ICU 9112

PCI DUAL RS232
PCI VELOCITY RS232

These products conform to the following standards:

CE Standard: EN55022:1987 Class B

IEC 801-2:   1991 Level 2

IEC 801-3:   1984 Level 2

IEC 801-4:   1988 Level 2

TIA / EIA: 232 - E

PCI DUAL RS232 &
PCI VELOCITY RS232 MANUAL

OUTLINE CONTENTS
Chapter 1 - Serial Solutions Software.

Chapter 2 - PCI Dual RS232 & PCI Velocity RS232 Specifications.

Chapter 3 - PCI Dual RS232 & PCI Velocity RS232 Software Configuration Guide.

Chapter 4 - RS232 Pinouts and Port Cabling

The Layout Of This Manual

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

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

Chapter 3 - PCI Dual RS232 & PCI Velocity RS232 Software Configuration Guide, shows you how to configure your operating system to successfully allow trouble free operation of your PCI Dual RS232 card. Installation procedures are for Windows 95 / 98, Windows NT 4.0, Windows 3.x and DOS.

Chapter 4 - RS232 Pinouts and Port Cabling - gives details of the 9 and 25 pin RS232 pin outs, cabling and connections.
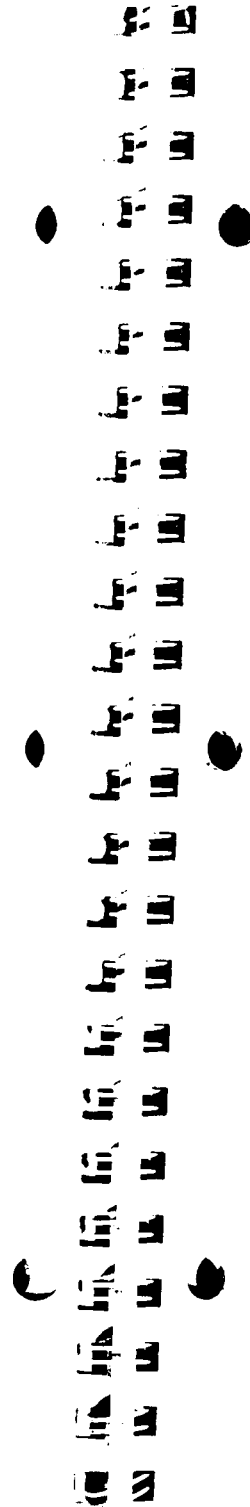

Table Of Contents.

Chapter 1
SERIAL SOLUTIONS SOFTWARE.

Introduction.

This chapter is a brief description of the Serial Solutions software package included with this product; extra copies or licenses for extra copies are 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 and 64 byte 16750 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. 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 EASYPAS 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 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: -

SSCards.inf   The information file to aid the installation process "Have Disk...."

Ssmodem.inf   Setup file for Serial Solutions modems.

sscardui.dll

ssportui.dll   The device manager configuration DLLs and...

ssenum.vxd

ssv485.vxd   ...the virtual device drivers providing the shared

ssvel.vxd   interrupt handlers and dispatch routines etc for the

ssmult.vxd   various Serial Solutions serial cards.

ssm485.vxd

Serial Solutions For Windows NT.

Windows NT has an improved communication API and directly supports up to 255 ports. Serial Solutions for Windows NT consists of the following programs: -

Setup.exe   Expands into the Control Panel applet and associated files which allows the configuration of all ports on Serial Solutions serial cards.

Ssmodem.inf   Setup file for Serial Solutions modems.

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 DUAL RS232 & PCI VELOCITY RS232 SPECIFICATIONS

Introduction.

This chapter details the specifications of the PCI Dual RS232 and PCI Velocity RS232 serial card. The differences between the two cards are: - LPT port present on PCI Dual RS232 only, larger FIFO size and greater baud rate on the PCI Velocity (due to the presence of a 16C750 UART, rather than the standard 16C550). These half-sized cards will work happily in any PCI 2.0 or greater compliant PC compatible.

General PCI RS232 Card Features.

- Two independent 9 pin D RS232 Serial ports.
- Reliable communications up to 50 feet, 15m, and beyond!
- 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.
- 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. 300MHz Pentium II WITHOUT extra wait states.

PCI Dual RS232 Features.

- 16C550 FIFO provides 16-byte input and 16-byte output buffer on each port.
- Maximum baud rate of 115,200 Baud.
- Clock input of 1.8432 Mhz
- One optional Centronics Parallel printer port, 100% PC compatible.

PCI Velocity RS232 Features.

- 16C750 FIFO provides 64-byte input and 64-byte output buffer on each port.
- Maximum baud rate of 921,600 Baud (1 Megabaud)
- Clock Input of 14.7456MHz
- Automatic hardware flow control.

Figure 2-1. PCI DUAL RS232 Card.
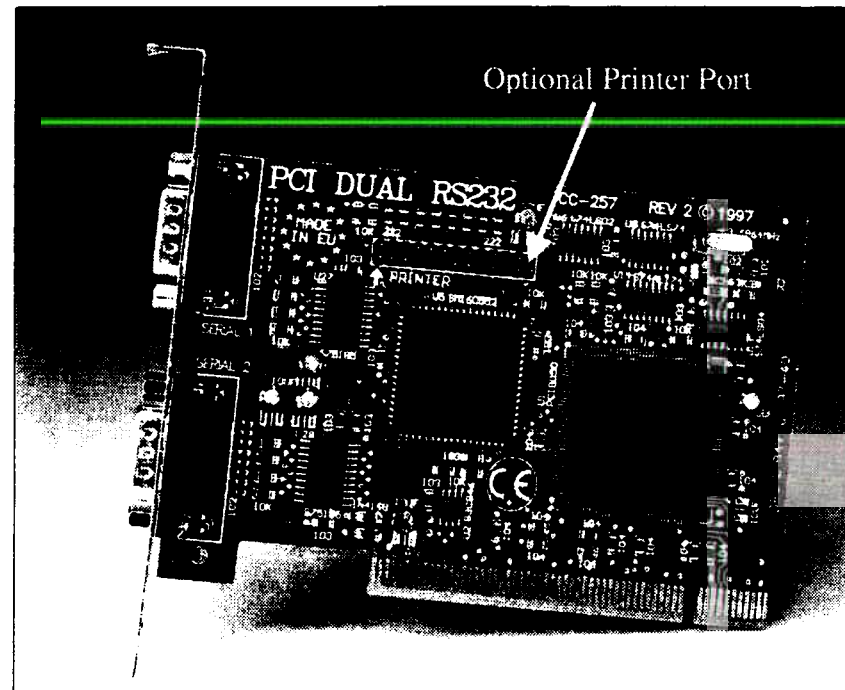
Optional Printer Port

Dimensions:	5 x 3 in, 120 x 85 mm
I/O Connection:	Serial Port 1: 9 pin Male D type.
	Serial Port 2: 9 pin Male D type.
Optional LPT port:	Parallel Port: 25 pin Female D type via flylead with PC bracket.
Weight:	84g

Figure 2-2. PCI Velocity RS232 Card.
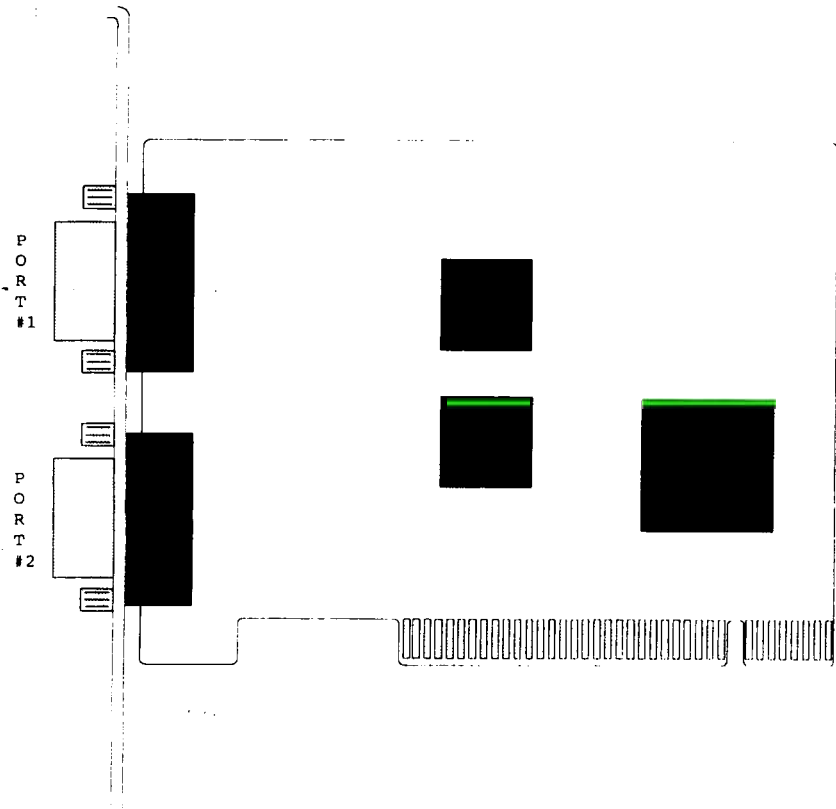
Dimensions: 5 x 3 in, 120 x 85 mm
I/O Connection: Serial Port 1: 9 pin Male D type.
                     Serial Port 2: 9 pin Male D type.
Weight: 85g
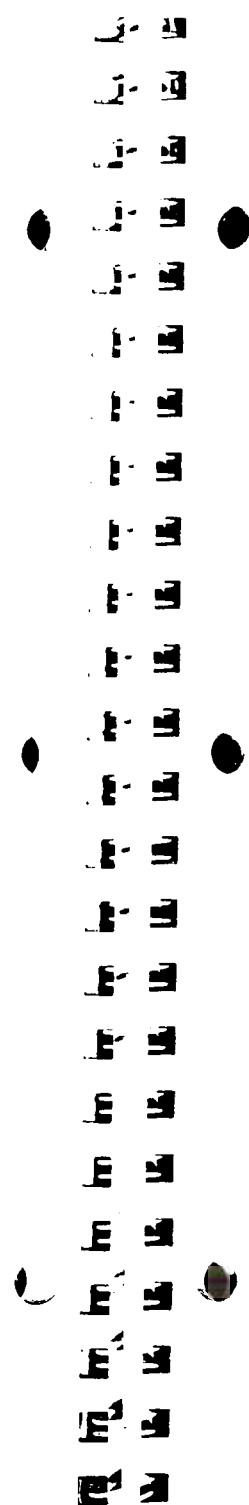
Configuring PCI Cards.

PCI cards, by definition, require no hardware configuration and can be installed "directly from the box".
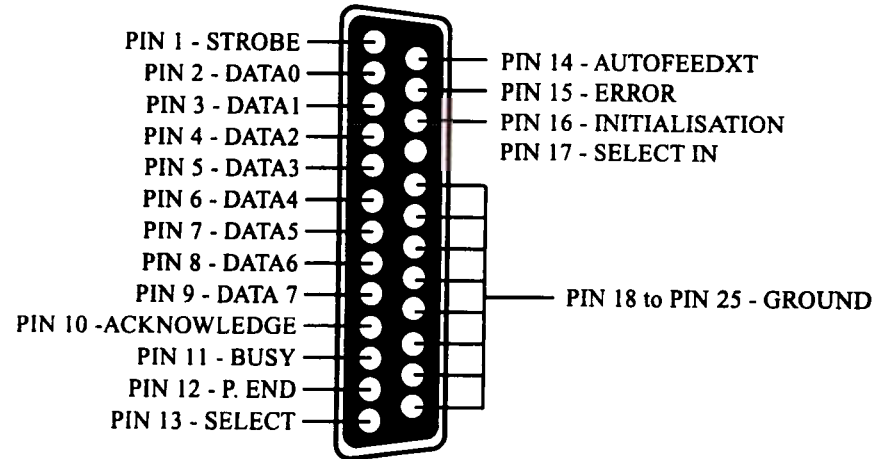
RS232 Cabling and Pinouts

For further details of the RS232 standard, pinouts and how to make various types of cables, refer to chapter 4, "RS232 Pinouts and Cabling."

Parallel Printer Port Configuration.

On the PCI Dual RS232, the optional parallel printer port is located at the top of the card next to the end plate The printer port is connected to the outside world via a fly lead to an available back plane aperture - this lead is available separately from your dealer.

Figure 2-3 Printer Port Pin Outs.

PIN 1 - STROBE
PIN 2 - DATA0
PIN 3 - DATA1
PIN 4 - DATA2
PIN 5 - DATA3
PIN 6 - DATA4
PIN 7 - DATA5
PIN 8 - DATA6
PIN 9 - DATA 7
PIN 10 - ACKNOWLEDGE
PIN 11 - BUSY
PIN 12 - P. END
PIN 13 - SELECT

PIN 14 - AUTOFEEDXT
PIN 15 - ERROR
PIN 16 - INITIALISATION
PIN 17 - SELECT IN

PIN 18 to PIN 25 - GROUND

Hardware Installation.

STEP 1: Before the PC card can be installed the power to the PC **MUST** be switched **OFF**, and the lead removed from the PC.

STEP 2: Remove the PC case.

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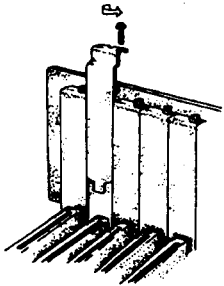
STEP 3: Choose an empty expansion slot. Remove the blanking cover protecting the slot on the PC back panel (Figure 2-4). KEEP the blanking cover screw safely for later.

Figure 2-5. Installing The Printer Port Cable.
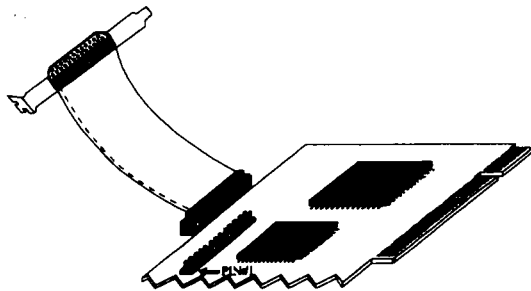
Step 4: (**OPTIONAL, PCI Dual RS232 Users**): Place the PCI DUAL RS232 on a flat, even surface. Making sure that the inverted triangle on the plug on the LPT lead aligns with the Pin#1 marking on the printer header, press the plug down evenly and firmly, until resistance is felt and it can be pushed no further - the port has been plugged in. The LPT port is mounted on a bracket allowing it to be placed in a spare PC aperture, next to the PCI card.

Figure 2-6. Inserting The PC Serial Card.
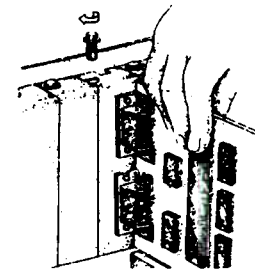
STEP 6: Now insert the PCI Serial card in the slot. Be careful to ensure that the gold plated PCB fingers fit neatly into the expansion connector. Press down firmly but evenly on the top of the PC Serial card (Figure 2-6).

STEP 7: The connectors should fit neatly through the slot's aperture to the outside world.

STEP 8: Now replace the system unit's cover by carefully sliding it down and back over the system unit. Replace the cover mounting screws.

STEP 9: After attaching all the monitor and keyboard cables, power up the PC. Do not forget the mains power cable! The PC should then 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 inspect the area surrounding the card to ensure that any potentially harmful bits of metal etc. are not present, if the problem persists ask your dealer to check the card or contact the HELP line as given on Intro. page 2.

Chapter 3
PCI DUAL RS232 & PCI VELOCITY RS232 SOFTWARE CONFIGURATION GUIDE

Introduction.

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

As previously noted, the install procedure for the Dual and Velocity PCI RS232 cards are the same, with the only difference being the reported card and port name in Windows 95 and NT 4.0; instances where this occurs will be clearly labeled.

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 Dual 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 Dual 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 Dual 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'.
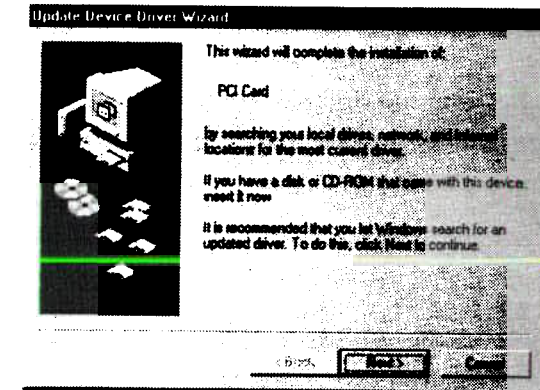
- The Wizard should then display something similar to following:
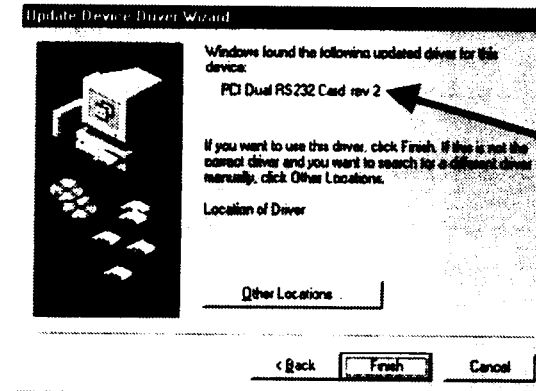
Velocity users, this entry will appear as:
PCI Velocity RS232

- 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 Dual RS232 it will also detect the parallel port, and then install it as a printer port.

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

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

- **PCI Velocity RS232**: PCI Velocity RS232 will appear under the "**Multi-function adapters**" branch and two Velocity 232 Ports 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.
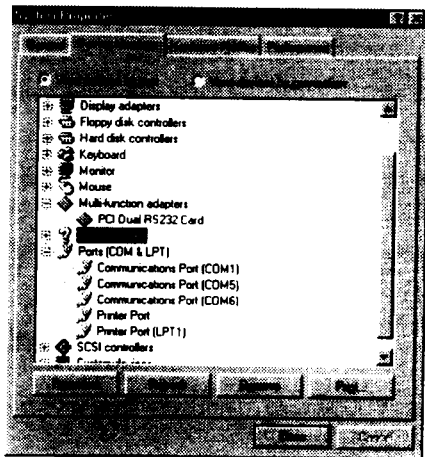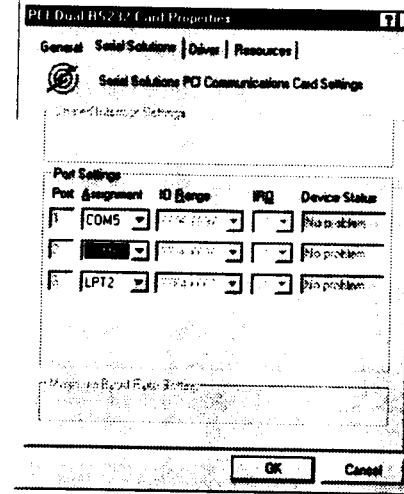
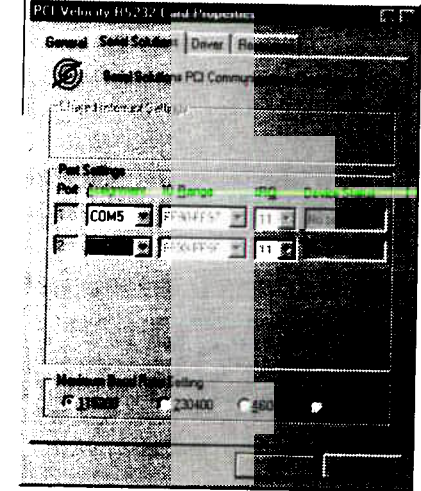**PCI Dual RS232 users:**   **PCI Velocity RS232 users:**
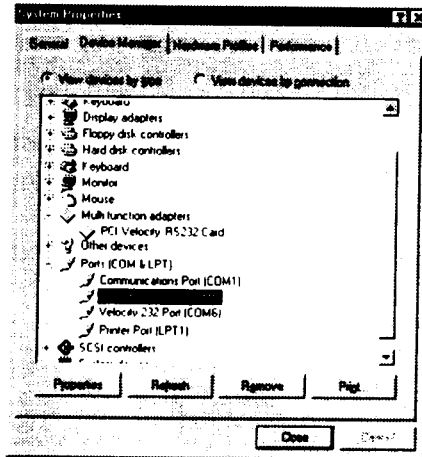
PCI Dual RS232 Card Settings In Windows 95 & 98.

- Select the PCI Dual 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:

**PCI Dual RS232 users:**   **PCI Velocity RS232 users:**

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 Dual 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**.

PCI Dual RS232 Users: this process also applies to LPT assignment, and LPT port usage can also be viewed from the **Device Manager.**

PCI Velocity RS232 Users: The maximum baud rate at which both ports of the card run at may be selected from the bottom of the window; see the section below, titled Maximum Baud Rate for more details.

Maximum Baud Rate Setting.

Four Maximum Baud rate Settings are available:
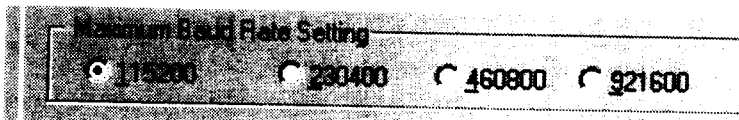
...which select the maximum baud rate at which the ports may operate; **note that settings chosen here affect both ports**. Table 3-1, below, indicates the ranges of baud rate values available at the Maximum Baud Rate Settings.
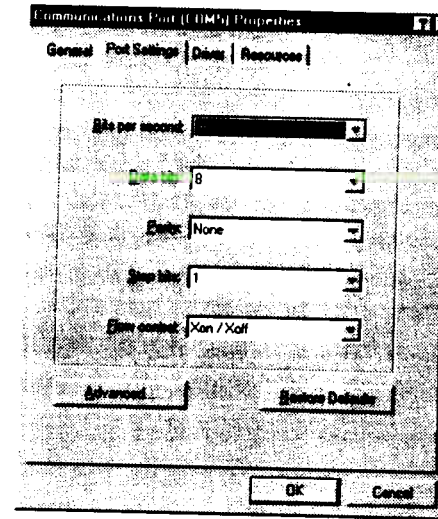
Table 3-1 Maximum Baud Rate Settings.

Maximum Baud Rate			
115200	**230400**	**460800**	**921600**
50	100	200	400
75	150	300	600
110	220	440	880
150	300	600	1200
300	600	1200	2400
600	1200	2400	4800
1200	2400	4800	9600
1800	3600	7200	1440
2000	4000	8000	16000
2400	4800	9600	19200
3600	7200	14400	28800
4800	9600	19200	38400
7200	14400	28800	57600
9600	19200	38400	76800
19200	38400	76800	153600
38400	76800	153600	230400
57600	115200	230400	460800
115200	230400	460800	921600

Baud Rates Available (left margin label)

Note: Many serial comms applications will not actually register the ports as running at baud rates of above 115200.
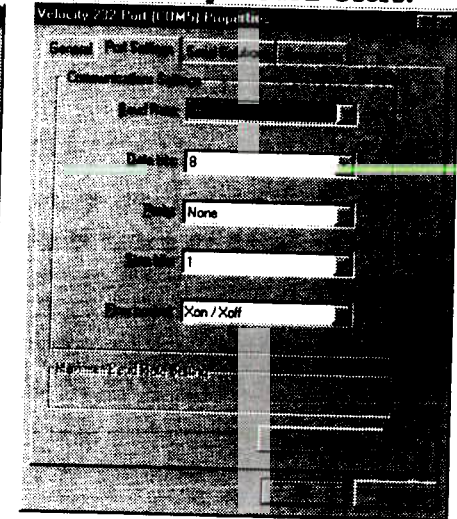
PCI Dual RS232 Port Settings In Windows 95 & 98.

Double clicking on a Communications Port that belongs to a PCI Dual RS232 card will display general properties window for that port (in this case COM5). Selecting the Port Settings tab produces:

PCI Dual RS232 users: **PCI Velocity RS232 Users:**
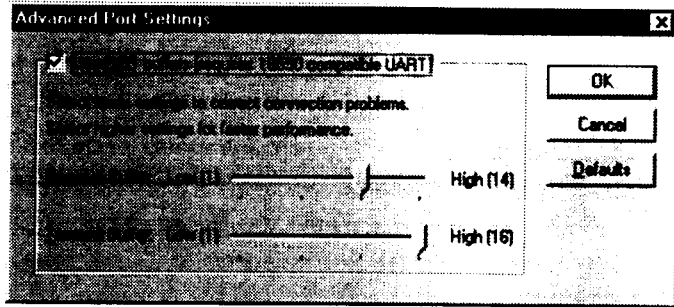

Settings available in these windows are:

1. **Baud Rate** - determines the baud rate at which the selected port operates.
   - **PCI Dual RS232 users,** 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.
   - **PCI Velocity RS232 users,** the maximum value available is dependant upon the Maximum Baud Rate Setting (see above)
2. **Data Bits.**
3. **Parity.**
4. **Stop Bits.**   Change to suit remote device.
5. **Flow Control.**

6. **Advanced (PCI Dual RS232 users only)** - 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

PCI Velocity Users Only:

Maximum Baud Rate Setting:	115,200

- **PCI Velocity RS232 users only**, clicking on the Serial Solutions tab will display:
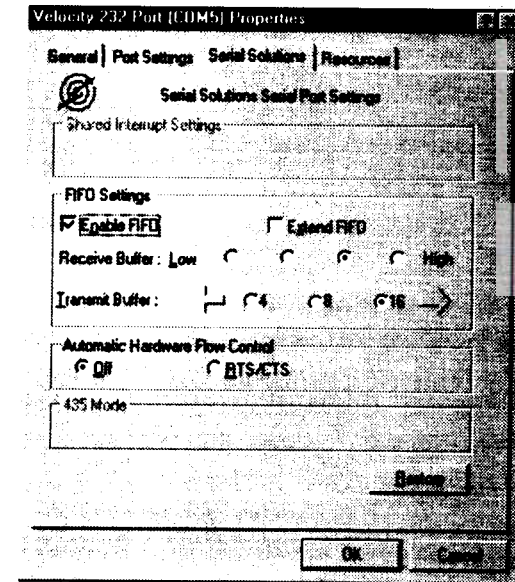
Settings available in this window are:

1. **FIFO settings**.
   - **Enable FIFO** - turns the selected ports FIFO buffer on or off. It is strongly recommended that the FIFO for both ports is left enabled.

- **Extend FIFO** - when checked, extends the selected ports FIFO buffer from 16 to 64 bytes.
- **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.

2. **Automatic Hardware Flow Control**. One of two options may be selected:
   - **Off** (Default) - This will turn off automatic flow control. (If you have no data transfer problems then selecting this option is fine.)
   - **RTS/CTS** - This will use the RTS and CTS lines for automatic hardware flow control.

Configuring Ports In Microsoft Windows NT 4.0

Microsoft Windows NT Provides built in support for 255 standard serial ports. To setup your PCI Dual RS232 serial card you should follow these steps. Please note that to change any kind of hardware configuration under Windows NT you must be logged in as a user with Administrator level privileges, if you do not have these please contact your system administrator.

Software Installation.

Insert the PCI Dual RS232 into your PC, as described in chapter 2, and restart. Place the supplied floppy disk titled "Serial Solutions for Windows NT" in a suitable drive and from the Start Menu choose Run and enter a:\setup (where a: is the path to the floppy drive with the installation disk).
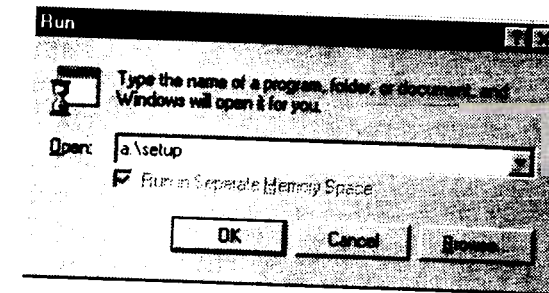

- InstallShield will then install the driver software automatically - it will then copy the necessary files and start itself. This automatically detects your new PCI serial card(s) and does not require any further system restarting.

Examining Card Configuration.

Go to Control Panel (Start/Settings/Control Panel) and double click on Serial Solutions PCI:
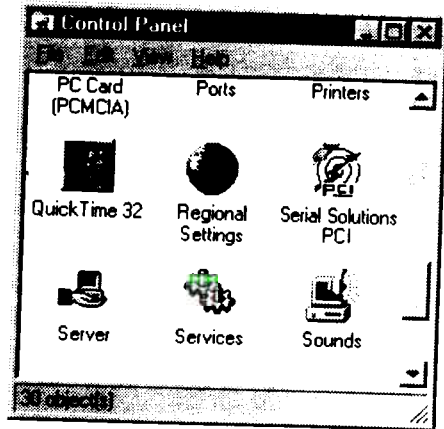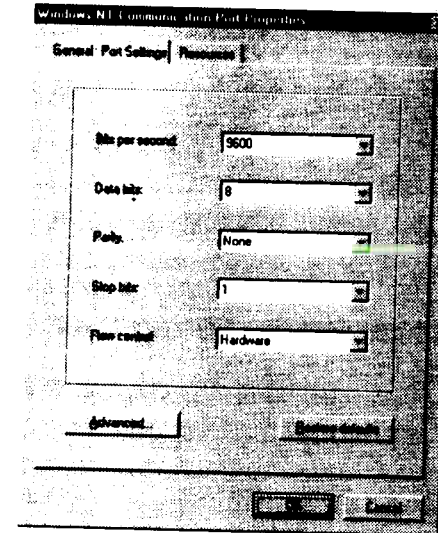

You will be presented with a Serial Solutions PCI Port Configuration window:
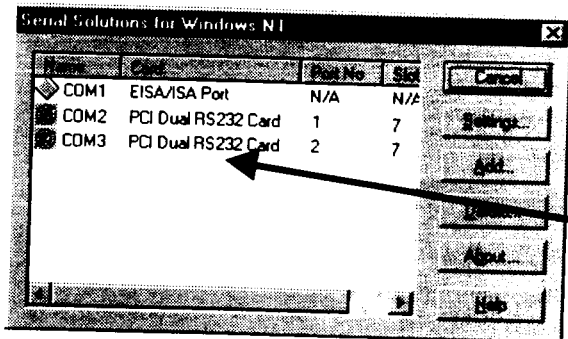
PCI Velocity RS232 users, these entries under card will appear as:
PCI Velocity RS232 Card.

Configuring Ports.

To view the settings of a port, select it and click on settings, and then click on the resources tab:

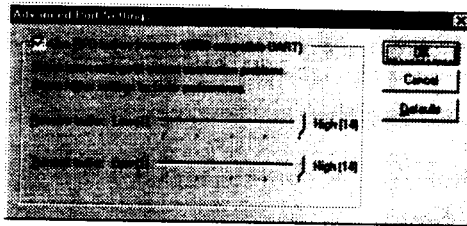Settings available in this window are:

1. **Baud Rate** - determines the baud rate at which the selected port operates.
   - **PCI Dual RS232 users:** The maximum baud rate available is 115,200.
   - **PCI Velocity RS232:** Users: the maximum value available is 921,600 (1 Megabaud.) **Note:** Many serial comms applications will not actually register the ports as running at baud rates of above 115200.
2. **Data Bits.**
3. **Parity.**
4. **Stop Bits.**   } Change to suit remote device.
5. **Flow Control.**
6. **Advanced** - see the section below, titled "Advanced Port Settings."

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: Hardware

Advanced Port Settings.

* **PCI Dual RS232 users**: When the **Advanced** button of Port Settings is selected the following dialogue is displayed:
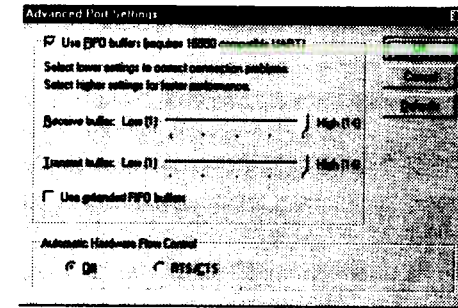
Settings available in this window are:

1. **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.
2. **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.
3. **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.

4. **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)

* **PCI Velocity Users**: When the **Advanced** button of Port Settings is selected the following dialogue is displayed:

Settings available in this window are:

1. **FIFO settings:**
   * **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.

- **Use Extended FIFO Buffers** - when checked, extends the selected ports FIFO buffer from 16 to 64 bytes.

2. **Automatic Hardware Flow Control**. One of two options may be selected:
   - **Off** (Default) - This will turn off automatic flow control. (If you have no data transfer problems then selecting this option is fine.)
   - **RTS/CTS** - This will use the RTS and CTS lines for automatic hardware flow control.

3. **Defaults** - When clicked this button resets the advanced properties to the followed settings:

Use FIFO Buffers:	On (checked)
Transmit Buffers:	1
Receive Buffers:	8
Use Extended FIFO:	Off (Unchecked)
Automatic Hardware Flow Control:	Off

Uninstalling Serial Solutions PCI.

To uninstall Serial Solutions PCI:

- From Control Panel, open the Add/Remove Programs applet, then close the Control Panel.
- Select from the list Serial Solutions PCI.
- Click the Add/Remove button.

Windows NT will then uninstall the Serial Solutions PCI applet without the need for restarting.

Configuring Ports In Windows 3.x

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

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

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

PCI Velocity RS232 users:
```
card 1 is on bus 0, device 16, function 0
Card ID=7, revision 2: Dual Velocity RS232
interrupt line 11 has been assigned
2 sets of 16750-compatible registers are at I/O address 0140
Baud clock control is at I/O address 02d0
Write 0xf6 for /8 (default), 0xf2 for /4, 0xd6 for /2, 0xd2 for /1.
```
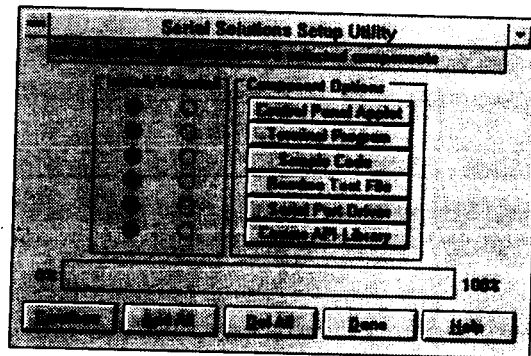
- Note down IRQ and I/O address, which in this case are:
  The IRQ = 11
  The I/O address = 0140

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).
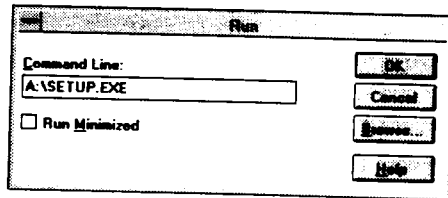
- Click OK, the Setup Program Main Screen is displayed:

By default, all component options will be installed, selecting the "Del All" 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.
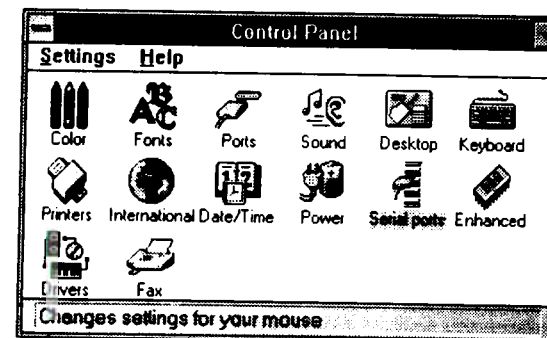
Note: If the Serial Port driver options has been selected, after the setup program has finished, Windows will display a restart message - answer **Yes** and Serial Solutions will be ready to run upon Windows restarting.
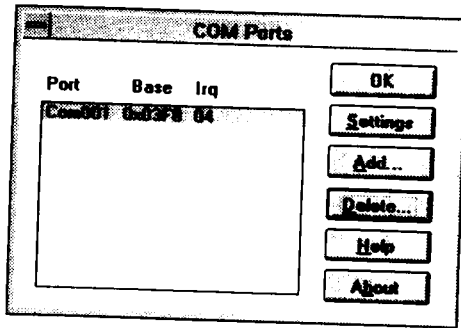
Serial Port Installation.

- From **Main**, select **Control Panel**:
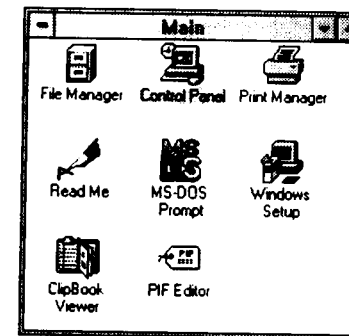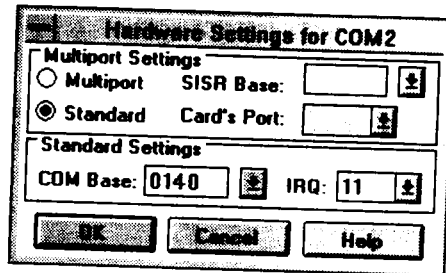

- Click on **Serial Ports**:

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 Dual 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:
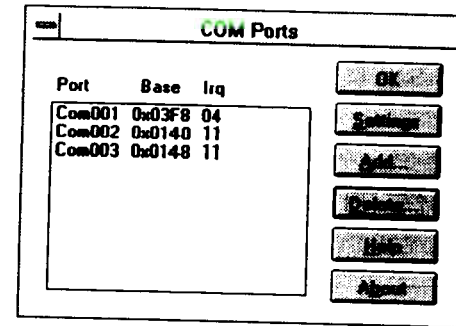
Configuring The COM Ports.

- From the COM Ports window choose the port that you wish to configure and click on **Settings** - the following dialogue will be displayed:
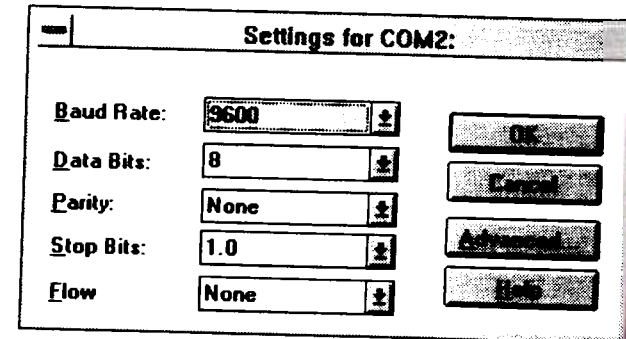
Note: A port that has been added has the default values of:

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 mis-match of settings in the Serial Ports Applet (COM1-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 Dual RS232 card is inserted:

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

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

PCI Velocity RS232 users:
```
card 1 is on bus 0, device 16, function 0
Card ID=7, revision 2: Dual Velocity RS232
interrupt line 11 has been assigned
2 sets of 16750-compatible registers are at I/O address 0140
Baud clock control is at I/O address 02d0
Write 0xf6 for /8 (default), 0xf2 for /4, 0xd6 for /2, 0xd2 for /1.
```

- Note down IRQ and I/O which in this case:

    The IRQ = 11
    The I/O address = 0140

NEWCOM.SYS Parameters.

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

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 /A*x,y* where *x* is COM port range and *y* is I/O address.

/I *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 Dual 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 PCI Dual 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 /I 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 Dual 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.
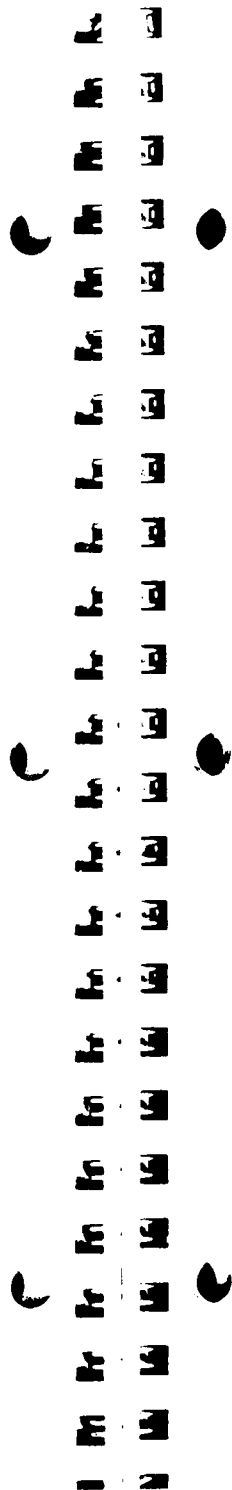
Chapter 4
RS232 PINOUTS AND PORT CABLING.

Introduction.

This chapter gives details of the 9 and 25 pin RS232 pin outs, cabling and connections, with information on how to connect the serial ports of two PCs and how to make a selftest loop back connector.

The RS232 Standard.

The RS232 standard is ancient in computer industry terms. Introduced in 1962, it is now widely established. RS232 is a slow speed, short distance, single ended transmission system (i.e. only one wire per signal). Typical RS232 maximum cable length is 50 feet with a maximum data rate of 20K bits per second.

Figure 4-1. RS232 Point To Point Connection.

TTL   D ———— R   TTL

GROUND   GROUND
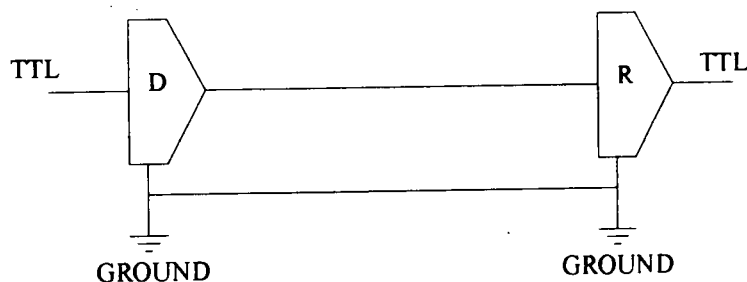
RS232C Standard 1 Driver 1 Receiver	
Line Length	Max Data Rate
50 Feet = 15m	20 Kbits/sec

Serial Port Pin Outs.

The pinouts of the 9 and 25 pin Male D connectors are given below.

Figure 4-2. Serial Port RS232 Pin Outs.

9 Pin connector:

PIN 6 - DATA SET READY (DSR)
PIN 7 - REQUEST TO SEND (RXD)
PIN 8 - CLEAR TO SEND (CTS)
PIN 9 - RING INDICATOR (RI)

PIN 1 - DATA CARRIER DETECT (DCD)
PIN 2 - RECEIVED DATA (RXD)
PIN 3 - TRANSMITTED DATA (TXD)
PIN 4 - DATA TERMINAL READY (DTR)
PIN 5 - GROUND (GND)

25 Pin connector:

PIN 20 - RING INDICATOR (RI)
PIN 22 - DATA TERMINAL READY (DTR)

PIN 2 - TRANSMITTED DATA (TXD)
PIN 3 - RECEIVED DATA (RXD)
PIN 4 - REQUEST TO SEND (RXD)
PIN 5 - CLEAR TO SEND (CTS)
PIN 6 - DATA SET READY (DSR)
PIN 7 - GROUND (GND)
PIN 8 - DATA CARRIER DETECT (DCD)

9 Pin D Serial Port RS232 Cables.

To connect to the AT style RS232 Serial Port you will need a cable terminating in a 9 way female D connector. It is sound practice to use cables with screws fitted that will allow you to fasten the cable securely to the PC card.

In general, you will need to make up a "cross over" cable to correctly interface the PC to the RS232 port of another computer or device. Traditionally, making up the cross over cable has been considered a black art. However, provided you have the pin outs and handshake requirements of both sides of your RS232

connection, the cross over cable becomes a matter of common sense. The cross over cable is simply to ensure that the right signals going out of one RS232 port go into the appropriate lines of the other RS232 port.

9 Pin D Serial Port Connection To Another PC.

Suppose we want to connect the AT style 9 pin D Serial Port to the serial port of another IBM PC. See Figure 4-3.

1) Connect the earth lines.
   Line 5 of Serial Port 2 to lines 1 & 7 of the other PC.
   This gives the two devices a common earth level.

2) Connect the Transmit and Receive lines together.
   Line 3, TXD, Port 2 goes to line 3, RXD, of the other PC.
   Line 2, RXD, Port 2 goes to line 2, TXD, of the other PC.
   This allows each to receive the data transmitted by the other.

3) Connect the Port 2 DTR line, pin 4 to the other PC DCD, pin 8 and CTS, pin 5, lines.
   Also, connect up the other PC DTR line, pin 20 to the Port 2 DCD, pin 1 and CTS, pin 8, lines.
   This allows the receiving device to signal when it can no longer accept data. The receiving device sets DTR false when it is unable to receive any more data. The sending device reads DTR on its CTS and DCD pins. It should stop sending when CTS goes false.

4) Connect the Port 2 RTS line, pin 7, to the other PC DSR line, pin 6. Also, connect the other PC RTS line, pin 4, to the Port 2 DSR line, pin 6.
   This RTS line is used to let the other device know that it is ready for data exchange.

Figure 4-3. 9 Pin D Serial Port To Other PC Cable.

AT SERIAL PORT Side   Other PC SERIAL PORT Side.
9 PIN D CONNECTOR   9 PIN D CONNECTOR
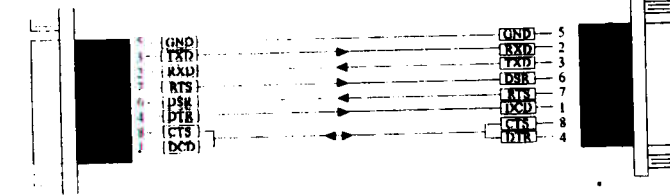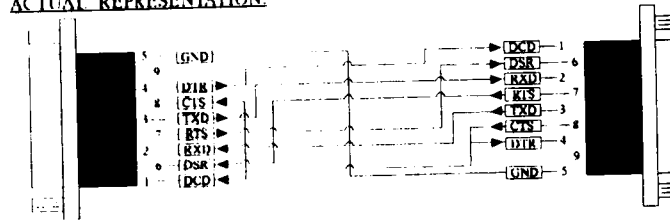
9 PIN D CONNECTOR   25 PIN D CONNECTOR
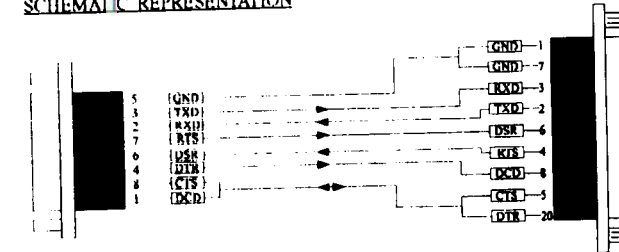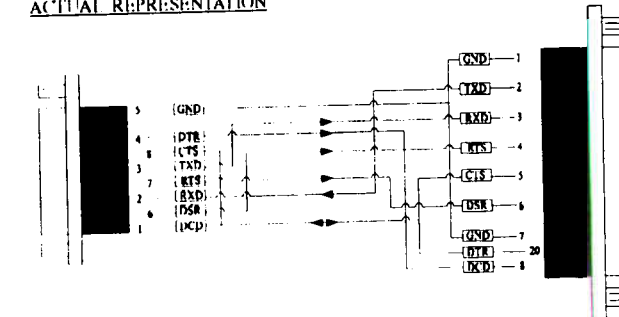
9 Pin D Serial Port To A Modem.

If you are connecting a MODEM to a 9 pin D Serial Port then you will NOT need a cross over cable and a straight through cable connected as the 9 to 25 pin adapter given in Figure 4-5.

9 Pin D Serial Port Loop Back Connector.

A loop back connector can be used to echo RS232 data transmitted by a serial port back into its own RS232 receiver. In this way, the function of the serial port can be tested.
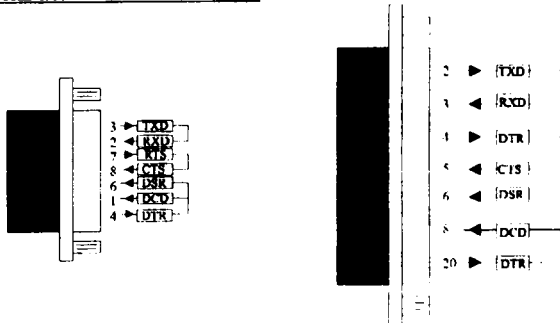
For an AT style Serial Port use the a female 9 way connector wired as in Figure 4-4.

Figure 4-4. 9 Pin D Serial Loop Back Connector.

9 PIN D CONNECTOR   25 PIN D CONNECTOR
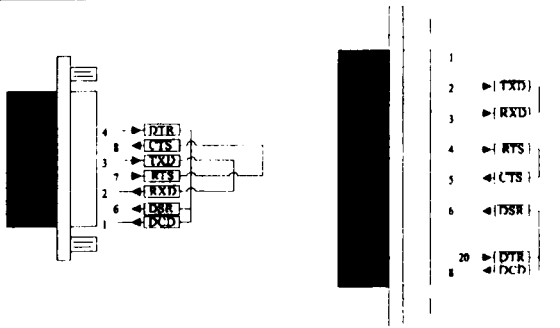
Figure 4-5. 9 To 25 Way Adapter.

This adapter cable makes the AT style 9-pin serial port, look like the standard PC 25 pin serial port. It is NOT a cross over cable!

9 Pin AT SERIAL PORT   25 Pin PC SERIAL PORT
9 Pin Female D Connector   25 Pin Male D Connector

Index