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**RS-232/422/485 PCI-104 Module**

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# **User's Manual**

First Edition, July 2005



**SUNIX**

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**CE FC**

# **RS-232/422/485 PCI/104 Module**

## **User's Manual**

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### **Safety Information**

1. Keep this User's Manual for future reference.
2. Always read the safety information carefully.
3. Keep this equipment away from direct sunlight, or in humid or damp places.
4. Do not place this equipment in an unstable position, or on vibrating surface before setting it up.
5. Do not use or place this equipment near magnetic fields, televisions, or radios to avoid electronic interface that affects device performance.
6. Do not attempt to disassemble or repair the equipment or the warranty would be useless.
7. To avoid damaging your system and equipment, please make sure that your computer is off before you install the product.



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# 1.

## Introduction

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PCI-104 is a PCI-only architecture PCI 32-bit bus running 33MHz that accommodates the advances of high-speed PCI devices in a small rugged form factor for embedded applications. With the publication of the PCI-104 standard in 2003, this bus architecture was available on a small, rugged form factor which has since become an industry standard.

As technological requirements advanced, a need began to arise for a higher performance bus throughput. PCI-104 architecture provides a link to versatile hardware while meeting the high-speed requirements for present and future hardware.

PCI-104 adds additional modules using stack-through connectors. This has two advantages: it reduces the system size and it makes the system more rugged so that it can better withstand shocks and vibrations.

The following topics covered in this chapter:

- ◆ **Overview**
- ◆ **Package Checklist**
- ◆ **Product Features**
- ◆ **Product Specifications**

## Overview

Thanks for purchasing PCI-104 compatible RS-232 or RS-422/485 serial interface module that combines small size, industrial grade construction and reliability specifications, plus perform the functions most commonly need in embedded application.

This Multi-port PCI-104 serial module equips with 2 or 4 ports high speed RS-232 or RS-422/485 standard serial ports which accessed through DB-9 or DB-25 male connectors. Each serial port has built-in 32byte hardware FIFO, and provides data transfer speed up to 921Kb/Sec with industry standard 16C650 asynchronous communication chip.

Because PCI-104 modules use as smart stacking bus design, they avoid the costs and bulk associated with backplanes or card cage. Its work with PC/104 -plus CPU boards that accept the PCI-104 expansion interface, and comes with DB9 or DB25 connection cables are available as options to meet users' varied connection requirements.

## Package Checklist

Please check if the following items are present and in good condition upon opening your package. Contact your vendor if any item is damaged or missing.

### 1. Hardware:

Serial Communication Board:

Multi-port PCI-104 serial module x 1

Cable:

2 ports PCI-104 series: 2x5 IDC socket to DB9 or DB25 Male x 2

4 ports PCI-104 series: 2x5 IDC socket to DB9 or DB25 Male x 4

### 2. CD Driver

### 3. Quick Installation Guide

### 4. User's Manual (This document)

## Product Features

### ◆ RS-232

- 2 or 4 independent RS-232 serial ports
- Single chip SUN1889 (16C650 compatible) hardware flow control
- Each serial port has built-in 32 byte hardware FIFO and 128K byte FIFO under Windows 2000, XP, and 2003 operation system.
- Low repair rate with ASIC design
- Data transmission speeds up to 921.6Kbps
- Ideal for PCI-104 embedded systems
- Certified by Microsoft WHQL, CE, FCC approval
- Support DOS, Linux, Microsoft WinCE, 3.x, 95, 98, Me, NT, 2000, XP, and 2003
- Operation temperature: 0 to 60 & Storage Temperature: -20 to 85

### ◆ RS-422/485

- 2 or 4 independent RS-422/485 serial ports
- Single chip SUN1889 (16C650 compatible) hardware flow control
- Each serial port has built-in 32 byte hardware FIFO and 128K byte FIFO under Windows 2000, XP, and 2003 operation system.
- Automatic RS-485 RTS signal control technology
- Support Auto Detect and Switch RS-422 and RS-485
- RTS/CTS± Handshaking Communication mode for RS-422/485
- Data transmission speeds up to 921.6Kbps
- Built-in termination resistors to avoid cross-talking
- Ideal for PCI-104 embedded systems
- Certified by Microsoft WHQL, CE, FCC approval
- Support DOS, Linux, Microsoft WinCE.NET, 3.x, 95, 98, Me, NT, 2000, XP, and 2003
- Operation temperature: 0 to 60 & Storage Temperature: -20 to 85

#### **NOTE:**

You can get more core technologies detail in Appendix chapter.

## Product Specifications

### ◆ RS-232

#### ● Function

Type	PCI-104 RS-232 Module
Mode of Operation	Hand-Shaking
Bus Transceivers	RS-232 Full-Duplex
Drivers per Line	RS-232 1 Driver
Receivers per Line	RS-232 1 Receivers

#### ● Hardware

IC	SUN1889
Controller	16C650 compatible UART
Bus Interface	PCI-104
Number of Ports	2 or 4 ports
Connector	Box Header

#### ● Communication

Interrupt	INT A, B, C, D by jumper setting
I/O address	Assigned by BIOS
Clock	CLK 0, 1, 2, 3 by jumper setting
ID Select	ID 0, 1, 2, 3 by jumper setting
FIFO	32 byte hardware FIFO 128K byte FIFO under Windows 2000, XP, and 2003 OS
Baud rate	75bps ~ 921.6 Kbps
Data bit	5,6,7,8
Stop bit	1,1.5,2
Parity	even, odd, none, mark, space
Flow Control	None, Xon/Xoff, Hardware
Signal	TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND

#### ● Driver support

Driver Support	Microsoft Windows CE4.2/CE5.0/3.x/95/98SE/Me/NT/2000/XP/2003 DOS, Linux 2.0.x / 2.2.x / 2.4.x / 2.6.x
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#### ● Dimensions

Dimensions (W x D)	95.9 x 90.2 mm
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#### ● Regulatory Approvals

Regulatory Approvals	CE, FCC, Microsoft WHQL
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## RS-422/485

### ● Function

Type	PCI-104 RS-422/485 Module
Mode of Operation	Differential
Bus Transceivers	RS-422/485 Full-Duplex
Drivers per Line	RS-422 1 Driver & RS-485 10 Drivers
Receivers per Line	RS-422 10 Receivers & RS-485 32 Receivers

### ● Hardware

IC	SUN1889
Controller	16C650 compatible UART
Bus Interface	PCI-104
Number of Ports	2 or 4 ports
Connector	Box Header

### ● Communication

Interrupt	INT A, B, C, D by jumper setting
I/O address	Assigned by BIOS
Clock	CLK 0, 1, 2, 3 by jumper setting
ID Select	ID 0, 1, 2, 3 by jumper setting
FIFO	32 byte hardware FIFO 128K byte FIFO under Windows 2000, XP, and 2003 OS
RS-485 Control	This ARSC™ (Auto RTS Signal Control) technology
Select RS-422/485	Auto Switch RS-422/485 technology
Baud rate	75bps ~ 921.6 Kbps
Data bit	5,6,7,8
Stop bit	1,1.5,2
Parity	even, odd, none, mark, space
Flow Control	None, Xon/Xoff, Hardware
Signal	RS-422: TxD+/-, RxD+/-, RTS+/-, CTS+/-, GND RS-485: Data+/-, RxD+/-, RTS+/-, CTS+/-, GND

### ● Driver support

Driver Support	Microsoft Windows CE4.2/CE5.0/3.x/95/98SE/Me/NT/2000/XP/2003 DOS, Linux 2.0.x / 2.2.x / 2.4.x / 2.6.x
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### ● Dimensions

Dimensions (W x D)	95.9 x 90.2 mm
--------------------	----------------

### ● Regulatory Approvals

Regulatory Approvals	CE, FCC, Microsoft WHQL
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# 2.

## Hardware Installation

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This chapter includes information about hardware installation for PCI-104 module. The following topics are covered:

- ◆ **Hardware Installation**
- ◆ **Mechanical Drawings**
- ◆ **Jumper and Connectors**
- ◆ **Pin Assignments**

## Hardware Installation

The hardware installation of PCI-104 serial boards is easy to carry out. Before you insert the card into the PCI-104 interface, you must first configure ID Select, Clock, and Interrupt Vector settings. Follow the detailed steps given below to install the PCI-104 serial board in your computer.

**Step 1:** Configure ID Select, Clock, and Interrupt settings (see details below).



### Safety First

To avoid damaging your system and boards, make sure your PC's power is turned off before installing your PCI-104 module.

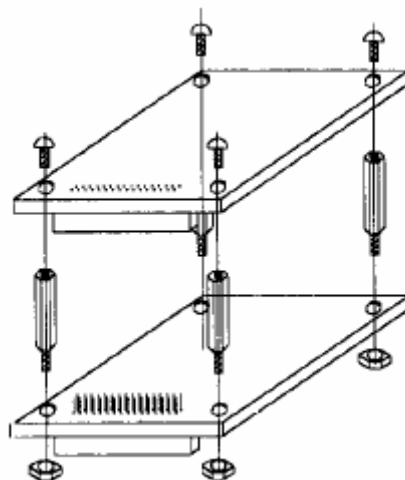
**Step 2:** Turn your PC's power off, and also shut off the power to any peripheral devices, and then remove the PC's cover.

**Step 3:** Insert the PCI-104 serial module into the PCI-104 or PC/104-plus interface slot.

**Step 4:** Fasten the holding screw to fix the serial board in place.

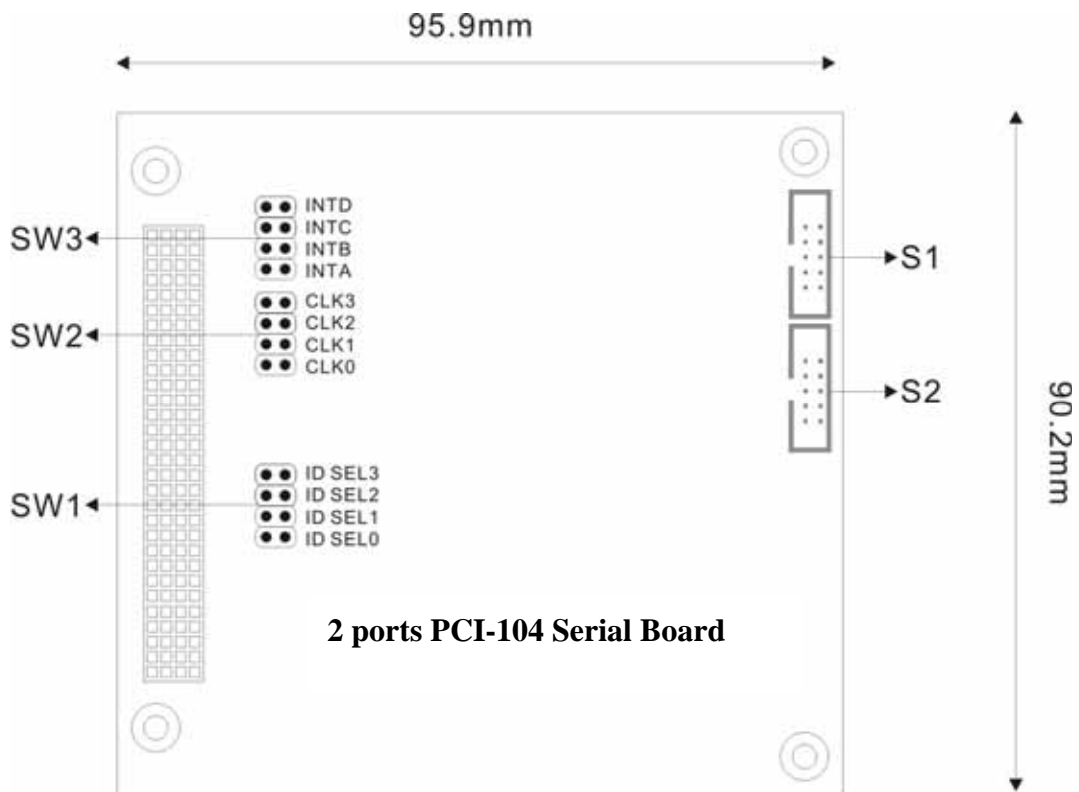
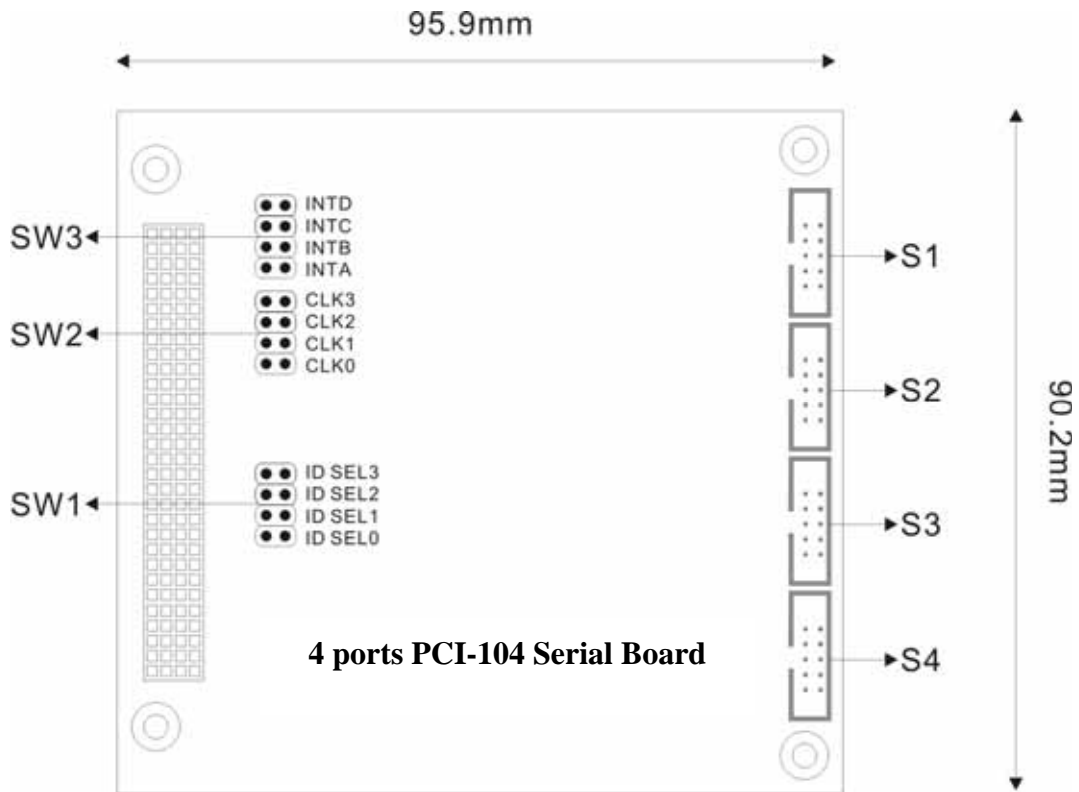
**Step 5:** Replace the PC's cover.

**Step 6:** Power on the PC.

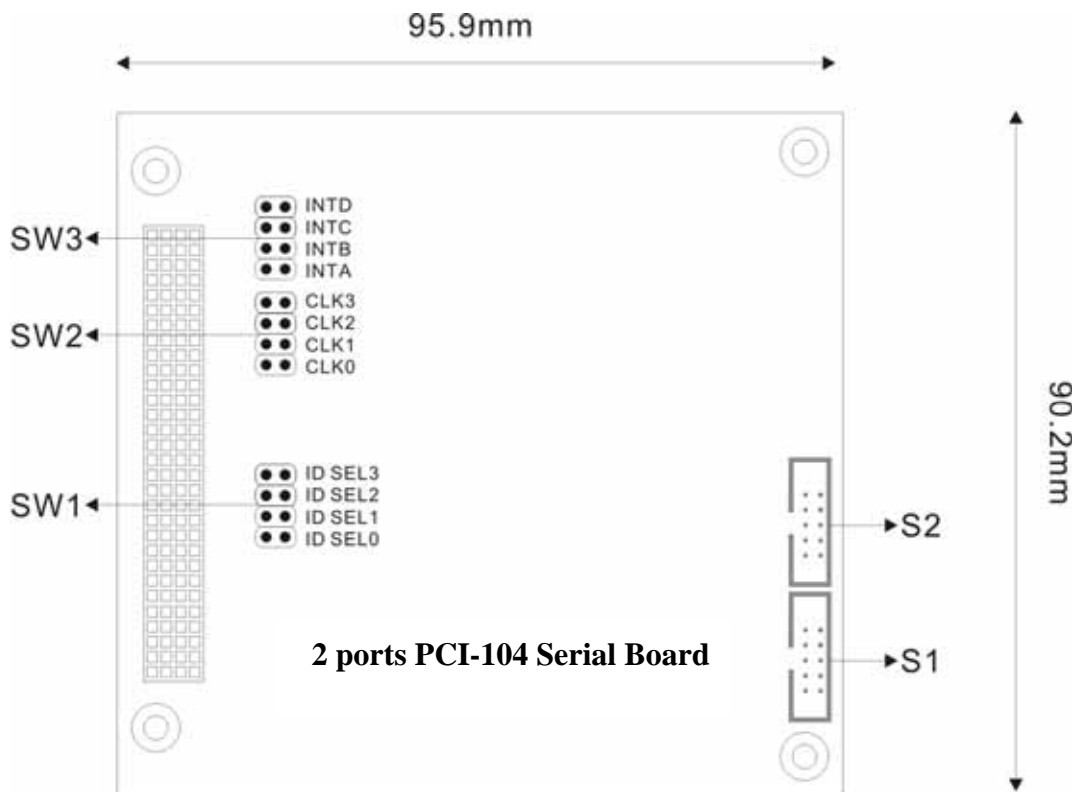
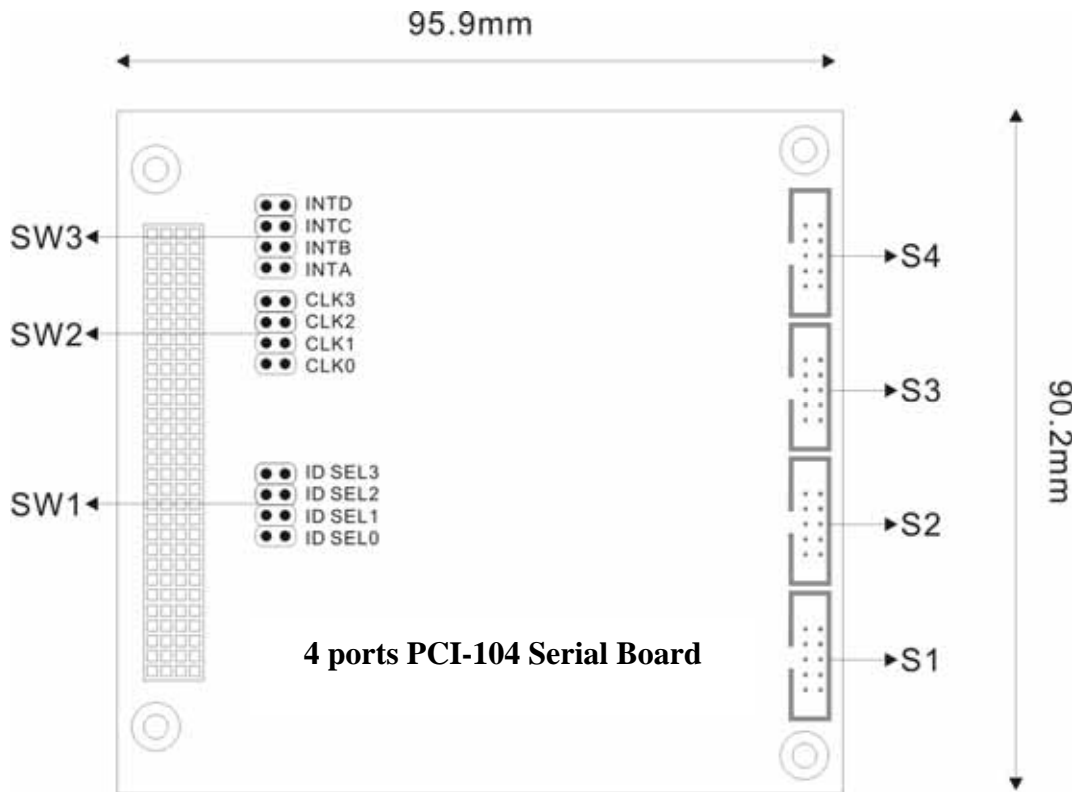


# Mechanical Drawings PCI-104 Serial Board

## ◆ RS-232



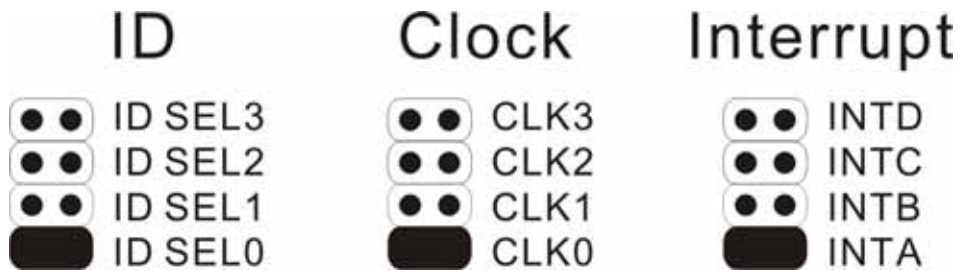
◆ RS-422/485



## Jumper and Connectors

PCI-104 serial board has a number of jumpers and connectors that allow you to configure your system to suit your application. The tables below list the function of each jumper and connector.

Connectors		Jumpers	
Label	Function	Label	Function
S1	RS-232 or RS-422/485 Port 1	SW1	PCI Interrupt Select
S2	RS-232 or RS-422/485 Port 2	SW2	PCI Clock Select
S3	RS-232 or RS-422/485 Port 3	SW3	PCI ID Select
S4	RS-232 or RS-422/485 Port 4		



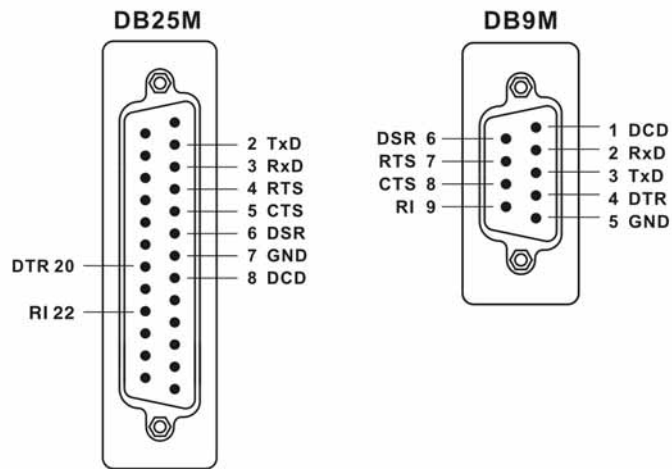
Since PCI-104 is a stack-through architecture, a means of selecting the appropriate signals for each expansion card must be established that will easily allow for the installation and configuration of add-in PC/104-Plus and PCI-104 modules. Table 1 shows the appropriate switch setting and signals used for each module in the stack.

Table1: Rotary Switch Settings

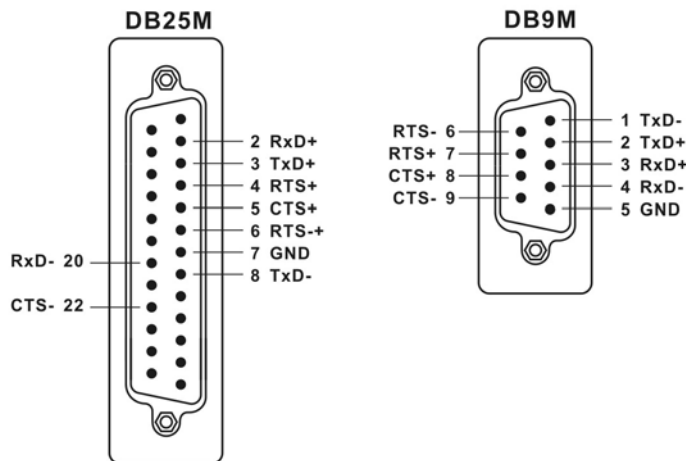
Module Slot	ID Select	Clock Select	Interrupt Select
1	IDSEL0	CLK0	INTA
2	IDSEL1	CLK1	INTB
3	IDSEL2	CLK2	INTC
4	IDSEL3	CLK3	INTD

# Pin Assignment

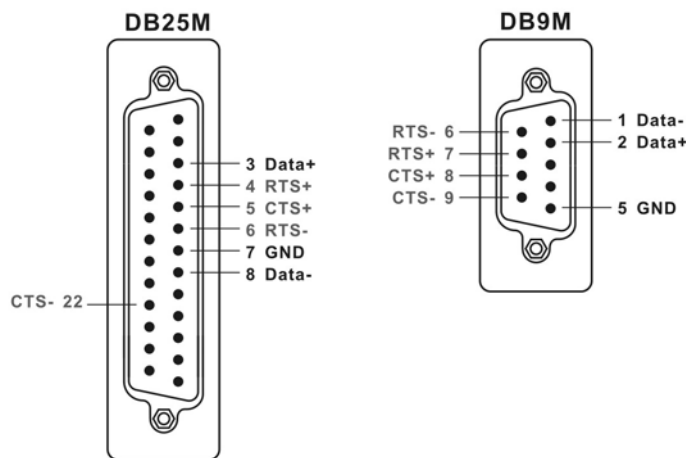
- RS-232



- RS-422



- RS-485



# 3.

## Software Installation

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After installing the PCI-104 serial module in your system successfully, please follow the step by step software installation guide to confirm how to install appropriate driver and configure the serial port settings.

The driver for PCI-104 serial board supports various operating systems, and you can select your requirement in the following chapter:

The following topics covered in this chapter:

- ◆ **Windows 2000/XP/2003 (32-bit)**
- ◆ **Windows 2000/XP/2003 (32-bit WHQL)**
- ◆ **Windows XP/2003 (64-bit)**
- ◆ **Windows 95/98/Me**
- ◆ **Windows NT**
- ◆ **Windows 3.1**
- ◆ **Windows CE.NET**
- ◆ **DOS**
- ◆ **Linux**

## Windows 2000/XP/2003 (32-bit)

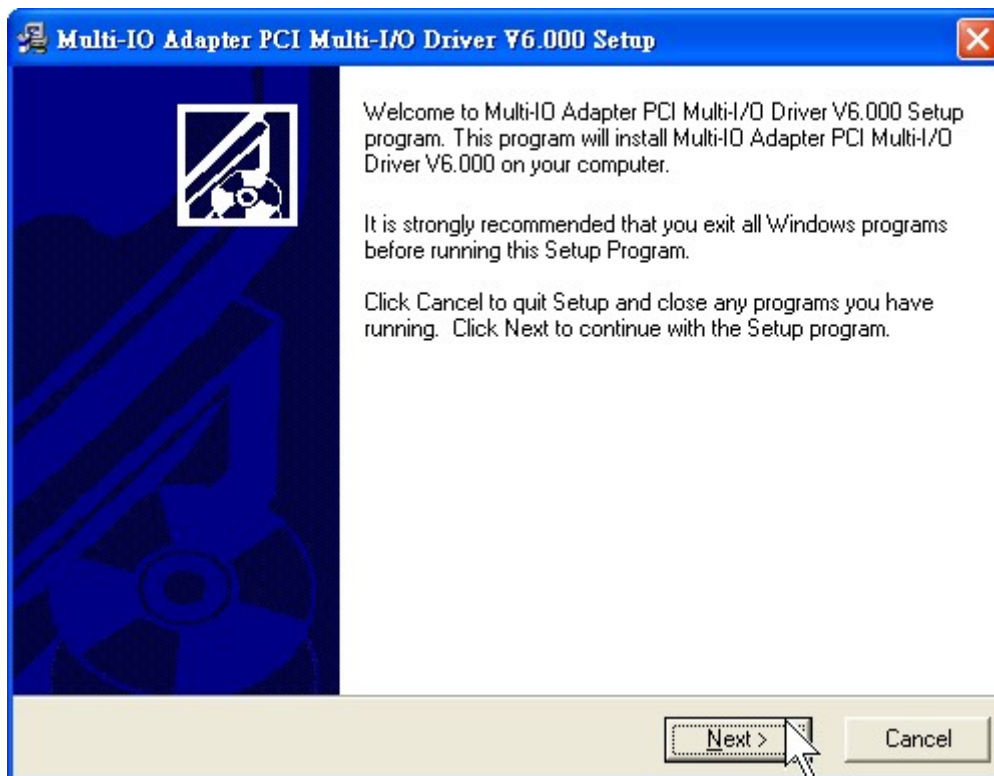
### ◆ Installing Driver

On booting up, system will detect present of the PCI-104 Serial Board and prompt for driver installation wizard, but ignore it . Please insert the driver CD in your CD/DVD ROM drive and run point directory setup file:

: \\IO\PCI IO\win2k and xp\setup.exe



(1) Please click “**Next**” to continue when Multi-IO Adapter PCI Driver window shows up.

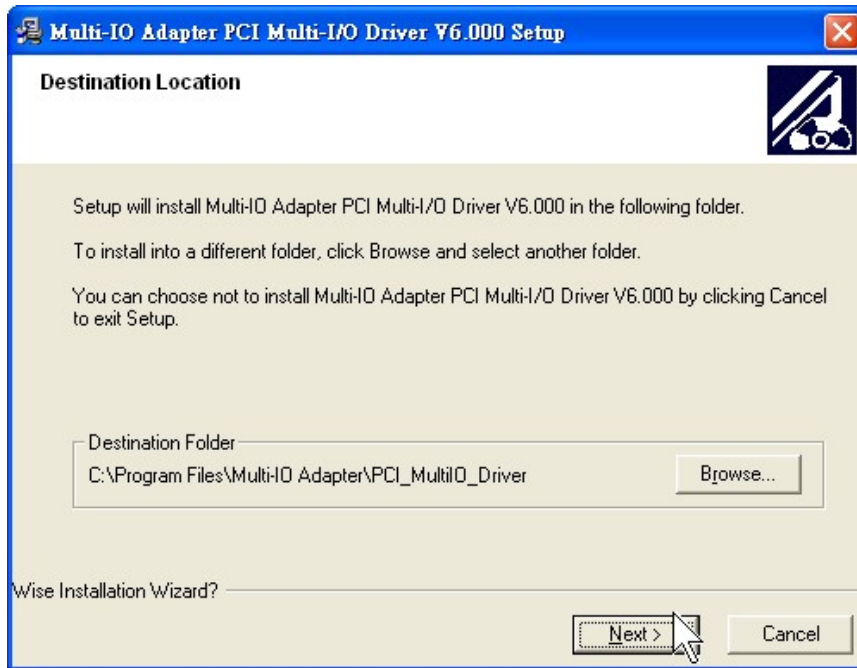


#### **Note:**

The driver program will detect and uninstall the previous I/O driver which you installed before. This step may take a few minutes and please be patient of the process.



- (2) You can select the folder location which driver installed.  
Click “**Next**” to continue.



- (3) A **Digital Signature Not Found** window will open. Although this message states that this PCI-104 serial board driver does not contain a Microsoft digital signature, you can rest assured, since the driver has already been tested and been shown that it can support Windows OS.  
Click “**Yes**” to continue the installation.



- (4) Please click “**Finish**” to finish installation step and eject the CD driver.

- (5) New “PCI Serial Port” will be found in Found New Hardware Wizard window. Select “Install the software automatically (Recommend)” and click “Next”.

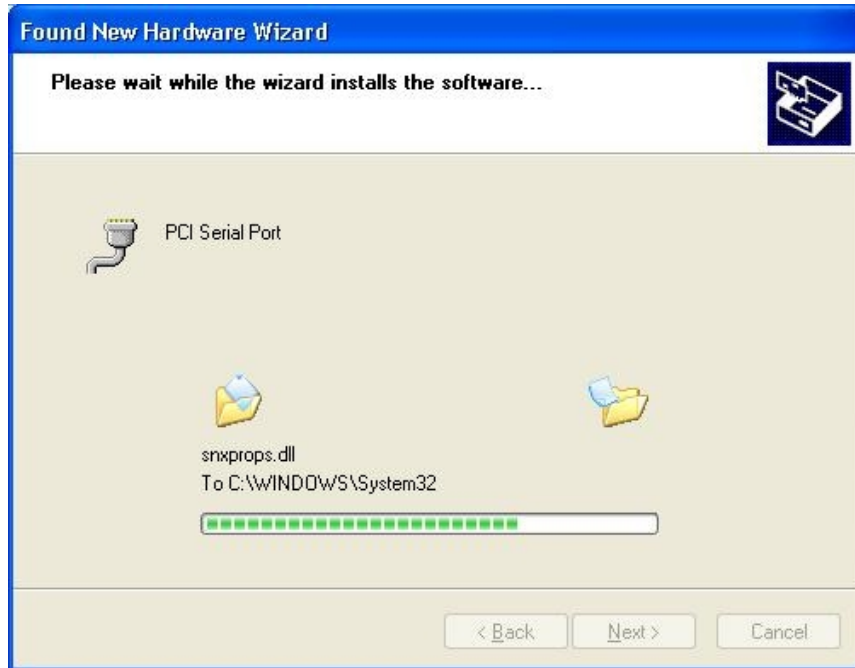


- (6) A **Digital Signature Not Found** window will open. Although this message states that this PCI-104 serial board driver does not contain a Microsoft digital signature, you can rest assured, since the driver has already been tested and been shown that it can support Windows OS.

Click “**Continue Anyway**” to continue the installation.



(7) System will install “PCI Serial Port” driver automatically.



(8) Please click “Finish” to finish installation step.

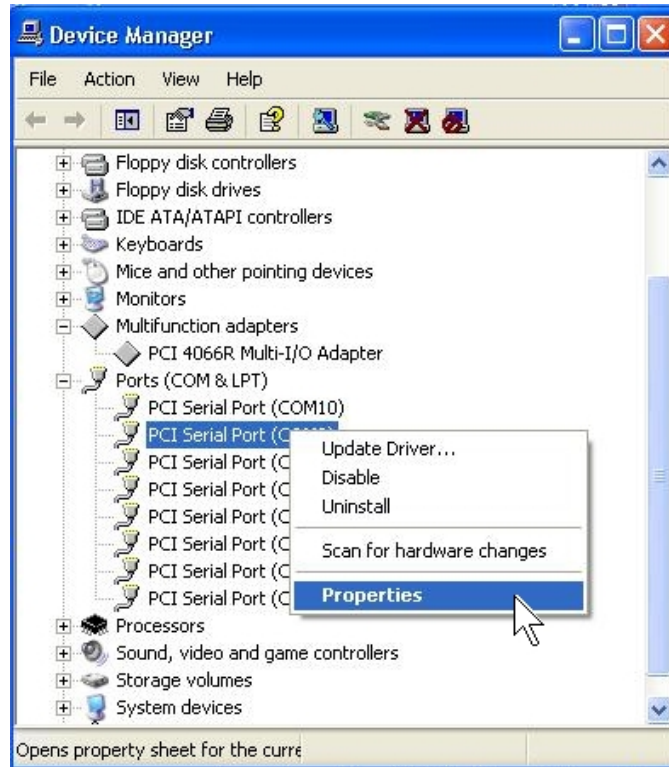


**Note:**

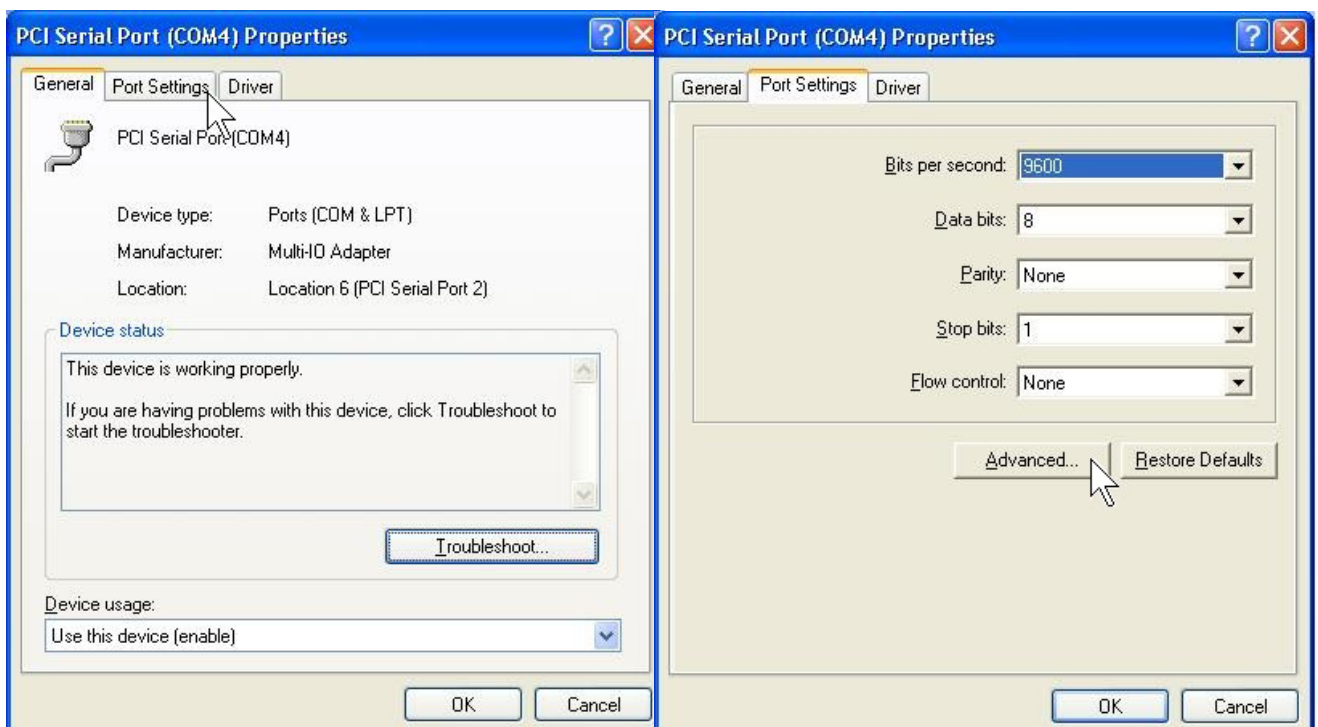
The “Found New Hardware Wizard” windows will show up and re-install driver several times until you finish installing each serial port. Please repeat step(5) to step(8) installation steps.

## ◆ Configure the Serial Port Settings

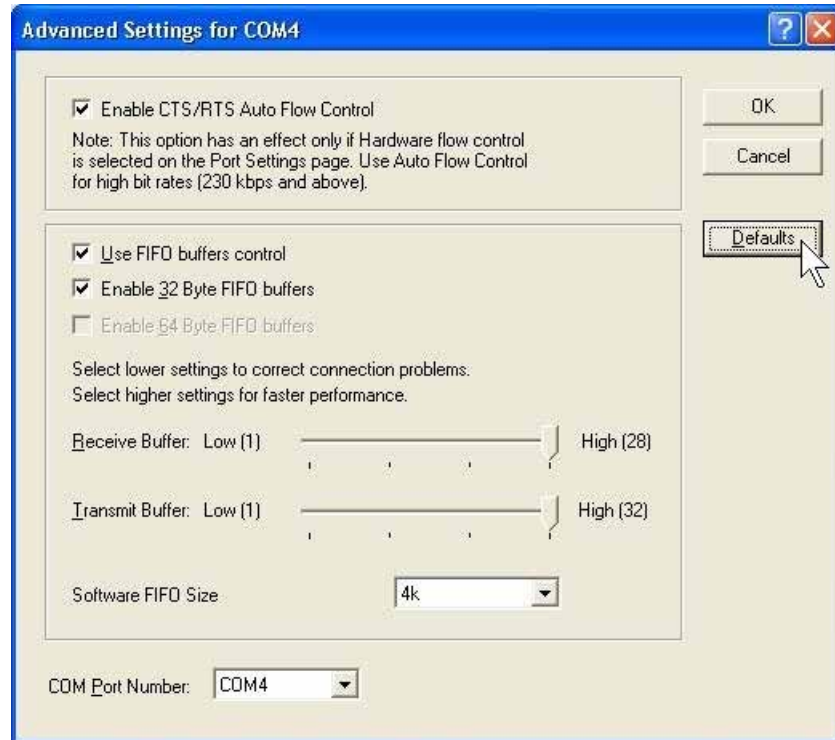
1. Please launch the “**Device Manager**” from *Start → Control Panel → System*
2. Right click the “**PCI Serial Port (COMXXX)**” item from the “**Ports (COM & LPT)**” sub-tree and click “**Properties**”.



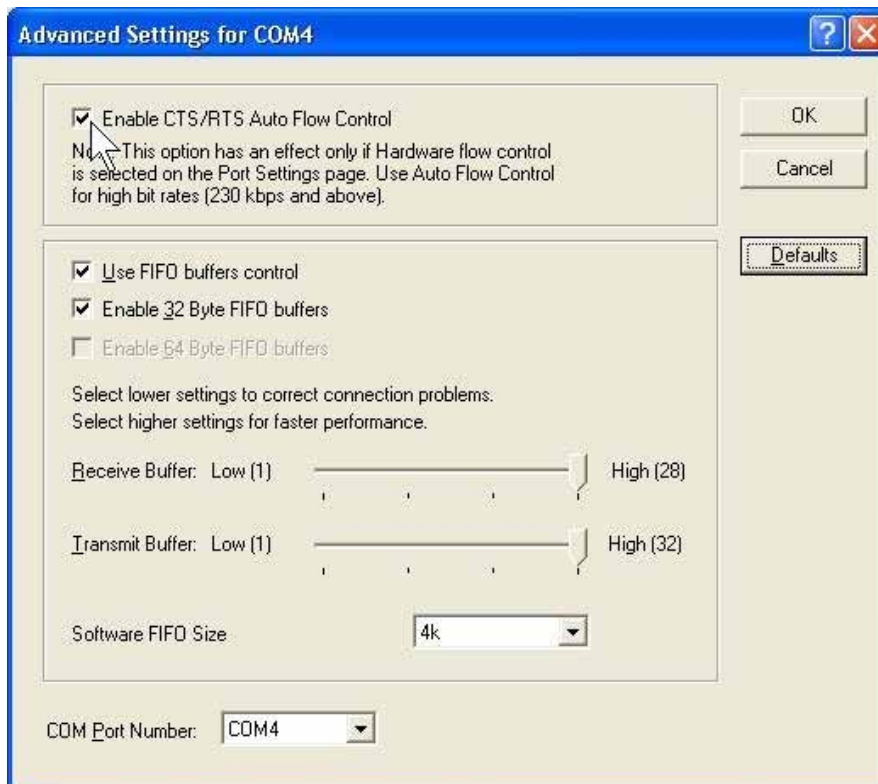
3. Click “**Port Settings**” tab page and click “**Advanced**” for advanced settings.



4. Click **“Defaults”** button for restoring default advanced settings.

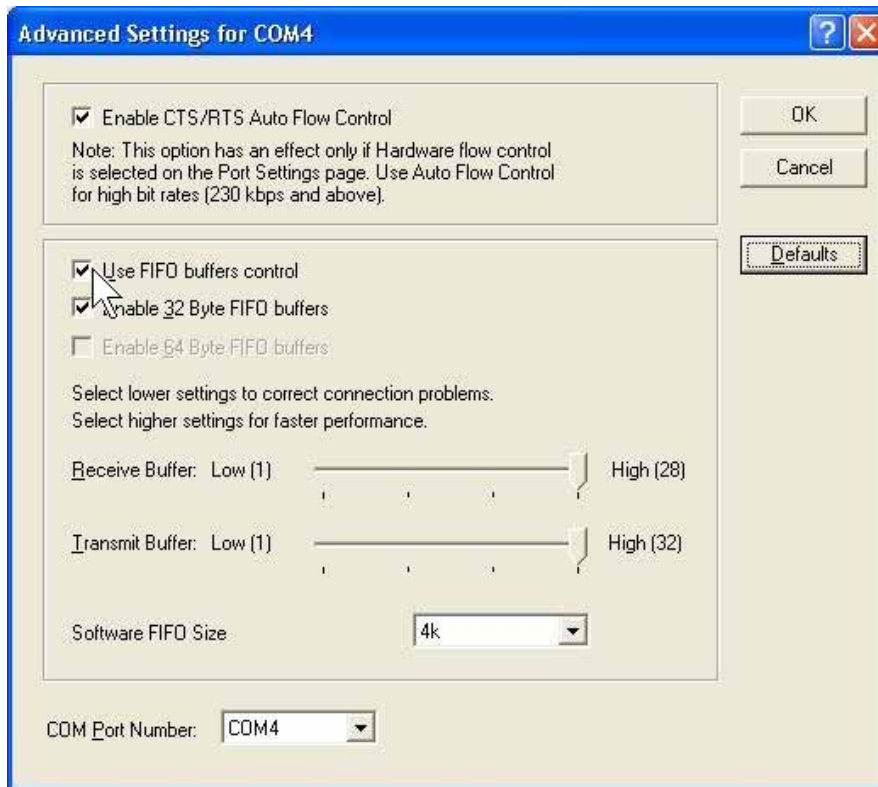


5. Check/un-check the **“Enable CTS/RTS Auto Flow Control”** checkbox to enable/ disable the hardware auto flow control feature.

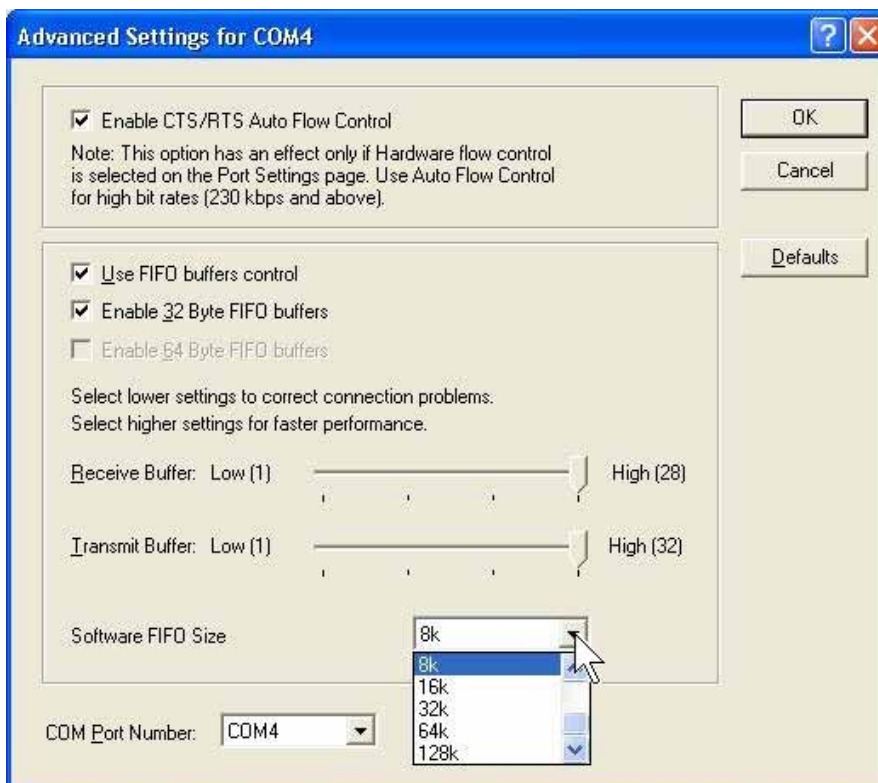




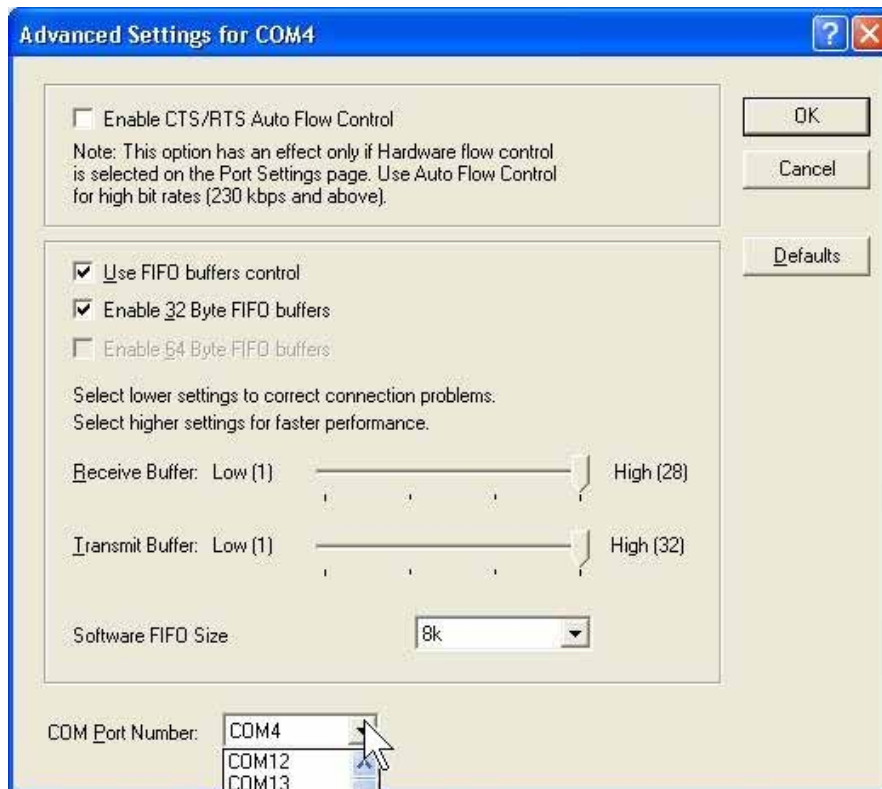
6. Check/Un-check the “**Use FIFO buffers control**” checkbox to enable / disable the hardware FIFO buffering feature or you can select the size of FIFO if “Use FIFO buffers control” is enabled.



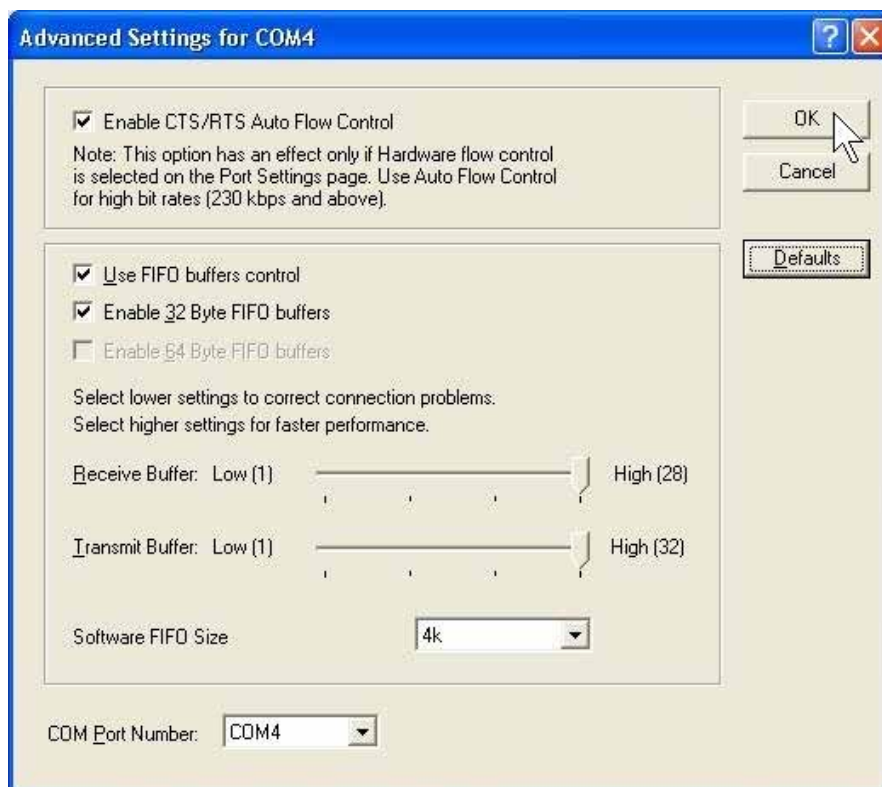
Also you can use software FIFO length from **128 byte to 128K byte**. There is more detail introduction in trouble shooting chapter FAQ8.



7. Re-map the COM port number by select a free COM port number from the “**COM Port Number**” combo box. The (in use) means this COM port number is used by another COM port.



8. Click “**OK**” to save your settings, and repeat above steps for each serial port.



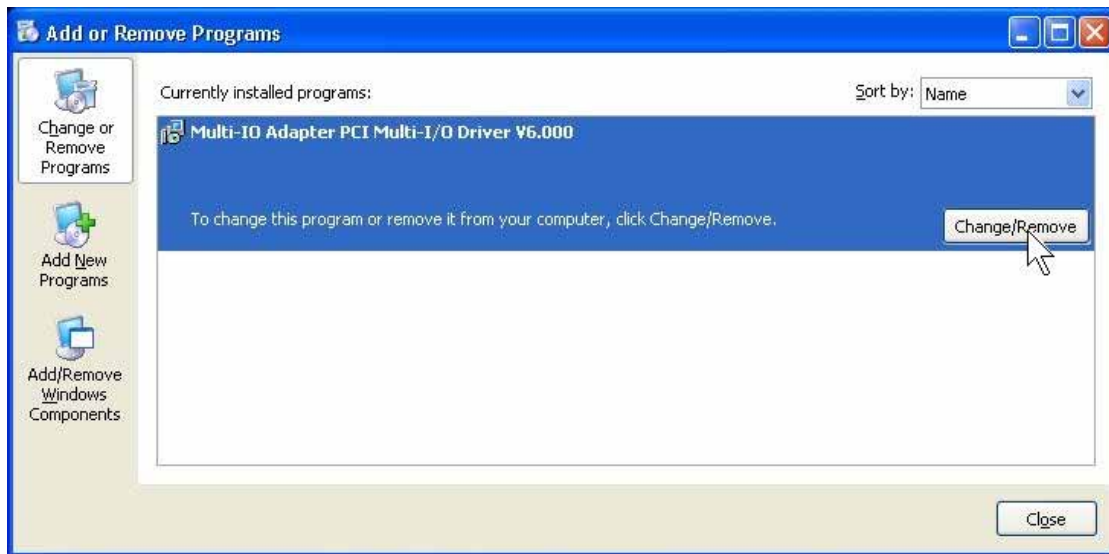
## ◆ Uninstalling Device

(1) Please launch the “Add or Remove Programs” in control panel

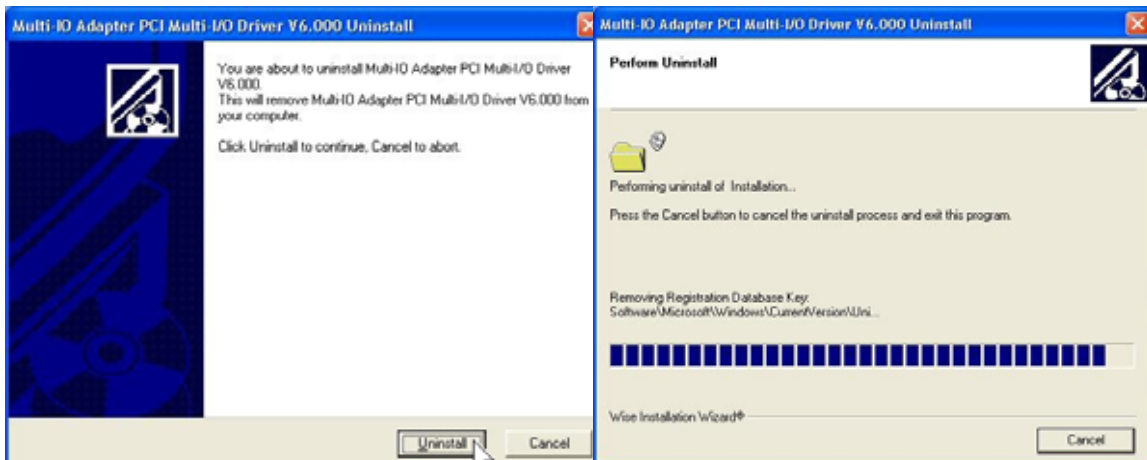
**Start > Control Panel > Add or Remove Programs**



(2) Please select PCI Multi-I/O Driver, and click “Change/Remove” button to uninstall driver.



(3) Please click “Uninstall” in Multi-IO Adapter Uninstall Wizard then system will uninstall your PCI-104 serial board automatically.





## Windows 2000/XP/2003 (32-bit WHQL)

The following procedure is for installing PCI-104 serial board driver under 32-bit hardware system under Windows 2000, XP and 2003. This driver is certified by Microsoft. You can get more detail in trouble shootings chapter FAQ9.

### ◆ Installing Driver

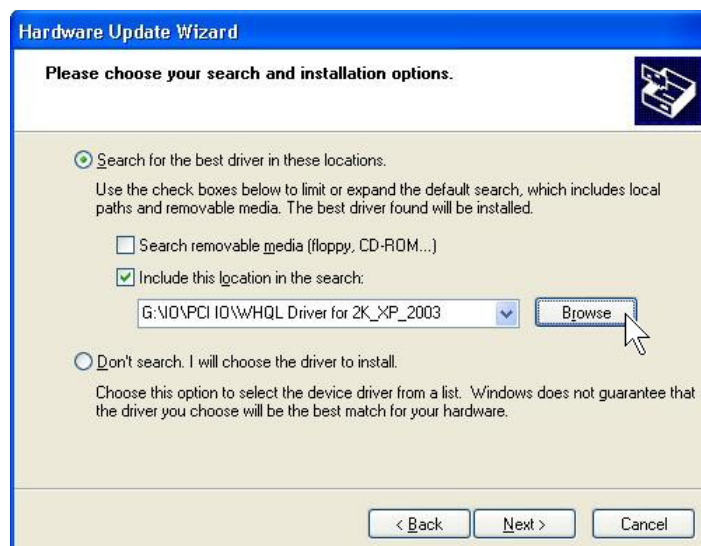
On booting up, system will detect present of the PCI-104 Serial Board and prompt for driver installation wizard. Please insert the CD driver bound with PCI-104 serial board into you CD/DVD ROM.

- (1) Please select “**Install from a list or specific location (Advanced)**” and click “**Next**” to continue in Found New Hardware Wizard window.

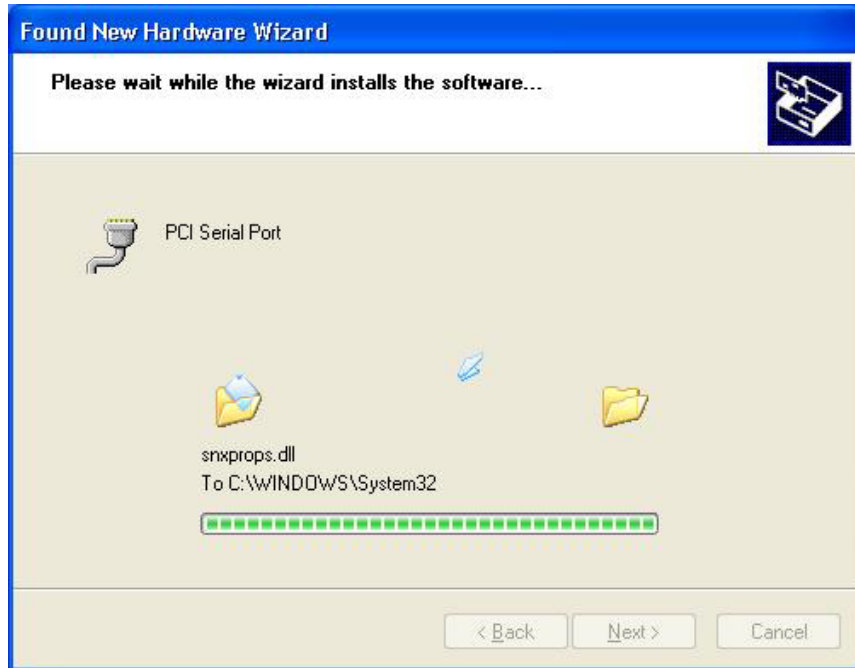


- (2) Click “**Browse..**”, and specify the driver locate within the CD driver. Click “**Next**” to continue.

**:\\IO\\PCI IO\\WHQL Driver for 2K\_XP\_2003\\**



(3) System will install the appropriate driver automatically.



(4) Please click “**Finish**” to end of PCI-104 serial board installation steps.

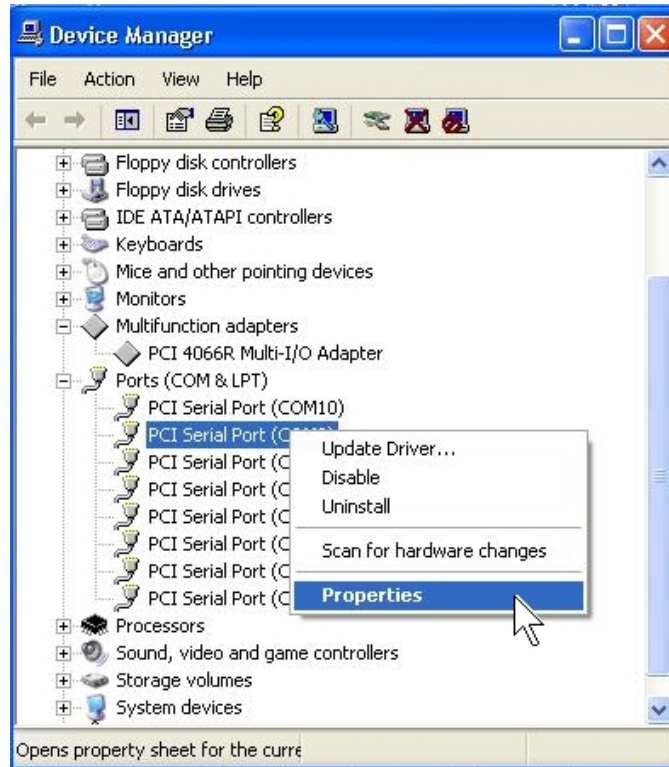


**Note:**

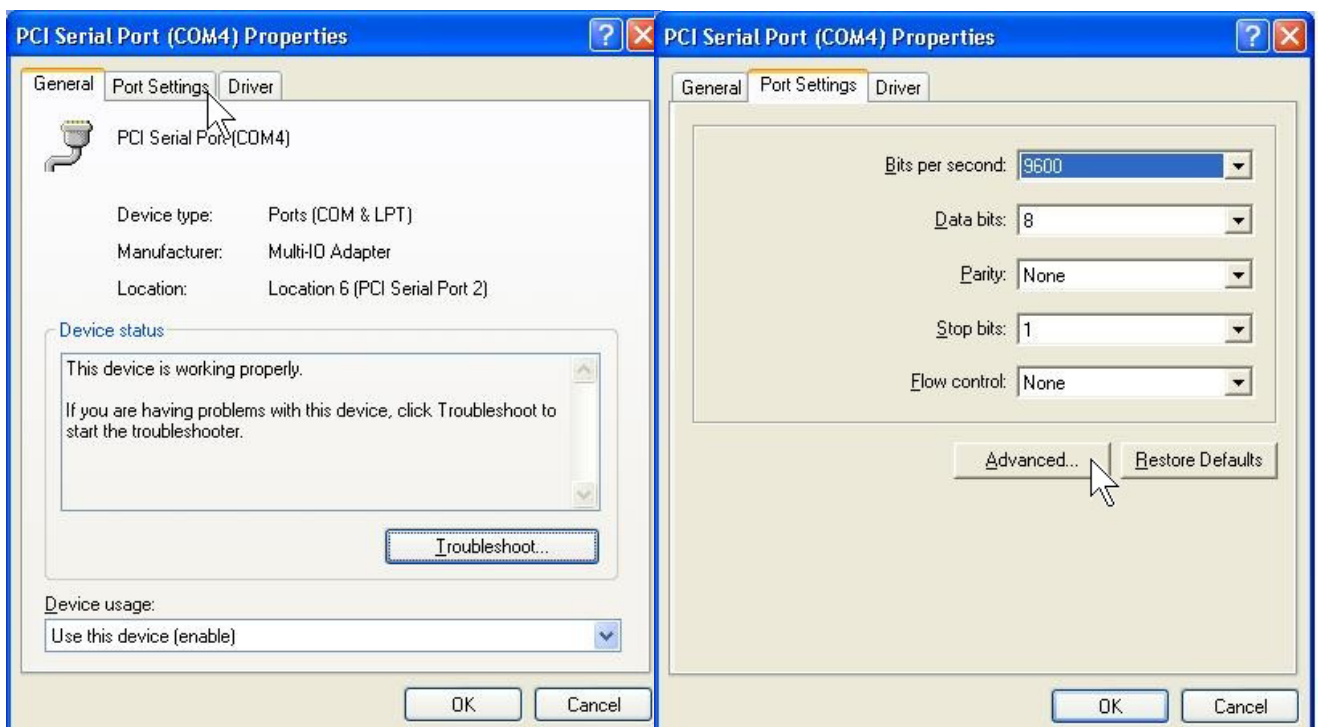
The “Found New Hardware Wizard” windows will show up and re-install driver several times until you finish installing each serial port. Please repeat step(1) to step(4) installation steps.

## ◆ Configure the Serial Port Settings

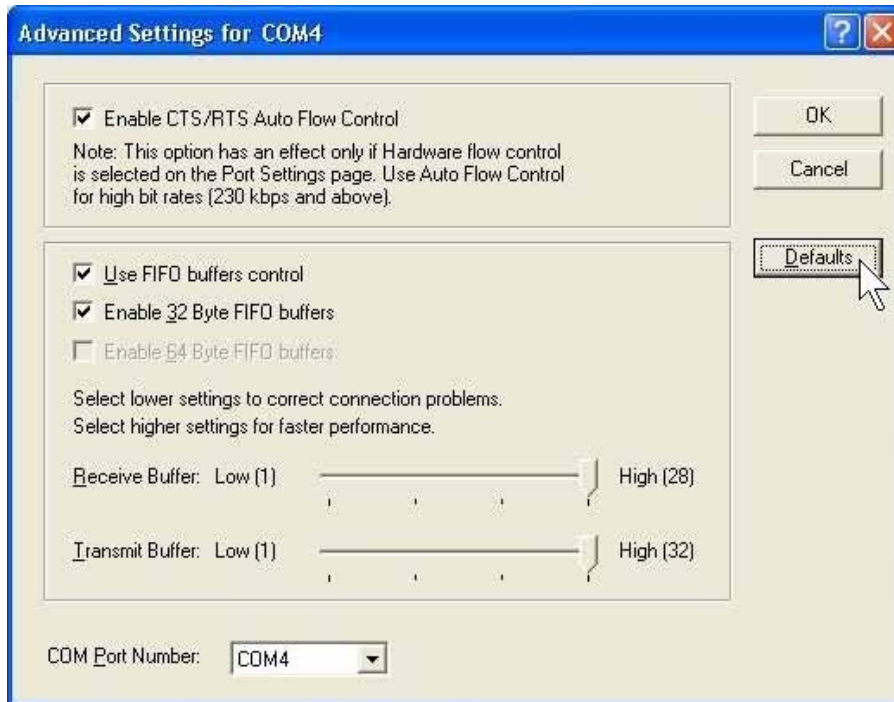
1. Please launch the “**Device Manager**” from *Start → Control Panel → System*
2. Right click the “**PCI Serial Port (COMXXX)**” item from the “**Ports (COM & LPT)**” sub-tree and click “**Properties**”.



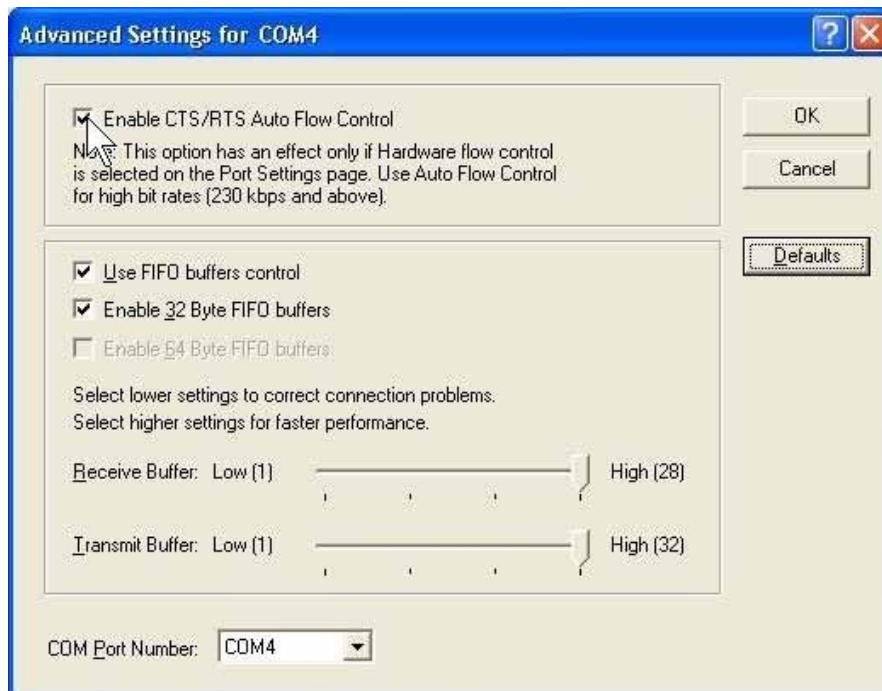
3. Click “**Port Settings**” tab page and click “**Advanced**” for advanced settings.



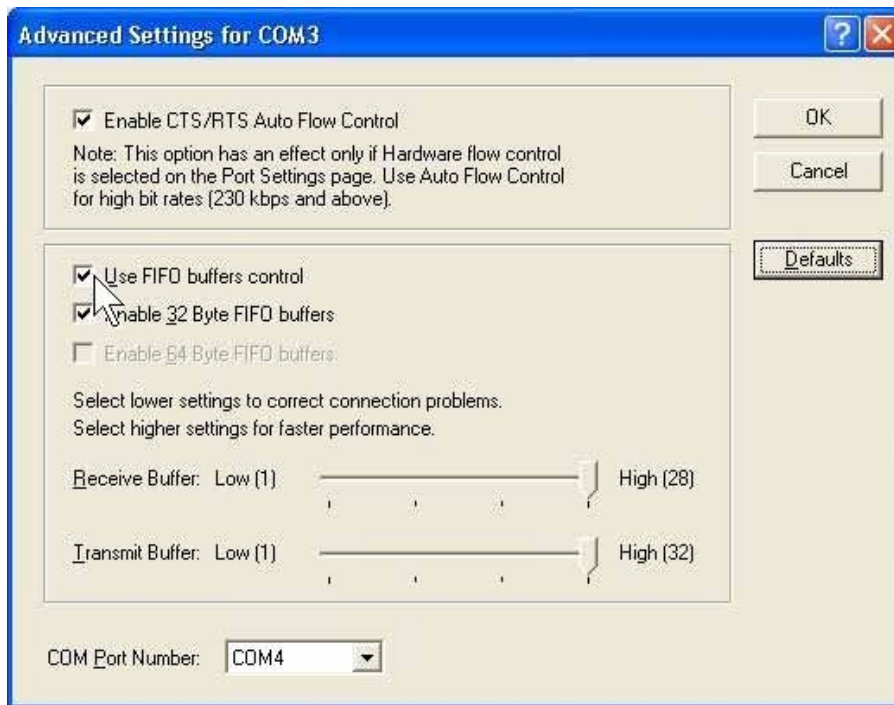
4. Click **“Defaults”** button for restoring default advanced settings.



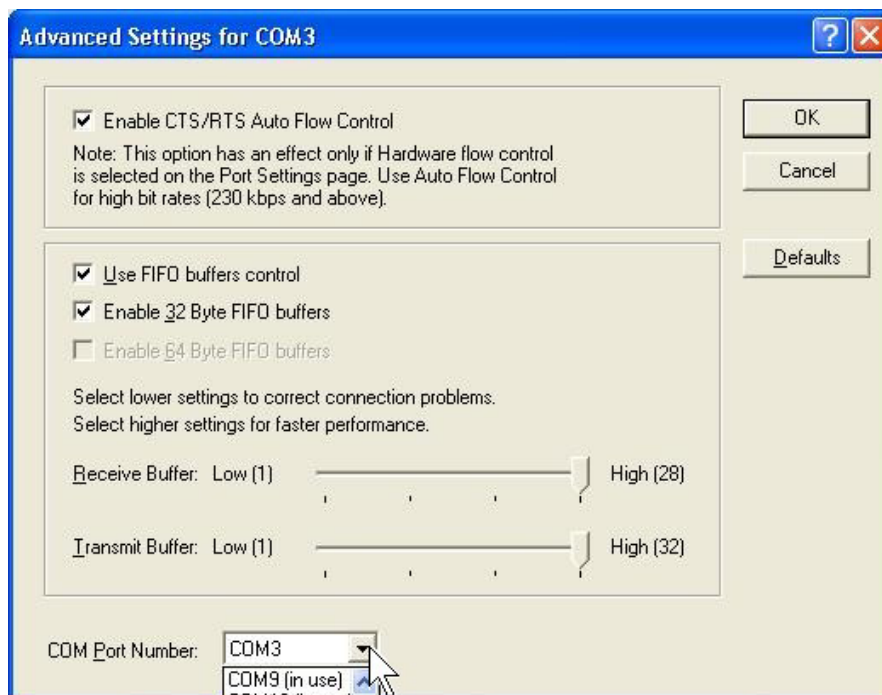
5. Check/un-check the **“Enable CTS/RTS Auto Flow Control”** checkbox to enable/ disable the hardware auto flow control feature.



6. Check/Un-check the “**Use FIFO buffers control**” checkbox to enable / disable the hardware FIFO buffering feature or you can select the size of FIFO if “Use FIFO buffers control” is enabled.



7. Re-map the COM port number by select a free COM port number from the “**COM Port Number**” combo box. The (in use) means this COM port number is used by another COM port.

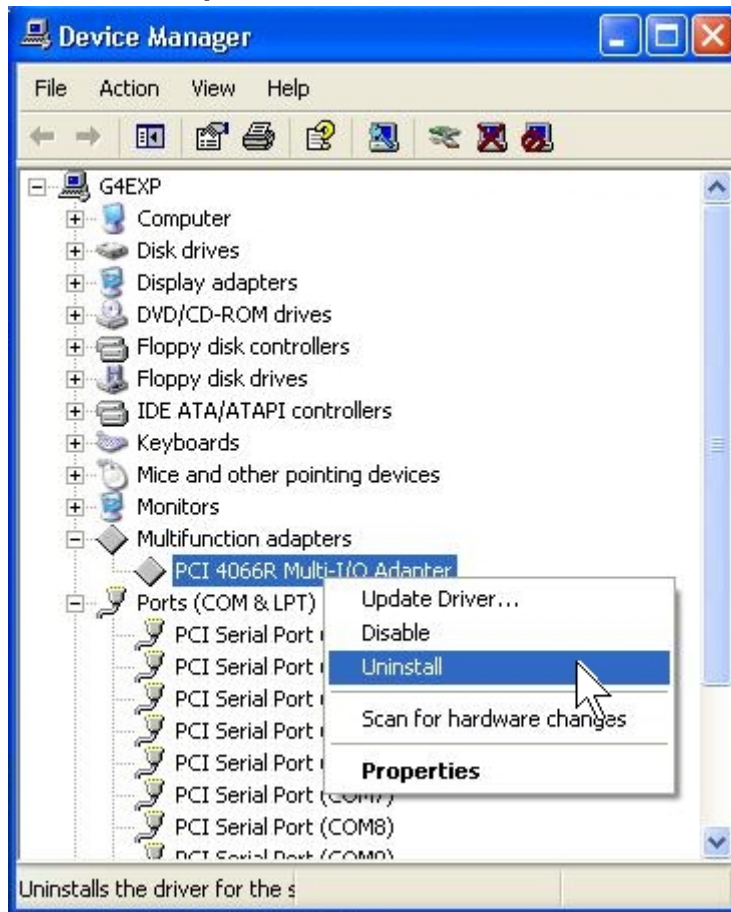


8. Click “**OK**” to save your settings, and repeat above steps for each serial port.



## ◆ Uninstalling Device

1. Please launch the “**Device Manager**” from *Start → Control Panel → System*
2. Expand the “**Multifunction adapter**” sub-tree and right-click the mouse on “**PCI xxxx Multi-I/O Adapter**” item, and select “**Uninstall**”.



3. A “**Confirm Device Removal**” Warning window will open. Click “**OK**” to uninstall the device.



## Windows XP/2003 (64-bit)

The following procedure is for installing PCI-104 serial board driver under 64-bit operation system Windows XP and 2003 including both INTEL and AMD 64-bit hardware systems.

INTEL:

Windows XP 64-Bit Edition Version 2003 for 64-Bit Itanium-based Systems (IA64) & Windows Server 2003 for 64-Bit Itanium-based Systems (IA64)

AMD:

Windows XP 64-Bit Edition Version 2003 for 64-Bit Extended Systems (AMD64) & Windows Server 2003 for 64-Bit Extended Systems (AMD64)

### ◆ Installing Driver

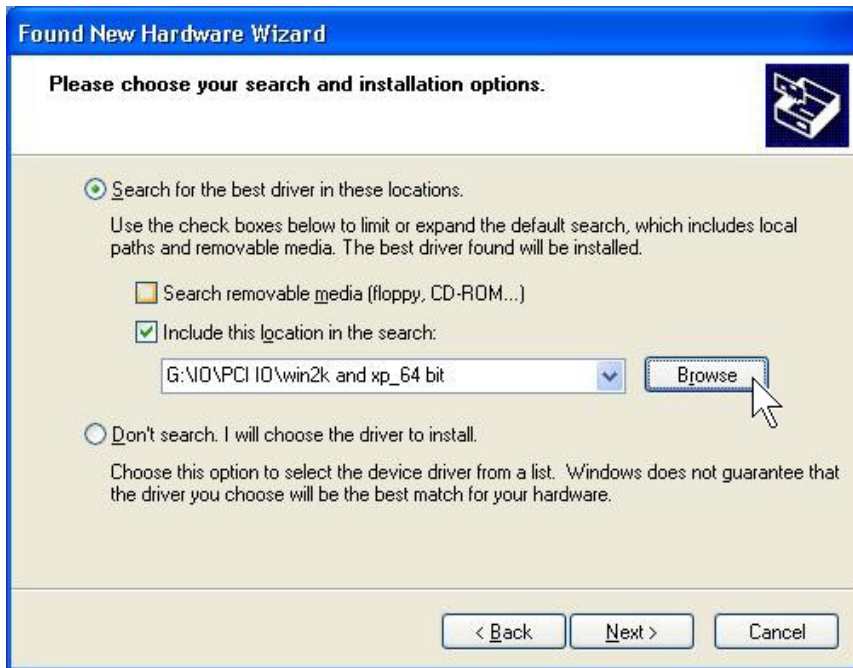
On booting up, system will detect present of the PCI-104 Serial Board and prompt for driver installation wizard. Please insert the driver CD bound with PCI-104 serial board in your CD/DVD ROM drive.

- (1) Please select “**Install from a list or specific location (Advanced)**” and click “**Next**” to continue in Found New Hardware Wizard window.



- (2) Click “**Browse..**”, and specify the driver locate within the CD drive as bound with PCI-104 serial board. Click “**Next**” to continue.

**:\\IO\PCI IO\Win2K and XP\_64 bit\**



- (3) A **Digital Signature Not Found** window will open. Although this message states that this PCI-104 serial board driver does not contain a Microsoft digital signature, you can rest assured, since the driver has already been tested and been shown that it can support Windows OS.

Click “**Continue Anyway**” to continue the installation.





(4) System will install the appropriate driver automatically.



(5) Please click “**Finish**” to end of PCI-104 serial board installation steps.

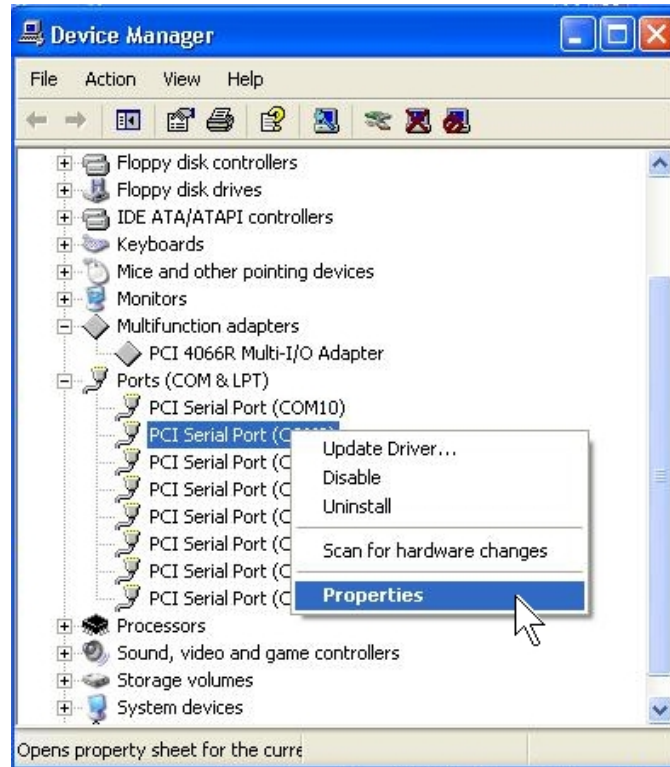


**Note:**

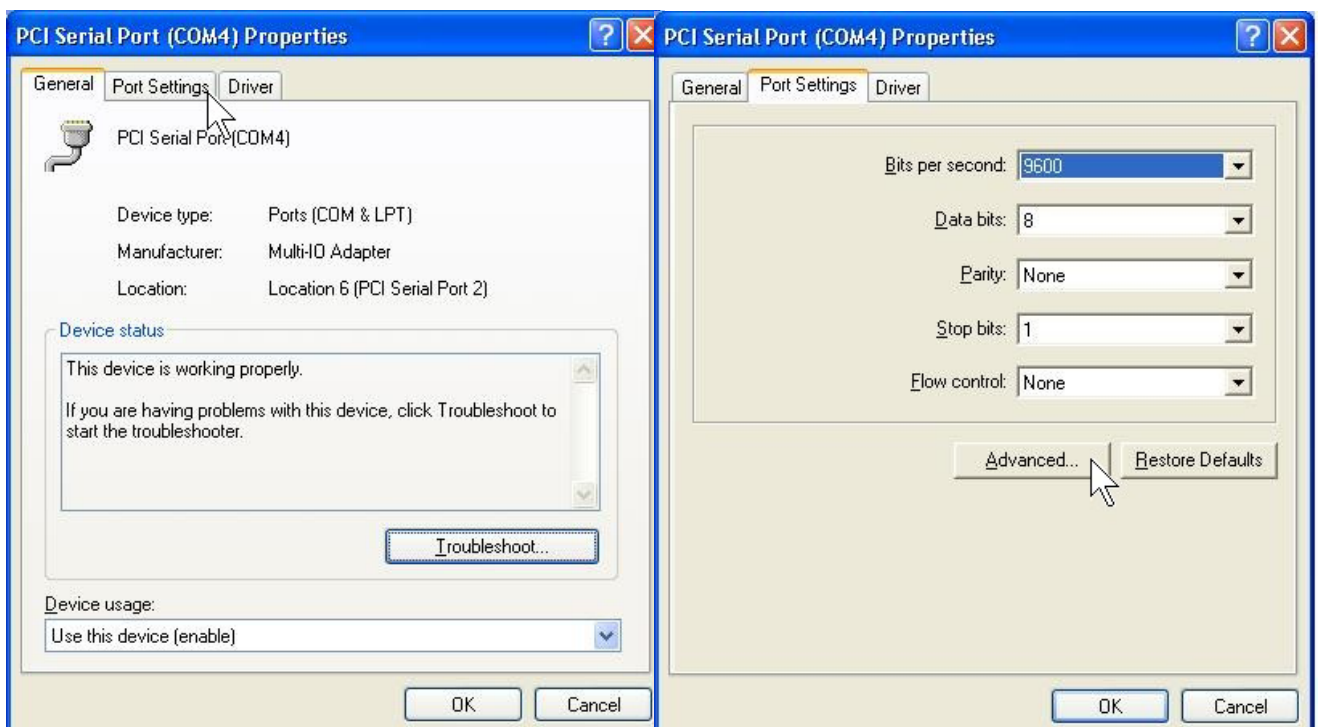
The “Found New Hardware Wizard” windows will show up and re-install driver several times until you finish installing each serial port. Please repeat step(1) to step(5) installation steps.

## ◆ Configure the Serial Port Settings

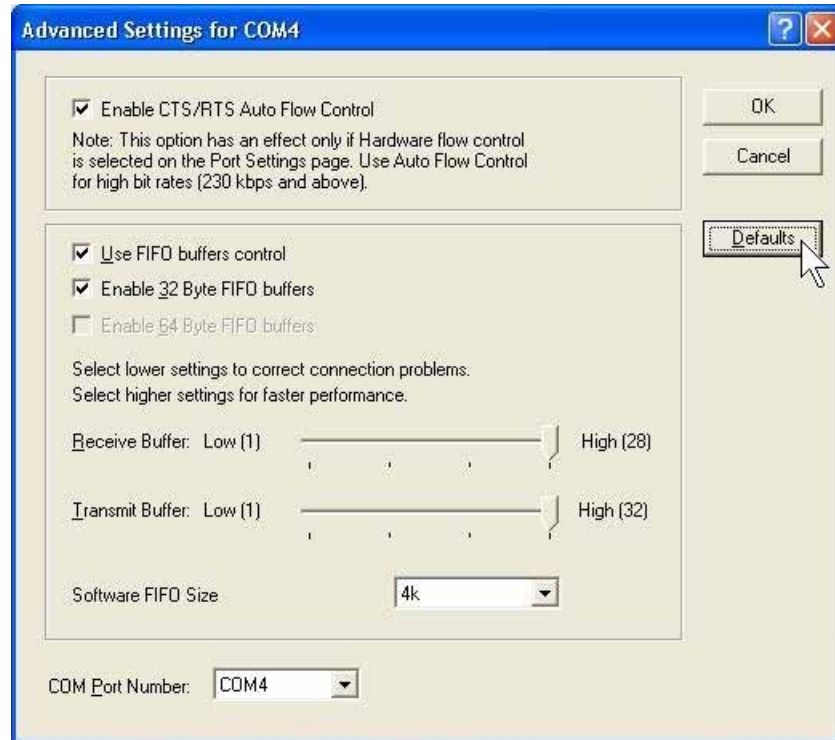
1. Please launch the “**Device Manager**” from *Start → Control Panel → System*
2. Right click the “**PCI Serial Port (COMXXX)**” item from the “**Ports (COM & LPT)**” sub-tree and click “**Properties**”.



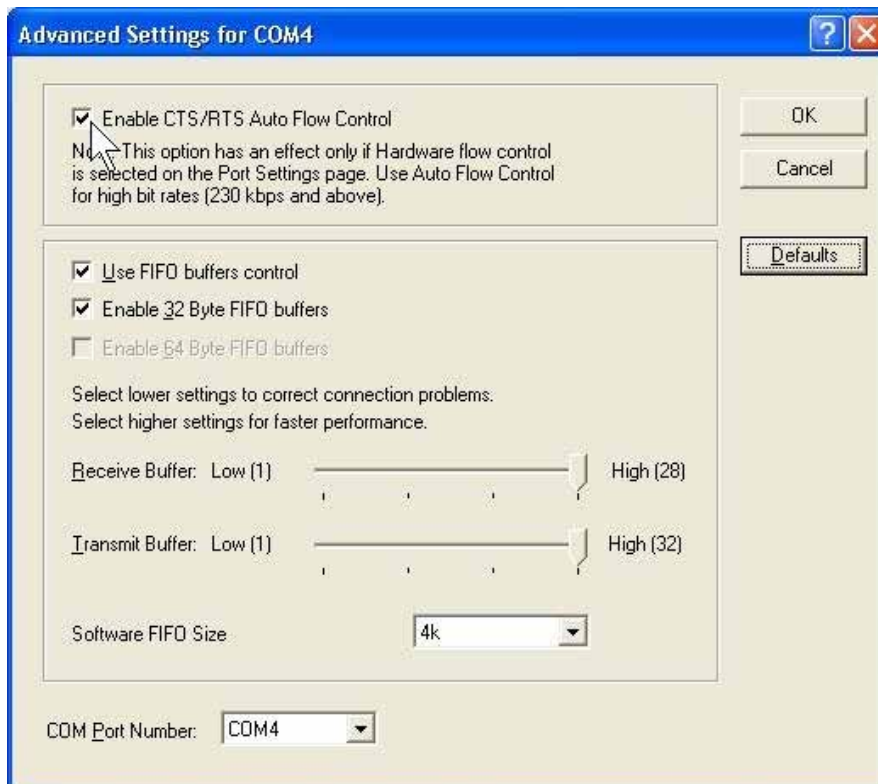
3. Click “**Port Settings**” tab page and click “**Advanced**” for advanced settings.



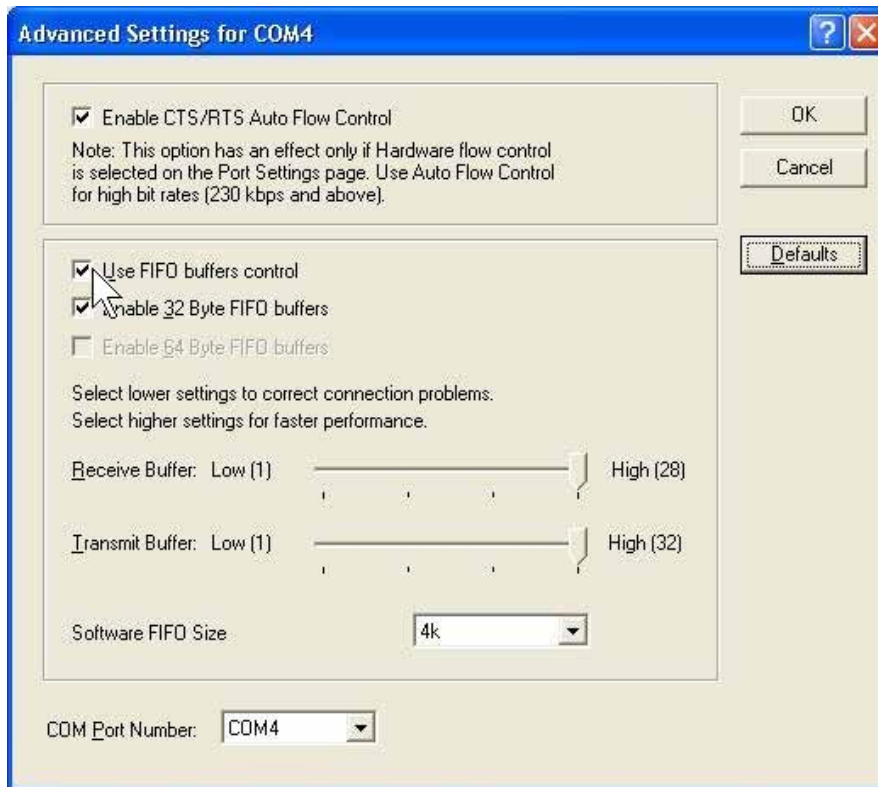
4. Click “**Defaults**” button for restoring default advanced settings.



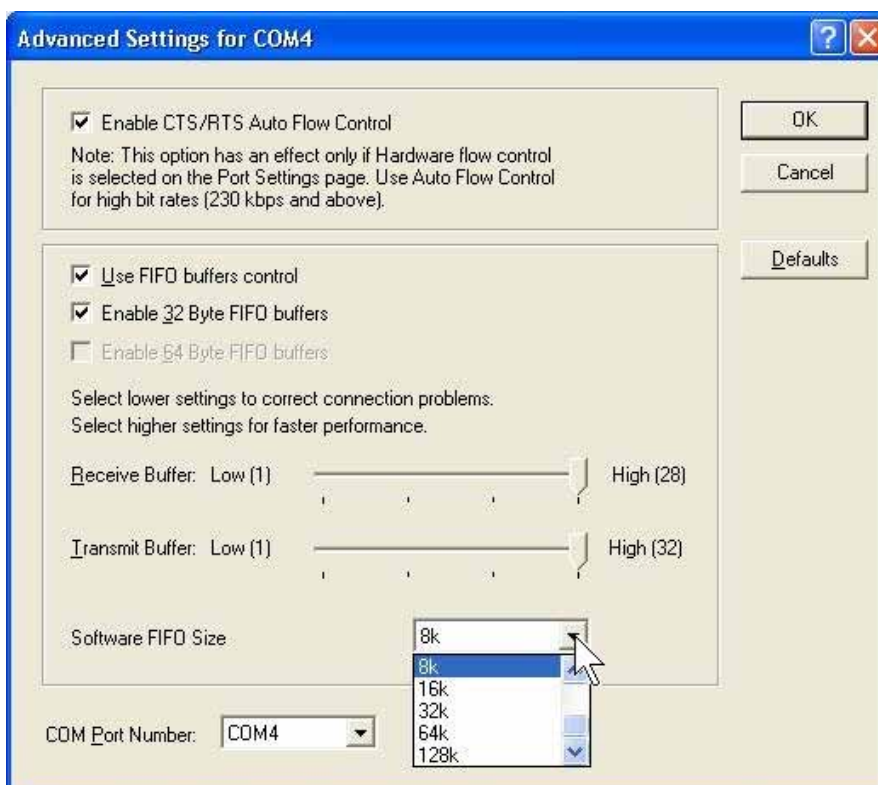
5. Check/un-check the “**Enable CTS/RTS Auto Flow Control**” checkbox to enable/ disable the hardware auto flow control feature.



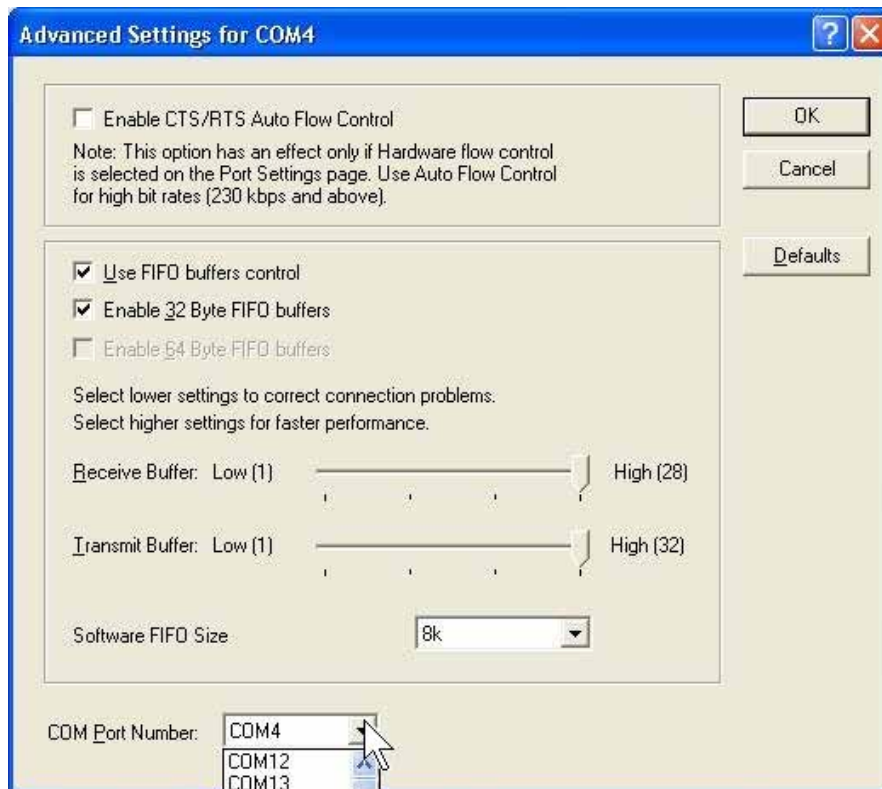
6. Check/Un-check the “**Use FIFO buffers control**” checkbox to enable / disable the hardware FIFO buffering feature or you can select the size of FIFO if “Use FIFO buffers control” is enabled.



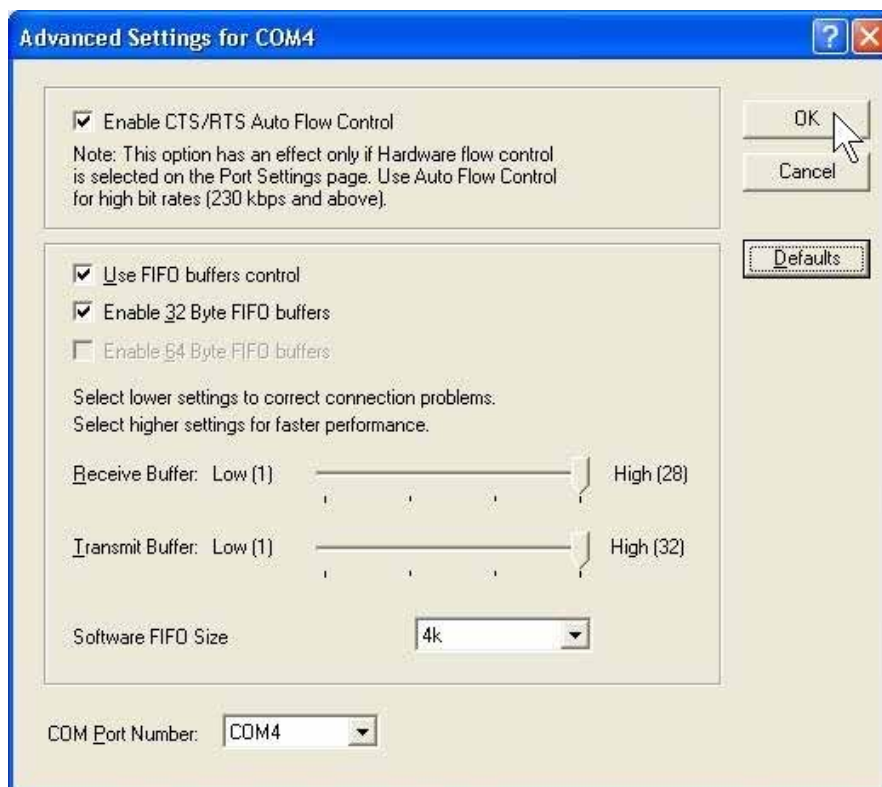
Also you can use software FIFO length from 128 byte to 128K byte. There is more detail introduction in trouble shooting chapter FAQ7.



7. Re-map the COM port number by select a free COM port number from the **“COM Port Number”** combo box. The (in use) means this COM port number is used by another COM port.



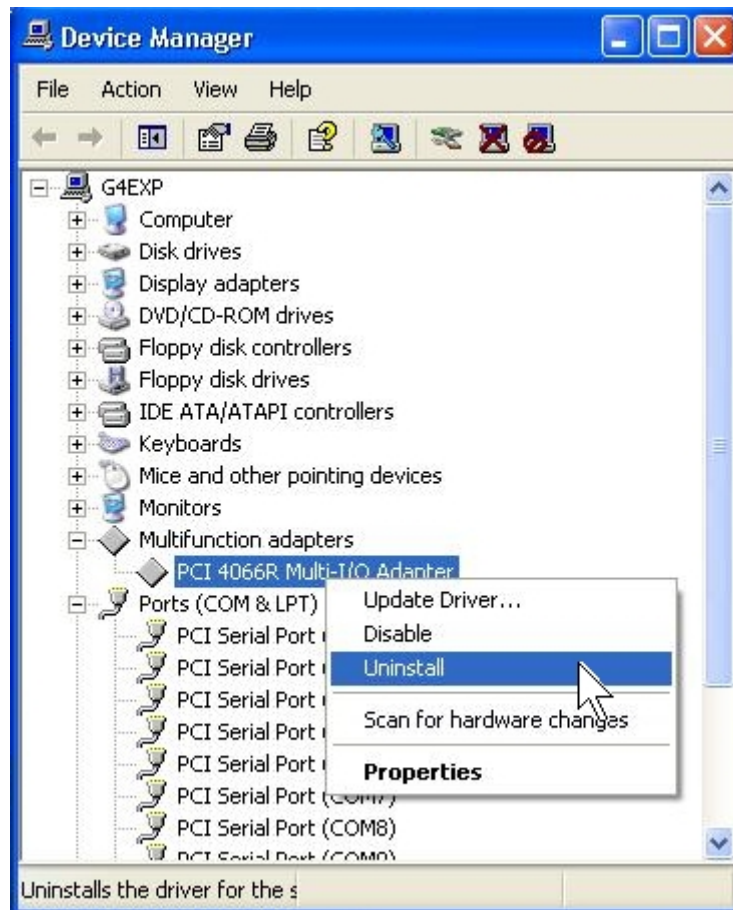
8. Click **“OK”** to save your settings, and repeat above steps for each serial port.





## ◆ Uninstalling Device

1. Please launch the “**Device Manager**” from *Start → Control Panel → System*
2. Expand the “**Multifunction adapter**” sub-tree and right-click the mouse on “**PCI xxxx Multi-I/O Adapter**” item, and select “**Uninstall**”.



3. A “**Confirm Device Removal**” Warning window will open. Click “**OK**” to uninstall the device.



## Windows 95/98/Me

The following procedure is for installing PCI-104 serial board driver under Windows 95/98/Me.

### ◆ Installing Driver

1. System will detect a new PCI Serial Card installing, and “Add New Hardware Wizard” will show up to assist you in setting up the new device. Click “**Next**” to continue.

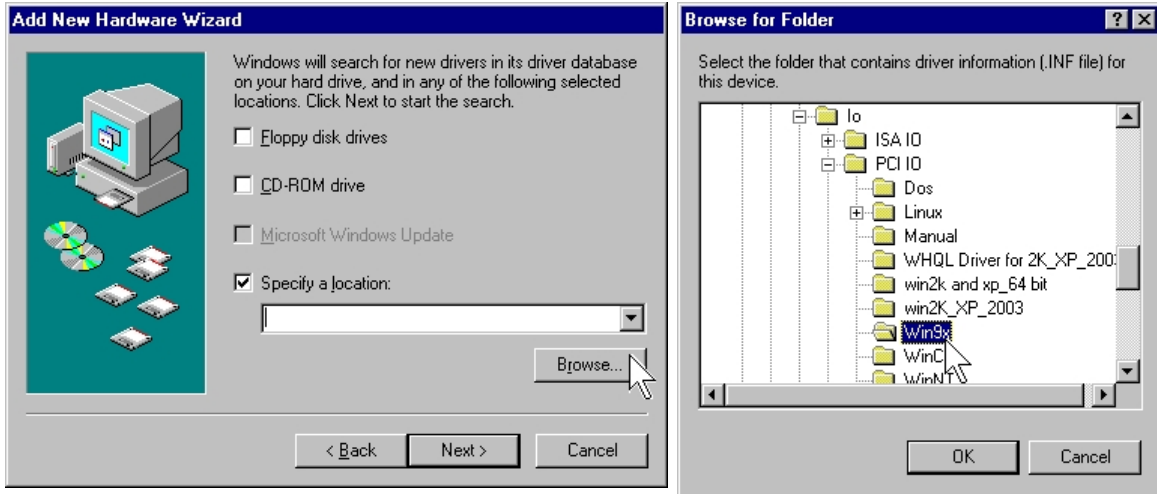


2. Please select “Search for the best driver for your device (Recommended)” and click “**Next**” to continue.



3. Please select “Specify a location” and click **“Browse”** button to specify the driver locate within the CD drive as bound with PCI-104 serial board.  
Click **“Next”** to continue.

**:\\IO\PCI IO\Win9x\**





4. System will detect a “Multi IO Controller” and search the appropriate driver for PCI-104 Serial Board. Click “**Next**” to continue.



5. System will install the driver automatically, then click “Finish” to end of installation steps.

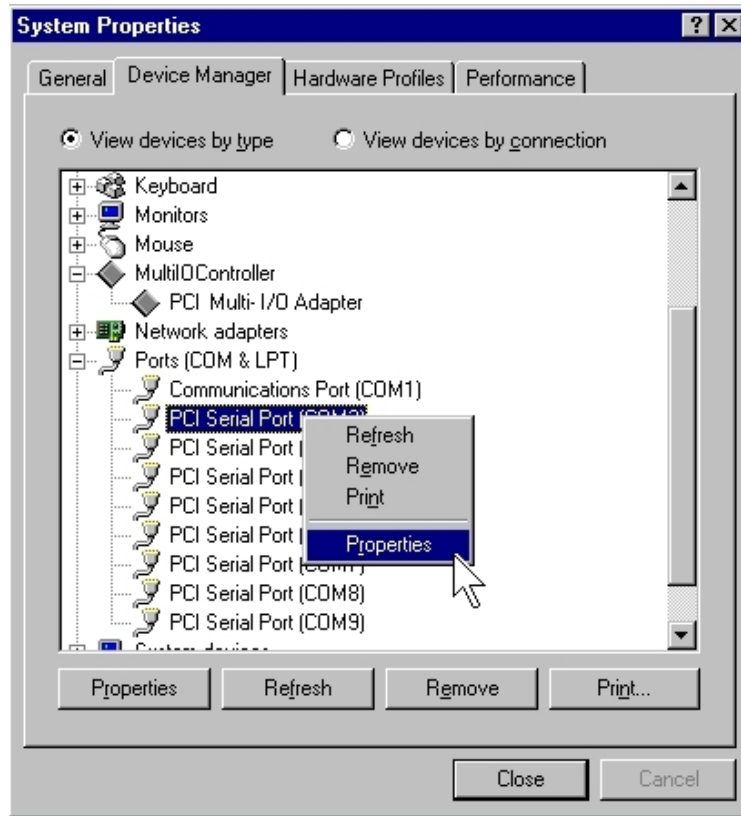


**Note:**

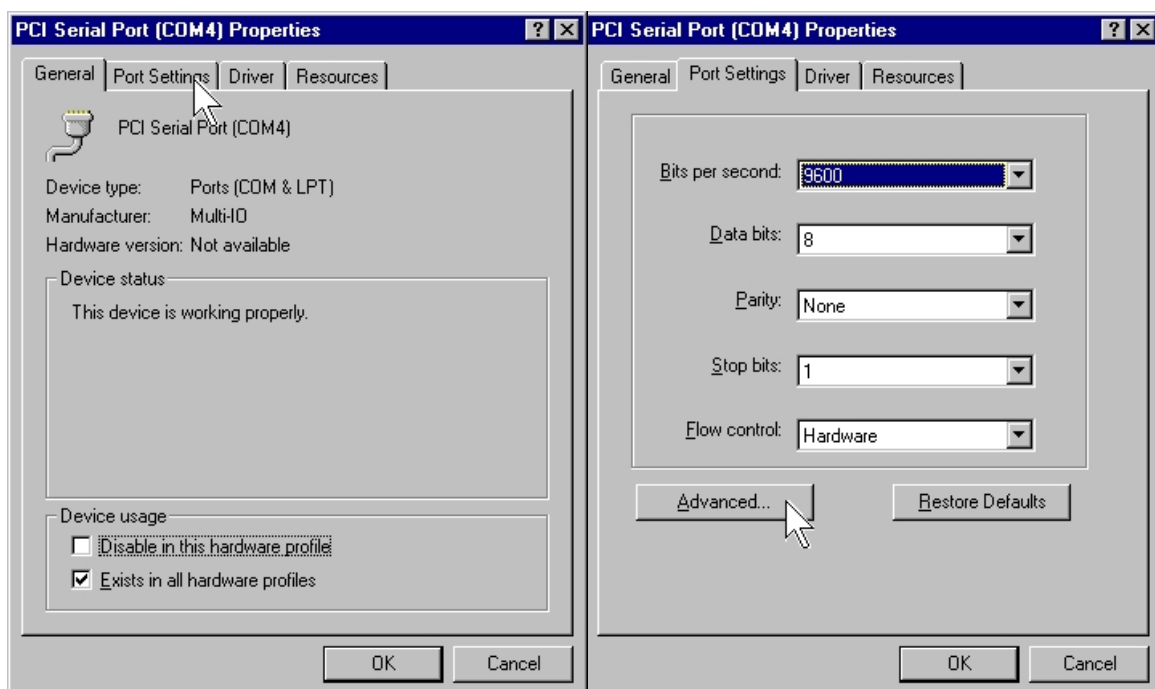
System will detect and install each serial port automatically, and please be patient with the installation process.

## ◆ Configure the Serial Port Settings

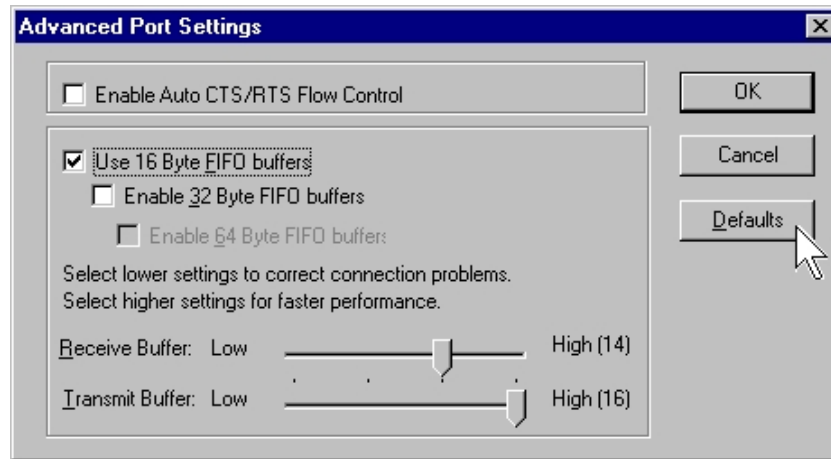
1. Please launch the “**Device Manager**” from *Start → Control Panel → System*
2. Right click the “**PCI Serial Port (COMXXX)**” item from the “**Ports (COM & LPT)**” sub-tree and click “**Properties**”.



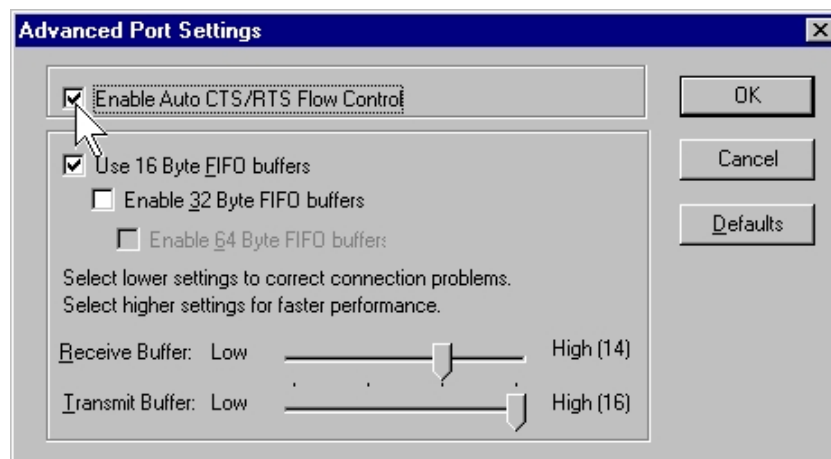
3. Click “**Port Settings**” tab page and click “**Advanced**” for advanced settings.



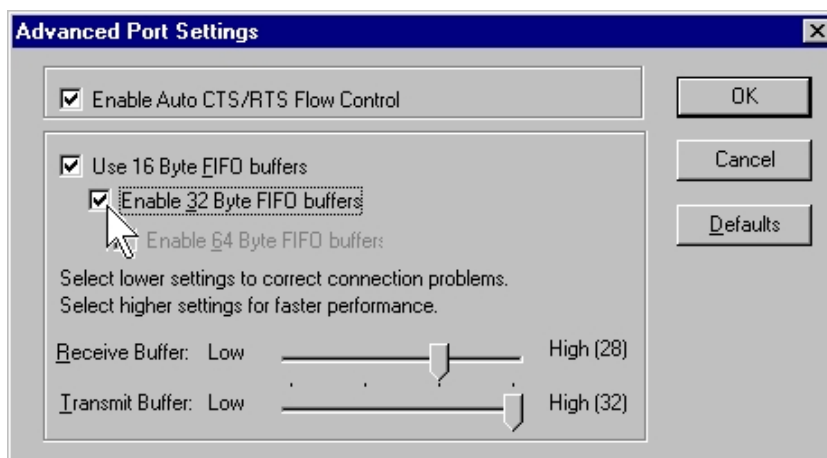
4. Click **“Defaults”** button for restoring default advanced settings.



5. Check/un-check the **“Enable CTS/RTS Auto Flow Control”** checkbox to enable/ disable the hardware auto flow control feature.



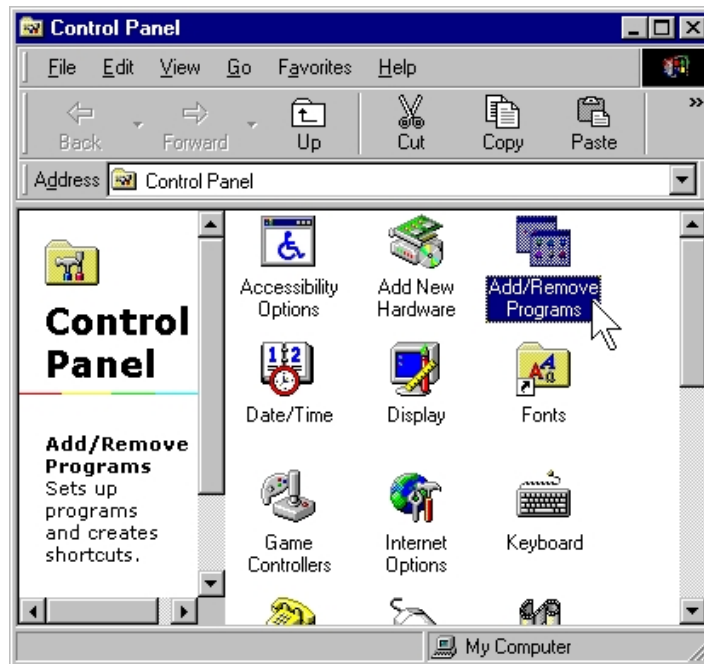
6. Check/Un-check the **“Use 16 Byte FIFO buffers”** or **“Use 32 Byte FIFO buffers”** checkbox to enable / disable the hardware FIFO buffering feature or you can select the size of FIFO if “Use FIFO buffers control” is enabled.



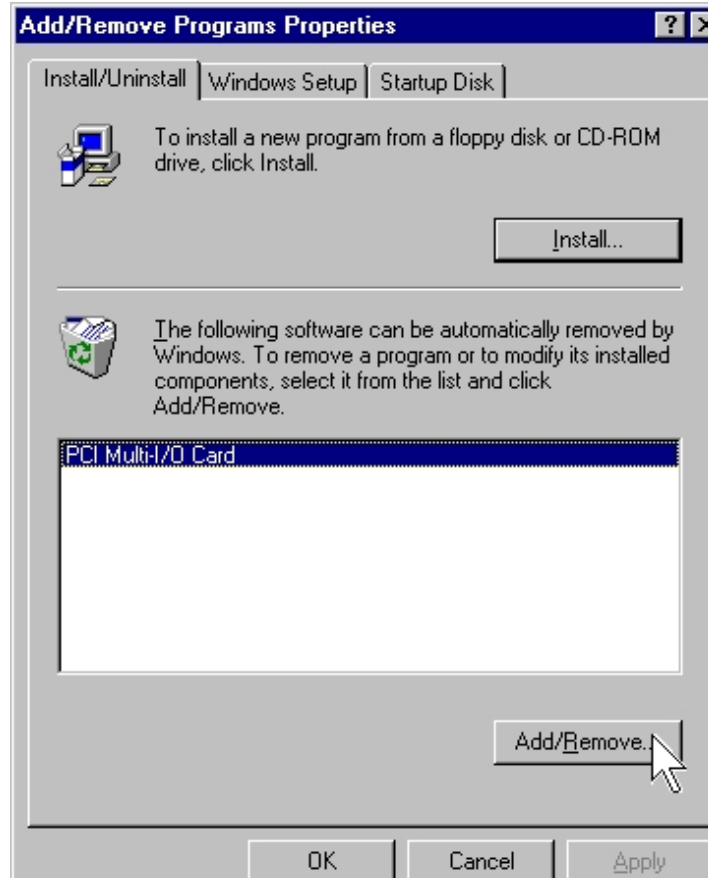
7. Click **“OK”** to save your settings. Repeat above steps for each serial port.

## ◆ Uninstalling Device

1. Please launch the “**Add/Remove Programs**” from *Start* → *Control Panel* → *Add/Remove Programs*



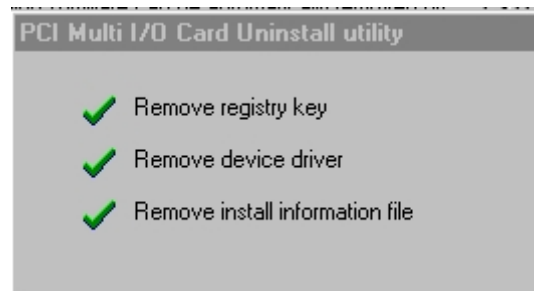
2. Please select “**PCI Multi-I/O Card**”, and click “**Add/Remove**”.



3. Please click **“Yes”** to remove PCI Multi-I/O card.



4. System will uninstall both driver and device automatically. Please click **“Yes”** to restart your computer.



## Windows NT

The following procedure is for installing PCI-104 serial board driver under Windows NT.

### ◆ Installing Driver

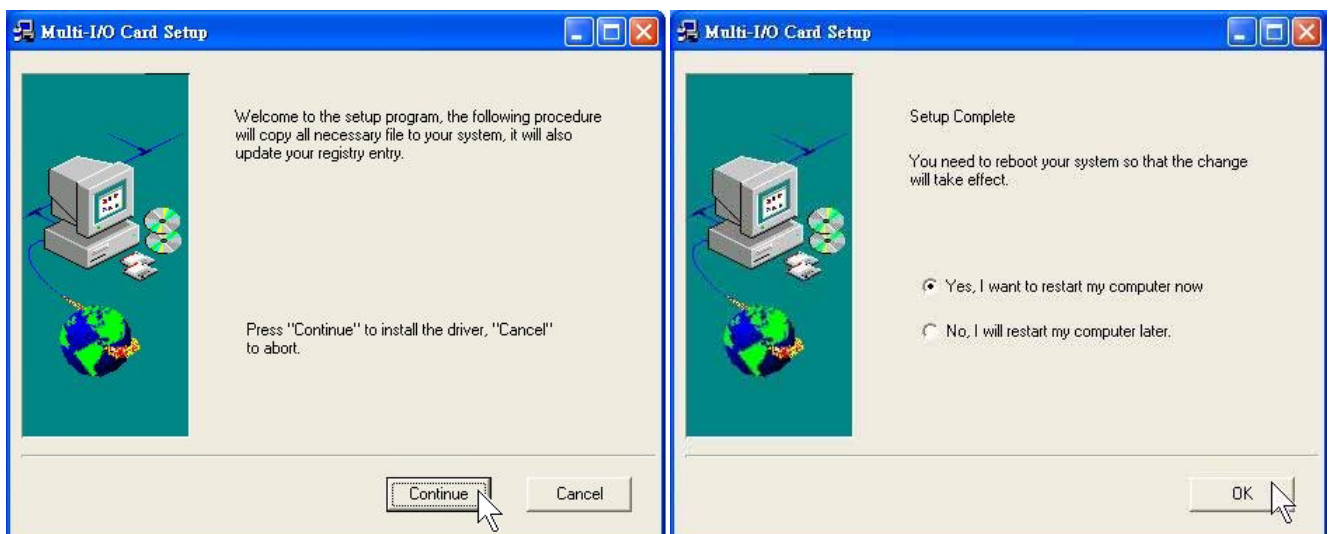
1. Please insert the CD Driver bound with PCI-104 serial board into your CD/DVD ROM, and then run under the **Setup.exe** program.

**: \\IO\PCI IO\WinNT\Setup.exe**

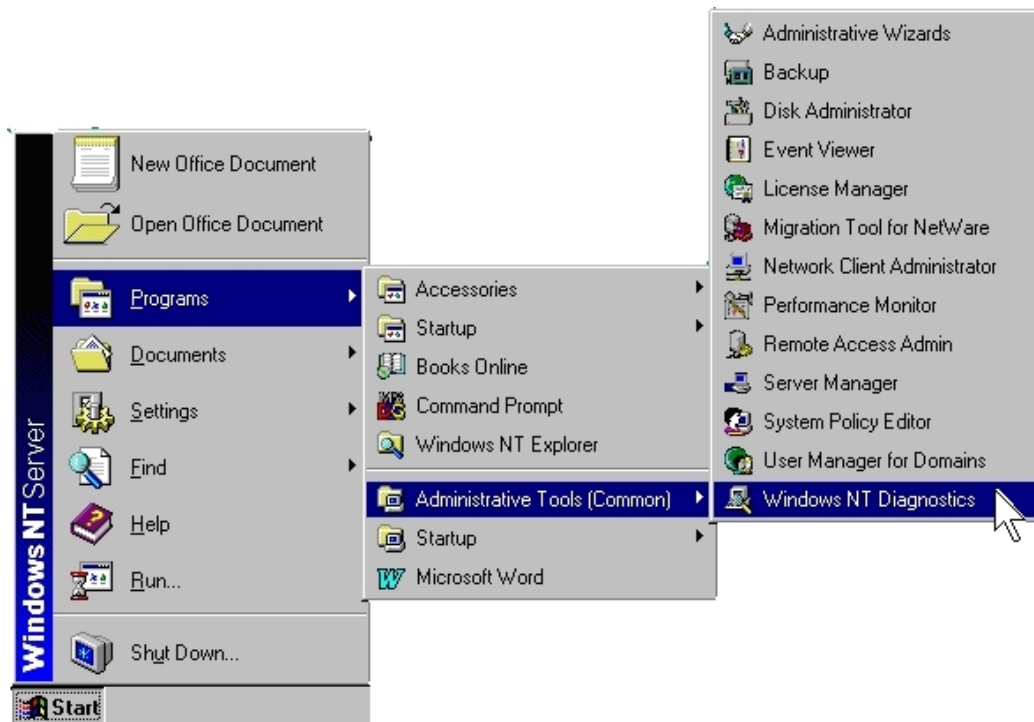


2. Press “**Continue**” to install the driver.

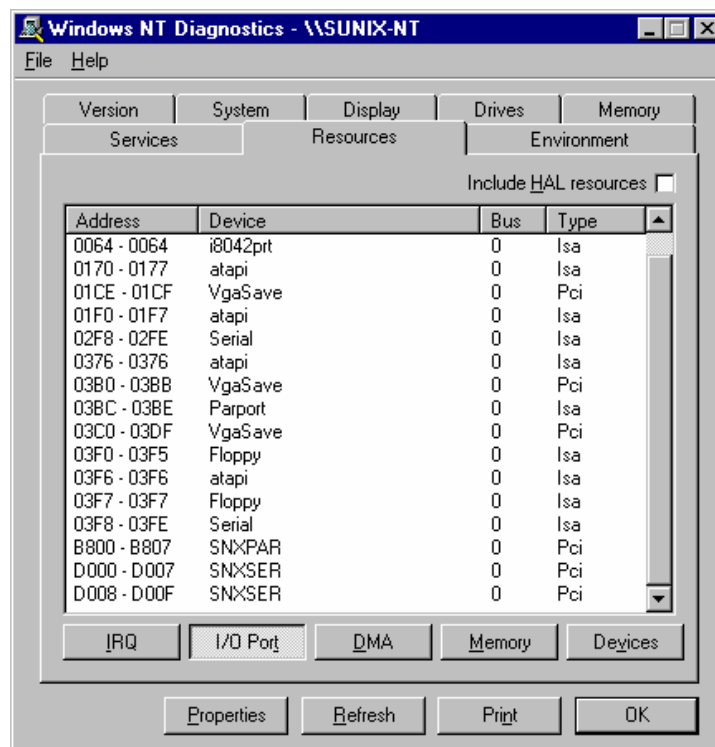
3. Click “**OK**” to reboot computer to load the new installed driver to NT.



4. Please launch the “**Windows NT Diagnostics**” from **Start → Programs → Administrative Tools [Common] → Windows NT Diagnostics**



5. Please press “**Resources**” tab page and click “I/O Port. You can find the I/O address of four serial ports (**SNXSER**). Or you can find the IRQ information by press “**IRQ**” tab page.

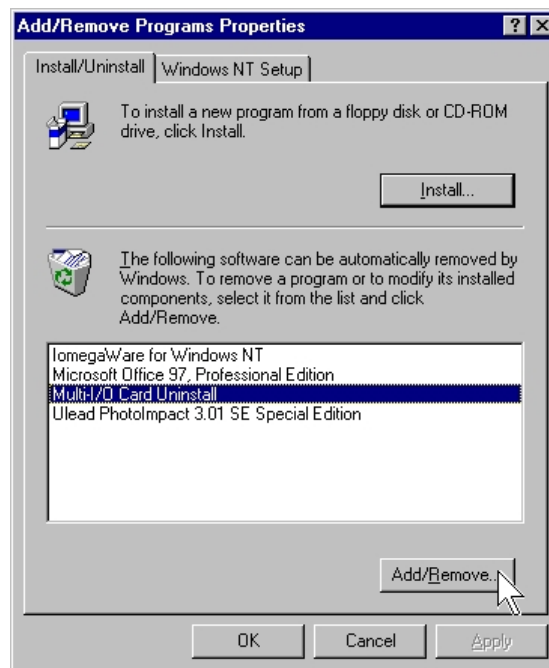


## ◆ Uninstalling Device

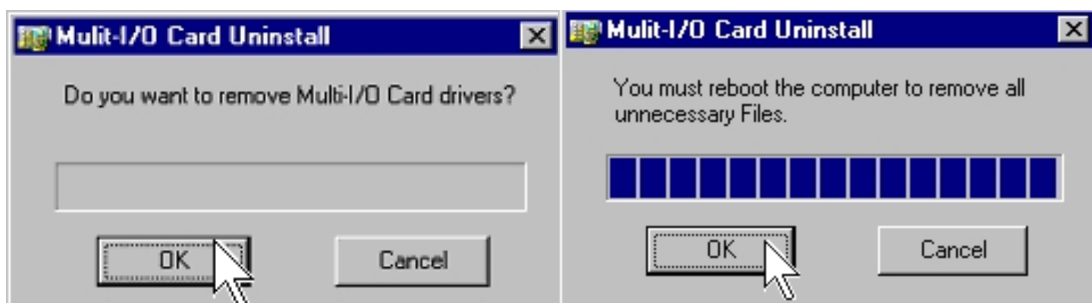
1. Double click “**Add/Remove Programs**” in control panel.



2. Select “**Multi-I/O Card Uninstall**” and click “**Add/Remove**” button.



3. Click “**OK**” to remove Multi-I/O card driver and click “**OK**” to reboot your PC.





## Windows 3.1

This installation guide describes the procedures to install the PCI-104 Serial Board in Microsoft Windows 3.1 operation system.

Normally PCI-104 Serial Board can be supported by Windows 3.1 default driver. However there are only 4 serial ports (3F8h,2F8h, 3E8h,2E8h) are supported by default.

Most likely the PCI serial ports are different from the above configuration (eg. I/O address or IRQ), these ports setting need to be changed / modified in Windows 3.1 manually. However it is necessary to inquire these PCI-104 Serial Board's resources in advance.

### ◆ Installing Driver

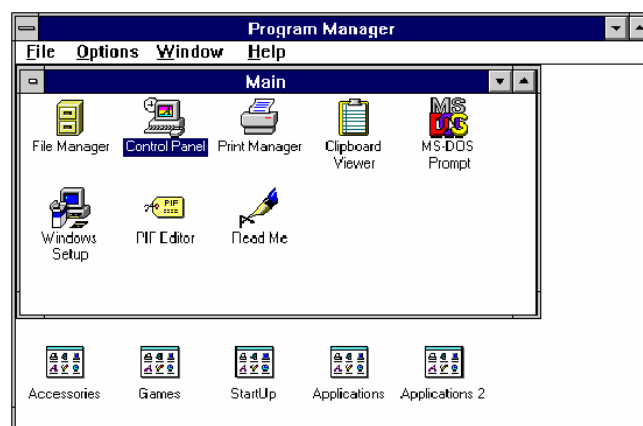
1. Please insert the CD Driver bound with PCI-104 serial board into your CD/DVD ROM, and then run **PCIDOS.exe** program.

**: \\IO\PCI IO\DOS\PCIDOS.exe**

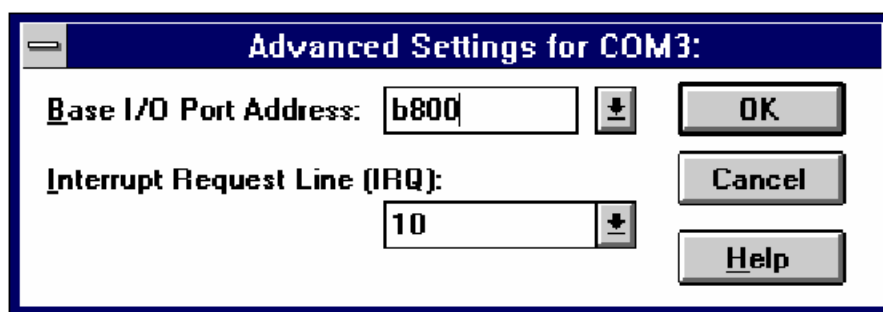
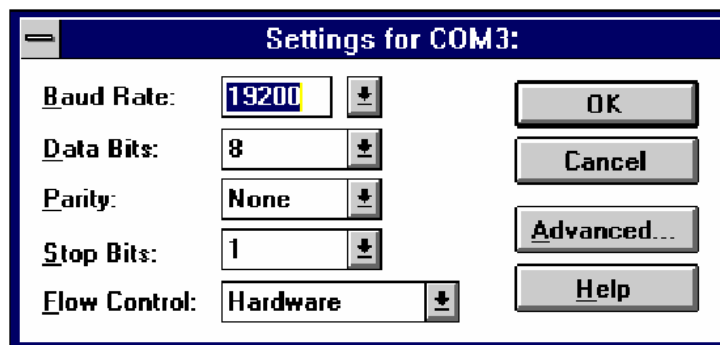
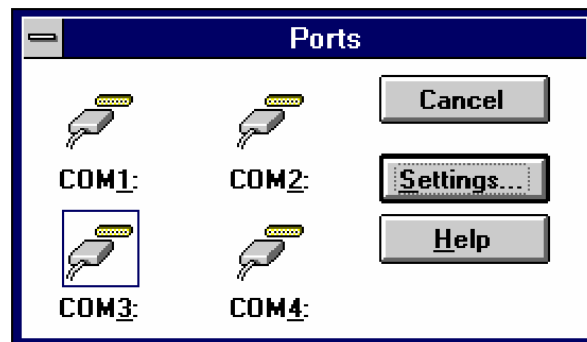
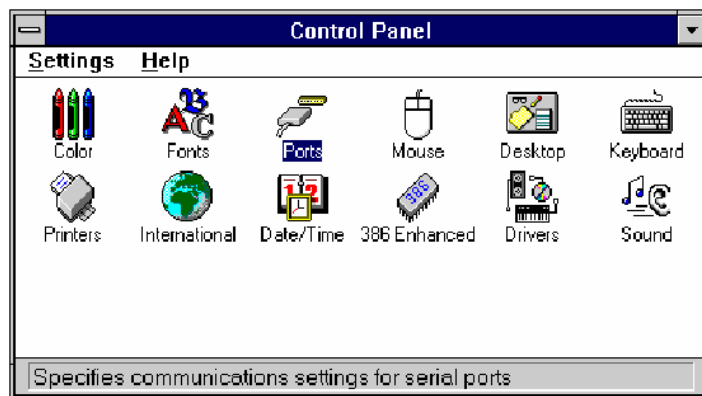


<b>On-Board/ISA Serial COM1</b>	<b>3f8H</b>	
<b>On-Board/ISA Serial COM2</b>	<b>2f8H</b>	
<b>PCI Serial COM3</b>	<b>b800H,IRQ</b>	<b>10</b>
<b>PCI Serial COM4</b>	<b>b808H,IRQ</b>	<b>10</b>
<b>On-Board/ISA Parallel LPT1</b>	<b>3bcH</b>	

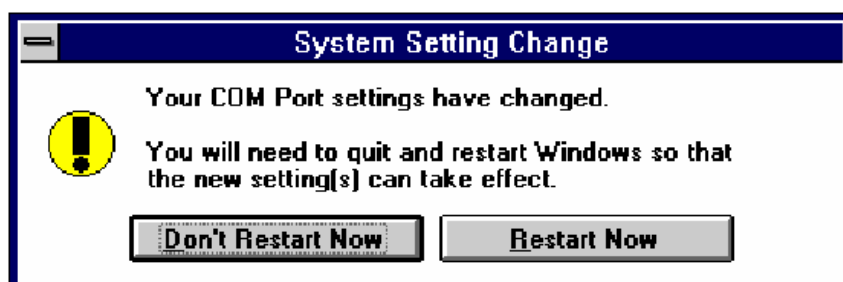
2. Start the Windows 3.1.



## 2. Change the port settings in Control Panel

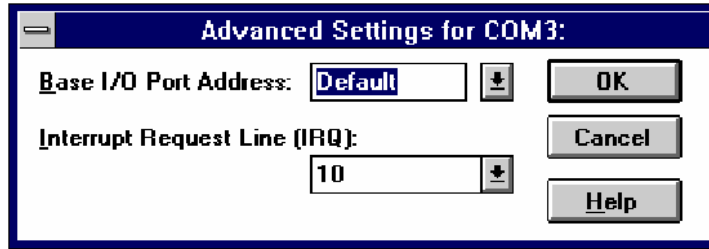


## 3. Restart the system



◆ **Check the new settings**

1. After system restart, the I/O port settings maybe become DEFAULT.



At this time, it is possible to check the PCI serial port setting in **\\windows\system.ini** file.

```
.....
.....
[386Enh]
.....
.....
COM3Base=B800
COM4Base=B808
COM3Irq=10
COM4Irq=10
.....
```

**NOTE :**

Since the PCI-104 Serial Board is drive by a higher CLK (14.7456 Mhz), thus the actual baud rate is 8 times higher than the BIOS/DOS baud rate setting. The following table shows the relation.

Clock= 14.7456 Mhz for all non-remapable port

Item	Actual Baud rate	BIOS/DOS setting	Remark
1	921600	115200	
2	460800	57600	
3	230400	28800	Non BIOS standard
4	115200	14400	Non BIOS standard
5	57600	7200	Non BIOS standard
6	38400	4800	
7	19200	2400	
8	9600	1200	
9	4800	600	Non BIOS standard
10	2400	300	
11	1200	150	
12	300	37.5	Non BIOS standard

## Windows CE.NET

This installation guide describes the procedures to install the PCI-104 Serial Board in Microsoft Windows CE.NET (Ver4.2 or 5.0) operation system on x86 systems.

### ◆ Driver Compiling

#### 1. Preparation prior to installation:

Copy driver file into the your platform BSP "File" folder.

**:IO\PCI IO\WinCE\**

(SUN1889.DLL, SUN1699.DLL, SerialCardControl.exe)

Path Example : `_WINCEROOT\Platform\MyBSP\File\`

("\_WINCEROOT" is your platform builder folder name)

("MyBSP" is your platform BSP base name)

#### 2. Install PCI-104 Serial Board Driver for PCI Bus

The platform setting must meet the following requirements.

(1) Edit the `_WINCEROOT\Platform\MyBSP\Files\Platform.bib` file,

Insert CopyFile command into the MODULES section.

("\_WINCEROOT" is your platform builder folder name)

("MyBSP" is your platform BSP base name)

;Example :

SUN1699.dll	<code>\$( _FLATRELEASEDIR )\SUN1699.dll</code>	NK	SH
SUN1889.dll	<code>\$( _FLATRELEASEDIR )\SUN1889.dll</code>	NK	SH
SerialDriverControl.exe	<code>\$( _FLATRELEASEDIR )\SerialDriverControl.exe</code>	NK	SH

(2) Edit the `_WINCEROOT\Platform\MyBSP\Files\Platform.reg` file,

Insert your serial card PCI Bus setting of file end,

\*\* Property illustration at [9.Other information] step(1).

("\_WINCEROOT" is your platform builder folder name)

("MyBSP" is your platform BSP base name)

;Example :

```
;-----  
; Sun1889 PCI Serial Card Bus Driver Setting  
; Property illustrations at [9.Other information] step(1).  
; Please puts Bus Driver setting in the PCI Template folder,  
ex:[...Drivers\BuiltIn\PCI\Template\Sunix]  
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889]  
  "Prefix"="SUN"  
  "Dll"="SUN1889.Dll"  
  "Class"=dword:07  
  "SubClass"=dword:00  
  "ProgIF"=dword:02  
  "VendorID"=multi_sz:"1409"  
  "DeviceID"=multi_sz:"7168"  
  "DeviceArrayIndex"=dword:0  
  "IsrDll"="giisr.dll"  
  "IsrHandler"="ISRHandler"  
;-----
```

- (3) Edit the `_WINCEROOT\Platform\MyBSP\Files\Platform.reg` file,  
Insert your Serial Port setting of file end,  
\*\* Property illustration at [3.Other information] step(2).  
("\_WINCEROOT" is your platform builder folder name)  
("MyBSP" is your platform BSP base name)

;Example :

```
;-----  
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889\MySerial]  
  "Prefix"="COM"  
  "Dll"="SUN1699.Dll"  
  "Class"=dword:07  
  "SubClass"=dword:00  
  "ProgIF"=dword:02  
  "VendorID"=multi_sz:"1409"  
  "DeviceID"=multi_sz:"7168"  
  "DeviceArrayIndex"=dword:1  
  "UARTIndex"=dword:1  
  "Index"=dword:2  
  "EnableRTSCTSAutoFlowControl"=dword:0
```

"WaterMarkerMode"=dword:1

"WaterMarker"=dword:1C

[HKEY\_LOCAL\_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889\MySerial\Unimodem]

"Tsp"="Unimodem.dll"

"DeviceType"=dword:0

"FriendlyName"=LOC\_FRIENDLYNAME\_SERIAL2

"DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,  
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00

-----

;Example the second Port

-----

[HKEY\_LOCAL\_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889\MySerial2]

"Prefix"="COM"

"Dll"="SUN1699.Dll"

"Class"=dword:07

"SubClass"=dword:00

"ProgIF"=dword:02

"VendorID"=multi\_sz:"1409"

"DeviceID"=multi\_sz:"7168"

"DeviceArrayIndex"=dword:2

"UARTIndex"=dword:2

"Index"=dword:3

"EnableRTSCTSAutoFlowControl"=dword:0

"WaterMarkerMode"=dword:1

"WaterMarker"=dword:1C

[HKEY\_LOCAL\_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889\MySerial2\Unimodem]

"Tsp"="Unimodem.dll"

"DeviceType"=dword:0

"FriendlyName"=LOC\_FRIENDLYNAME\_SERIAL3

"DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,  
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00

-----

```

;Example the three Port;
;-----
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889\MySerial3]
  "Prefix"="COM"
  "Dll"="SUN1699.Dll"
  "Class"=dword:07
  "SubClass"=dword:00
  "ProgIF"=dword:02
  "VendorID"=multi_sz:"1409"
  "DeviceID"=multi_sz:"7168"
  "DeviceArrayIndex"=dword:3
  "UARTIndex"=dword:3
  "Index"=dword:4
  "EnableRTSCTSAutoFlowControl"=dword:0
  "WaterMarkerMode"=dword:1
  "WaterMarker"=dword:1C

[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\PCI\Template\SUN1889\MySerial3\Unimodem]
  "Tsp"="Unimodem.dll"
  "DeviceType"=dword:0
  "FriendlyName"=LOC_FRIENDLYNAME_SERIAL4
  "DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,
  00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00
;-----

```

(4) Build your platform system.

### 3. Other information

(1) PCI Bus property : (to be careful of dword is hexadecimal)

"Prefix"="SUN" (Set "SUN")  
"Dll"="SUN1889.Dll" (Set "SUN1889.Dll")  
"Class"=dword:07 (Serial Card Class Number)  
"SubClass"=dword:00 (Serial Card SubClass Number)  
"ProgIF"=dword:02 (Serial Card ProgIF Number)  
"VendorID"=multi\_sz:"1409" (Serial Card VendorID Number)  
"DeviceID"=multi\_sz:"7168" (Serial Card DeviceID Number)  
"DeviceArrayIndex"=dword:0 (Device Array Index,zero is initializes)  
"IsrDll"="giisr.dll" (Set "giisr.dll")  
"IsrHandler"="ISRHandler" (Set "ISRHandler")

Serial Port property : (to be careful of dword is hexadecimal)

"Prefix"="COM" (Set "COM")  
"Dll"="SUN1699.DLL" (Set "SUN1699.DLL")  
"IoBase"=dword:0268 (This is you serial card IoBase jump  
Setting)

How to keeps IoBase.please reference Windows CE  
menu,Resource manager section

"IoLen"=dword:8 (Set 8)  
"SysIntr"=dword:1C (This is you serial card IRQ jump setting  
value add 16)(example : IRQ = 3, SysIntr = 13)(HEX).

How to keeps IRQ.please reference Windows CE menu,Resource manager  
section)

"Index"=dword:2 (This is you serial port number)  
(This property can be ignored.)

"EnableRTSCTSAutoFlowControl"=dword:0 (This property is setting  
hardware flow control state. this property can be ignored. default is disabled.

"WaterMarkerMode"=dword:1 (This property is setting Buffer Size (16/32  
Bytes). this property can be ignored. default is 32 Bytes.(16 Bytes : 0,32  
Bytes : 1)

"WaterMarker"=dword:1C (This property is setting FIFO level. this  
property can be ignored. default is 28bytes.(16 bytes: 1 / 4 / 8 / 15(E), 32 bytes:  
1 / 16(10) / 24(18) / 28(1C))

Unimodem property :

"Tsp"="Unimodem.dll" (Set "Unimodem.dll")  
"DeviceType"=dword:0 (please reference Windows CE menu)



"FriendlyName"=LOC\_FRIENDLYNAME\_SERIAL3 (\*\*Attention!!)

(if you want use

"LOC\_FRIENDLYNAME\_SERIAL5" (> 4) key words, you maybe need string define of the language file, please reference Windows CE menu)

"DevConfig"=hex: 10,00, ..... (please reference Windows CE menu)

- (2) If you sure, want use the same motherboard standard serial port IoBase or IRQ( 02F8, 03E8, 02E8... IRQ3, IRQ4, IRQ5). Then, Your mainboard standard serial port must be disabled. And also need to mark standard serial port registry in the platform.reg please following step.  
(please reference Windows CE menu)

(1) Disabled motherboard step.

BIOS --> CHIPSET FEATURES SETUP --> Onboard Serial Port 1--> change setting to disabled.

BIOS --> CHIPSET FEATURES SETUP --> Onboard Serial Port 2--> change setting to disabled.

BIOS --> CHIPSET FEATURES SETUP --> Parallel Port --> change setting to disabled.

(2) Mark standard serial port registry. please open platform.reg.

Find string "[HKEY\_LOCAL\_MACHINE\Drivers\BuiltIn\Serial]"

You will find this section.

```
; @CESYSGEN IF CE_MODULES_SERIAL
```

```
IF BSP_NOSERIAL !
```

```
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial]
```

```
"SysIntr"=dword:13
```

```
"IoBase"=dword:02F8
```

```
"IoLen"=dword:8
```

```
"DeviceArrayIndex"=dword:0
```

```
"Prefix"="COM"
```

```
"IClass"="{CC5195AC-BA49-48a0-BE17-DF6D1B0173DD}"
```

```
"Dll"="Com16550.Dll"
```

```
"Order"=dword:0
```

```
"Priority"=dword:0
```

```
; Turn on follows for Installable ISR (isr16550 supporting SOFTWARE  
FIFO
```

```
; "Irq"=dword:3
```

```
; "IsrDll"="isr16550.dll"  
; "IsrHandler"="ISRHandler"
```

```
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial\Unimodem]  
"Tsp"="Unimodem.dll"  
"DeviceType"=dword:0  
"FriendlyName"=LOC_FRIENDLYNAME_SERIAL  
"DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,  
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00  
ENDIF BSP_SERIAL !
```

```
IF BSP_SERIAL2  
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial2]  
"SysIntr"=dword:14  
"IoBase"=dword:03E8  
"IoLen"=dword:8  
"DeviceArrayIndex"=dword:1  
"Prefix"="COM"  
"IClass"="{CC5195AC-BA49-48a0-BE17-DF6D1B0173DD}"  
"Dll"="Com16550.Dll"  
"Order"=dword:0
```

```
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial2\Unimodem]  
"Tsp"="Unimodem.dll"  
"DeviceType"=dword:0  
"FriendlyName"=LOC_FRIENDLYNAME_SERIAL2  
"DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,  
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00  
ENDIF BSP_SERIAL2
```

```
IF BSP_SERIAL3  
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial3]  
"SysIntr"=dword:15  
"IoBase"=dword:02E8  
"IoLen"=dword:8  
"DeviceArrayIndex"=dword:2  
"Prefix"="COM"  
"IClass"="{CC5195AC-BA49-48a0-BE17-DF6D1B0173DD}"  
"Dll"="Com16550.Dll"  
"Order"=dword:0
```

```

[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial3\Unimodem]
"Tsp"="Unimodem.dll"
"DeviceType"=dword:0
"FriendlyName"=LOC_FRIENDLYNAME_SERIAL3
"DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00
ENDIF BSP_SERIAL3

```

(3) Please use ";" character mark all registry.

```

IF BSP_NOSERIAL !
;[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial]
;   "SysIntr"=dword:13
;   "IoBase"=dword:02F8
;   "IoLen"=dword:8
;   "DeviceArrayIndex"=dword:0
;   "Prefix"="COM"
;   "IClass"="{CC5195AC-BA49-48a0-BE17-DF6D1B0173DD}"
;   "Dll"="Com16550.Dll"
;   "Order"=dword:0
;   "Priority"=dword:0
;; Turn on follows for Installable ISR (isr16550 supporting SOFTWARE
FIFO
;;   "Irq"=dword:3
;;   "IsrDll"="isr16550.dll"
;;   "IsrHandler"="ISRHandler"

;[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial\Unimodem]
;   "Tsp"="Unimodem.dll"
;   "DeviceType"=dword:0
;   "FriendlyName"=LOC_FRIENDLYNAME_SERIAL
;   "DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00
ENDIF BSP_NOSERIAL !

```

```

IF BSP_SERIAL2
;[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial2]
;   "SysIntr"=dword:14
;   "IoBase"=dword:03E8

```

```

; "IoLen"=dword:8
; "DeviceArrayIndex"=dword:1
; "Prefix"="COM"
; "IClass"="{CC5195AC-BA49-48a0-BE17-DF6D1B0173DD}"
; "Dll"="Com16550.Dll"
; "Order"=dword:0

;[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial2\Unimodem]
; "Tsp"="Unimodem.dll"
; "DeviceType"=dword:0
; "FriendlyName"=LOC_FRIENDLYNAME_SERIAL2
; "DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00
ENDIF BSP_SERIAL2

IF BSP_SERIAL3
;[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial3]
; "SysIntr"=dword:15
; "IoBase"=dword:02E8
; "IoLen"=dword:8
; "DeviceArrayIndex"=dword:2
; "Prefix"="COM"
; "IClass"="{CC5195AC-BA49-48a0-BE17-DF6D1B0173DD}"
; "Dll"="Com16550.Dll"
; "Order"=dword:0

;[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial3\Unimodem]
; "Tsp"="Unimodem.dll"
; "DeviceType"=dword:0
; "FriendlyName"=LOC_FRIENDLYNAME_SERIAL3
; "DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00,
00,4B,00,00, 00,00, 08, 00, 00, 00,00,00,00
ENDIF BSP_SERIAL3

```

(3) SerialDriverControl.exe application reference "Microsoft Foundation Classes (MFC)" Library, and your platform must be include this item.(use catalog add this item) (please reference Windows CE menu)

## DOS

This installation guide describes the procedures to install the PCI serial ports in MS-DOS environment.

Normally serial I/O ports can be supported by BIOS call services in DOS environment. However there are only support 4 serial ports (3F8h, 2F8h, 3E8h, 2E8h) are supported by BIOS/DOS.

In case the PCI serial ports are different from the above configurations (e.g. I/O address or more than 4 serial ports), they are not supported by BIOS/DOS directly. However some applications (e.g. "PComm Plus" could support 8 serial ports and each I/O address is settable) have their own driver, thus PCI-104 Serial Board could work correctly.

### ◆ Installing Driver

1. Please insert the CD Driver bound with PCI-104 serial board into your CD/DVD ROM, and then run **PCIDOS.exe** program.

**: \IO\PCI IO\DOS\PCIDOS.exe**

<p><b>Please enter the directory path for installation</b> <b>C:\PCI_DOS</b> (return for default)</p>
---

2. Enter the destination subdirectory

You could enter your preferred destination subdirectory for installation, RETURN for default path. Once the dos driver has been installed successfully, the response looks like below.

<p><b>succeed ...Press Any Key</b></p>
--

#### **Note:**

- (1). The installation program will add the dos driver (one command line) "C:\PCI\_DOS\PciDos.exe AUTO" to autoexec.bat file. The original batch file will be saved to autoexec.SNX.
- (2). For uninstallation, just restore autoexec.snx into autoexec.bat.

### 3. Start the dos driver automatically

Once the installation is completed, Install.exe will start the dos driver (PciDos.exe) automatically. This means that it is not necessary to restart the system once again.

<b>On-Board/ISA Serial COM1</b>	<b>3f8H</b>
<b>On-Board/ISA Serial COM2</b>	<b>2f8H</b>
<b>PCI Serial COM3 Remap</b>	<b>3e8H,IRQ 11</b>
<b>PCI Serial COM4 Remap</b>	<b>2e8H,IRQ 11</b>
<b>On-Board/ISA Parallel LPT1</b>	<b>3bcH</b>

Note : This display is dependent on which PCI card you have.

### 4. Check / inquire the PCI card information

You could run SunixPCI.exe any time to inquire the PCI serial and parallel port's I/O address & IRQ information.

ISA	PCI	Setup	Card	About
On-Board/ISA Serial COM1			3f8H	
On-Board/ISA Serial COM2			2f8H	
PCI Serial COM3 Remap			3e8H,IRQ	11
PCI Serial COM4 Remap			2e8H,IRQ	11
On-Board/ISA Parallel LPT1			3bcH	

ESC: Exit

ISA (ALT-I) : Detect on-board/ISA legacy serial /parallel ports.

PCI (ALT-P) : Find PCI serial /parallel ports.

Setup (ALT-S) : Remap PCI serial port to legacy port/display port resources.

Card (ALT-C) : Display PCI card model.

Store (ALT-R) : Store a configuration file to c:\snxcfg.txt

In this file the user find detailed information of every port from all PCI cards in the Slot.

In the program window the user can see only the first ten ports, in the file snxcfg.txt all ports of all PCI Cards are listed.

About (ALT-A) : Version Information.

**NOTE :**

Since the PCI-104 Serial Board is drive by a higher CLK (14.7456 Mhz), thus the actual baud rate is 8 times higher than the BIOS/DOS baud rate setting.

The following table shows the relation.

Clock= 14.7456 Mhz for all non-remapable port

Item	Actual Baud rate	BIOS/DOS setting	Remark
1	921600	115200	
2	460800	57600	
3	230400	28800	Non BIOS standard
4	115200	14400	Non BIOS standard
5	57600	7200	Non BIOS standard
6	38400	4800	
7	19200	2400	
8	9600	1200	
9	4800	600	Non BIOS standard
10	2400	300	
11	1200	150	
12	300	37.5	Non BIOS standard

## Linux

This installation guide describes the procedures to install the PCI-104 Serial Board in Linux kernel 2.0.x, 2.2.x, 2.4.x and 2.6.x.

The following demonstration is showing the compiling steps under kernel 2.4.x or 2.6.x. Or you can check the other Kernel version in CD driver as bound with PCI-104 serial board.

**: \IO\PCI IO\Linux\**

### ◆ Overview

1. Please insert the CD driver as bound with PCI-104 serial board into you CD or DVD ROM. Then open the folder :

**: \IO\PCI IO\Linux\Kernel2.6.x\**

This package contains patches to the Linux kernel sources for both 2.4.x and 2.6.x series kernels. The patch modifies the serial driver provided by the kernel and will add an additional kernel module which handles card detection.

2. There are separate patches for 2.4.x and 2.6.x kernel versions in the folder.

The 2.4.x patch has been tested with the Linux kernel source version 2.4.20 and 2.4.27. However, it should work with other versions as well.

The 2.6.x patch has been tested with the Linux kernel source version 2.6.8.1. However, it should work with other versions as well.



## ◆ Installation Steps

In order to apply the patch the Linux kernel sources need to be installed and the kernel needs to be compiled. Refer to the documentation that came with your Linux distribution for information on how to do that.

Normally, the kernel sources will be installed under **/usr/src/linux**. Often, this directory is a symbolic link that points to the location where the sources reside.

When the kernel sources are installed and you are able to successfully build a kernel then follow the installation instructions given below to apply the patch.

### Kernel 2.4.x

1. Copy the patch file `sunix_multi_io_patch_2.4.x.diff` to `/usr/src`.
2. Change to the directory `/usr/src/linux`.
3. To apply the patch issue the following command:  
`patch -p1 < ../sunix_multi_io_patch_2.4.x.diff`  
Warnings produced by patch can be ignored.
4. To configure the kernel run the following command:  
`make menuconfig`  
Alternatively, you can use the command recommended by your Linux distribution, e.g. `make xconfig`
5. In the kernel configuration menus make sure that the options `parport`, `parport_pc` and `serial` are selected.  
These options can be found at the following locations:  
Parallel port support ->  
    `parport`  
Parallel port support ->  
    PC-style hardware ->  
        `parport_pc`  
Character devices ->  
    Standard/generic (8250/16550 and compatible UARTs) serial support  
        -> `serial`

If one of these options is selected to compile as a module then the PCI-104 serial board support has also to be compiled as a module. See the next step for details.

6. Now the following new kernel config option is available:

Character devices ->

Standard/generic (8250/16550 and compatible UARTs) serial support ->

Sunix Multi I/O PCI Card support

Enable the option "Sunix Multi I/O PCI Card support". If one of the options parport, parport\_pc or serial in the previous step was selected to compile as a module then this option has also to be compiled as a module.

7. Build and install the kernel. Refer to the documentation of your Linux distribution for more information on the required steps.

8. When the new kernel is running, the driver will be automatically loaded and initialized if compiled as a static driver. If the SUNIX driver was compiled as a module then it needs to be loaded with the following command:

```
modprobe snx_multi_io
```

You can decide to add this command to an init script.

Now the PCI-104 Serial Board driver should work and the serial ports are available to the system.

## Kernel 2.6.x

1. Copy the patch file `sunix_multi_io_patch_2.6.x.diff` to `/usr/src`.

2. Change to the directory `/usr/src/linux`.

3. To apply the patch issue the following command:

```
patch -p1 < ../sunix_multi_io_patch_2.6.x.diff
```

Warnings produced by patch can be ignored.

4. To configure the kernel run the following command:

```
make menuconfig
```

Alternatively, you can use the command recommended by your Linux distribution, e.g. `make xconfig`

5. In the kernel configuration menus make sure that the options `parport`, `parport_pc` and `serial` are selected.

These options can be found at the following locations:

```
Device Drivers ->
```

```
Parallel port support ->
```

```
parport
```

```
Device Drivers ->
```

```
Parallel port support ->
```

```
PC-style hardware ->
```

```
parport_pc
```

```
Device Drivers ->
```

```
Character devices ->
```

```
Serial drivers ->
```

```
8250/16550 and compatible serial support ->
```

```
serial
```

If one of these options is selected to compile as a module then the PCI-104 serial board support has also to be compiled as a module. See the next step for details.

6. Now the following new kernel config option is available:

```
Device Drivers ->
```

```
Character devices ->
```

```
Serial drivers ->
```

```
Sunix Multi I/O PCI Card support
```

Enable the option "Sunix Multi I/O PCI Card support". If one of the options parport, parport\_pc or serial in the previous step was selected to compile as a module then this option has also to be compiled as a module.

7. Check the following kernel configuration parameter:

Device Drivers ->

Character devices ->

Serial drivers ->

8250/16550 and compatible serial support ->

Maximum number of non-legacy 8250/16550 serial ports

Make sure that this parameter is set to the number of external serial ports available on PCI cards + 4. For example, if you use an 8 serial ports card then this parameter needs to be set to 12.

If you use two such cards then the parameter needs to be set to 20.

8. Build and install the kernel. Refer to the documentation of your Linux distribution for more information on the required steps.

9. When the new kernel is running, the SUNIX driver will be automatically loaded and initialized if compiled as a static driver. If the SUNIX driver was compiled as a module then it needs to be loaded with the following command:

```
modprobe snx_multi_io
```

You can decide to add this command to an init script.

Now the PCI-104 serial board driver should work and the serial ports of your card are available to the system.

## Device Files

-----  
After you installed your Linux system there will be a default set of device files in /dev. For each serial port you plan to use there needs to be a device file named /dev/ttySN, where N is an integer number usually starting at zero. Issue the following command to list the existing serial device files:

```
# ls -al /dev/ttyS*
```

Note that usually the first 4 device files (/dev/ttyS0../dev/ttyS3) will be assigned to on-board serial ports (COM1..COM4). External serial ports, which include the SUNIX ports, will be assigned to /dev/ttyS4 and higher numbers. If there are not enough /dev/ttySN device files available by default, you have to create further device files manually.

For example, if you use an 8 ports serial card then you have to ensure that /dev/ttyS4 to /dev/ttyS11 do exist in your system.

How to create additional device files?

You should first try to use the MAKEDEV script. This script is usually located in /dev/MAKEDEV but might also have a copy (or a symbolic link) in /sbin/MAKEDEV. The command is used as follows:

```
# /dev/MAKEDEV -v ttyS8
```

Repeat this command for any device file you need to create.

Note: On some Linux distributions it may be necessary to use the mknod command to create device files. Consult your Linux documentation for information on how to do that. Using MAKEDEV is the preferred way.

After you created additional device files you should set the correct ownership and access mode on these files. Issue an

```
# ls -al /dev/ttyS0
```

command to see the mode set on the first device file.

Use the chown and chmod commands to set the same rights on the newly created files, for example:

```
# chown root:root /dev/ttyS8
```

```
# chmod 555 /dev/ttyS8
```

Repeat these commands for any device file you created.

# 4.

## Troubleshooting

---

This chapter shows some problems that user came with usually. Also you can check it if the PCI-104 serial board can not work properly in your system after following hardware and software installation steps.

## Troubleshooting

### 1. System fails to find the PCI-104 serial board or COM port.

**A:** It may cause by following issue:

- a. The board is not properly plugged into the PCI-104 or PC/104 Plus slot.
- b. The mainboard does not have an available IRQ for the CP-104UL board. Enter the PC.s BIOS and make sure an IRQ setting is available in the PCI/PnP settings.
- c. Please confirm the jumper is setting properly. You can back to page 2-5 affirm ID, Clock, and Interrupt settings fitting your mainboard and NOT conflictrd with other PCI-104 serial board.
- d. The board itself might be defective. You can try another mainboard testing this board working or not.

### 2. There is a blue screen when I entry operation system.

**A:** The possible reason is an IRQ or I/O address conflict with other PC/104 ISA Bus adapters, such as LAN or serial boards, or with the system BIOS. Refer to the corresponding problem in the previous FAQ for solutions.

### 3. After the system reboots, I can not see this PCI-104 Serial Board shown on the “PCI DeviceList” display.

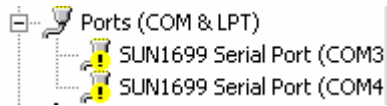
**A:** After rebooting (before operation system starting), system will show the following information in the PCI devive list:

Bus No	Device No	Func No	Vendor ID	Device ID	Device Class	IRQ
2	9	0	1409	7168	Simple Comm. Controller	10

This indicates that this serial board was found.

If you do not see this information, please confirm the IRQ conflicts with another adapter. Check the PCI BIOS IRQ settings and then select an available IRQ for the serial boards. Also the board itself might be defective. You can try another mainboard testing this board working or not.

**4. There are some exclamation marks in device manager and serial ports can not work properly.**



**A:** It caused by the wrong driver installing or hardware settings. Please turn off your computer firstly and re-install hardware and software.

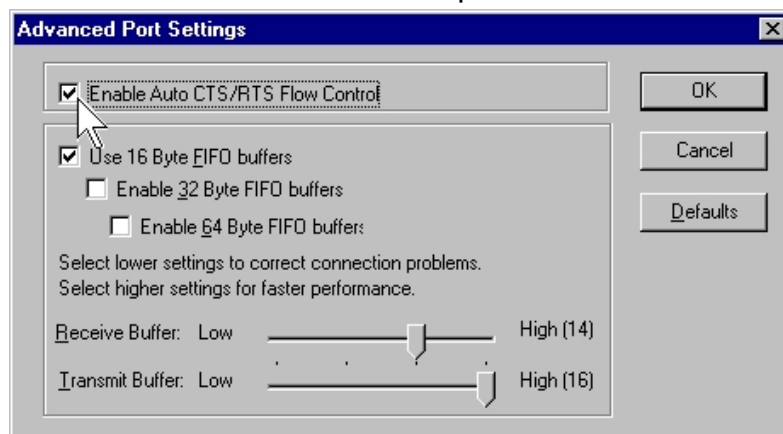
**5. Can I set the same ID with other PCI-104 serial board or system?**

**A:** NO, you can not set the same ID number with other PCI-104 board on your system. There will be a conflict with both two cards. One PCI-104 mainboard only supports 4 PCI interface added-on cards at most.

**6. How large FIFO length I should set?**

**A:** PCI-104 serial board supports 32 bytes FIFO, and you can use 0,16 or 32 4 bytes FIFO. The default value is 16 Byte FIFO buffers.

Set the Receive/Transmit Buffer to higher value will get faster performance because the interrupts will be reduced, but the time for interrupt service routine will become shorter. The receive buffer overflow will be easily happened if the CPU speed is not enough to handle. If the system is not stable, select the lower value to correct problems.



**7. Should I enable auto flow control features?**

**A:** Enable Auto CTS/RTS Flow Control means the CTS/RTS flow control is controlled by hardware automatically. System will be more stable if the function is enabled.

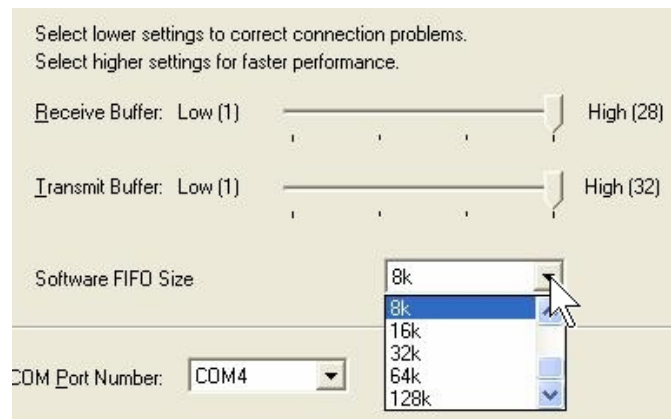


## 8. Shall I set Software FIFO?

**A:** FIFO (First-in-First-out) buffers are used to reduce the frequency of interrupt processes for UART chips. The size of the buffer will determine the number of times the cards need to interrupt the computer's CPU in order to process a string of data. With larger FIFO buffer size; there is more data flow and less interruption to the CPU, therefore allowing the CPU to be free to handle other more crucial tasks.

This Serial I/O Communication Boards can provide users with up to 128K byte of FIFO buffer size for high system performance. Embedded within unique serial driver, we have added the function which allows users to assign part of the system's DRAM memory to act as the FIFO buffer for the cards. Users can also assign various size of memory depends on their requirement. With the large buffer capacity, users can have more improved performance and increased efficiency to their systems.

PCI-104 serial board driver supports software FIFO for serial port under Windows 2000, XP and 2003 operation system.



This FIFO is used to buffer data on the receive path. The size of the FIFO can be configured in the advanced property page of the driver. It allows setting between 128byte to 128 kilo byte. The setting of the software size can be chosen individually for each port.

The selected software FIFO size is allocated from kernel memory. This memory can not be used by different application. If a lot of serial ports are used on a system with a small memory size selection of a large software FIFO size may cause problem. Increase the size of the physical memory of the PC in the case. The software FIFO may help to make data transfer on the serial port more reliable.

You can go to page 3-8 checking how to set software FIFO.

**9. I am confused in installing Windows 2000, XP, and 2003 driver. One is Microsoft WHQL certified, and the other is not. Which one I should install ?**

**A:** Both WHQL and none-WHQL drivers all can work finely under Windows 2000, XP and 2003. None-WHQL driver equips 128K byte software FIFO features but WHQL driver does NOT. If you install none-WHQL driver into your system, there will be an **Digital Signature Warring message** show up. You can skip this message.



**10. What's WHQL certified driver?**

**A:** This logo represent that this driver pass through Microsoft **Windows Hardware Quality Labs** (WHQL). It had been verified by Microsoft® Windows® Logo Program for hardware with the hardware and software compatibility testing. This driver will working finely on your system without any conflicting with your operation system.



# 5.

## Appendix

---

This chapter shows PCI-104 serial board core technologies and shows you how to contact with us for information about this and other products.

In this appendix, we cover the following topics.

- ◆ **Core Technologies**
- ◆ **Contract Information**

## Core Technologies

Our R&D team is experienced and expert at many advanced technologies needed for manufacturing highly- reliable data communication products.

This PCI-104 serial board equips many hardware and software features for users easily equipping in kinds of critical or harsh factory and industrial environment. It's also the best solution for all of industrial communication and automation application.

### ◆ High Performance & Intelligent ASIC SUN1889 & SUN1699

SUN1889 and SUN1699 are high performance and intelligent 16C650 UART. It's not only for full compatibility with Microsoft OS series and Linux, but also allowing us to offer complete support for driver and technological change on kinds of Serial interface including RS-232 / 422 / 485.



### ◆ Microsoft WHQL Certification Approval

In order to make the systems more stable and compatible, We design our own chipsets which enable us to provide full support for our I/O products with WHQL certified. In addition, we have received numerous industrial certifications, among them is the ISO 9001:2000, and customers can ensure the best product quality offered.



◆ **High Efficiency 128K byte FIFO**



FIFO (First-in-First-out) buffer size decides the interrupt frequency to the computer's CPU. The bigger the size of the FIFO buffer, the more of the data flow, the system will work consistently at anytime and the resource of CPU will be saved, therefore the system performance can be dramatically increased. We provide large capacity size of 128K byte FIFO buffer memory; it is 1024 times faster than the current existing PCI-Bus serial card on the market. The unique 128K FIFO technology design is the leader in the I/O industrial circles.

◆ **RS-422/485 Auto Identify & Switch Technology**



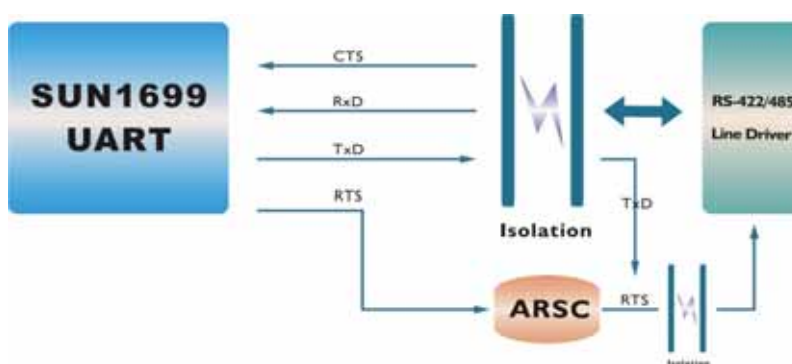
The unique circuit-designed RS-422/485 Auto Identify & Switch technology can automatically identify the state of RS-422 full-duplex or RS-485 half-duplex and control the data transceiver and receiver wires at the same port without selecting jumpers or switches anymore. It's more convenient for users to avoid shutting down the computer and opening the chassis for jumpers or switches setting.

◆ **RS-485 ARSC™ Technology**



Due to the limitation of traditional RS-485 two wires half-duplex communication, system must determine when to switch the transmitter on and off. There is only one node can be switch on and off at any given time by software. ARSC™ (Auto RTS Signal Control) technology can identify the status of data transceiver or receiver and send RTS signal automatically, instead of using software/hardware to control the transmitter.

This PCI-104 RS-422/485 serial board has built-in ARSC™ technology now. System can manage the RS-485 ports without writing extra code to control the half-duplex protocol by using ARSC™ technology.



## ◆ Termination Resistors Building In

When an electrical signal travels through two different resistance junctions in a transmission line, the impedance mismatch will sometimes cause signal reflection. Signal reflection causes signal distortion, which in turn contributes to communication errors. The solution to this problem is to establish the same impedance at the line ends as in the line itself by terminating them with resistors. It is normally sufficient when the value of the termination resistor equals the characteristic impedance of the transmission line. PCI-104 RS-422/485 serial board builds in termination resistors to prevent those problems.

## ◆ Optical Isolation Protection (Optional)



The ground loop is a common problem in many industrial environments, especially in the state of ground voltage levels differ between connected devices in the type of critical or harsh factory environment when transmission line is long. Communications devices connected by long cables may be damaged by the mismatch between ground voltage levels at the two ends of the wire. Optical isolation uses photo cells at both ends of the line to isolate the devices' sensitive components from this type of electrical damage. PCI-104 serial board provides 2.5KV optical isolation for power and signals to eliminate this kind of problem.

## ◆ Surge Protection (Optional)



Surges are high amplitude electrical pulses lasting only several millionths of a second in duration. They can be caused by heavy-duty equipment, power lines, short circuits, or large motors. A surge suppressor has the ability to effectively absorb the high energy in an extremely short period of time, preventing the connected devices from damage. To eliminate this problem, we provide the embedded 600W surge protection for all signals.

## Contract Information

Customer satisfaction is our number one concern, and to ensure that customers receive the full benefit of our products, SUNIX services has been set up to provide technical support, driver updates, product information, and user's manual updates.

The following services are provided

E-mail for technical support

..... [info@sunix.com.tw](mailto:info@sunix.com.tw)

World Wide Web (WWW) Site for product information:

..... <http://www.sunix.com.tw>