

***Single and Dual Port PCI Bus* CE**
RS-232 Serial Card

232PCI1A 232PCI1B

232PCI2A 232PCI2B

Documentation Number 232PCIXX4502

Each of these models is an RS-232 serial card and uses the same printed circuit board. The "1" and "2" suffix designates the number of ports on the card. The "A" models are equipped with 16550A UARTs with 16 byte transmit and receive buffers. The "B" models come with 16850 UARTs with 128 byte transmit and receive buffers. The model number of each card is printed on a sticker on the board.

*This product designed and manufactured in Ottawa, Illinois USA
of domestic and imported parts by*



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Chapter 1: **GENERAL INFORMATION**

Introduction

The B&B Electronics 232PCI1A, 232PCI1B, 232PCI2A and 232PCI2B serial interface cards are designed for IBM compatibles with a PCI Bus. The PCI design is Plug and Play compatible which allows the driver and Operating System to select the IRQ and addresses used by the card.

If you are writing your own applications, be sure the communications routine used supports Windows communication drivers and a wide range of COM ports.

Description

The 232PCI1x is a one port card and the 232PCI2x is a two port card. All versions offer high speed RS-232 communications with the 4X clock option enabled. Buffered, high speed UARTs (16550A or 16850) make it ideal for high speed (modem) and multitasking applications.

Features

- IBM compatible, PCI Version 2.1 bus
- Supports baud rates to 460.8K baud with 4X clock option enabled
- One or two port high speed RS-232 serial card
- Supports all standard RS-232 lines: TD, RD, RTS, CTS, DTR, DSR, DCD, RI and Signal Ground.
- Drivers for Windows 95, 98, 2000, and NT 4.0
- Available models:

Model 232PCI1A – 1 Port with 16 byte FIFO 16550A UARTs

Model 232PCI1B – 1 Port with 128 byte FIFO 16850 UARTs

Model 232PCI2A – 2 Ports with 16 byte FIFO 16550A UARTs

Model 232PCI2B – 2 Ports with 128 byte FIFO 16850 UARTs

Specifications

Bus: PCI bus version 2.1
Slot: Requires one PCI slot
Dimensions: 6.2 x 4.2 in (15.8 x10.7 cm)
I/O Connections: 9 pin male D-sub (DB9M) connectors
OS Supported: Windows 95, 98, 2000, and NT 4.0
Baud rates: 460.8K baud maximum
UARTs: 16550A 16 byte TX and RX buffers (**232PCI1/2A**), or
16850 128 byte TX and RX buffers (**232PCI1/2B**)

Character length: 5, 6, 7, or 8 bits
Parity: Even, odd or none
Stop bits: 1, 1.5, or 2

RS-232 Control Lines Drivers/Receivers:

Device: 75185 Transceiver
High level output voltage: 6.0 V minimum
Low level output voltage: -6.0 V minimum
Output current limited to: ± 10 mA
Input high threshold voltage: 1.5 V maximum
Input low threshold voltage: 0.75 V minimum
Device will withstand: ± 30 V

RS-232 Data Lines Drivers/Receivers:

Device: SP211H Transceiver
High level output voltage: 5.0 V minimum
Low level output voltage: -5.0 V minimum
Output current limited to: ± 25 mA
Input high threshold voltage: 1.7 V maximum
Input low threshold voltage: 0.8 V minimum
Device will withstand: ± 15 V

Max Power Consumption: All ports loaded

| Voltage (V) | 232PCI1x | | 232PCI2x | |
|--------------|-----------------|--------------|-----------------|--------------|
| | Current (mA) | Power (W) | Current (mA) | Power (W) |
| +5 | 235.0 | 1.175 | 286.0 | 1.430 |
| +12 | 31.0 | 0.372 | 62.0 | 0.744 |
| -12 | 31.0 | 0.372 | 62.0 | 0.744 |
| Total | 297.0 | 1.919 | 410.0 | 2.918 |

Accessories:

Software: Driver Disk (3.5) for Windows 95/98/2000/NT 4.0
 PCI/USB COM Port Utility Disk (3.5)

Manual: Instruction Manual (this booklet)

Chapter 2: *SETUP*

Inspection

Your 232PC1xx serial card was tested for proper operation before shipment. It should be in perfect mechanical and electrical condition upon receipt.

The data clock speed is set by one jumper to x1 (normal) operation or to x4 operation. Dual port cards share the single master clock.

CAUTION: ELECTROSTATIC SENSITIVE DEVICE
Use ESD precautions for safe handling.

Before removing the card from the anti-static protective packaging.

- Discharge any static electricity buildup on your body by touching a large grounded metal surface or the metal chassis on equipment connected to earth ground by a 3-wire power cord.
- Avoid touching the gold connectors or other parts on the card except as necessary. After setting the jumper, ground yourself to the computer chassis before and while inserting the card.
- Remove AC power from the computer and unplug the power cord before inserting the card.
- Retain the ESD bag for handling the card.
Save the packaging for storage or shipping.

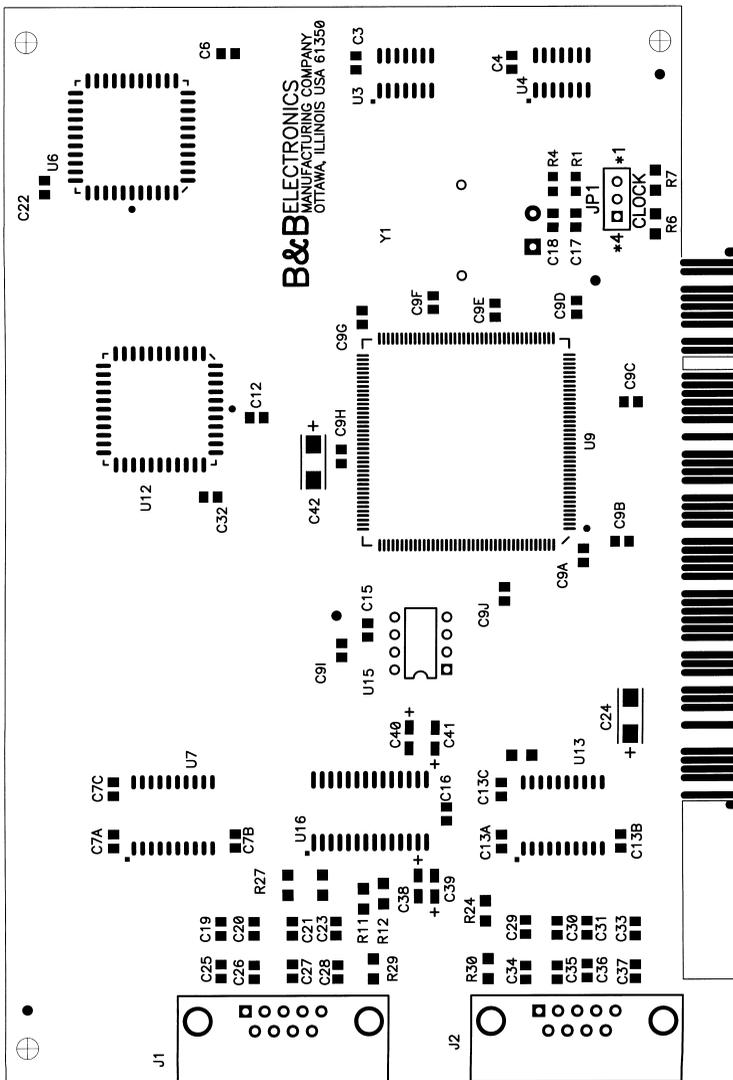


Figure 1. Silk Screen Plot of 232PClxx PCB

4X Baud Rate Option

Baud rates higher than 115,200 are possible with the 232PC1xx card. Jumper JP1 controls the clock frequency supplied to the UARTs. By moving this jumper to the “*4” (left) position, the clock frequency is increased from 1.8432 to 7.3728 MHz. This multiplies all UART baud rates by 4 times. For example, if the software is set for 57.6K baud, the actual baud rate will be increased by a factor of four to 230.4K baud. In many systems, these higher baud rates can improve throughput significantly. However, remember that baud rates and actual throughput are only proportional if the system can keep up with the communications, otherwise increasing the baud rate effectively only increases the idle time between characters.

Installing the Card

1. Ground yourself by touching the metal chassis of the computer to discharge any static electricity.
2. Turn the power to your computer off and unplug the power cord.
3. Remove the cover of the computer.
4. Locate a free PCI expansion slot.
5. Remove the expansion slot cover. Save the screw for installation of the 232PC1xx card.
6. Install the card into the unused slot. Be certain that the card is inserted completely (fully seated) in the slot.
7. Secure the card with the mounting screw from step 5.
6. Replace the cover, plug in the power cord, and power up the system.

Table 1: RS-232 Pinouts

| Name | Description | Direction | DB9M Pin |
|-------------|---------------------|------------------|-----------------|
| DCD | Data Carrier Detect | Input | 1 |
| RD | Receive Data | Input | 2 |
| TD | Transmit Data | Output | 3 |
| DTR | Data Terminal Ready | Output | 4 |
| GND | Signal Ground | ----- | 5 |
| DSR | Data Set Ready | Input | 6 |
| RTS | Request to Send | Output | 7 |
| CTS | Clear to Send | Input | 8 |
| RI | Ring Indicator | Input | 9 |

Pinouts

The male DB-9 male connectors on the 232PClxx cards are configured as standard DTE RS-232 serial ports. Table 1 lists signal names and pin numbers.

Chapter 3: *WINDOWS INSTALLATION*

Windows 95 and Windows 98

Any prior installation using previous B&B serial drivers must be removed before installing the new drivers. (Refer to page 16.)

Windows 98 screens are shown for this section. Windows 95 is a bit different with fewer steps and the screen names and text shown differs. Windows 95 differences are noted (*W95:...*)

1. Configure the card for x1 or x4 Clock Speed.
2. Install the card in the slot, start the computer.
3. Windows will detect the PCI card, start the Add New Hardware Wizard, and begin driver installation. When installation is complete, Windows will set the hardware addressing & interrupt using the drivers and the Plug and Play function of the Operating System.
4. The driver installation proceeds in two parts, the first part installs the driver for the PCI Serial card, the second part installs the serial driver for the Com Port A & B (Port A=Port 1, Port B=2).

NOTE: The single or dual-port RS-232 PCI Serial Adapter cards will be identified as the 3PCISD1 (232PCI1x) or 3PCISD2 (232PCI2x) by the drivers. They are functionally the same to the Operating System, except for the number of ports supported.

continued next page

5. After new hardware is detected, this screen will appear.
(W95: This screen is named Update Device Driver Wizard).



6. Click **Next** to continue. (W95: Insert the Driver Disk in Drive, then click Next - skip to step 9)

continued next page



7. Click **Next**.



8. Select **Floppy disk drives**, Specify **A:**

9. Insert the driver disk, then Click **Next**.

Windows will find PCI Serial Adapter (3PCISD1) for the 232PCI1x or 2-Port PCI Serial Adapter (3PCISD2) for the 232PCI2x and the driver inf file. (*W95: Driver name not shown - skip to step 11*)



10. Click **Next**.



11. Click **Finish** to begin the second part of the driver installation which installs the Com port driver for Port A & B.



12. Click **Next**. (W95: Skip to step 15)



13. Click **Next** to continue. Re-insert the driver disk if needed. Windows will find the Communications Port and inf file.



14. Click **Next**. (*W95: Driver name not shown*)

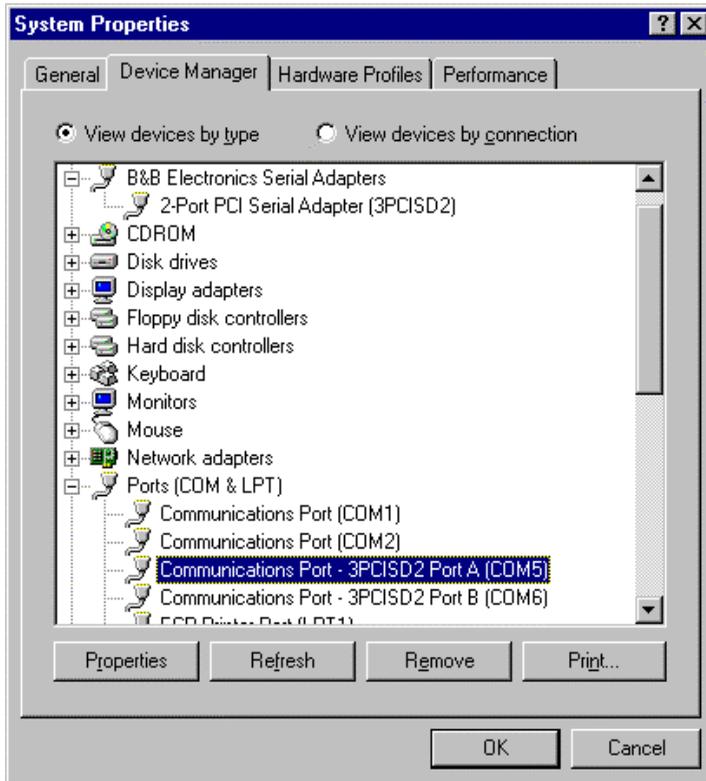


15. Click **Finish** to complete Com driver installation.

The computer will finish Com driver installation for Port A, then search, find and install the driver for Port B without requiring any more user input.

16. Wait for the process to complete.
17. You can now remove the driver disk, close the Windows, and check the new ports with your software.

Then select the **Device Manager** Tab.



Click the **B&B Electronics Serial Adapters** device to view the adapter. If you want other details, Select **Properties**.

Click **Ports (COM & LPT)** to view the COM numbers assigned by Windows to the card.

The single port card will have 3PCISD1 Port A (COMx) and the dual port card will have 3PCISD2 Port A (COMx) and Port B (COMx). The COM port numbers will normally be COM5, COM6, if available.

NOTE: The 232PCI1x will be identified as 1-Port PCI Serial Adapter (3PCISD1). The 232PCI2x will be identified as the 2-Port PCI Serial Adapter (3PCISD2). The cards and drivers are functionally the same to the Operating System.

18. You can now remove the driver disk, close the Windows, and check the new ports with your software.

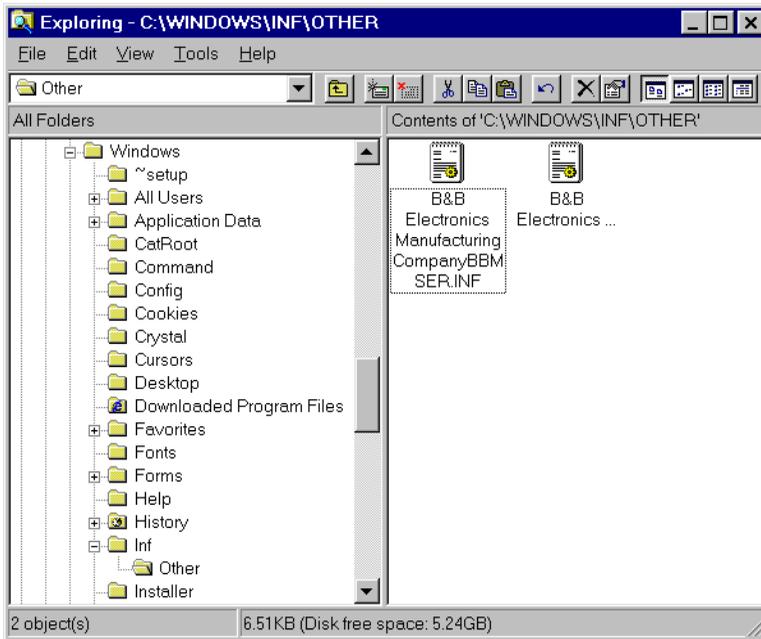
If your software requires accessing a COM port below COM5, and you have unused COM numbers not occupied by a FAX/Modem or other device, you can re-assign the PCI card COM numbers using our B&B PnP COM Rename utility. Refer to Appendix D.

To verify the installation, open **My Computer, Control Panel, System** (or Start, Setting, Control Panel, System).

Removal of Card And Drivers

If you need to remove the card from your system or remove the current driver before installing a possible future driver upgrade:

1. Open **My Computer, Control Panel, System** (or Start, Setting, Control Panel, System).
2. Select the **Device Manager** Tab. (See figure on previous page.)
3. Click **B&B Electronics Serial Adapters**, then Select the **2-Port PCI Serial Adapter (3PCISD2)** or **1-Port PCI Serial Adapter (3PCISD1)**.
4. Click the **Remove** button.
5. Close the Windows, and Open **My Computer, Drive C:**
6. Open the Windows directory on your Hard Drive, then Open the Inf folder, then Other. (If the Inf folder is not shown, it is hidden; Select **View, Folder Options, Files and Folders, Show** all files. Win95: Select **View, Options, View, Show** all files.)



7. Remove the B&B INF files. (*BBMSER.INF & *BBMSER95.INF) Close the Window.
8. Shut down the computer, then remove the card.

continued next page

Windows 2000 Professional

This section covers device driver installation for Windows 2000 Professional.

1. Set the Clock speed jumper as needed to x1 or x4.
2. Install the card in the slot, start the computer as an Administrator or ask your system administrator to install the software.
3. Windows will detect the PCI card and start Found New Hardware Wizard, to begin driver installation. When installation is complete, Windows will set the hardware addressing & interrupt using the drivers and the Plug and Play function of the Operating System.
4. After the driver for the PCI Serial Card installs, the serial driver for the Com port will be installed once for each port on the card.



5. Click **Next** to continue.



6. Select Search, Click **Next**.



7. Insert the driver disk in the **Floppy disk** drive A: Click **Next**..



8. Click **Next**.



9. Click **Finish** to complete the Install.

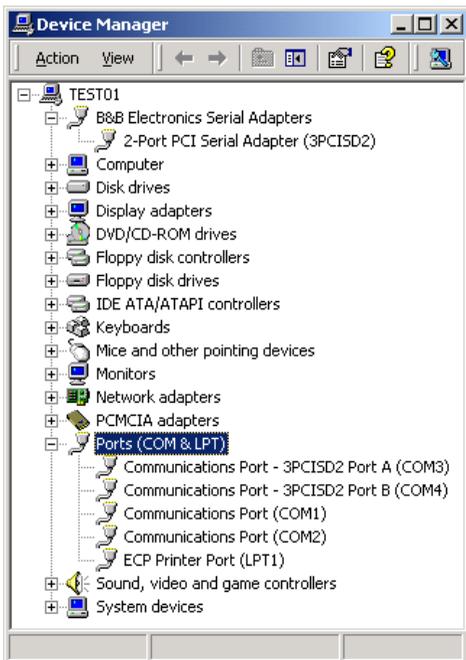
The computer will complete the installation of the driver for the card, then search for the Com driver for Port A, then for Port B (if present) without requiring any more user input.

10. Wait for the process to complete.
11. Open **My Computer, Control Panel, System**, then select the **Hardware** tab on System Properties.
12. Select **Device Manager**, then view the hardware list.

Under B&B Electronics Serial Adapters, the PCI Serial Adapter (3PCISD1) or 2-Port PCI Adapter (3PCISD2) is installed. This is the single port 232PC11 or dual port 232PC12 card.

Under Ports, COM3 was assigned to Port A , and COM4 was assigned to Port B. (Port 1 is Port A, Port 2 is Port B)

NOTE: The 232PC11x will be identified as PCI Serial Adapter (3PCISD1). The 232PC12x will be identified as 2-Port PCI Serial Adapter (3PCISD2). The cards and drivers are functionally the same to the Operating System.



13. Remove the driver disk and check the ports with your software.

Removal of Card & Drivers

If you need to remove the card from your system or remove the current driver before installing a possible future driver upgrade:

1. Click on *3PCISD1 Port A* under **Ports (COM & LPT)** and select **Uninstall** (right click). Repeat for Port B. (The 232PC11x identifies as 3PCISD1, the 232PC12x identifies as 3PCISD2.)
2. Next Click on *PCI Serial Adapter (3PCISD1 or 3PCISD2)* under **B&B Electronics**. Select **Uninstall**.
3. Remove the two sets of driver files from the Windows INF directory. (These are named by the OS in the sequence of installation. On a clean system they are: Oem0.inf & Oem0.PNF and Oem1.inf & Oem1.PNF. The .inf versions should be verified by opening it with Notepad, then checking that it is a B&B Electronics file. The PNF version is a compiled copy of the same information.)

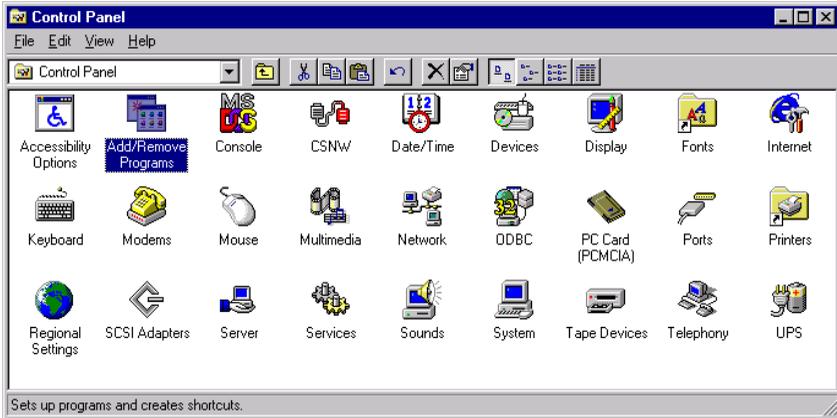
You can use the **Find, File or Folder** function to search for the text *B&B* within the files.

You may need to set your Views (under My Computer) to show all files and folders if the INF directory and .inf files are not visible.

4. Shut down the system and remove the card.

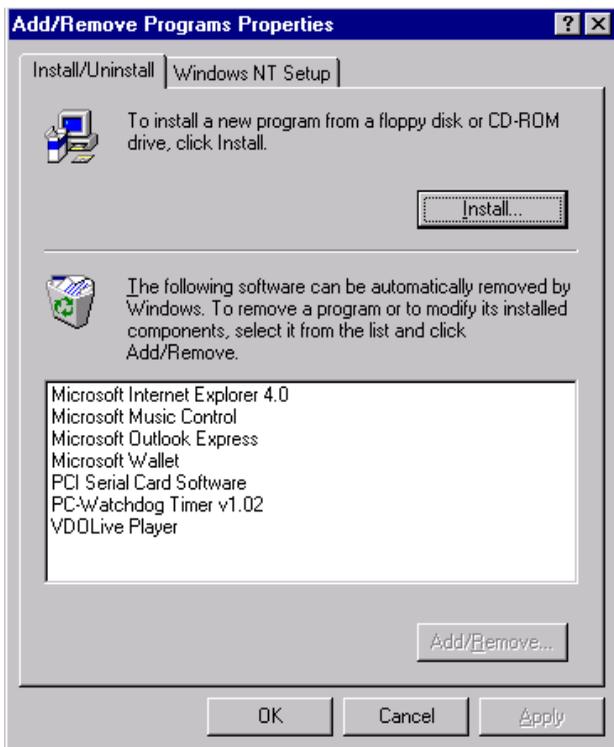
Windows NT 4.0

1. Set the x1 or x4 Clock speed jumper as needed.
2. Install the card in the slot, start the computer, and log on to Windows NT 4.0 as an Administrator or ask your system administrator to install the software.
3. Open the **Control Panel**. (Select **Start, Settings.**)



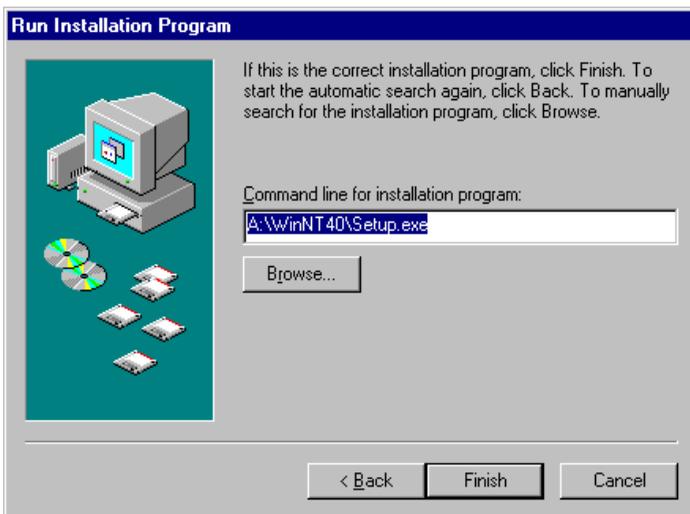
4. Select **Add/Remove Programs**.

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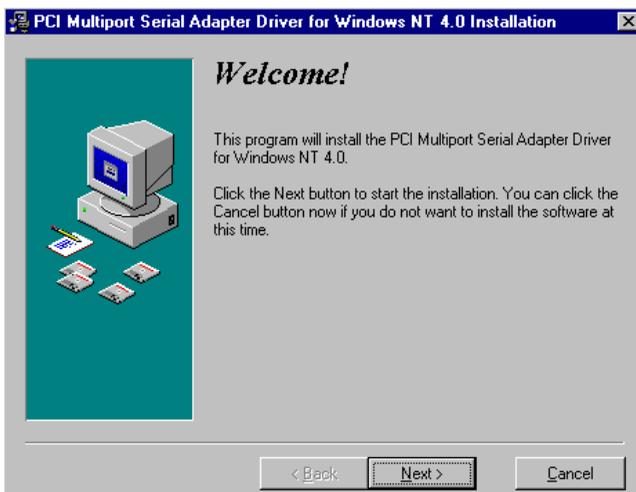


5. Click the **Install** button, then click **Next**.

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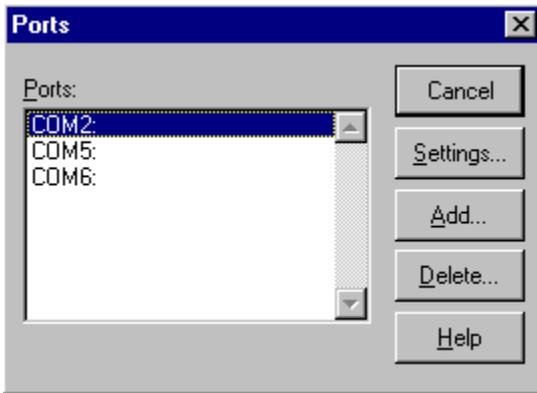


6. Insert the driver disk into drive A:.
7. Enter **A:\WinNT40\Setup.exe** in the **Command line for installation program** window. (as above).
8. Click **Finish** to start the Setup program.



9. Click **Next**. Follow the instructions until completed.
10. This driver does not require re-booting to complete installation.

11. Open the **Control Panel**, select **Ports**.



12. Verify 1 or 2 new COM Ports. (shown here as COM5: & COM6:)

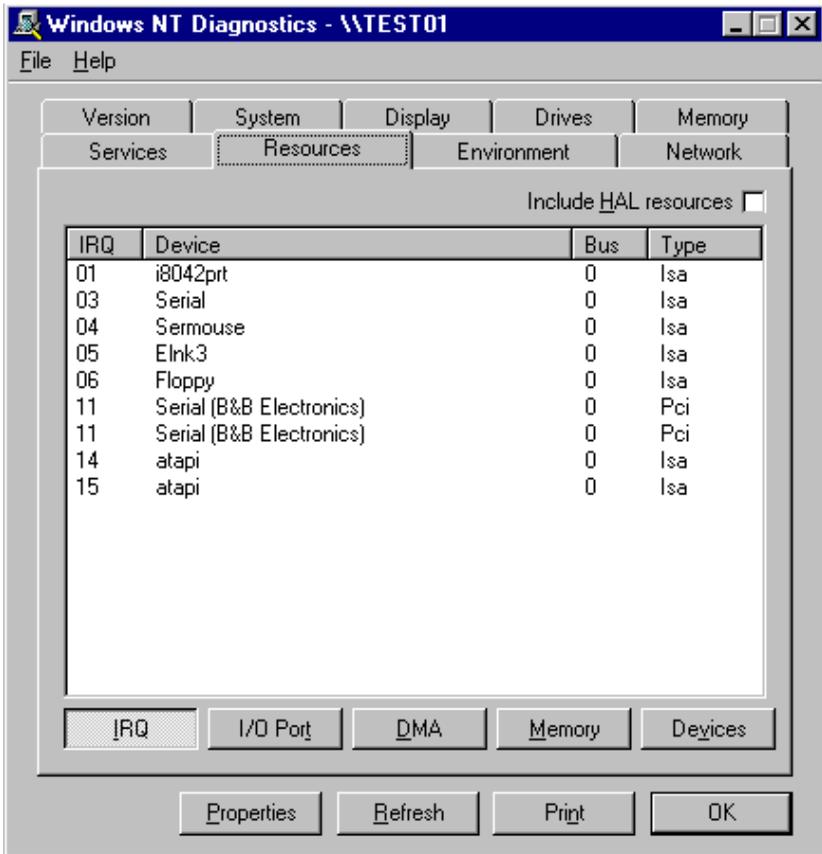
If you have 1 or 2 new COM ports, the installation is complete. Select the port, select **Settings, Advanced**. You should obtain the message, "*There are no user configurable Advanced I/O parameters for this COM port.*"

Check the ports with your software or with a Loopback test.

NOTE: In the above example, a serial mouse is connected to the port which would usually be COM1. NT does not show it. COM2 is the second built-in serial port.

You can check details of the serial card setup using **Windows NT Diagnostics**, found under **Administrative Tools**. This can show the **Resources** used such as addresses and IRQ.

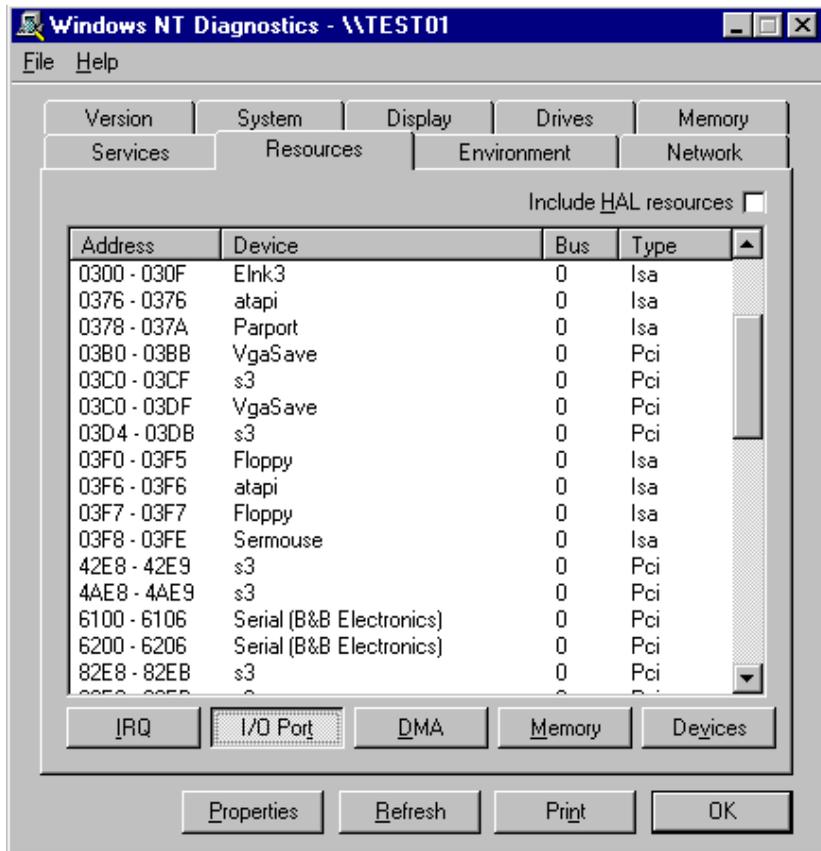
Windows Diagnostics will not allow changing anything.



The above shows 2 ports using one PCI card interrupt.

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The screen below shows the address range for the each serial port on the B&B Electronics 2-port Serial Card.



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Removal of Card and Driver

If you need to remove the card from your system or remove the current driver before installing a possible future driver upgrade:

1. Open the Windows NT subdirectory.
2. Open System32.
3. Open Drivers.
4. Find the "Bbserial.Sys" file and delete it.
5. Shut down the system.
6. Remove the 1 or 2-Port PCI Serial Adapter card.

CHAPTER 4: TROUBLESHOOTING

If you have any trouble starting your system after installing the card, the card may not be properly seated in the slot. Remove and re-insert it or try a different slot.

If you are unable to communicate with the card using your software and hardware devices:

1. Check your pinouts. Computer RS-232 ports are always configured as DTE (Data Terminal Equipment) devices. Some devices (such as printers, video recorders/editors, cameras) are also configured as DTE. When two similar DTE devices are interconnected, a "NULL MODEM" cable is needed (refer to **Appendix B**, Table 2, for cabling). A "serial printer cable" is usually wired as a null modem cable.
2. Some RS-232 connections use only Receive and Transmit (plus signal common/ground). Sometimes the device "loops back" the CTS/RTS line pair and the DTR/DSR line pair, but other times, the loopback must be done within your connection cable/connector. Refer to the hardware manual for the device connected.
3. Use the COMTest program provided on the PCI/USB COM Port Utility Disk with a loop back to check the card. A loopback connection for RS-232 connects the Transmit output to the Receive input (pins #2 & #3 on the DB9M connector).
4. Try another software package for troubleshooting.
5. Check our website for available FAQ's or troubleshooting hints.
6. Call B&B Electronics Technical Support for troubleshooting assistance.

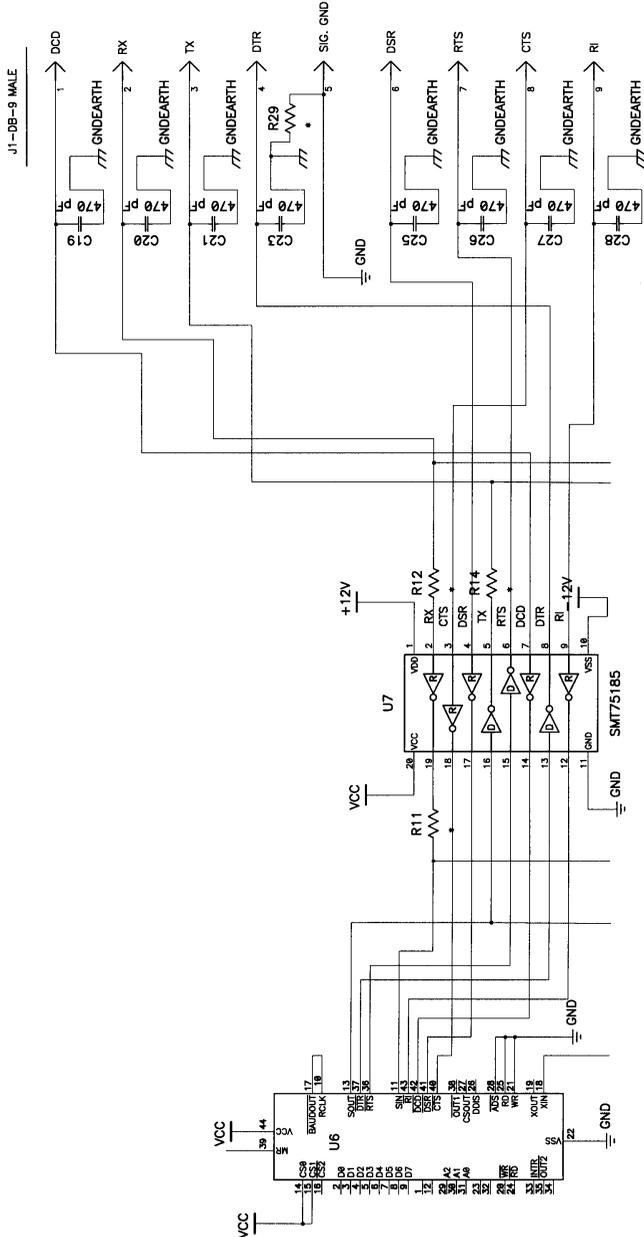
USA Office

Technicians are available at (815) 433-5100 to answer your questions from 8 AM - 5 PM weekdays (Central Time).

European Office

Technicians are available at +353 91-792444 to answer your questions from 8:30 AM – 5 PM weekdays (GMT Time).

Appendix A: 232PCIXX I/O SCHEMATIC



Port 1: I/O Schematic

Appendix B: RS-232 Pinouts

Table 1: RS-232 Pinouts (DTE)

| Name | Description | Direction | DB9M Pin |
|------|---------------------|-----------|----------|
| DCD | Data Carrier Detect | Input | 1 |
| RD | Receive Data | Input | 2 |
| TD | Transmit Data | Output | 3 |
| DTR | Data Terminal Ready | Output | 4 |
| GND | Signal Ground | ----- | 5 |
| DSR | Data Set Ready | Input | 6 |
| RTS | Request to Send | Output | 7 |
| CTS | Clear to Send | Input | 8 |
| RI | Ring Indicator | Input | 9 |

Table 2: Reference Cabling Table

DB9 to DB25

DB9 to Null Modem Cabling

| Name | DB9 Pin | To DB25 | DB9 Pin | DB9 Null | DB25 Null |
|------|---------|---------|---------|----------|-----------|
| DCD | 1 | 8 | 1 | * | * |
| RD | 2 | 3 | 2 | 3 | 2 |
| TD | 3 | 2 | 3 | 2 | 3 |
| DTR | 4 | 20 | 4 | 6 | 6 |
| GND | 5 | 7 | 5 | 5 | 7 |
| DSR | 6 | 6 | 6 | 4 | 20 |
| RTS | 7 | 4 | 7 | 8 | 5 |
| CTS | 8 | 5 | 8 | 7 | 4 |
| RI | 9 | 22 | 9 | - | - |

NOTE: In null cables, the DCD connection is usually connected to DSR at each end.

2 Channel RS-232 Handshaking loopback for Tx & Rx: Connect DB9 pins #7 & #8 together, and pins #4 & #6 & #1 together.

Appendix C: TROUBLESHOOTING WITH COMTest

Included on the PCI/USB COM Port Utility Disk is a test program called COMTest. It can be installed on your “Programs” menu for use by inserting the disk and running Setup.

COMTest is a simple 32-bit Windows (Windows 95, 98, or NT) COM port Test program. It is a simple tool that can be used to troubleshoot RS-232, RS-422, or RS-485 serial communications. It allows multiple ports, at any address and IRQ, to be opened at any given time. ComTest is available on B&B Electronics Mfg. Co. websites: www.bb-elec.com or www.bb-europe.com.

Appendix D: Renaming COM Ports - Win 95/98/ME

Renaming PCI COM Ports Using the PnP COM Rename Utility

CAUTION: *You must be using Windows 95/98 or ME. This utility is not designed for NT or other Windows versions.*

This program edits the registry directly, it will only change entries related to B&B PCI or USB Serial Ports. Improper use of this program can cause conflicts with other COM Ports installed on your computer.

Renaming COM ports will only affect software that accesses COM ports through Windows, not software that accesses ports from DOS or at the hardware level.

This program should only be used after all serial ports have been installed.

Windows 95/98 and ME automatically assigns COM port numbers starting at COM5 when the port is not at the standard base addresses for COM1 to COM4.

If your software refuses to access COM ports above COM4, and you have unused COM numbers that you want to be able use with your B&B PCI Serial Card, this utility can be used to rename some or all of the ports to the unused COM numbers.

First, check the ports list shown in the Device Manager, then check any Modem or FAX device to make sure that the port number isn't being used for a FAX/Modem or Network Redirector.

If you have built-in ports you want to disable from the BIOS in order to use your PCI card at that COM number, first remove the port with the Device Manager. Then re-boot to the BIOS, disable the port with hardware settings, Exit with a "Save Settings", then re-start Windows. Next, verify the port number is not present. Then use the Rename utility to rename the PCI card ports as needed.

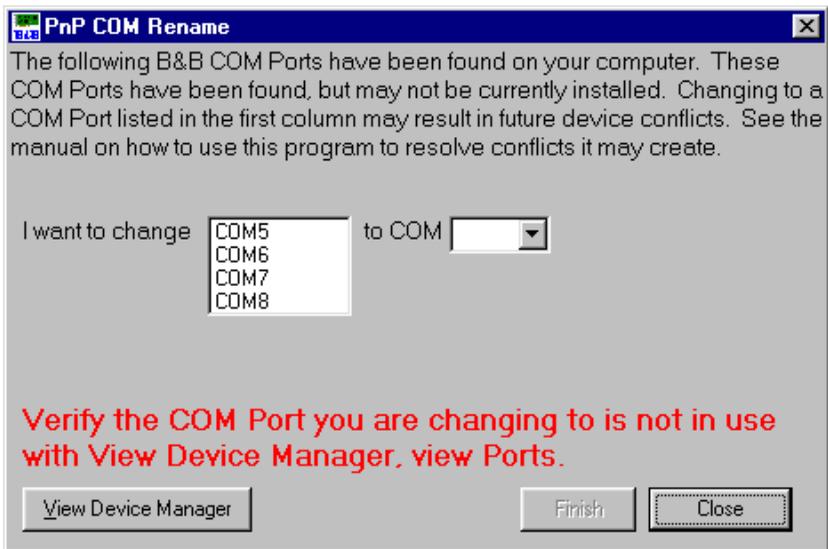
To Remove a Port: Choose Settings, Control Panel, System, Device Manager, then select the port to highlight it. Click Remove below the window. To remove all B&B PCI ports, select the B&B Serial Adapter. This clears registry entries for the card and ports.

Install the PCI/USB COM Port Utilities

- (1) To use the PnP COM Rename utility, insert the PCI/USB COM Port Utility Disk and run Setup.exe. This will install COMTest and PnP COM Rename under Programs, B&B Electronics.
- (2) The Rename utility will not be installed if you are running Windows 2000 or NT.

Using PnP COM Rename

- (1) Shut down all programs that are accessing any Com ports.
- (2) Start the PnP COM Rename Utility from the Programs menu under B&B Electronics.
- (3) Read the Cautionary Warnings, it is possible to rename a PCI or USB serial port to a number already in use which will cause problems. If any problems occur after renaming, you may need to re-start the system and rerun the Rename utility to correct the situation or remove the serial card in the Device Manager. Then Refresh the Device Manager to detect the card and re-install the drivers. Determine which renamed COM port caused the problem, and do not use that name for a renamed port.
- (4) Accept the conditions of use by clicking Yes or click No to exit.
- (5) Select the currently named COM port number you want to change in the left window, then the new number in the right window. Then click Finish. Repeat for other ports as needed.



- (6) If the PCI card was previously installed and not removed in the Device Manager, you may find several B&B COM ports with the same number. The last instance of the same number is usually the most recent installation. Only the active ports can be renamed with the program to show the new name under the Device Manager. Inactive port numbers will not show any change after renaming. Ideally, unused entries should be removed by using RegEdit, then having the system re-install the drivers to make the entries. This will result in a single entry for each port on the card, and only that entry will need to be changed.
- (7) After all B&B PCI or USB COM ports have been renumbered as needed, click Close to exit.

If you need to install another serial device after using renaming with this utility, you must:

- (1) Name all COM Ports back to original settings using this program.
- (2) Install the new device according to manufacturer directions.
- (3) Use this utility to rename the B&B COM Ports again as needed.

Appendix E: *Declaration of Conformity*

DECLARATION OF CONFORMITY

Manufacturer's Name: B&B Electronics Manufacturing Company
Manufacturer's Address: P.O. Box 1040
707 Dayton Road
Ottawa, IL 61350 USA
Model Numbers: 232PCI1A/B, 232PCI2A/B
Description: Single/Dual Port RS-232 PCI Serial Card
Type: Light industrial ITE equipment
Application of Council Directive: 89/336/EEC
Standards: EN 50082-1
EN 61000 (-4-2, -4-3, -4-4, -4-5, -4-6)



William H. Franklin III, Director of Engineering

