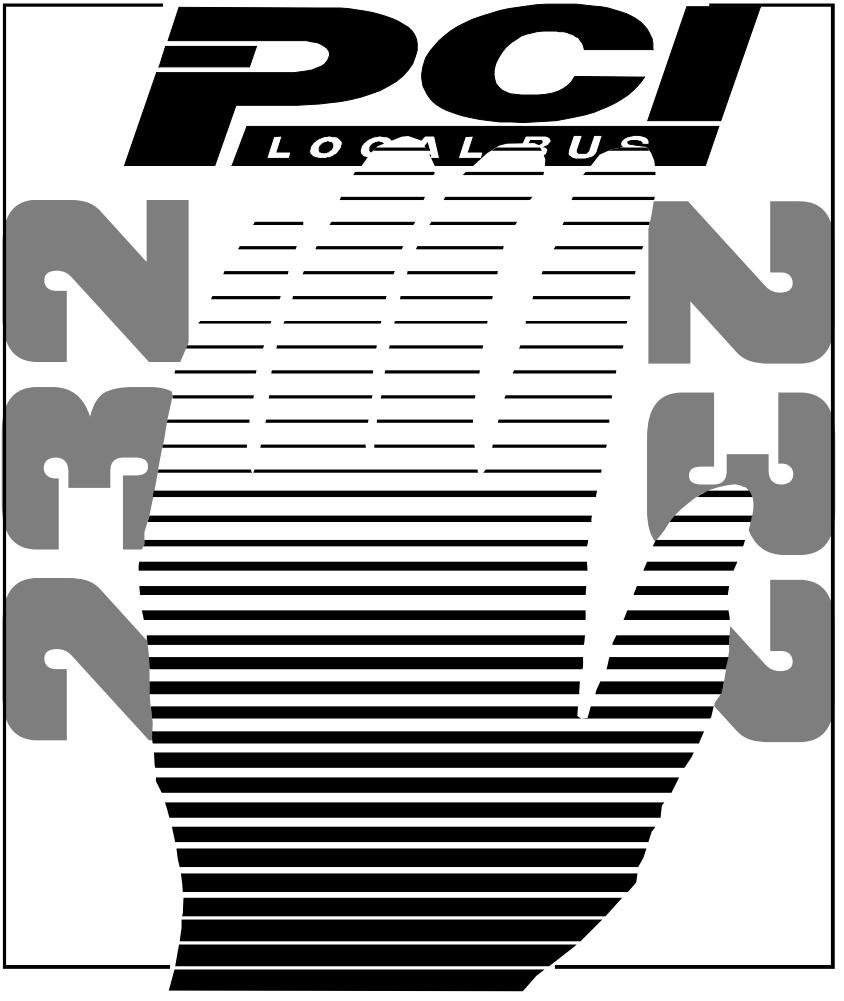
Hardware Manual



PCI LPT & RS232

1.1 Edition September 1998

Guarantee.

FULL 36 MONTHS GUARANTEE.

We guarantee your Serial Port Card for a full 36 months from purchase, parts and labour, provided it has been used in the specified manner. In the unlikely event of failure return your interface to your Dealer, with proof of purchase, who will determine whether to repair or replace this product with an equivalent unit.

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ACKNOWLEDGEMENTS.

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PCI LPT & RS232 MANUAL

OUTLINE CONTENTS

The Layout Of This Manual

Chapter 1 - Serial Solution Software, is an overview of the optional, ideal companion software package for our range of serial port cards. Buy it from your dealer now!

Chapter 2 - PCI LPT & RS232 Specifications, gives details of the PCI LPT & RS232 specifications, details of how to install the optional parallel port and shows you how to install your PCI LPT & RS232 card.

Chapter 3 - PCI LPT & RS232 Software Configuration Guide, shows you how to configure your operating system to successfully allow trouble free operation of your PCI LPT & RS232 card. Installation procedures are for Windows 95/98, Windows 3.x and DOS.

CHAPTER 1

SERIAL SOLUTIONS SOFTWARE.

Introduction.

This chapter is a brief advertisement for the OPTIONAL Serial Solutions software package; this is purchased SEPARATELY and is available from YOUR DEALER.

Introducing Serial Solution Software.

The perfect partner for any Serial Port is Serial Solutions Software! Serial Solutions is a fully featured suite of programs designed to squeeze the most from PC serial communications.

Serial Solutions is made up of the following components: -

Serial Solutions for DOS
Serial Solutions for Windows 3.x
Serial Solutions for Windows 95
Serial Solutions for Windows NT

All the Serial Solutions drivers have the following features: -

- Drivers for PC FIFO UARTs e.g. 16550 as well as the new improved 32 byte 16650, 64 byte 16750 and 128 byte 16950 UARTs
- Support for any mix of RS232, RS422 and RS485 handshake schemes.
- Support for wider range of Baud rates and for more than 4 serial ports.

Serial Solutions For DOS.

Serial Solutions for DOS consists of the following programs: -

NewCOM.sys	A device driver, it supports COM1 to COM16, allowing 16 serial ports to be used under DOS. It also includes an interrupt handler for enhanced performance with user definable buffer sizes. Accessible from all DOS languages, it is the heart of the Serial Solution. It has extensive handshaking support, implementing both hardware handshaking using any combination of the DTR, DSR, CTS, RTS, and DCD lines, and a software handshake using the XON/XOFF protocol.
NewCOM24.sys	A device driver providing support for 24 ports.
NewCOM32.sys	A device driver providing support for 32 ports.
NewMode.exe	A replacement for the DOS 'mode com...' command. NewMode is used to set the serial parameters, including the port address, IRQ line used, the baud rate, parity and data and stop bit options. e.g. NEWMODE COM5:38400,E,7,1 01A0 7 Baud rates supported are from 110 baud to 115,200 baud! Included is a very handy query mode that reports the settings of the various serial ports. Flexible and fast!
EASY programs.	The EASY disk contains short, simple to understand and use EASYBAS, EASYC and ASYPAS programs, providing straight forward, file type I/O to serial ports with debug information. Use these FIRST, base your sample applications on them.

Source code, make files and compiled ready to run programs supplied.

TERM programs A suite of larger terminal emulation programs written in C (Cterm), Assembly language (Aterm), Pascal (Pasterm), BASIC (BASterm) and FORTRAN (FORterm) show how to access the NEWBIOS routines as well as the simple file I/O to ports. They contain many lines of code and are thus harder to grasp. They demonstrate in depth serial port programming in a variety of languages but they are also useful tools for using serial devices.

Comtest.exe

Comtest is a short but invaluable program that is used to check that the serial port at a particular I/O address is functioning correctly and is connected to the particular IRQ line. The program correctly identifies the UART type e.g. non-FIFO, 16550 FIFO, 16550AF FIFO and the improved 16650 32 byte FIFO and 16750 64 byte FIFO's. By employing the built in loop back capability of the PC serial port chip, a full test of the baud rate generator, transmitting and receiving buffer, parity enable and start stop bit is performed. There is no need for a second serial port or a cable when using this utility.

Serial Solutions For Windows 3.x

Serial Solutions for Windows 3.x works with Windows 3.0, 3.1 and 3.11 as well as Windows For Workgroups 3.11.

Serial Solutions for Windows 3.x consists of the following programs: -

Setup.exe	The install routine for the package.
Port.DLL	Enhanced Control Panel applet. Allows configuration of extra serial ports from the Windows Control Panel. Supports single as well as multiport cards using shared interrupts.
BbLynx.drv	Replacement for COMM.DRV.
LynxAPI.dll	Enhancement to the Windows Comms API's allowing support for more than 9 ports.
Term.exe	Terminal program.
EasyCWIN	C source code, project files and ready to run.exe program for an easy to understand Windows terminal program. Learn how to write Windows comms apps correctly the easy way.

Serial Solutions For Windows 95.

Windows 95 has an improved communication API and directly supports up to 255 ports. Our Windows 95 driver supports the shared interrupt mechanism used on our multiport cards. Serial Solutions for Windows 95 consists of the following programs: -

`ISA.inf`
`PCI.inf`
`SSDRVS.INF`
	The information files to aid the installation process "Have Disk...

`SSCARDUI.DLL` `SSPORTUI.DLL`	…The DLL's and…

`SSSENUM.vxd`
`SSM485.VXD`
`SSMULT.VXD`
`SSV485.VXD`
`SSVEL.VXD`
	...the virtual device driver providing the shared interrupt handler.

Complete Documentation and Technical Backup.

We believe in supplying complete documentation with every package we sell. The Serial Solution Software Package is no exception, it has an attractive manual in an A5 binder, containing over 150 pages of in-depth technical detail with comprehensive indexes and table of contents. We guarantee your Serial Solution Software package or a full 12 months from purchase. A complete technical backup service is available to ensure that you get the maximum performance out of your investment.

CHAPTER 2
PCI LPT & RS232 SPECIFICATIONS

Introduction.

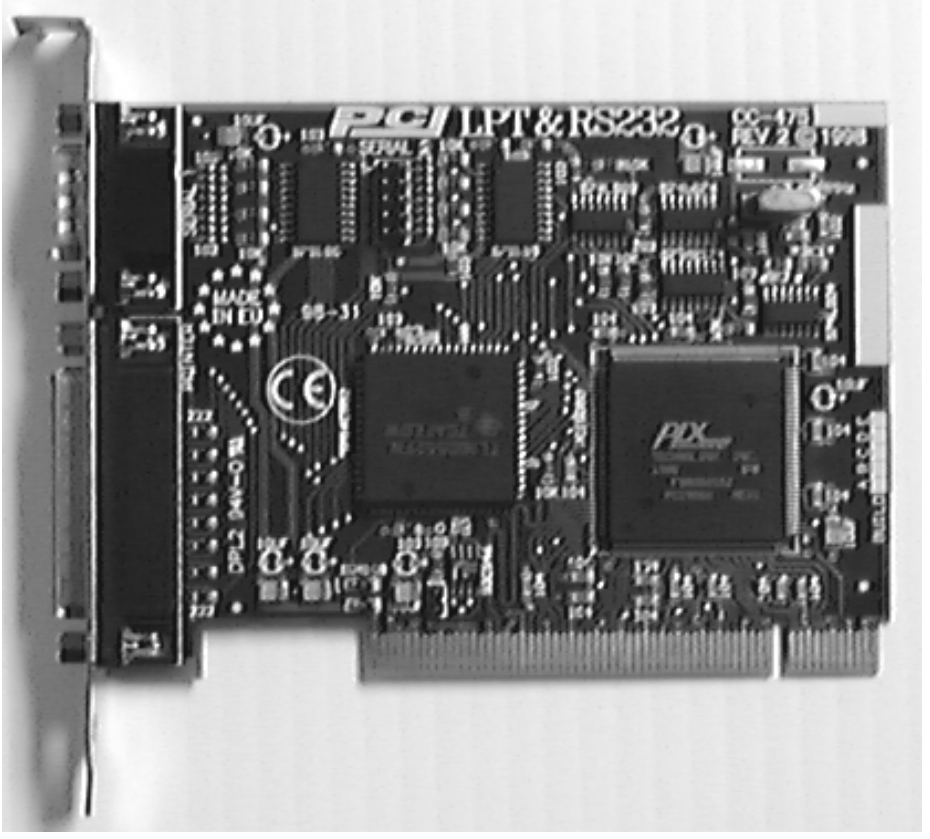
This chapter details the specifications of the PCI LPT & RS232 card and explains how to add the optional serial port to the card.

This half-sized card will work happily in any PCI 2.0 or greater compliant PC compatible.

PCI LPT & RS232 Card Features.

- Centronics Parallel printer port, 100% PC compatible
- One or Two independent 9 pin D RS232 Serial ports.
- Reliable communications up to 50 feet, 15m, and beyond!
- 16550 FIFO provides 16-byte input and 16-byte output buffer on each port.
- Maximum baud rate of 115,200 Baud.
- Word length of 5, 6, 7 or 8 bits.
- Even, Odd, None, Mark or Space parity options.
- 1 start bit always sent.
- 1, (1.5 for 5 bit data word length) or 2 stop bits.
- Clock input of 1.8432 MHz
- 100% PC Compatible serial port TI 16C550, up to 115,200 baud.
- Full modem control TXD, RXD, DSR, DCD, DTR, RTS, CTS and RI signals.
- Fully double buffered for reliable asynchronous operation.
- High-speed integrated circuitry ensures operation with fast PC's e.g. 500MHz Pentium II WITHOUT extra wait states.

Figure 2-1. PCI LPT & RS232 Card Layout.



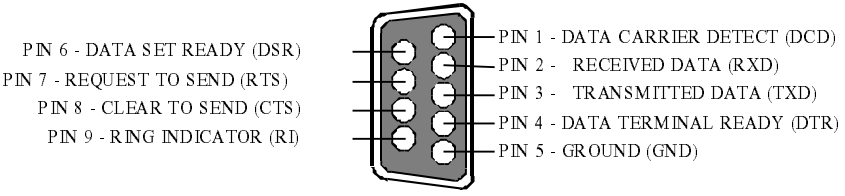
PCI LPT & RS232 Specifications:

Dimensions:	4.8 x 3.5 in, 120 x 90 mm
I/O Connection:	Serial Port 1: 9 pin Male D type. Optional Serial Port 2: 9 pin Male D type. (via flylead with PC bracket.)
LPT port:	Parallel Port: 25 pin Female D type

Configuring The PCI LPT & RS232 Card.

PCI cards, by definition, require no hardware configuration and can be installed "directly from the box".

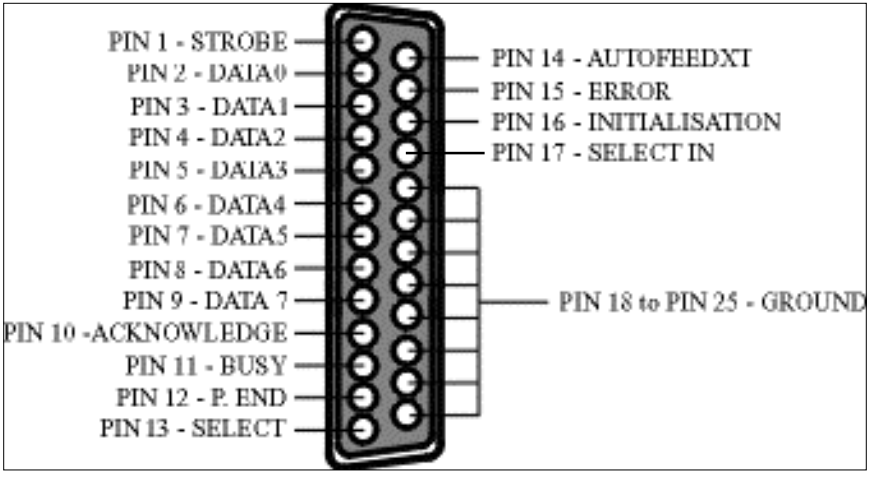
Figure 2-2. 9 Pin D Connector Port Pinouts.



Parallel Printer Port Configuration.

On the PCI LPT & RS232 card, the parallel printer port is the lower 25-pin connector on the card.

Figure 2-3 Printer Port Pin Outs.



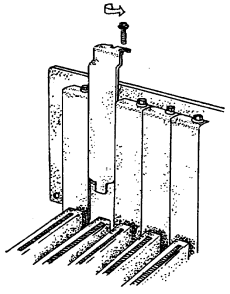
Hardware Installation.

NOTE: Always turn the computer OFF before installing or removing any interface board..!!!

STEP 1: Before the PC card can be installed the power to the PC must be switched off and for additional safety it is recommended that the mains supply plug is removed from the PC itself.

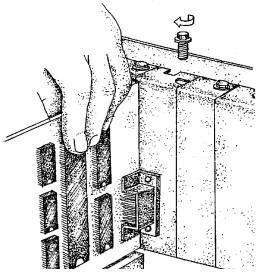
STEP 2: Remove the case.

Figure 2-4. Removing Blanking Cover



STEP 3: Choose an empty appropriate expansion slot. Remove the blanking cover protecting the slot on the PC back panel. KEEP the blanking cover screw safely for later (Figure 2-4).

Figure 2-5. Inserting The PC Serial Card.



STEP 4: Now insert the PC Serial card in the available slot. Be careful to ensure that the gold plated PCB fingers fits neatly into the I/O expansion connector. Press down firmly but evenly on the top of the PC Serial card (Figure 2-5).

STEP 5: The D connectors should fit neatly through the slot's aperture to the outside world. NB. Use the screw kept back from the blanking cover to screw the PC Serial retaining bracket into the PC back panel housing.

STEP 6: Now replace the system units cover by carefully sliding it down and back over the system unit. Replace the cover mounting screws.

STEP 7: After attaching all the monitor and keyboard cables, power up the PC. Do not forget the mains power cable!
The PC should power on in the normal way.

Problems!

If the system fails to power up normally check the following.:

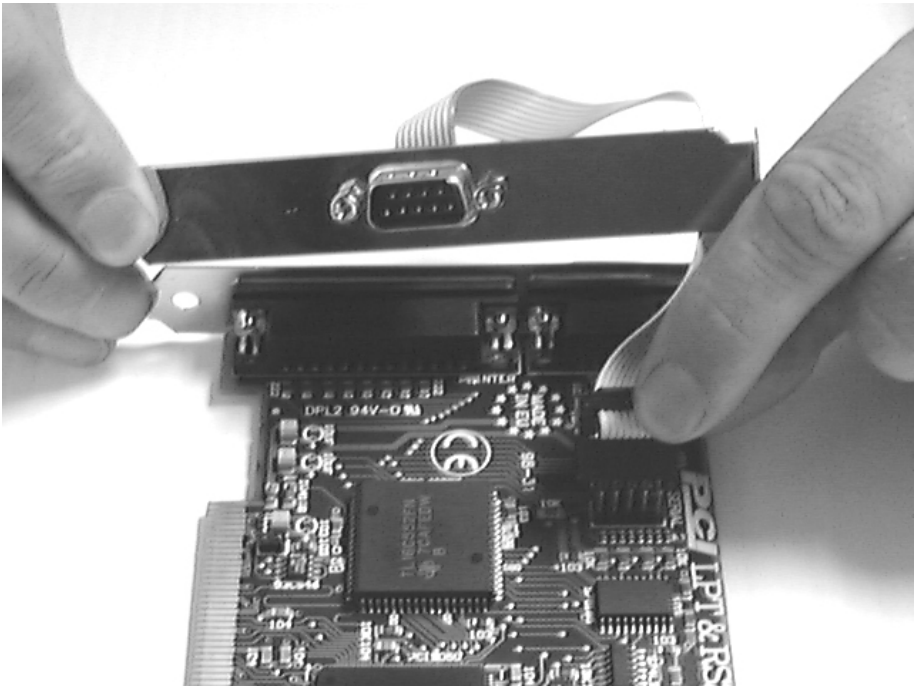
i.) Ensure that the PC Serial card is installed correctly.
ii.) Ensure that other cards in the PC have not been upset.
iii.) Ensure that the power is connected and the PC is switched ON!

■ If all these have been checked and the PC still does not power up then there is probably a conflict of I/O address between the PC Serial card and another board in the PC. Ask your dealer to check this

Installing Serial Port 2.

On the ribbon cable of the fly lead, an individual wire is coloured, which leads to the male connector, at which point it terminates, below that point is an inverted triangle - this indicates the Pin # 1 of the serial port. Making sure the Pin # 1 marking on the plug aligns with the Pin # 1 marking next to the serial header press the plug down evenly and firmly, until resistance is felt - the serial port has been plugged in. It is then mounted on a bracket allowing it be placed in a spare PC aperture. Figure 2-6, below, indicates this.

Figure 2-6 Installation of Serial Port 2.



Chapter 3

PCI LPT AND RS232 SOFTWARE CONFIGURATION GUIDE

Introduction.

This section contains the installation procedures of the PCI LPT and RS232 card, with the Windows 95/98 Windows 3.x and DOS operating systems.

The setup procedures in this chapter assume that your PC has only one serial port present.

Installing Ports In Microsoft Windows 95 & 98.

Although covering the installation of the PCI LPT and RS232 into the Windows 95 operating system, the procedure is also valid, with only minor differences, in the Windows 98 Operating System. The Windows 95 environment now supports up to 255 standard serial ports, RS232, RS422, RS485 etc.

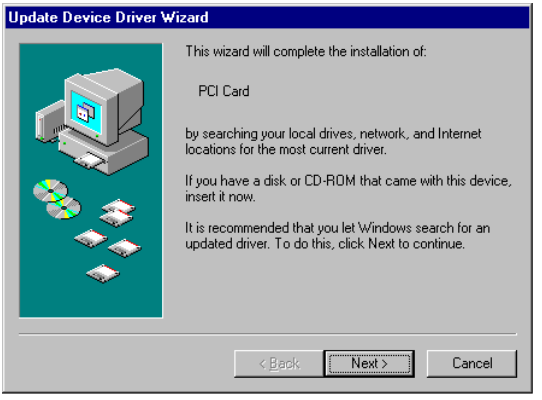
To obtain a trouble free mix-and-match of the COM ports:

- Switch off your computer, insert your PCI LPT and RS232 card into a free PCI slot, as described in the section "**Hardware Installation**" in Chapter 2, and switch your computer on again.

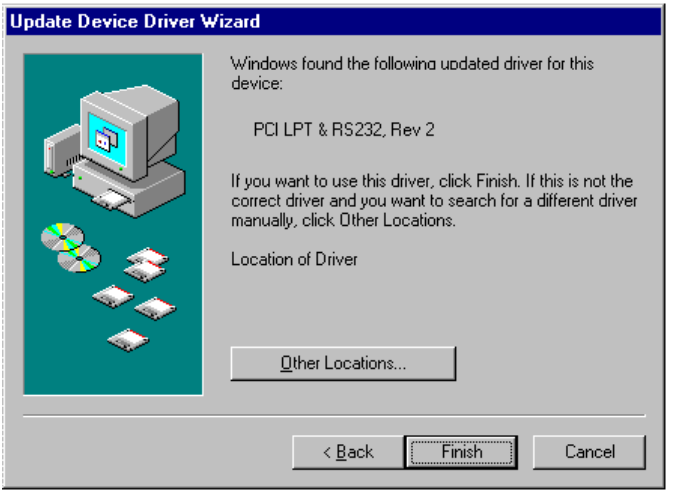
- During the booting process, Windows 95 will detect PCI LPT and RS232, but will display it simply as a "PCI CARD", and you will briefly see a message box to this effect.

- Windows will then display the "Update Device Driver Wizard", which asks you to "insert any disk which came with the PCI card".

Insert the Windows 95 installation disk into an appropriate drive and click 'Next'.



- The Wizard should then display something similar to following:

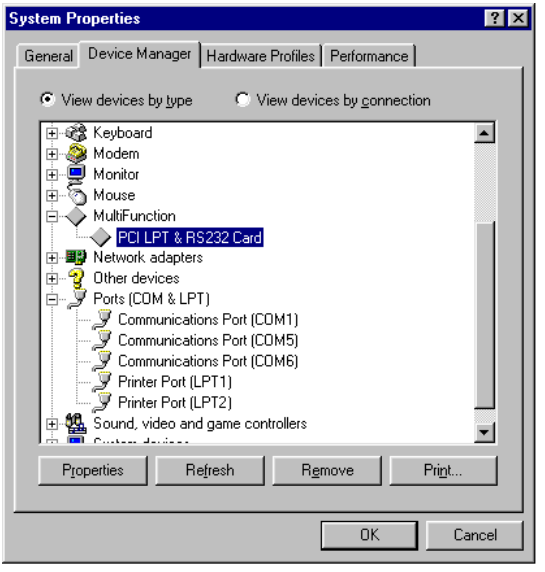


- Click **Finish**.

- A "Copying Files…" window should now appear. Click 'OK' when it asks you to insert the disk.

- After copying the file, Windows 95 will then detect each of the serial ports in turn and install them as communications ports; in the case of the PCI LPT and RS232 it will also detect the parallel port, and then install it as a printer port.

When the "**Device Manager**" is viewed:

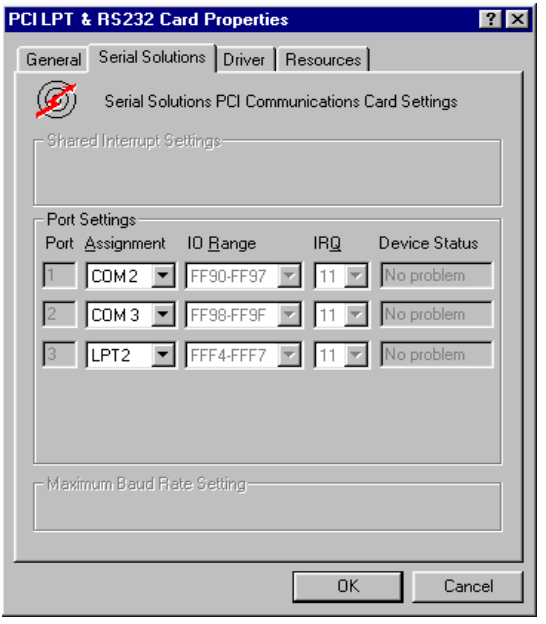


- PCI LPT and RS232 will appear under the "**Multi-function adapters**" branch, a Communications Ports and a Printer Port will appear under the "**Ports (COM & LPT) branch.**"

For most users who have 4 or less COM ports the new ports will appear as COM5 and COM6, as pictured below; for users with more than 5 COM ports the new ports will appear as the first available COM ports.

Card Settings In Windows 95 & 98.

- Select the PCI LPT and RS232 card from the "**Multi-Function Adapter**" entry in **Device Manager** and click on properties to view the cards general properties; clicking on the Serial Solutions tab produces:

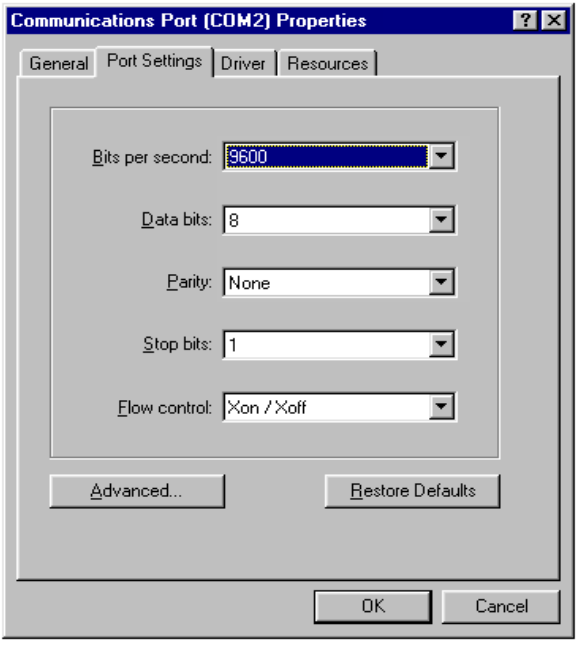


In this window, the COM (and LPT) port assignment may be changed, simply by selecting a new COM port value from the pull down menu relevant to the port. However, COM port usage other than those for the PCI LPT and RS232 card itself are not checked, so it is advisable to first check which COM ports are in use - port availability can be checked by viewing the **Device Manager**.
This process also applies to LPT assignment, and LPT port usage can also be viewed from the **Device Manager.**

. **NOTE: At time of print there exists no facility within the driver software to disable any of the card's ports.**

Port Settings In Windows 95 & 98.

Double clicking on a Communications Port that belongs to a PCI LPT and RS232 card will display general properties window for that port (in this case COM2). Selecting the Port Settings tab produces:

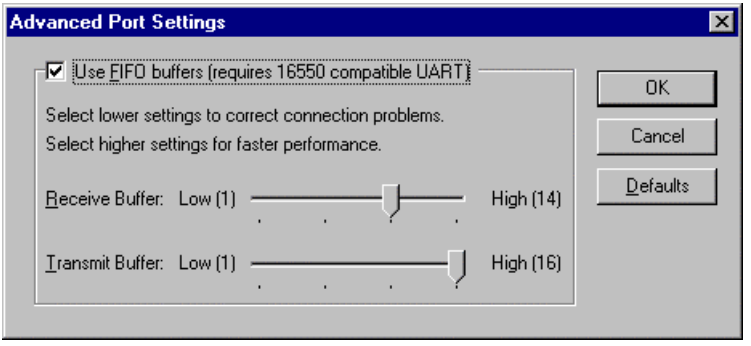


Settings available in these windows are:

1. **Baud Rate** - determines the baud rate at which the selected port operates.
   - the maximum value of operation is 115,200, even though the maximum value selectable is 921,600 - this is due to standard Windows COM port drivers being used.
2. **Data Bits.**
3. **Parity.**
4. **Stop Bits.**
5. **Flow Control.**

} Change to suit remote device.

6. **Advanced** - clicking on this will display the following window:



Settings available in this window are:

- **Use FIFO Buffers** - turns the selected ports FIFO buffer on or off. It is strongly recommended that the FIFO for both ports is left enabled.
- **Receive Buffer** - These settings allow the selection of a receiver FIFO trigger setting. Selecting a low value will allow the interrupt to be serviced quicker, which is good for slow machines. If you have a fast machine, setting a high value will give you more time for multi-tasking operations.
- **Transmit Buffer** - These settings allow the selection of a transmitter FIFO trigger setting. Selecting a low value will send fewer data-bytes per interrupt, and this is recommended if you are communicating to a slower machine. Selecting a high value will send more data-bytes per interrupt, and will give more time for multi-tasking operations.

- **Defaults**: when clicked this button restores the advanced settings for the selected port to:

  Use FIFO Buffers: On (Checked)
  Receive Buffer: High (14)
  Transmit Buffer: High (14)

7. **Restore Defaults** - when clicked, resets the selected COM port to the following values:

Baud Rate:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	Xon / Xoff

Configuring Ports In Windows 3.x

The Windows 3.x installation procedure consists of two steps after the PCI LPT & RS232 CARD is inserted:

1. Determining the resources that the PCI LPT & RS232 Card has claimed.
2. Informing Windows 3.x of those resources.

Determining PCI LPT & RS232 Resources.

Insert the card into a PC, as described in Chapter 2.

Run BBCARDS.EXE, from the supplied DOS utility disk titled "Serial Solutions Utility Disk" by typing the following:

```
A:\PCI\BBCARDS
```

Where A:\ is the drive containing the supplied disk.
BBCARDS.EXE will return a string that looks similar to the following (values contained in the string may differ in individual PC's due to resource availability):

PCI LPT & RS232 users:

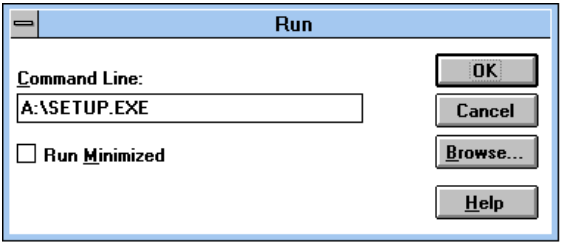
```
card 1 is on bus 0, device 16, function 0
Card ID=5, revision 2: LPT &  RS232
interrupt line 11 has been assigned
2 sets of 16550-compatible registers are at I/0 address 0140
```

Note down IRQ and 1/0 address, which in this case are:

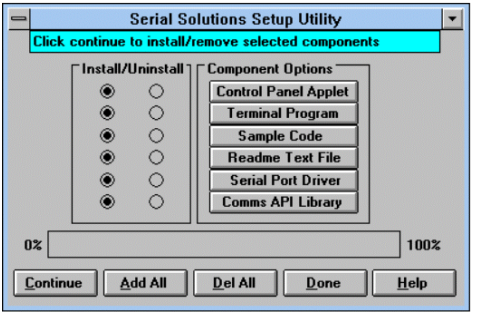
The IRQ = 11
The 1/0 address = 0140

Windows 3.x Software Installation.

Place the supplied Serial Solutions for Windows 3.x disk in a suitable drive. From File Manager choose 'Run' and enter `a:\setup` (where a: is the path to the floppy drive with the installation disk).



* Click OK, the Setup Program Main Screen is displayed:



By default, all component options will be installed, selecting the "Del AT' button will select all installed components for deletion and "Add All" chooses all uninstalled components for installation; options may not be changed when the components are installed. For further details on the Component Options consult the README.TXT file on the supplied disk.

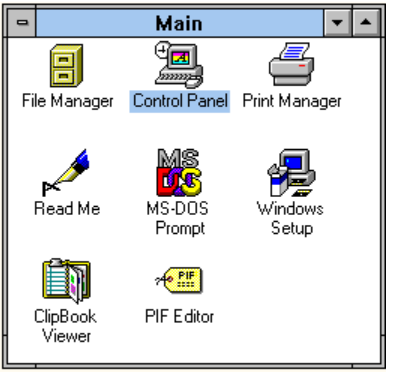
If only logical ports COM1 to COM9 are to be used then de-select the Comms API library option in the "Install" column. This library is only necessary to allow the use of logical ports greater than COM9 e.g. COM10 COM11 etc.

When you have made your choice of Component Options click Continue and when the setup program has finished select the Done button.

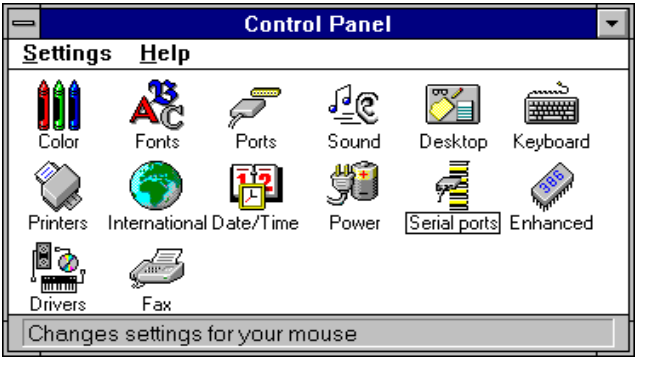
Note: If the Serial Port driver options has been selected, after the setup program has finished, Windows will display a restart message - answer Yes and Serial Solutions will be ready to run upon Windows restarting.

Serial Port Installation.

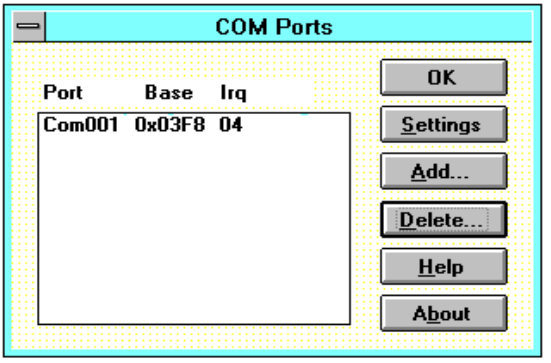
From Main, select **Control Panel**:



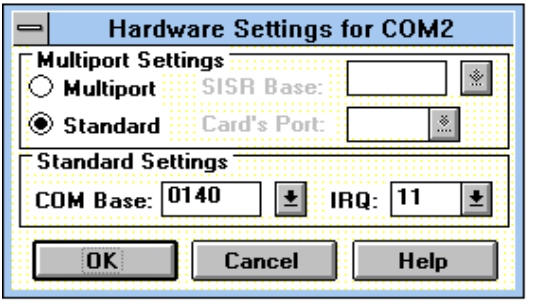
Click on **Serial Ports**:



The following dialogue will be displayed:



To add a COM port:
Click on the **add** button and a Window similar to the following will be displayed:

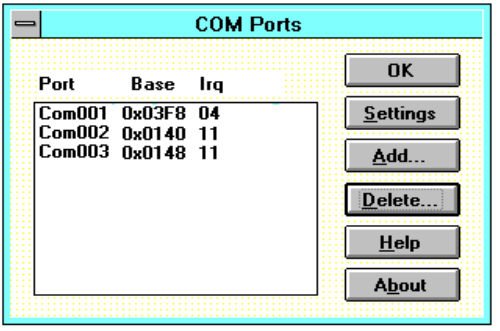


In Standard Settings:
In the COM Base field, enter the value 0140.
Note: COM ports are defined with an i/o address range, which in this case, begins at 0140 and all subsequent ports have an i/o address that is 8 higher than the previous. i.e. if COM2 has an address of 0140h, then COM3 has an address of 0148h.
In the IRQ field, enter the value 11.

Note: The values used in the above section were those returned by the BBCARDS program, as described in the above section.

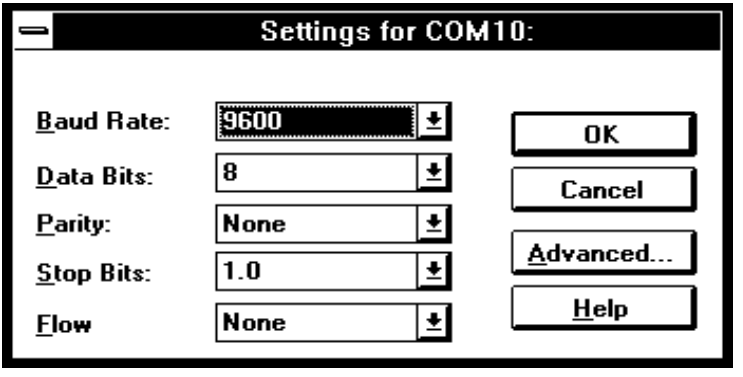
When you have finished, click on **OK**. A restart message will be displayed; to save time restart only when both ports have been added and correctly configured.

Repeat the above process to add the second COM port of the PCI LPT & RS232, the COM base will be **0148**; the IRQ value will remain the same. After adding the remaining COM port the COM Ports Window will look similar to the following:



Configuring The COM Ports.

From the COM Ports window choose the port that you wish to configure and click on Settings - the following dialogue will be displayed:



Note: A port that has been added has the default values of.

Baud Rate:	9600
Data Bits:	8
Parity:	None
top Bits:	1.0
Flow:	None

Change the communications Settings in the COM Ports to match the baud rate, parity settings etc. of the remote serial device.

Deleting Ports in Windows.

The Delete button can be used to discard the entries of ports that have been removed from the system. Note. Never try to leave out a serial port number when using the delete button, because Windows may automatically shift serial port numbers which results in a mismatch of settings in the Serial Ports Applet (COM 1-COM4 only).

Restarting Windows.

Whenever certain values have been entered or changed in the hardware settings window, a message prompting to restart Windows will appear. Only after having made ALL the necessary changes restart Windows so that the new settings come into effect.

Configuring Ports In DOS.

The DOS installation procedure consists of two steps after the PCI LPT & RS232 card is inserted:

1. Determining the resources that the PCI LPT & RS232 has claimed.
2. Informing the Serial Solutions DOS device driver of those resources.

Determining PCI LPT & RS232 Resources.

Insert card into PC, as described in Chapter 2.

Run BBCARDS.EXE, from the supplied DOS utility disk titled "Serial Solutions Utility Disk" by typing the following:

```
A:\PCI\BBCARDS
```

Where A:\ is the drive containing the supplied disk. BBCARDS.EXE will return a string that looks similar to the following (values contained in the string may differ in individual PC's due to resource availability):

PCI LPT & RS232 users:

```
card 1 is on bus 0, device 16, function 0
Card ID=5, revision 2: LPT &  RS232
interrupt line 11 has been assigned
2 sets of 16550-compatible registers are at I/0 address
0140
```

Note down IRQ and 1/0 which in this case:

The IRQ= 11

The 110 address = 0140

NEWCOM.SYS Parameters.

The NewCOM.SYS device driver included with the PCI LPT & RS232 driver software is used to set up the card in DOS and has the following syntax:

PCI LPT & RS232

NEWCOM.SYS /A *port address, /I IRQ, range /B number buffer /S buffer* /H *hardware handshake*

Where /A *port address* specifies COM port number followed by a hexadecimal address in the form /Ax,y where x is COM port range and y is I/0 address.

A IRQ, range specifies card interrupt and COM port range. The COM port range specifies the COM port(s). Range may be a single port OR a range of ports.

/B number buffer is used to set the number of pairs of buffers to be allocated to ports and is a decimal number in the range 1-maxport.

/S buffer Set size of all buffers in bytes, *buffer* is rounded to the nearest power of 2 and must be a decimal number in the range 32 to 32768. For any serial port opened two buffers of size *buffer* are allocated, one for input and the other for output.

/H *hardware handshake* selects which hardware handshake type to use on the specified ports. This is used in the following manner: /H *range, hs* where *range* specifies the COM port or ports and *hs* selects handshake type. Handshake types available are:

Type 0 RS232 DTR/CTS - The PC only transmits when CTS is input true. When the PC is able to receive its sets DTR output true. The DSR and DCD inputs

are ignored. The RTS output line is set true just in case the external serial device needs a true signal.

Type 4 3 Wire Handshake - Really no handshake at all since the PC transmits irrespective of the handshake lines. The 3 wires are TxD, RxD and Ground, no other lines are required. Thus the CTS, DSR and DCD inputs are ignored. The RTS and DTR output lines are set true just in case the external serial device needs a true signal.

Note: If hardware handshaking is not specified in the NEWCOM.SYS parameters, type 4, 3 Wire Handshake is selected automatically.

Configuring And Installing NEWCOM.SYS

To load the Serial Solutions for DOS device driver an entry needs to be added to the CONFIG.SYS file. Any simple text editor, EDIT for example, can edit the CONFIG.SYS file for example. The installation procedure given below is for a PCI LPT & RS232 as COM 5 - COM6.
The parameter required by the NEWCOM.SYS driver are those returned by the BBCARDS.EXE application earlier. A brief explanation for the parameters required by NEWCOM.SYS follows:

Port Address.

/A5-6,0140

COM ports 5 and 6 are defined, with an i/o address range that begins at 0140h with the next port having an i/o address that is 8 higher than the previous. i.e. COM5 has an address of 0140h, therefore COM6 will have an address of 0148h.

IRQ, Range.

/I 11,5-6
11 is the IRQ and since the COM port range is COM5 COM6 range is entered as 5-6.

Number Buffer.

/B6
Six buffers are defined, though only four ports are in use this is because buffers in DOS are assigned in a sequential order from COM1. Since the PG LPT & RS232 has been assigned COM port values of 5 to 6, all preceding COM ports, must have buffers assigned to them also.

Buffer Size.

/S512
Buffer size set to 512 bytes.

Hardware Handshaking.

/H,4
Type 4, 3 Wire Handshake selected for all ports. Type 4, 3 Wire Handshake selected for all ports.

Modifying Command Line Parameters.

When "assembled" the NEWCOM.SYS command line looks like...

DEVICE=NEWCOM.SYS /A5-6,0140 A 11,5-6 /B8 /S 512 /H,4

... and should be entered into the CONFIG.SYS file. Once you are sure that these parameters have been entered correctly, restart your PC and your PCI LPT & RS232 should be ready to use immediately.

Sample terminal applications are provided on "Serial Solutions Disk 1 & 2" enabling communications to be established to your peripherals quickly and easily.

Index