI card drivers (Windows NT4 only), ***remove*** installed drivers (Windows NT4 only), and ***modify*** the allocated buffer sizes of AI, AO, DI and DO. The default location of this utility is <InstallDir>\Util directory. Because it has been mentioned in the previous chapter, we will not introduce it here. Please refer to the section "NuDAQ PCI Configuration Utility" in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide*.

3

PCIS-VEE NT/2000/98/XP Overview

This chapter briefly describes each function in PCIS-VEE. The interfaces of functions in these three versions are the same. Therefore all applications developed with PCIS-VEE are compatible across Windows 98, Windows NT, and Windows 2000/XP.

You can find the detailed description of each function by the following ways:

1. Through PCIS-VEE on-line help
2. PDF manual files in <Install Dir>\Manual directory.

PCIS-VEE functions are grouped to the following classes:

General Configuration Function Group

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

Timer/Counter Function Group

- Read/write counter/timer functions
- PCI-8554 Configuration functions

3.1 General Configuration Function Group

Use these functions to initializes and configures data acquisition card.

Register_Card: Initializes the hardware and software states of a NuDAQ PCI-bus data acquisition card. Register Card must be called before any other PCIS-VEE/NT function can be called for that card.

Release_Card: Tells PCIS-VEE/NT driver that this card is not used currently and can be released. This would make room for new card to initialize.

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/NT of the trigger source and trigger mode selected for the analog input operation of PCI9111.

AI_9112_Config: Informs PCIS-VEE/NT of the trigger source selected for the analog input operation of PCI9112.

AI_9113_Config: Informs PCIS-VEE/NT of the trigger source selected for the analog input operation of PCI9113.

AI_9114_Config: Informs PCIS-VEE/NT of the trigger source selected for the analog input operation of PCI9114.

AI_9118_Config: Informs PCIS-VEE/NT of the trigger source, trigger mode, input mode, and conversion mode selected for the analog input operation of PCI9118.

AI_9812_Config: Informs PCIS-VEE/NT of the trigger source, trigger mode, and trigger properties selected for the analog input operation of PCI9812/10.

One-Shot Analog Input functions

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

AI_VRead_Channel: Performs a software triggered A/D conversion (analog input) on an analog input channel and returns the value scaled to a voltage in units of volts.

AI_VScale: Converts the result from an AI_ReadChannel call to the actual input voltage.

Continuous Analog Input functions

AI_Cont_Read_Channel: Starts continuous A/D conversions on the specified analog input channel.

AI_Cont_Scan_Channels: Starts continuous A/D conversions on the specified *continuous* analog input channels.

3.3 Analog Output Function Group

Analog output Configuration functions

AO_6208A_Config: Informs PCIS-VEE/NT of the current range selected for the analog output operation of PCI-6208A.

AO_6308A_Config: Informs PCIS-DASK library of the current range selected for the analog output operation of PCI6308A. You must call this function before calling function to perform current output operation.

AO_6308V_Config: Informs PCIS-DASK library of the polarity (unipolar or bipolar) that the output channel is configured for the analog output and the reference voltage value selected for the analog output channel(s) of PCI6308V. You must call this function before calling function to perform current output operation.

AO_9111_Config: Informs PCIS-VEE/NT library of the polarity (unipolar or bipolar) that the output channel is configured for the analog output of PCI-9111. You must call this function before calling function to perform voltage output operation.

AO_9112_Config: Informs PCIS-VEE/NT library of the reference voltage source (internal or external) and the reference voltage value selected for the analog output channel(s) of PCI-9112. You must call this function before calling function to perform voltage output operation.

One-Shot Analog Output Functions

AO_Write_Channel: Writes a binary value to the specified analog output channel.

AO_Vwrite_Channel: Accepts a voltage value, scales it to the proper binary value and writes a binary value to the specified analog output channel.

AO_VScale: Scales a voltage to a binary value.

3.4 Digital Input Function Group

Digital Input Configuration functions

DI_7200_Config: Informs PCIS-VEE/NT of the trigger source and trigger properties selected for the digital input operation of PCI7200.

DI_7300B_Config: Informs PCIS-VEE/NT of the trigger source and trigger properties selected for the digital input operation of PCI-7300A Rev.B board.

One-Shot Digital Input functions

DI_Read_Line: Reads the digital logic state of the specified digital line in the specified port.

DI_Read_Port: Reads digital data from the specified digital input port.

Continuous Digital Input functions

DI_Cont_Read_Port: Starts continuous digital input on the specified digital input port.

3.5 Digital Output Function Group

Digital Output Configuration functions

DO_7200_Config: Informs PCIS-VEE/NT of the trigger source and trigger properties selected for the digital input operation of PCI7200.

DO_7300B_Config: Informs PCIS-VEE/NT of the trigger source and trigger properties selected for the digital input operation of PCI-7300A Rev.B board.

One-Shot Digital Output functions

DO_Write_Line: Sets the specified digital output line in the specified digital port to the specified state.

DO_Write_Port: Writes digital data to the specified digital output port.

DO_Read_Line: Read the digital logic state of the specified digital output line in the specified port.

DO_Read_Port: Read back the output digital data from the specified digital output port.

Continuous Digital Output functions

DO_Cont_Write_Port: Starts continuous digital output on the specified digital output port.

3.6 DIO Function Group

DIO_Port_Config: Informs PCIS-VEE/NT of the port direction selected for the digital input/output operation.

3.7 Timer/Counter Function Group

CTR_Read: Reads the current contents of the selected counter without disturbing the counting process.

CTR_Reset: Sets the output of the selected counter to the specified state.

CTR_Setup: Configures the selected counter to operate in the specified mode.

CTR_8554_ClkSrc_Config: Sets the counter clock source of PCI-8554.

CTR_8554_CK1_Config: Sets the source of CK1 of PCI-8554.

CTR_8554_Debounce_Config: Sets the debounce clock of PCI-8554.

4

PCIS-VEE/95 Overview

This chapter briefly describes each function in PCIS-VEE/95. You can find the detailed description of each function by the following ways:

1. Through PCIS-VEE/95 on-line help

2. 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 port
6208 Digital Output	Write data to digital output port

4.3 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 port.

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 Readback	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 HiDW	Read high 32-bit digital input data from digital input port.
7433 DI LowDW	Read low 32-bit digital input data from digital input port.

4.8 7434 User Objects

7434 Initial	Initialize PCI-7434 card.
7434 DO HiDW	Write data to high 32 bits of the 64 isolated digital outputs.
7434 DO LowDW	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 FFHF INT Start	Initial and start up the interrupt transfer by using AD FIFO Half-Full Interrupt transfer mode
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	Initial and start up the interrupt transfer by using End-of-conversion (EOC) Interrupt transfer mode
9111 AD INT Stop	Stop the EOC interrupt data transfer function
9111 AD FFHF INT Repeat	Perform continuous A/D FIFO Half Full interrupt transfer.

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 Allocate 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	De-allocate 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	Initial and start up the interrupt transfer by using End-of-conversion (EOC) Interrupt transfer mode by using internal pacer trigger
9113 AD INT Stop	Stop the EOC interrupt analog input operation

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	Initialize and start 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	Initialize and start up the interrupt transfer with End-of-conversion (EOC) Interrupt transfer mode by using internal pacer trigger
9114 AD INT Stop	Stop the EOC 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	Initialize and start up A/D conversion with DMA data transfer
9812 AD DMA Status	Check the status of DMA analog input operation
9812 AD DMA Stop	Stop the DMA analog input operation