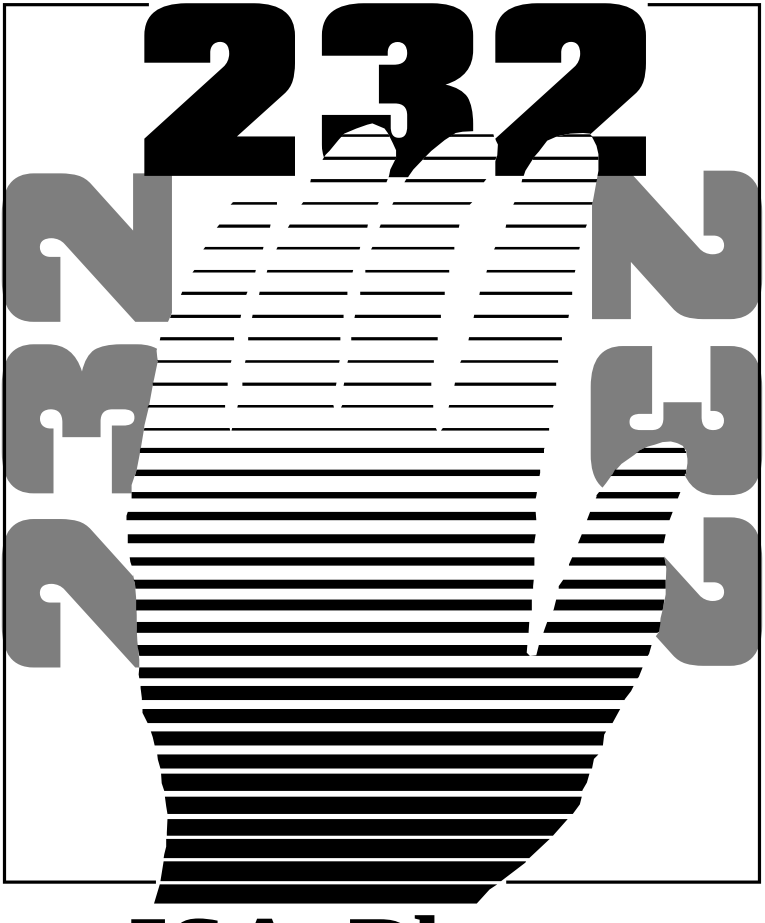
Hardware Manual



ISA Photon
4 Port RS232

1.0 EDITION December 1998

Guarantee.

FULL 36 MONTHS GUARANTEE.

We guarantee your interface 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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PHOTON 4 PORT RS232 MANUAL

THE LAYOUT OF THIS MANUAL

Chapter 1 - ISA Photon 4 Port RS232 Hardware Configuration, Summarises the features of the ISA Photon 4 Port RS232 Card, describes the two configurable options and lists all the possible DIP Switch options settable on the card.

Chapter 2 – Installing the card into the PC,
Explains how to open the PC and insert a new serial card

Chapter 3 – ISA Photon 4 Port RS232 Software Installation
This chapter details how to install and configure the Photon 4 Port RS232 Card in Windows 3.x, Windows 95/98 and Windows NT.

Chapter 4 – RS232 Port Cabling

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CHAPTER 1
HARDWARE CONFIGURATION.

Introduction.

This chapter explains how to configure the ISA PHOTON 4 PORT RS232 in a PC compatible, giving details for address and IRQ jumper selection. Detailed instructions are given how to set the address select DIP switch and IRQ jumper.

This half size RS232 card will fit into ANY 16 bit ISA slots and will work happily in any PC compatible up to and exceeding 500MHz Pentium II, single or multiprocessor.

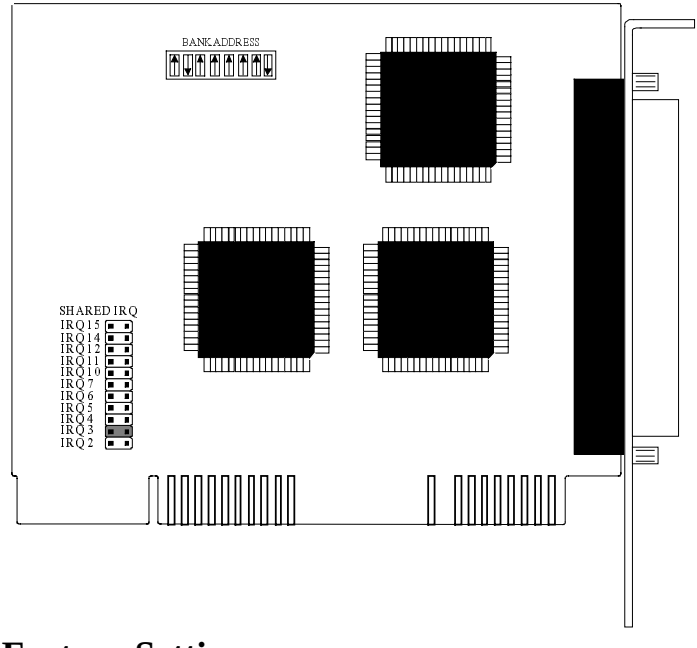
ISA PHOTON 4 PORT RS232 Card Features.

* Four independent Serial ports.
* Reliable communications up to 50 feet, 15m, and beyond!
* 100% 16C550 PC Compatible serial port, up to 230,400 baud.
* 16550 compatible FIFO provides 128 byte input and 128 byte output buffer on each port.
* Jumper selectable interrupt level IRQ 2-7, 10-12, 14 & 15.
* Shared IRQ settings for all Ports
* 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. 500 MHz Pentium II WITHOUT extra wait states.

The ISA PHOTON 4 PORT RS232 has the following features:

Baud Rate:	50 Baud to 230400 Baud.
Word Length:	5, 6, 7 or 8 bits.
Parity:	Even, Odd, None, Mark or Space.
Start Bit:	1 start bit always sent.
Stop Bits:	1, (1.5 for 5 bit data word length) or 2.

Figure 1-1 ISA Photon 4 Port RS232 Factory Settings



Factory Settings

Shared IRQ	3	
BANK	100	GIVING
		Port 1 100
		Port 2 108
		Port 3 110
		Port 4 118
		SISR 120

Configuring the ISA Photon 4 Port RS232

In the state, it leaves our factory, the ISA Photon 4 Port RS232 is ready to plug straight into a PC compatible computer. Unless there is GOOD REASON, do not alter its default setting. However, due to the presence of other serial ports in the PC, your card may need configuring to suit your setup.

If your card needs to be reconfigured it is important to know the settings (particularly IRQ allocations) of any other add on cards / motherboard resources that exist in your PC, in order to ensure its trouble free operation. Various means of determining these settings exist, for example, the Device Manager in Windows 95 or the MSD program in MS-DOS, but these do not always give the complete picture and should be used for indication only. Settings for legacy devices such as ISA cards, are determined most accurately by examining the appropriate hardware, or contacting the supplier. ISA device settings can change, but are usually reported by the BIOS at boot time.

The two configurable options are:-

i) **Serial Port I/O Address**
Set by the Bank DIP Switch

ii) **Interrupt Allocation.**
Set on the IRQ Jumper Block

The factory default settings (listed in the table above) are suitable for the majority of systems.

Recommended alternate setting are given in Table 1-1 below.

Table 1 -1 ISA Photon 4 Port Card Alternate Settings

Shared IRQ	5, 10, or 11	
BANK	300	GIVING
		Port 1 300
		Port 2 308
		Port 3 310
		Port 4 318
		SISR 320

Serial Port Connectors

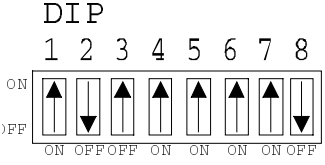
The ISA Photon 4 Port RS232 card has four 9 pin serial ports, connected via a 37 pin female port. See **Chapter 6 "RS232 PINOUTS AND PORT CABLING"** for details on pin outs wiring etc.

Serial Port Configuration.

The position of the DIP determines the I/O address of the serial ports, configuring the card to a "bank" address in the range 100h to 3F8h, with the address of the shared interrupt register immediately following the bank address. Thus the ISA Photon 4 Port RS232 card occupies 34 consecutive I/O address locations starting at the bank address. The bank address is always on an 8 byte boundary.

The bank address is selected by the first 7 DIPs on the DIP switch. DIP 8 is currently not used and should be set in the off position.

Figure 1-4. Serial Port Bank Address Allocation



PORT ADDRESS SETTINGS			
P#1	P#2	P#3	P#4
100h	108h	110h	118h

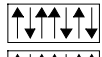
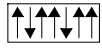
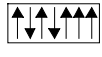
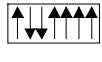
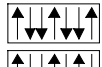
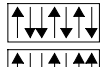
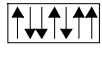
Within this 32 byte bank, port 1 - port 4 are decoded consecutively. e.g. Port 1 is at the bank address, port 2 at bank+8, port 3 at bank+16, port 4 at bank+24, SISR at bank +32.

In all, each of serial ports 1-4 may be set to 1 of 96 addresses. The default bank I/O address is 100hex.

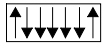
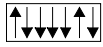
The best addresses for the serial ports are in the range 0100-01EF hex, which is rarely used and 0200-023F hex & 0280-02BF hex which are usually unused.

I/O addresses to avoid are given in Figure 1-6.

Figure 1-5. Valid Photon 4 Port Base Addresses.

	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	SWITCH	P#1	P#2	P#3	P#4
	On	Off	On	On	On	Off	Off		-	-	-	100
	On	Off	On	On	On	Off	On		-	-	100	108
	On	Off	On	On	On	On	Off		-	100	108	110
Default	On	Off	On	On	On	On	On		100	108	110	118
	On	Off	On	On	Off	Off	Off		108	110	118	120
	On	Off	On	On	Off	Off	On		110	118	120	128
	On	Off	On	On	Off	On	Off		118	120	128	130
	On	Off	On	On	Off	On	On		120	128	130	138
	On	Off	On	Off	On	Off	Off		128	130	138	140
	On	Off	On	Off	On	Off	On		130	138	140	148
	On	Off	On	Off	On	On	Off		138	140	148	150
	On	Off	On	Off	On	On	On		140	148	150	158
	On	Off	On	Off	Off	Off	Off		148	150	158	160
	On	Off	On	Off	Off	Off	On		150	158	160	168
	On	Off	On	Off	Off	On	Off		158	160	168	170
	On	Off	On	Off	Off	On	On		160	168	170	178
	On	Off	Off	On	On	Off	Off		168	170	178	180
	On	Off	Off	On	On	Off	On		170	178	180	188
	On	Off	Off	On	On	On	Off		178	180	188	190
	On	Off	Off	On	On	On	On		180	188	190	198
	On	Off	Off	On	Off	Off	Off		188	190	198	1A0
	On	Off	Off	On	Off	Off	On		190	198	1A0	1A8
	On	Off	Off	On	Off	On	Off		198	1A0	1A8	1B0
	On	Off	Off	On	Off	On	On		1A0	1A8	1B0	1B8

ISA Photon 4 Port RS232 Hardware Configuration

DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	SWITCH	P#1	P#2	P#3	P#4
On	Off	Off	Off	On	Off	Off		1A8	1B0	1B8	1C0
On	Off	Off	Off	On	Off	On		1B0	1B8	1C0	1C8
On	Off	Off	Off	On	On	Off		1B8	1C0	1C8	1D0
On	Off	Off	Off	On	On	On		1C0	1C8	1D0	1D8
On	Off	Off	Off	Off	Off	Off		1C8	1D0	1D8	1E0
On	Off	Off	Off	Off	Off	On		1D0	1D8	1E0	1E8
On	Off	Off	Off	Off	On	Off		1D8	1E0	1E8	1F0
On	Off	Off	Off	Off	On	On		1E0	1E8	1F0	1F8
Off	On	On	On	On	Off	Off		1E8	1F0	1F8	200
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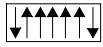
Off	On	On	On	On	On	Off		1F8	200	208	210
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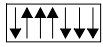
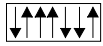
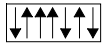
Off	On	On	On	Off	Off	Off		208	210	218	220
Off	On	On	On	Off	Off	On		210	218	220	228
Off	On	On	On	Off	On	Off		218	220	228	230
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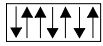
Off	On	On	Off	On	Off	On		230	238	240	248
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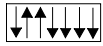
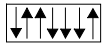
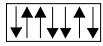
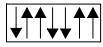
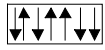
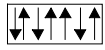
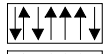
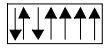
Off	On	On	Off	Off	Off	Off		248	250	258	260
Off	On	On	Off	Off	Off	On		250	258	260	268
Off	On	On	Off	Off	On	Off		258	260	268	270
Off	On	On	Off	Off	On	On		260	268	270	278

ISA Photon 4 Port RS232 Hardware Configuration

DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	SWITCH	P#1	P#2	P#3	P#4
Off	On	Off	On	On	Off	Off		268	270	278	280
Off	On	Off	On	On	Off	On		270	278	280	288
Off	On	Off	On	On	On	Off		278	280	288	290
Off	On	Off	On	On	On	On		280	288	290	298
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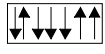
Off	On	Off	On	Off	Off	On		290	298	2A0	2A8
Off	On	Off	On	Off	On	Off		298	2A0	2A8	2B0
Off	On	Off	On	Off	On	On		2A0	2A8	2B0	2B8
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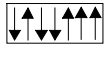
Off	On	Off	Off	On	Off	On		**2B0**	**2B8**	**2C0**	**2C8**
Off	On	Off	Off	On	On	Off		2B8	2C0	2C8	2D0
Off	On	Off	Off	On	On	On		2C0	2C8	2D0	2D8
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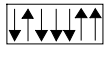
Off	On	Off	Off	Off	Off	On		2D0	2D8	2E0	2E8
Off	On	Off	Off	Off	On	Off		2D8	2E0	2E8	2F0
Off	On	Off	Off	Off	On	On		2E0	2E8	2F0	2F8
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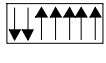
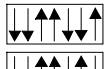
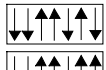
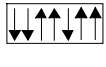
Off	Off	On	On	On	Off	On		2F0	2F8	300	308
Off	Off	On	On	On	On	Off		2F8	300	308	310
Off	**Off**	On	On	On	On	On		300	308	310	318
Off	Off	On	On	Off	Off	Off		308	310	318	320
Off	Off	On	On	Off	Off	On		310	318	320	328
Off	Off	On	On	Off	On	Off		318	320	328	330
Off	**Off**	On	On	Off	On	On		320	328	330	338

ISA Photon 4 Port RS232 Hardware Configuration

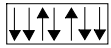
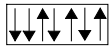
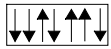
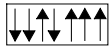
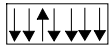
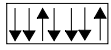
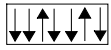
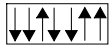
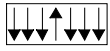
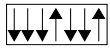
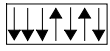
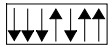
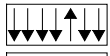
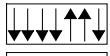
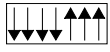
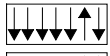
DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	SWITCH	P#1	P#2	P#3	P#4
Off	Off	On	Off	On	Off	Off		328	330	338	340
Off	Off	On	Off	On	Off	On		330	338	340	348
Off	Off	On	Off	On	On	Off		338	340	348	350
Off	Off	On	Off	On	On	On		340	348	350	358
Off	Off	On	Off	Off	Off	Off		348	350	358	360
Off	Off	On	Off	Off	Off	On		350	358	360	368
Off	Off	On	Off	Off	On	Off		358	360	368	370
Off	Off	On	Off	Off	On	On		360	368	370	378
Off	Off	Off	On	On	Off	Off		368	370	378	380
Off	Off	Off	On	On	Off	On		370	378	380	388
Off	Off	Off	On	On	On	Off		378	380	388	390
Off	Off	Off	On	On	On	On		380	388	390	398
Off	Off	Off	On	Off	Off	Off		388	390	398	3A0
Off	Off	Off	On	Off	Off	On		390	398	3A0	3A8
Off	Off	Off	On	Off	On	Off		398	3A0	3A8	3B0
Off	Off	Off	On	Off	On	On		3A0	3A8	3B0	3B8
Off	Off	Off	Off	On	Off	Off		3A8	3B0	3B8	3C0
Off	Off	Off	Off	On	Off	On		3B0	3B8	3C0	3C8
Off	Off	Off	Off	On	On	Off		3B8	3C0	3C8	3D0
Off	Off	Off	Off	On	On	On		3C0	3C8	3D0	3D8
Off	Off	Off	Off	Off	Off	Off		3C8	3D0	3D8	3E0
Off	Off	Off	Off	Off	Off	On		3D0	3D8	3E0	3E8
Off	Off	Off	Off	Off	On	Off		3D8	3E0	3E8	3F0
Off	Off	Off	Off	Off	On	On		3E0	3E8	3F0	3F8

Figure 1-6. I/O Addresses To Avoid.

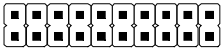
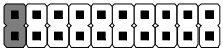
I/O Address	Normal Use
01F0H - 01F7H	IDE Hard Disk
0201H - 0201H	Game Control Adapter
0278H - 027FH	Second Printer Port Adapter
0378H - 037FH	Printer Port Adapter
03B0H - 03BFH	Monochrome Display and Printer Card
03C0H - 03CFH	VGA & EGA cards
03D0H - 03DFH	VGA cards
03F8H - 03FFH	COM1 Port Adapter

If any of these adapter cards are installed in the PC DO NOT set the any of Photon 4 Port RS232 Serial ports to reside in the same range.

Serial Port IRQ Interrupt Jumper Selection.

The position of the movable jumper on the interrupt jumper block, located in the bottom left hand corner of the card, determines the IRQ vector for all of the serial ports, configuring the card as IRQ2 - IRQ7, IRQ10 - IRQ12, or IRQ14 - IRQ15.

Figure 1-7. Card Shared IRQ Jumper Block.

1111 2345670125	VALUE	NORMAL USE
		
	IRQ 2	Usually free.
	IRQ 3	COM 2.Factory Default. Do not use if COM2 already installed.
	IRQ 4	COM 1.
	IRQ 5	PRINTER PORT #2
	IRQ 6	DISK DRIVE STATUS, AVOID!
	IRQ 7	PRINTER PORT #1
	IRQ 10	Usually free.
	IRQ 11	Usually free
	IRQ 12	POINTING DEVICE, Usually Free.Free when mouse is on a COM port.
	IRQ 15	Usually free

The movable jumper on the jumper block is used to specify which hardware interrupt is to be generated by the PC serial board.

CHAPTER 2
INSTALLING THE CARD

Serial Card Installation.

Once the card has been correctly configured then it can be installed in the PC. For the ISA card it is best to make a note of the Bank I/O address and IRQ jumper settings for later use.

After installing the card and configuring the software the cables should be attached and communication with the serial peripheral devices should be established.

Provided that the RS232 installation is attacked in this orderly manner, everything should work first time. If it does not then check the software selectable communications parameters, Baud rate, Parity, stop bits first, and that the communications program is attempting to access the serial port installed. If this fails to solve the problem check the cable connections. Finally check that the card is indeed configured as you believed!

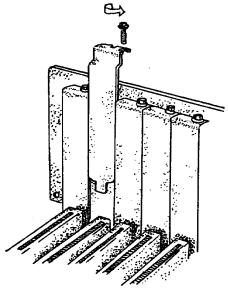
NOTE: Always turn the computer OFF before installing or removing any interface board..!!!

After having made sure that the I/O address and if appropriate jumpers are correctly set, now is the time to insert the PC Serial card into the I/O connector slots in the computer.

STEP 1: Before the PC card can be installed the power to the PC **MUST** be switched **OFF!**

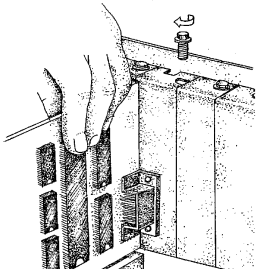
STEP 2: Remove the case.

Figure 2-1. 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 2-14).

Figure 2-2. 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 2-15).

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.

Attach all the cables.
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

CHAPTER 4
SOFTWARE INSTALLATION

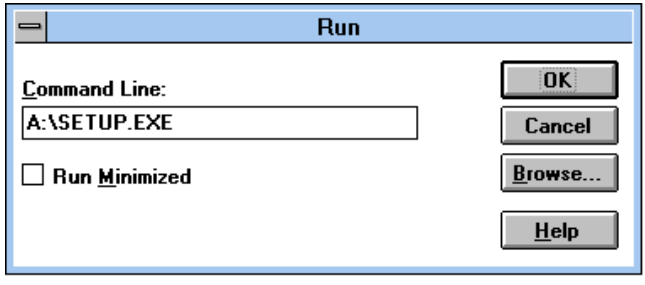
Introduction

This section describes installation procedures for Serial Solutions driver for Windows 3.x, Windows 95/98 and for Windows NT. The drivers are on the HandyWEB CDRom

Serial Solutions Installation for Windows 3.x

To install the software from the supplied disk, insert the disk from Windows **Program Manager's** File menu choose "Run" and in the Command Line entry window type <drive:>\diskimg\sswin3x\setup.exe (CDROM) or
<drive:>\setup.exe (FLOPPY)
(where <drive:> is the path to installation disk).

Selecting the "OK" button shows the setup program main screen, Figure 4-1, which will automatically select components for



installation that have not already been installed. Selecting the "Del All" button will select all installed components for deletion and selecting "Add All" chooses all uninstalled components for installation. Several of the components have user selectable parameters, e.g. target install directory, which can be changed by clicking on the button. These options may not be changed once the components have been installed. A README.TXT file on the disk contains details of the latest updates to this software.

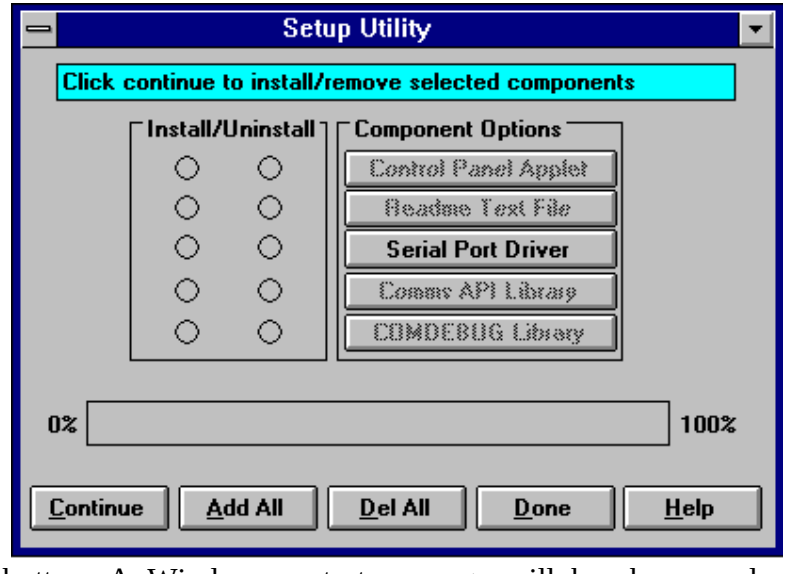
Note: If it is necessary to re-install an OLDER version of a component then the NEWER version component must be FIRST

removed by selecting the component's button in the "Uninstall" column then selecting the "Continue" button.

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

Figure 3-1. Setup Program Main Display.

Selecting the **Continue** button will start the installation process. When the setup program has finished select the **Done**



button. A Windows restart message will be shown only if the Windows communications driver option has been selected, and you should choose **Yes** to allow the new driver to run.

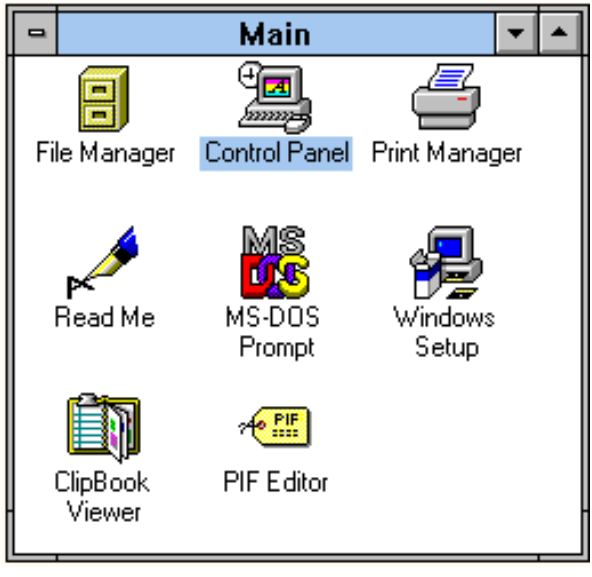
TIP

When installing serial cards the parameter that usually causes the greatest trouble is finding an unused Interrupt Request line, a free IRQ.

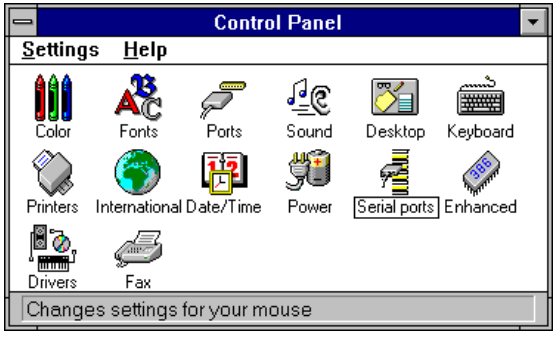
If the system already has a COM2 port installed IRQ 3 will be allocated to that. In this case, and whenever IRQ 3 is being used by other devices, the Photon 4 Port RS232 card will not be able to be installed at it's default settings. However there should be no need to change the Bank address as set in the DIP switch just change the IRQ jumper setting to an unused IRQ e.g. 5, 10 or 11. Which IRQ is free depends on what other devices you have installed in your PC.

Serial Port Installation

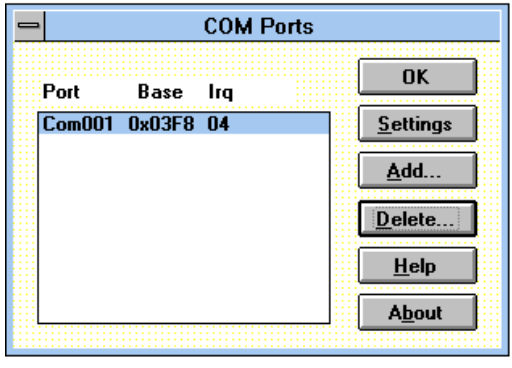
If your PC has only one COM port (COM1), and you are installing a Photon 4 Port RS232 card, click on **Control Panel** from the **Main** Window:



Then click on **Serial Ports**:



The following dialogue should then appear:

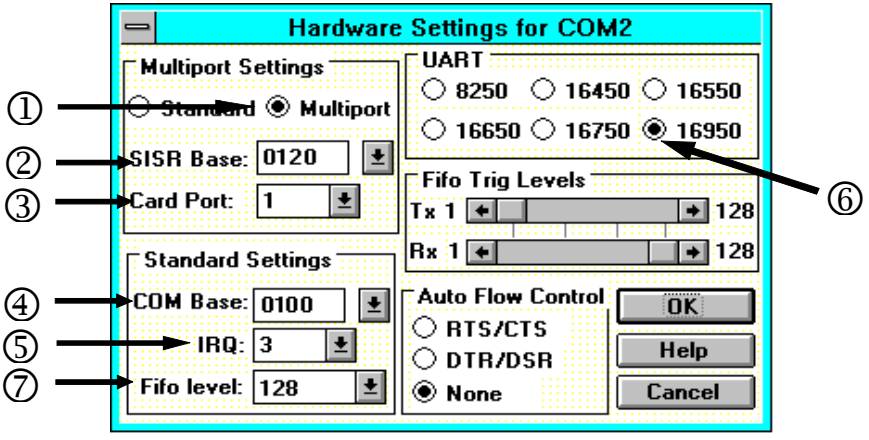


ISA Photon 4 Port RS232 in Win 3.x Overview

The two configurable options on the Photon 4 Port RS232 card are the Bank address DIP switch and the IRQ jumper block. The IRQ must match that set on the Photon 4 Port RS232 card. The bank address DIP switch determines the COM Base address of each port and also the SISR Base address of the card.

COM Base of port 1 = the Bank Address
COM Base of port 2 = the Bank Address + 8hex
COM Base of port 3 = the Bank Address + 10hex
COM Base of port 4 = the Bank Address + 18hex
SISR Base = the Bank Address + 20hex

Adding an ISA Photon 4 Port RS232 Serial Card.



For each port on the Photon 4 Port RS232 card we need to **ADD** a port and fill in the following 7 settings in the order given.

Figure 3-2. ISA Photon 4 Port RS232 Serial Card Settings.

Multiport Settings:-

①Each Port should have the **Multiport** button selected, this tells Windows 3.x that the port is one of several ports using a SISR (shared interrupt status register).

② The **SISR Base** address needs setting to a value 20hex greater than the bank address set on the DIP switch on the Photon 4 Port RS232 card.

③The **Card Port** setting tells Windows whether this is the first, second, third or fourth port of the Photon 4 Port RS232 card.

Standard Settings:-

④ The **COM Base** address is the I/O address of each serial card.

⑤ The **IRQ** as set on the Photon 4 Port RS232 jumper block should be set according to the advice in the tip above (p26).

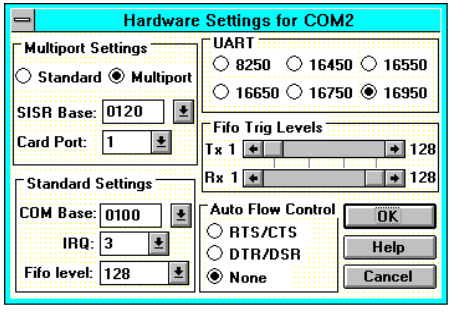
⑥ The **UART** on the photon port is an enhanced 16550 called the 16950.

⑦ Having selected the 16950 you can then set the **FIFO level** at 128 bytes.

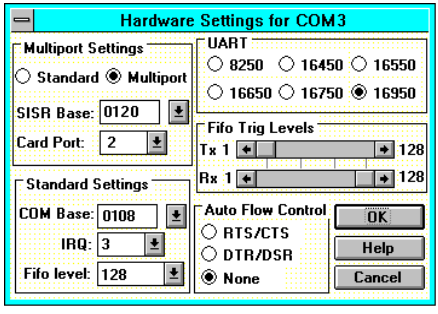
Default Settings for Photon 4 Port RS232 Card COM1 Present

COM Port	SISR	Card Port	COM Base	IRQ	UART	FIFO Trip
COM2	120	1	100	03	16950	Default
COM3	120	2	108	03	16950	Default
COM4	120	3	110	03	16950	Default
COM5	120	4	118	03	16950	Default

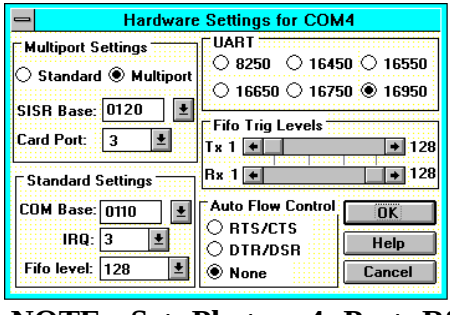
Card Port 1



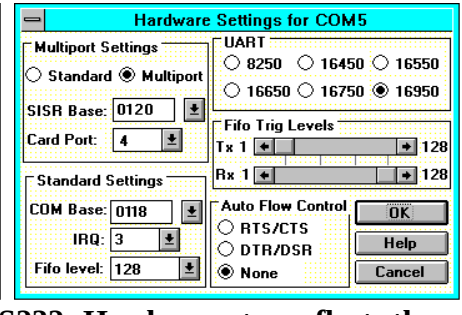
Card Port 2



Card Port 3



Card Port 4



NOTE: Set Photon 4 Port RS232 Hardware to reflect these settings

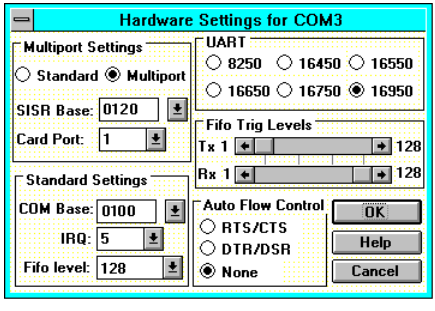
The only settings that change from port to port are the COM Base and the Card Port Settings

Settings for Photon 4 Port RS232 Card COM1 & 2 Present

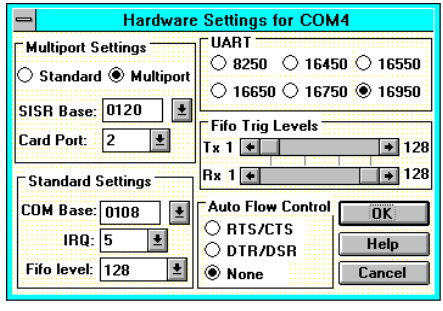
COM Port	SISR	Card Port	COM Base	IRQ	UART	FIFO Trip
COM3	120	1	100	5*	16950	Default
COM4	120	2	108	5*	16950	Default
COM5	120	3	110	5*	16950	Default
COM6	120	4	118	5*	16950	Default

*As COM2 is already set to IRQ 3 you will need to set the IRQ to 5, 10 or 11 dependent on what interrupts are free because of other installed devices. IRQ 5 is used in these examples

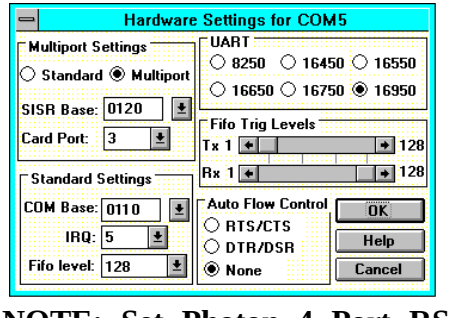
Card Port 1



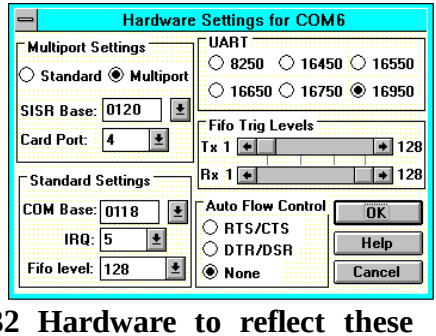
Card Port 2



Card Port 3



Card Port 4



NOTE: Set Photon 4 Port RS232 Hardware to reflect these settings

The only settings that change from port to port are the COM Base and the Card Port Settings

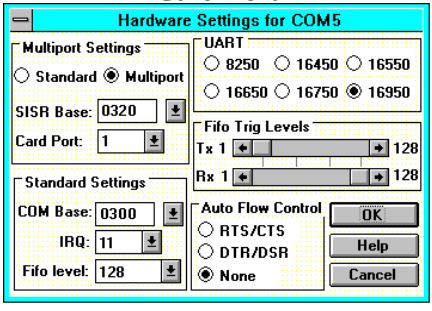
Alternate Settings for Photon 4 Port RS232 Card

COM1 - 4 Present

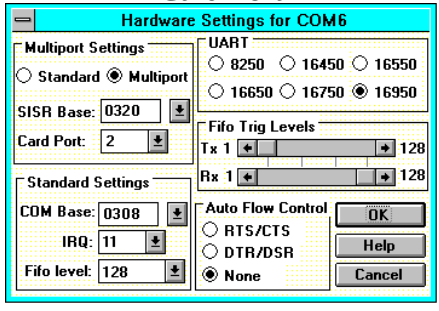
COM Port	SISR	Card Port	COM Base	IRQ	UART	FIFO Trip
COM5	320	1	300	11*	16950	Default
COM6	320	2	308	11*	16950	Default
COM7	320	3	310	11*	16950	Default
COM8	320	4	318	11*	16950	Default

*you will need to set the IRQ to 5, 10 or 11 dependent on what interrupts are free, because of other installed devices. IRQ 11 is used in these examples.

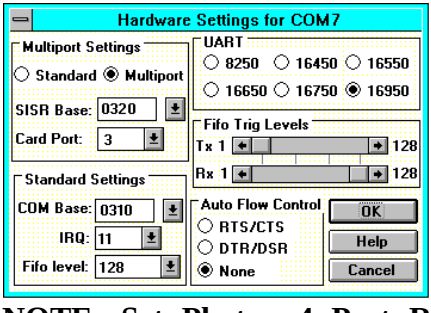
Card Port 1



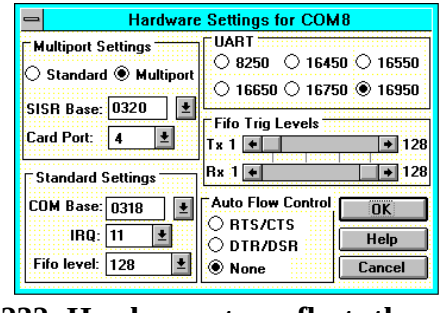
Card Port 2



Card Port 3



Card Port 4

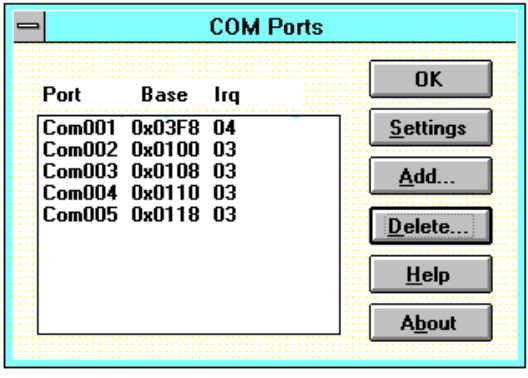


NOTE: Set Photon 4 Port RS232 Hardware to reflect these settings

The only settings that change from port to port are the COM Base and the Card Port Settings

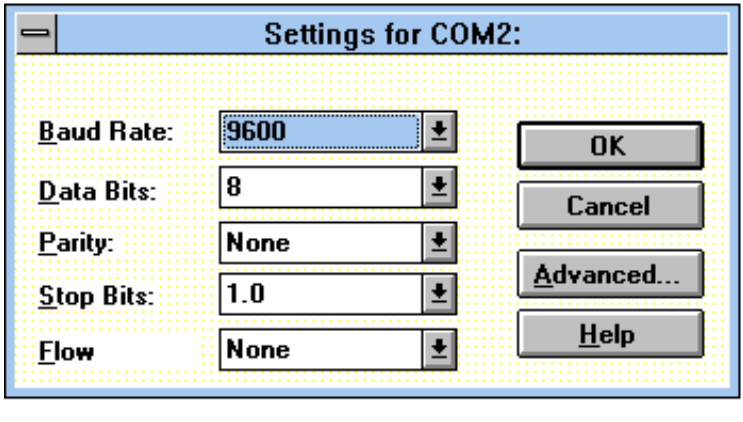
Select the **OK** button to finish adding the port. This will display a Windows restart message, but do not restart until you have installed all four ports. Be sure to restart Windows after all serial ports have been added so that the new configuration takes effect.

Figure 3-3. After Adding a PHOTON 4 PORT RS232 Card (COM1 present).



Note: Adding a port automatically sets default values for the communications settings to 9600 baud, no parity, 8 data bits and 1 stop bit. These values can be changed as described below.

Figure 3-4. ISA Photon 4 Port RS232 Card Comms Settings.



Changing Serial Port Settings

Once the Photon 4 Port RS232 card has been installed it may be necessary to change the communications settings in the COM Ports to match the baud rate, parity settings etc. of the remote serial device.

- Highlight the serial port required, e.g. COM2., in Serial Ports, Control Panel
- Click on the **Settings** button to change the communications settings, Figure 3-3.
- Select the appropriate communications settings, which must match the communications settings on the remote device.
- Click on the **OK** button to leave the communications **Settings** window.

The **Advanced** option in **Settings** can be used to change the hardware settings to match a new base address and IRQ physically set on the Photon 4 Port RS232 serial port cards if it becomes necessary to reconfigure the card due to the installation of other new hardware.

- Click on the **Advanced** button for the hardware settings window, Figure 3-4. Enter the 7 options in the same manner as described in the section "Adding an ISA Photon 4 Port RS232 Serial Card"

Deleting Ports in Windows.

The **Delete** button can be used to discard the entries of ports that have been removed from the system.

Note. Due to problems with the standard Windows Serial Ports Applet in the Control Panel **Make sure** that there are no gaps in the numbering of the first four serial ports, COM 1-4. If necessary leave a "place holder" otherwise Windows may automatically reorder the COM port numbers resulting in serious problems.

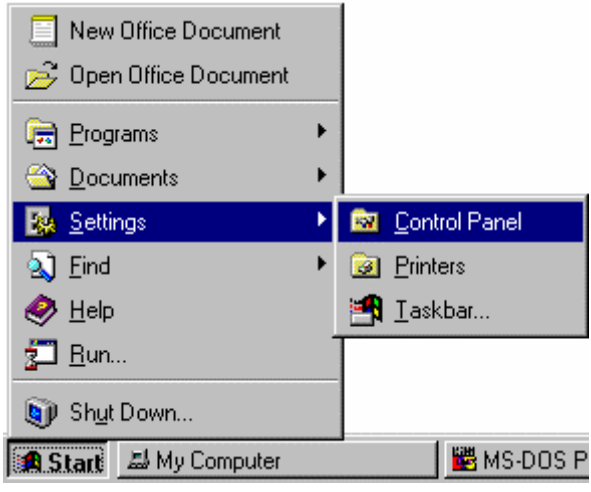
Restarting Windows.

Whenever certain values have been changed in the **Advanced** window, a message prompting the user to restart Windows will appear. Once ALL necessary changes have been made Windows should be restarted so that the new settings may come into effect.

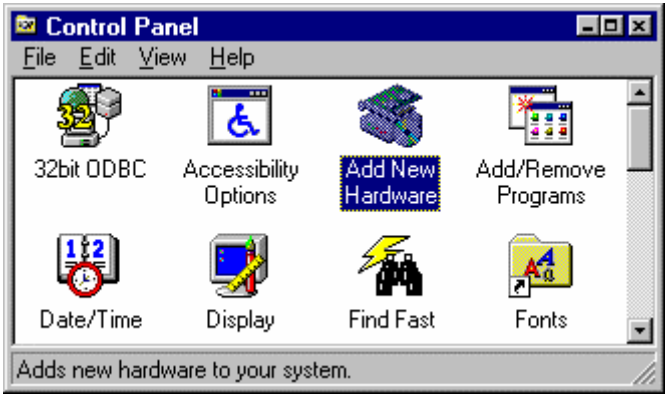
Serial Solutions Installation for Windows 95 & 98.

The following steps describe the installation of the Serial Solutions driver for Windows 95, which is supplied, on the HandyWEB CDROM. The listed installation procedure assumes that only 1 COM port (COM1) is present.

Open the **Control Panel** - there are several routes to the **Control Panel**, the simplest is to open the **Start** menu and select **Settings**.



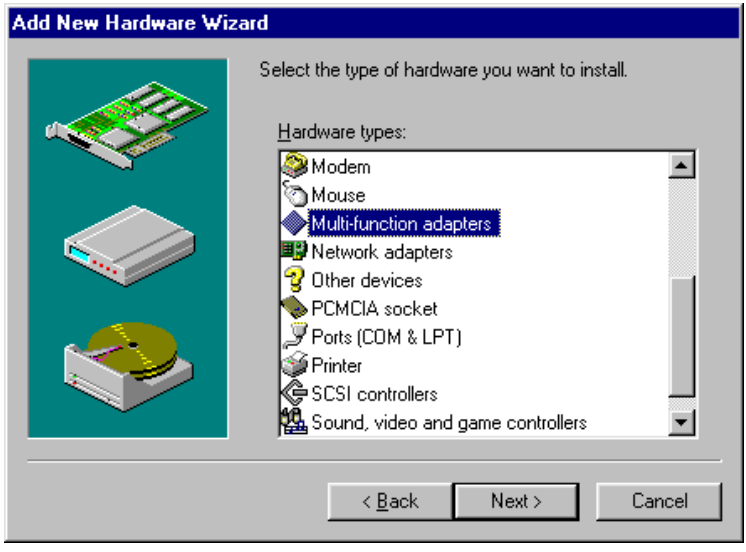
Double click the **Add New Hardware** icon in the control panel.



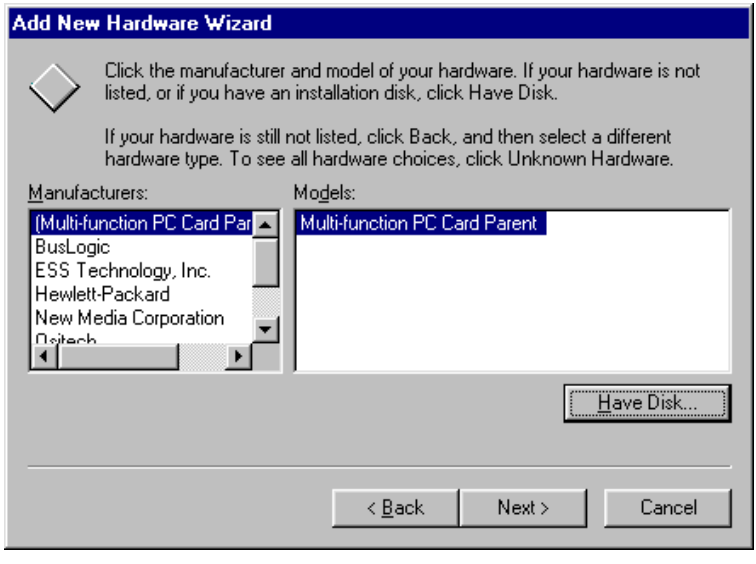
Click **next** on the applet dialogue.

The **Add New Hardware** wizard will ask you if you wish Windows to search for your hardware. Click the **No** radio button since Windows cannot find Multiport Serial Solutions serial ports and it will save some time. Click **next**

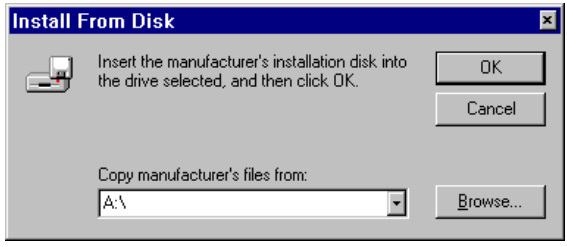
From the hardware types list on the next page select **Multi Function-Adapter**. Click **next**.



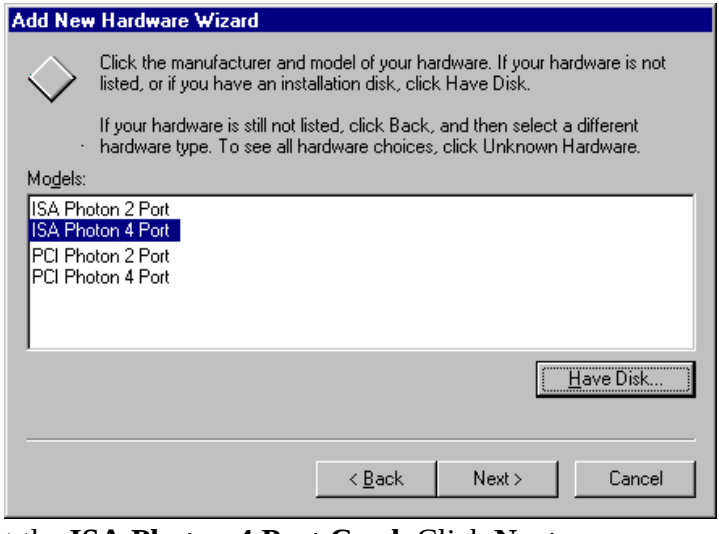
click **Have Disk.**



Windows will then ask you for the location of the Serial Solutions files you will see the following:

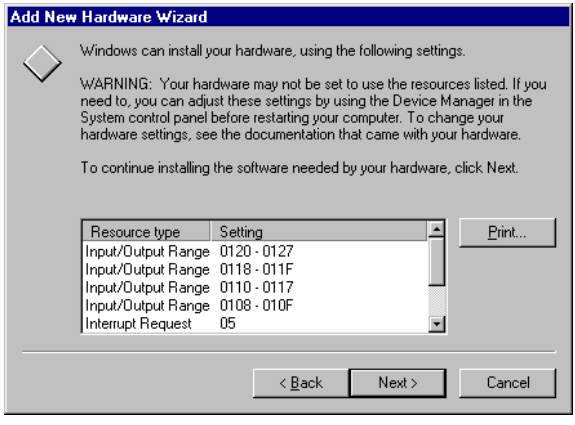


If you are installing from the Serial Solutions CDROM the path is <drive:>\diskimg\sswin9x\
(where <drive:> is the letter of your CDROM.)
After the installation procedure, the Window will display a list of Photon cards:

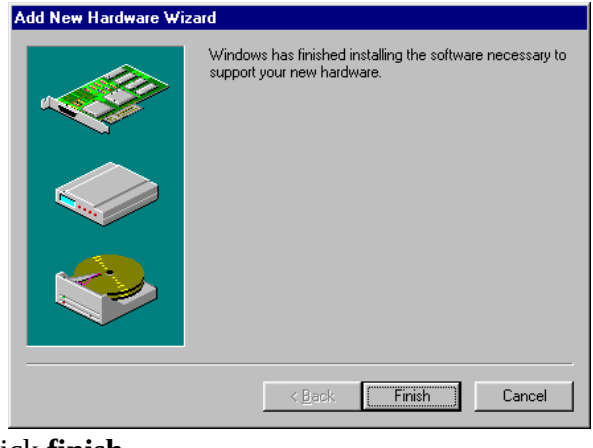


Select the **ISA Photon 4 Port Card**. Click **Next.**

Windows 95 will then inform you of the settings it has assumed for the new ports.



Click **next.**



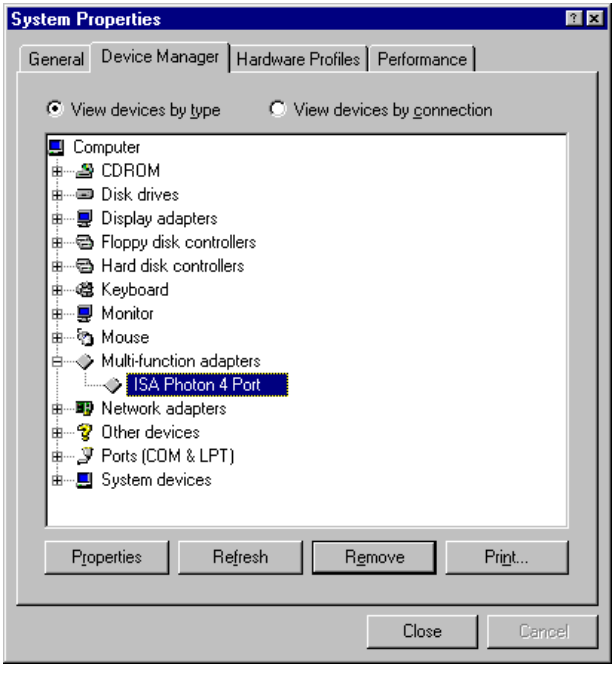
Click **finish**.

You will then be asked if you wish to re-boot the system. Since the Photon 4 Port RS232 card will now need to be installed, select yes. Turn the PC off and insert the Photon 4 Port RS232 card . Restart the computer and allow Windows 95 to load normally. Upon loading it will then "detect" each of the ports on the Photon 4 Port RS232 card individually and install them, in a similar manner to that of a Plug and Play card.

However, if you choose not to restart your PC Windows 95 will still "detect" each of the ports on the Photon 4 Port RS232 card as described above, despite the card not being installed - this is due to the nature of the driver software.

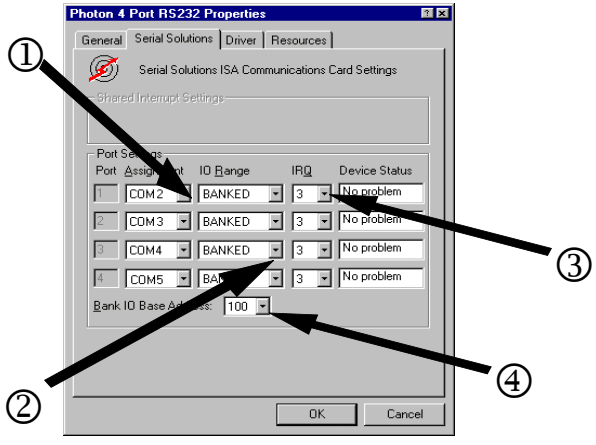
Photon 4 Port RS232 Card Settings in Win 95 & 98.

Upon installation of the Photon 4 Port RS232 card and Windows being restarted, the **Device Manager** will appear similar to the following:



It is now necessary to change the settings of the parent device (the Photon 4 Port RS232 Card), to match those physically set on the card, double click the Photon 4 Port RS232 card entry under the **Multi-Function adapter** branch, and select the Serial Solutions Tab:

For each port on the Photon 4 Port RS232 card we need to and fill in the following 4 settings shown below



The adjustable options available in this window are:

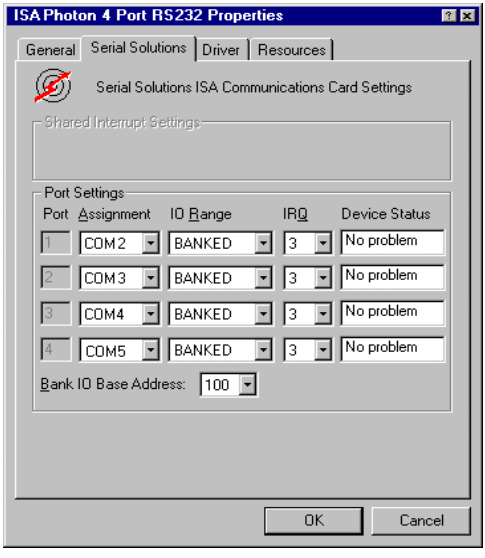
① The **COM Port** assignment determines the names by which the Photon 4 Port RS232 Ports are known to the system. Windows 95 supports up to 255 COM ports known as COM1 to COM255. The ports need to be numbered consecutively
i.e. if port 1= COM3, then port 2 = COM4,
port 3 = COM5 and port 4 = COM6.

② **IO Range:** with Photon 4 Port RS232 Cards this must always be set to Banked

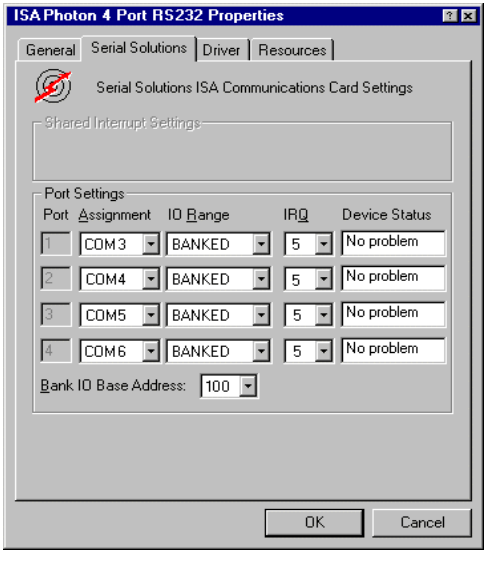
③ **IRQ.** All four ports should be set to the same IRQ as that set physically on the card's IRQ Jumper Block.

④ **Bank I/O Base Address:** this is the address which is set physically by the Bank DIP switch.

Default Settings for Photon 4 Port COM1 Present

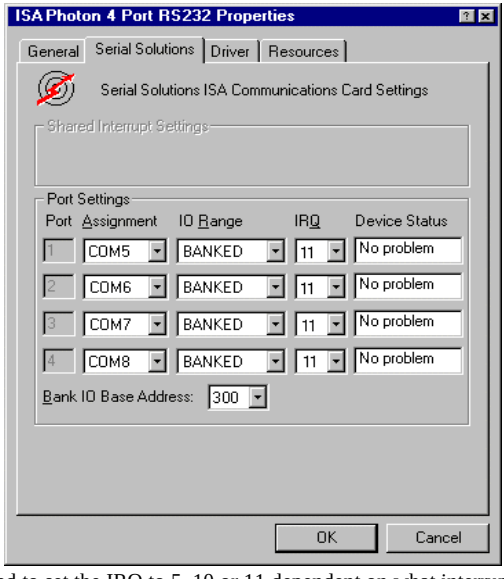


Settings for Photon 4 Port Card COM1 & 2 Present



*As COM2 is already set to IRQ 3 you will need to set the IRQ to 5, 10 or 11 dependent on what interrupts are free because of other installed devices. IRQ 5 is used in these examples

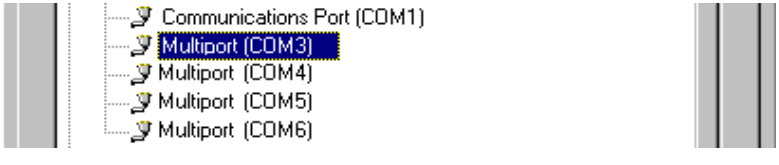
Settings for Photon 4 Port Card COM1 to 4 Present



*you will need to set the IRQ to 5, 10 or 11 dependent on what interrupts are free, because of other installed devices. IRQ 11 is used in these examples.

Changing COM Port Numbers in Windows 95 & 98.

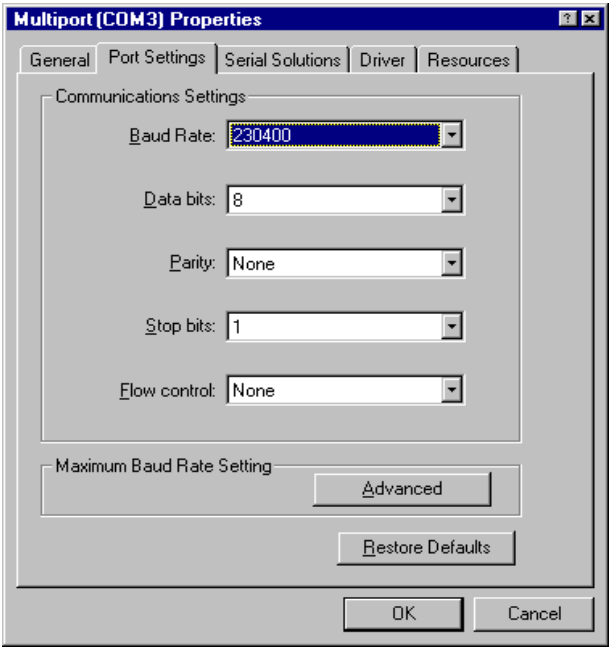
In the Serial Solutions tab of the parent device properties window the COM port assignment may be changed, simply by selecting a new COM port value from the pull down menu relevant to the port. However, COM port usage other than those for the installed Photon 4 Port RS232 card itself are not checked, so it is advisable to first check which COM ports are in use - port availability can be checked by viewing the Device Manager:



All COM ports present will be listed under the entry "**Ports (COM & LPT)**." The above screenshot indicates that COM6 and above are not installed, and therefore may be used.

ISA Photon 4 Port Card Port Settings In Win 95/98.

Double clicking upon an individual port entry in the **Device Manager**, and selecting the **Port Settings** tab will display:



Settings available in this window are:

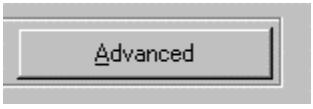
1. **Baud Rate.**
2. **Data Bits**.
3. **Parity**.
4. **Stop Bits**.
5. **Flow Control**.

Change to suit remote device.

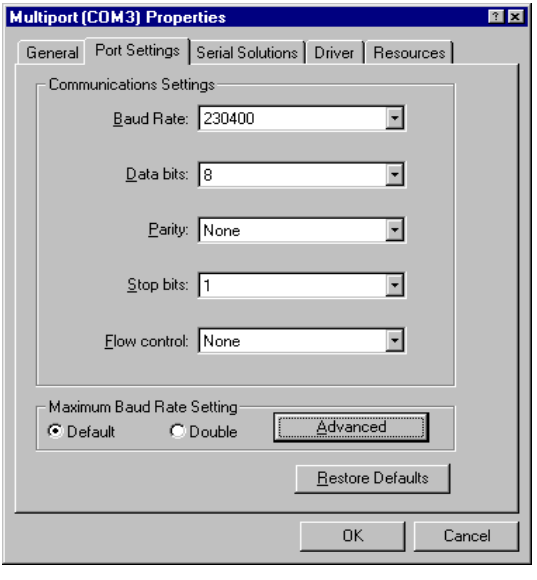
6. **Restore Defaults** - When clicked, this will reset the selected port to the default values of:

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

Maximum Baud Rate Settings.



Clicking the **Advanced** button gives the user the option of changing the behaviour of the driver.



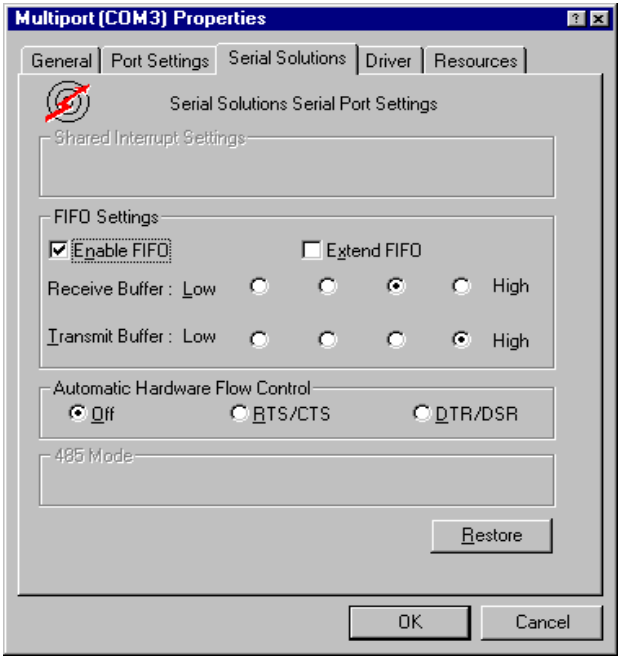
The **Default** behaviour of the driver is to operate on a wysiwyg (what you see is what you get) basis, meaning the Baud rate than application selects will be the Baud rate of the data leaving the port.

Selecting **Double** changes the driver behaviour in the following ways…

For applications using the above dialogue e.g. HyperTerminal there will be no change.

For applications directly calling the Win32 API e.g. Dial Up Networking the selected baud rate is doubled, i.e. selecting 115,200 gives a real baud rate of 230,400.

Selecting the **Serial Solutions** tab of the selected port properties Window 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 all ports is left enabled.
   - **Extend FIFO** – When the FIFO is enabled the default FIFO size is 16 Bytes. The extended FIFO size is 128 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. The trigger options in the case of the Photon Card's 128 byte FIFO are 1, 32, 64 and 112.

- **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. The trigger options in the case of the Photon Card's 128 byte FIFO are 1, 32, 64 and 112.

2. **Restore-**

   Clicking on this port will restore the port setting of the Serial Solutions tab to the values set on entry to this page.

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ISA Photon 4 Port RS232 in Win NT4 Overview

The ISA Photon 4 Port RS232 card requires the use of one interrupt (IRQ) and 22hex = 34dec contiguous I/O locations i.e. a BANK of 22hex I/O addresses. The two configurable options on the Photon 4 Port RS232 card are the Bank address DIP switch and the IRQ jumper block. The Bank address DIP switch determines the COM Base address of each port and also the SISR Base address of the card.

COM Base of port 1 = the Bank Address
COM Base of port 2 = the Bank Address + 8hex
COM Base of port 3 = the Bank Address + 10hex
COM Base of port 4 = the Bank Address + 18hex
SISR Base = the Bank Address + 20hex

Serial Solutions Installation for Windows NT4

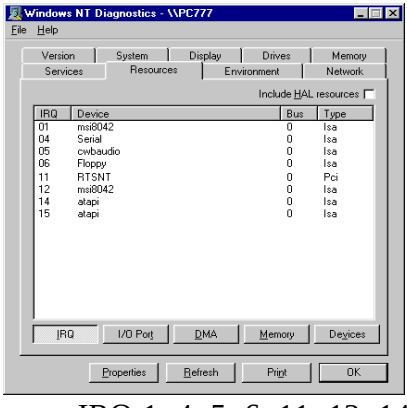
The suggested installation sequence is:

1. Check Windows NT's I/O usage, to determine which IRQs and I/O addresses are already in use on your PC and thus which are available.
2. Choose an unused IRQ and select an I/O address range.
3. Configure the Photon 4 Port RS232 Card to match these settings, noting down the settings of the IRQ jumper and DIP switches and Install the card into the PC, switch the PC off and back on.
4. a. If this is the first time that you have installed the Photon card then you will need to install the software from the CD
   b. If you already have other Photon card and drivers installed then you will need to run the **ADD** option from the Serial Solutions icon in the **Control Panel**.
5. Enter the IRQ and Bank address as set on the Photon 4 Port RS232 card into the card setting window when prompted.

Note To install this software or change serial port settings under Windows NT 4 you must be logged in as a user with **Administrator** level privileges, consult your NT documentation to see how this can be set.

Checking Windows NT 4 I/O Usage

The simplest way to find out which I/O addresses and IRQ's are available for the serial card is to examine those that Windows NT believes are free. This is done using **Windows NT Diagnostics.** From the **Start Menu** choose **Programs**, **Administrative Tools (Common)** and **Windows NT Diagnostics**. Click the **Resources** tab, and if the **IRQ** button is not selected, select it.



In the list shown IRQ 1, 4, 5, 6, 11, 12, 14 & 15 are used leaving IRQ 3, 7, 9, &10 free. Any interrupt not shown on the list can be used, make a note of a free IRQ and set the card to use it. Also click the **I/O Port** tab and make a note of a free address space for the card. This card requires 22hex/32dec consecutive bytes of I/O space. Select **OK** to clear this dialogue.

TIP

When installing serial cards the parameter that usually causes the greatest trouble is finding an unused Interrupt Request line, a free IRQ. If the system already has a COM2 port installed IRQ 3 will be allocated to that. In this case, and whenever IRQ 3 is being used by other devices, the Photon 4 Port RS232 card will not be able to be installed at it's default settings however there should be no need to change the Bank address DIP switch just the IRQ jumper setting to an unused IRQ e.g. 5, 10 or 11. Which IRQ is free depends on what other devices you have installed in your PC.

Configuring and Installing the Serial Card

Having chosen a free IRQ and I/O address range, physically set from the IRQ jumper and the Bank DIP switches on the card as shown in **Chapter 1.**

Note down the IRQ and Bank addresses for use later when entering the Photon 4 Port RS232 card settings when configuring the driver.

Install the serial interface card in an available slot.

Installing the Serial Solutions Software

To install the software place the HandyWeb CD-ROM into a suitable drive, from Start Menu choose "Run" and in the resulting window type:

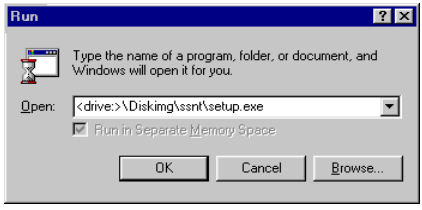
<drive:>\drivers\speed\winnt\setup.exe (where <drive:> is the path to the drive containing the installation disk).

Selecting the "OK" button begins the conventional InstallShield setup process, there are no options for this installation, all items must be installed in the NT System32 directory. Once the software has been installed, you may run the **Serial Solution** applet by double clicking on it's icon from the **Control Panel**.

If installing from the Serial Solutions CDROM

Insert your CDROM into your CD Drive.

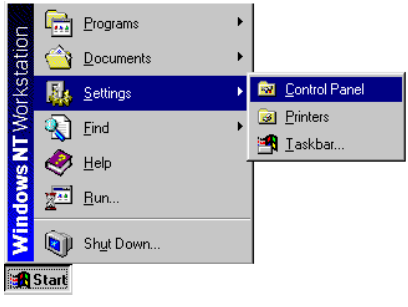
Click **Start => Run**



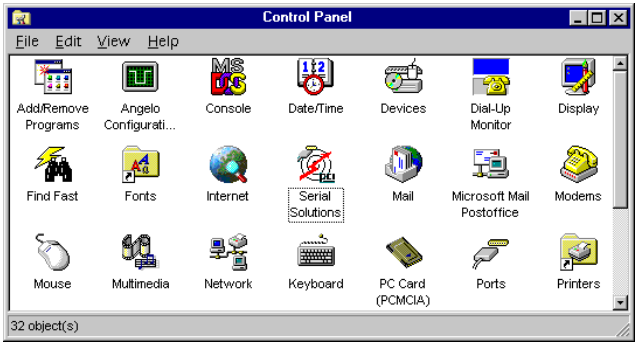
<drive:> = the letter assigned to your CDROM drive
click on OK. The driver software will then be installed
If you are installing from Floppy Disk then the path for installation will be <drive:>\setup.exe

Adding the Photon 4 Port RS232 Card to Windows NT4

All that remains is that the Photon 4 Port RS232 card is added to NT4 using the installed Serial Solutions Control Panel Applet.

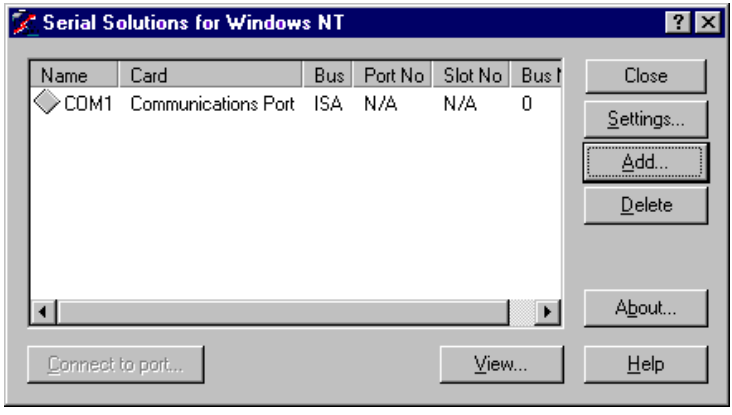


Click the start button, select **Settings** and then **Control Panel**
From control panel Double click the **Serial Solutions** icon.

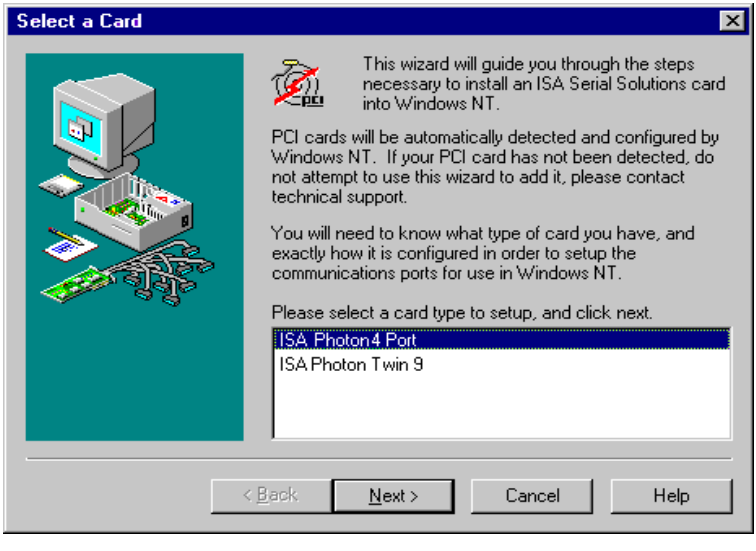


If you only have one existing port in your PC then your ports applet will look something like the above screenshot.

Click **Add**Select **ISA Photon 4 Port RS232 Click** Next

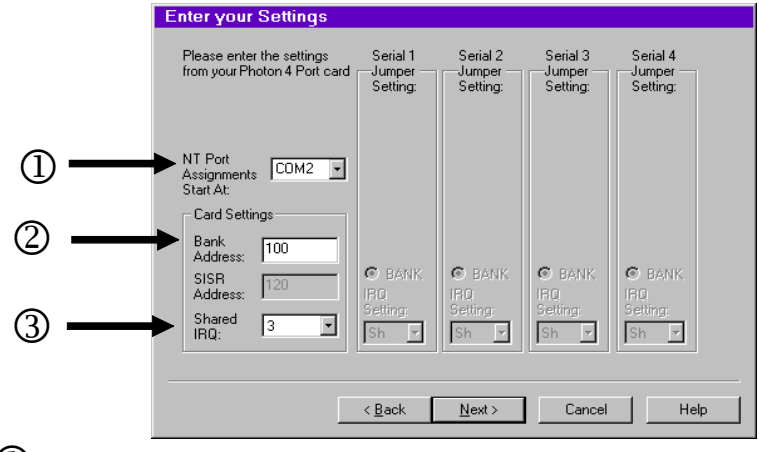


One of the following sections will apply dependant on how many COM ports are already present on your machine.



Configurable Settings for Photon 4 Port RS232 Card

For each Photon 4 Port RS232 Card there are **Three** parameters to set:



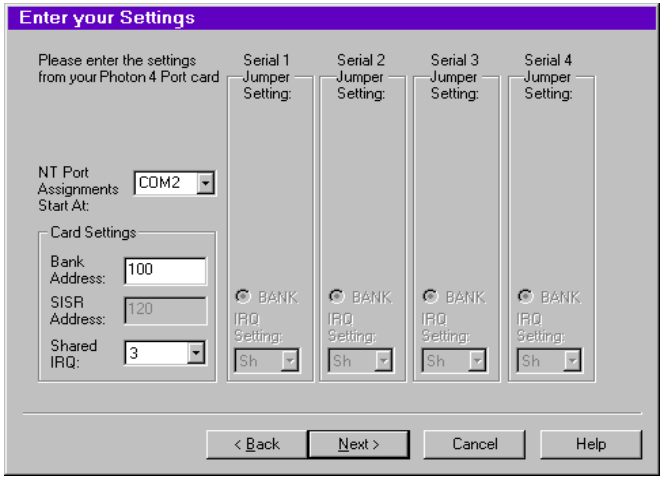
① The **NT Port** assignment determines the names by which the Photon 4 Port RS232 Ports are known to the system. Windows NT4 supports up to 255 COM ports known as COM1 to COM255. The Base COM Port sets the name of port 1 on the Photon 4 Port RS232 Card. Ports 2-4 are automatically allocated to the next 3 port names. Selecting COM2 here will cause the Photon 4 Port RS232 ports to be known as COM2, COM3 COM4 & COM5.

② The **Bank Address:** this is the address which is set by the Bank DIP switch.

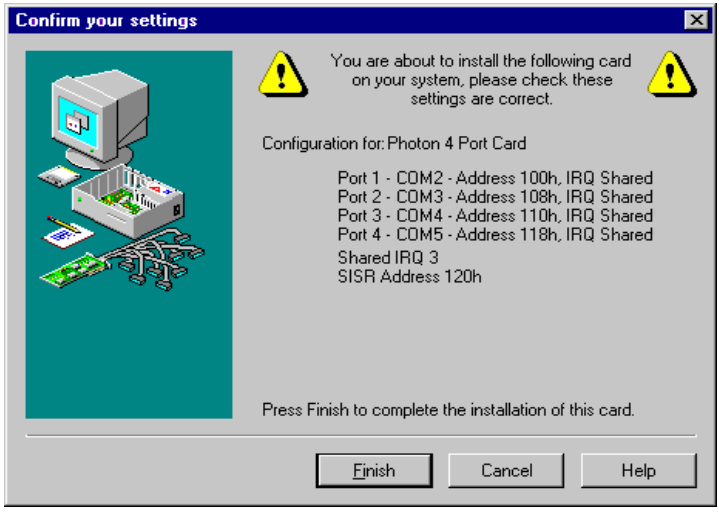
③ The **Shared IRQ** as set on the Photon 4 Port RS232 jumper block, see the advice in the tip above (p47).

The following pages display suggested settings for adding a Photon 4 Port RS232 card to a variety of systems where other ports are already present.

Default Settings for Photon Card COM1 Present

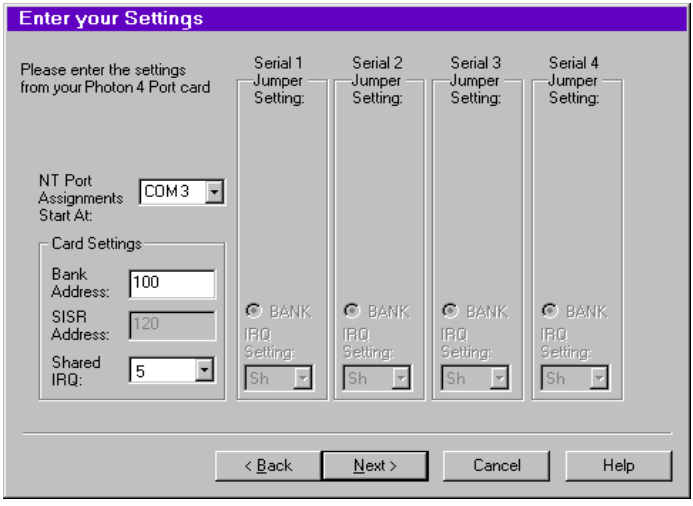


Change any of the settings in the box as appropriate to match your hardware. For this example the Photon 4 Port RS232 Card's IRQ jumper and DIP switches are left in the factory set configuration. When you are happy with your settings, Click **Next**



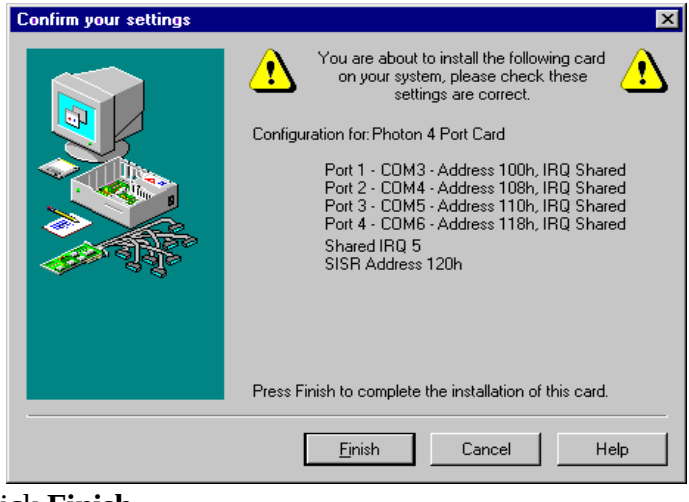
Click **Finish**

Settings for Photon Card COM1 & 2 Present



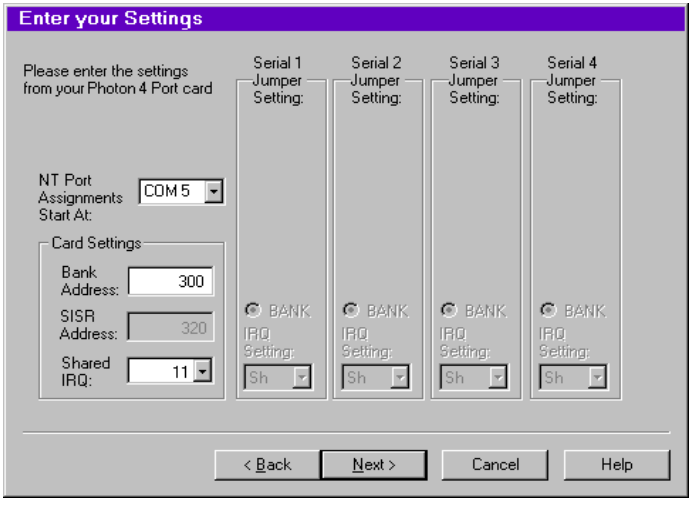
Change any of the settings in the box as appropriate to match your hardware. For this example the Photon 4 Port RS232 Card's IRQ jumper should be set to IRQ5.

When you are happy with your settings, Click **Next**



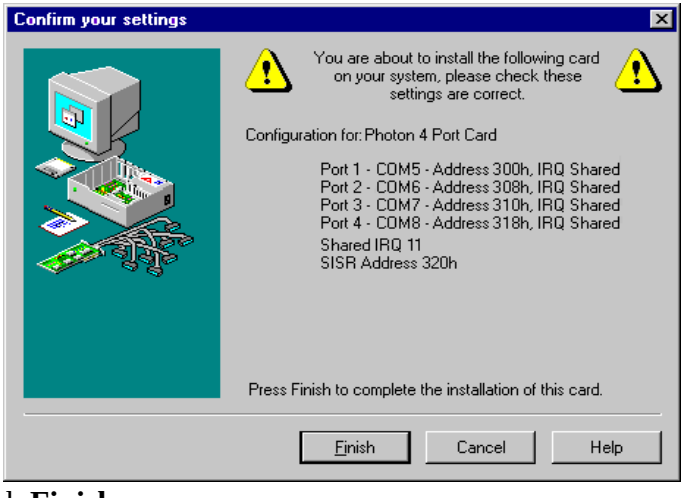
Click **Finish**

Alternate Settings for Photon Card COM1 - 4 Present



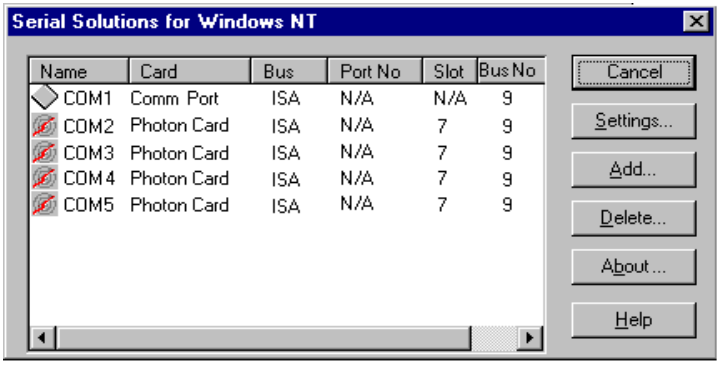
Change any of the settings in the box as appropriate to match your hardware. For this example the Photon 4 Port RS232 card should have its IRQ jumper set to IRQ 11 and the Bank DIP switches set to 300hex.

When you are happy with your settings, Click Next



Click **Finish**

After adding a Photon 4 Port RS232 Card (COM 1 present) you will be presented with a Serial Solutions Port Configuration window:

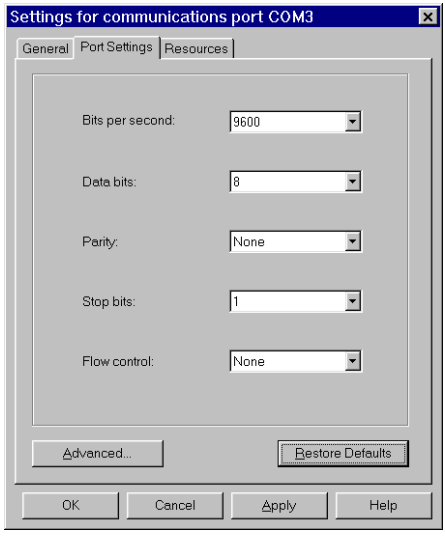


Changing Serial Port Settings

Adding a Photon 4 Port RS232 Card to the system automatically sets default values for communications settings to 9600 Baud, 8 Data Bits, No Parity and 1 Stop Bit.

To view the settings of a port, select it and click on **Settings**.

Clicking on the **Port Settings** tab opens up the following window:



Settings available in this window are:

1. **Baud Rate** - determines the baud rate at which the selected port operates, providing it is not overridden by any serial comms applications in use. ISA Photon 4 Port RS232 will operate correctly up to 230,400 baud at distances of up to 10 meters,

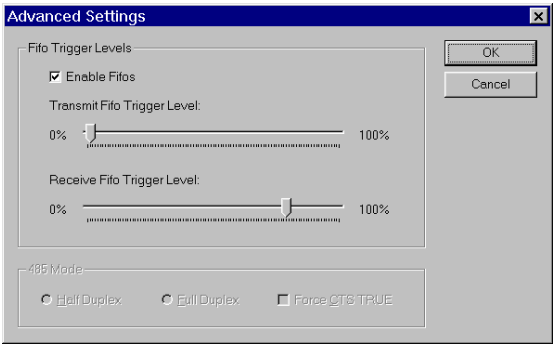
   Note: Many serial comms applications will not actually register the ports as running at baud rates of above 115200.
2. **Data Bits.**
3. **Parity.**
4. **Stop Bits.**
5. **Flow Control.**

   } Change to suit remote device.
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.

When the **Advanced** button of Port Settings in 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 lessen the likelihood of data loss due to overrun errors when Photon 4 Port RS232 cards are installed in slower host PCs running ports at higher baud rates. Setting a high value will give better overall system performance when the host PC has multiple applications running simultaneously.
    - **Transmit Buffer** - These settings allow the selection of a transmitter FIFO trigger setting. Selecting a low value will send fewer data-bytes per interrupt, this is recommended if you are communicating to an older external serial device. Setting a high value will give better overall system performance when the host PC has multiple applications running simultaneously.
      Be warned, many older devices or even modern PC's without PHOTON ports cannot deal with long bursts of data, especially at high Baud rates.

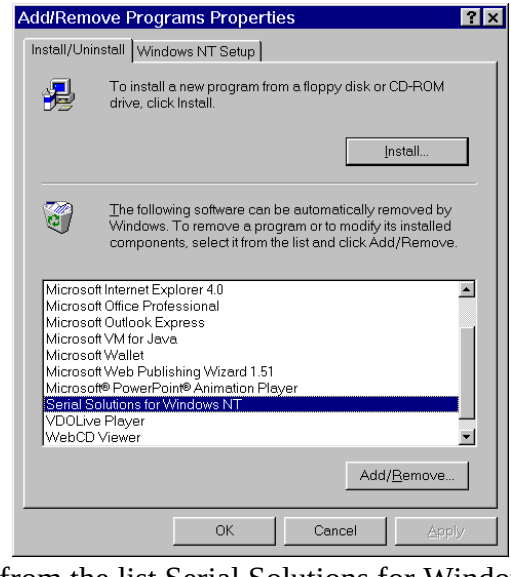
2. **Defaults -** When clicked this button resets the advanced properties to the followed settings:

Use FIFO Buffers:	On (checked)
Transmit Buffers:	1%
Receive Buffers:	80%

Uninstalling Serial Solutions for Windows NT

To uninstall Serial Solutions for Windows NT:

- From Control Panel, open the **Add/Remove** Programs applet, then be certain to close the Control Panel.



- Select from the list Serial Solutions for Windows NT.
- Click the **Add/Remove** button.

Windows NT will then uninstall the Serial Solutions applet, without the need for restarting your machine.

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, how to make a selftest loop back connector and the pinouts of the Photon 4 Port RS232 cards.

The RS232 Standard.

The RS232 standard is ancient in computer industry terms. Introduced in 1962, it is now widely established. RS232 is a slow photon, 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.

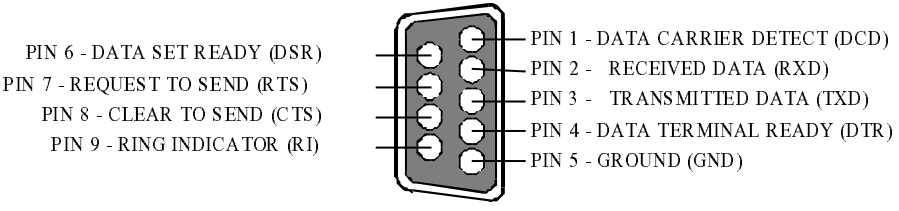
RS232C Standard 1 Driver 1 Receiver	
Line Length	Max Data Rate
50 Feet = 15m	20 Kbits/sec

Serial Port Pin Outs.

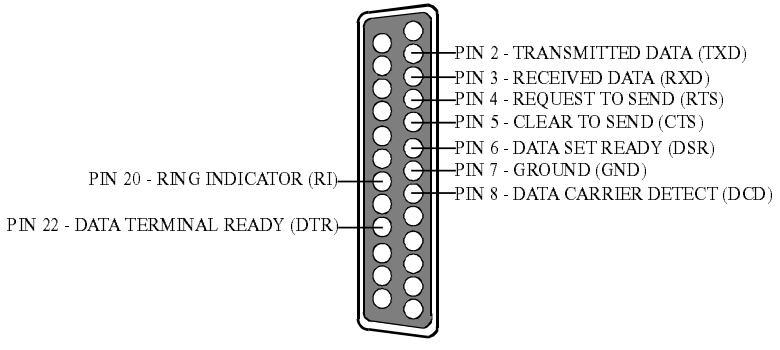
The pinouts of the 9 & 25 pin Male D connectors are given below.

Figure 5-2. Serial Port RS232 Pin Outs.

9 Pin connector:



25 Pin connector:



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 25 pin D. See Figure 6-3.

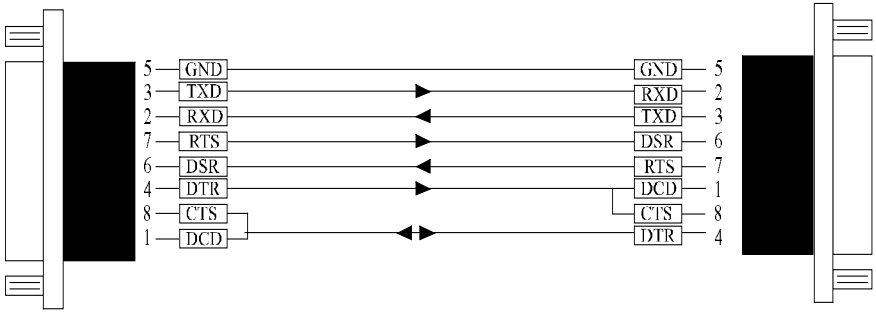
1) Connect the earth lines.
   Line 5 of Serial Port 2 to lines 1 & 7 of the other PC.
   This gives the two devices a common earth level.
2) Connect the Transmit and Receive lines together.
   Line 3, TXD, Port 2 goes to line 3, RXD, of the other PC.
   Line 2, RXD, Port 2 goes to line 2, TXD, of the 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.

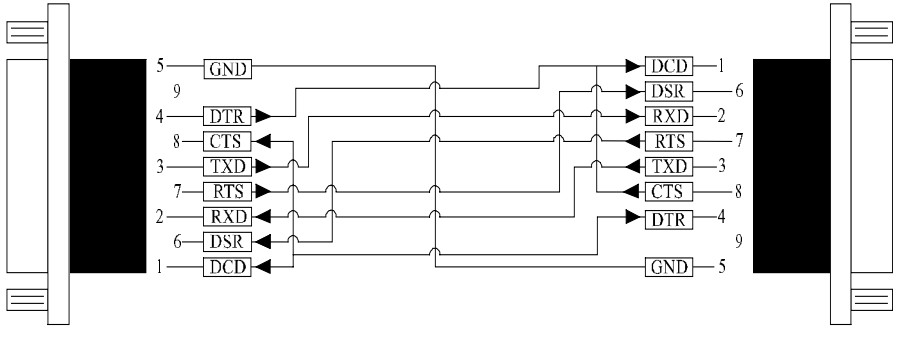
AT SERIAL PORT Side
9 PIN D CONNECTOR

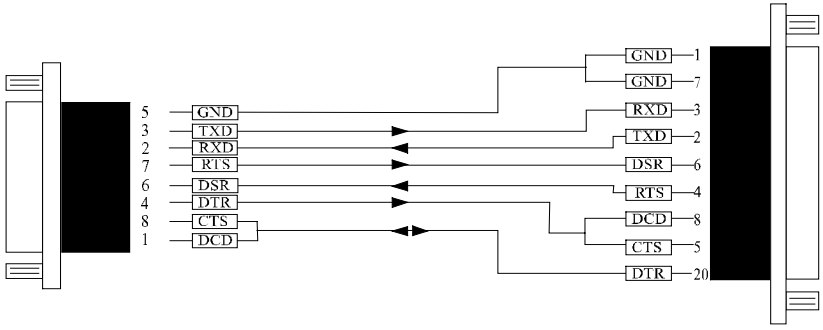
Other PC SERIAL PORT Side.
9 PIN D CONNECTOR

SCHEMATIC REPRESENTATION:

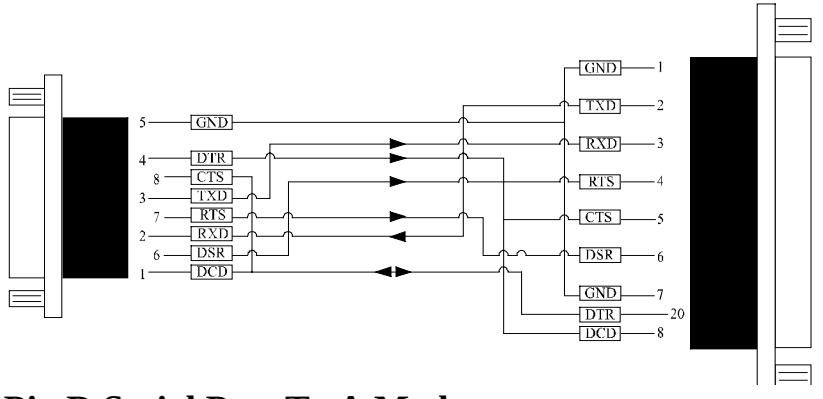


ACTUAL REPRESENTATION:





ACTUAL REPRESENTATION



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.

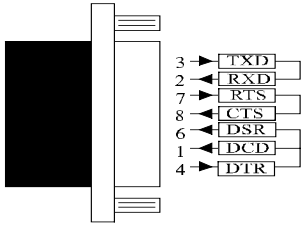
A loop back connector can be used to echo RS232 data transmitted by a serial port back into its own RS232 receiver. In this way, the function of the serial port can be tested.

For an AT style Serial Port use the a female 9 way connector wired as in Figure 4-4.

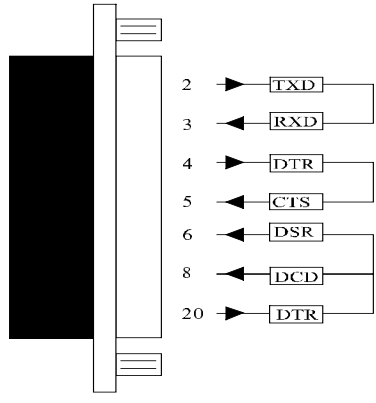
Figure 4-4. 9 Pin D Serial Loop Back Connector.

9 PIN D CONNECTOR

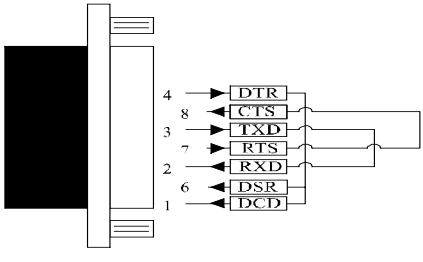
SCHEMATIC REPRESENTATION:



25 PIN D CONNECTOR



ACTUAL REPRESENTATION:



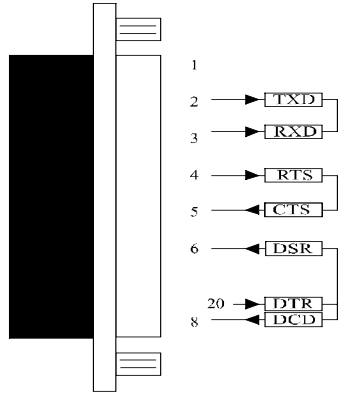
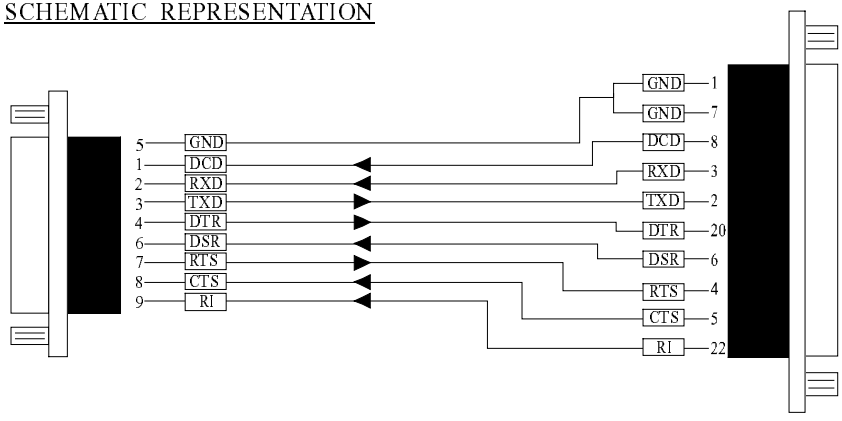


Figure 6-5. 9 To 25 Way Adapter.

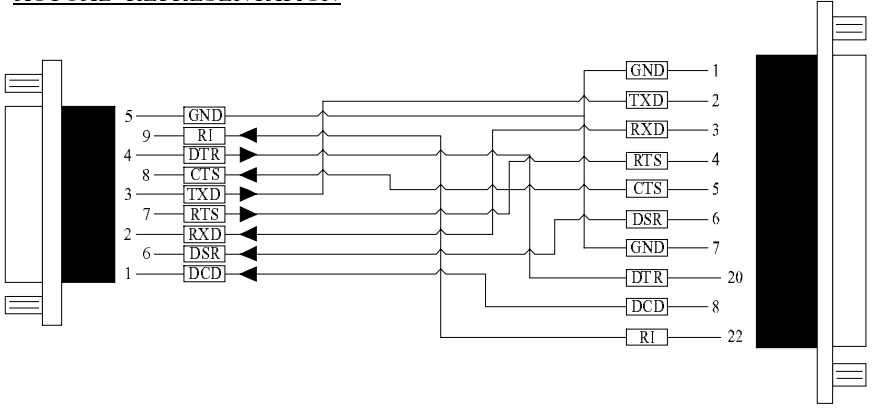
This adapter cable makes the AT style 9 pin serial port, look like the standard PC 25 pin serial port. It is NOT a cross over cable!

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

SCHEMATIC REPRESENTATION



ACTUAL REPRESENTATION



The Photon 4 Port RS232 Cable Pinouts

The Photon 4 Port RS232 cable consists of a 37 way female D connector attached to four either 25 or 9 way Male D connectors. Each of the cables carries 9 cores plus a sheath. Each of the 25 pin D connectors has 9 connections, based on the standard PC serial port configuration. Figure 6-7, on the next page shows the 37 way female connector pin numbers corresponding to each of the 4 separate port pin outs and pin functions. Each cable is approximately 1 metre long and is clearly marked as P1 for Port 1, P2 for Port 2 etc.

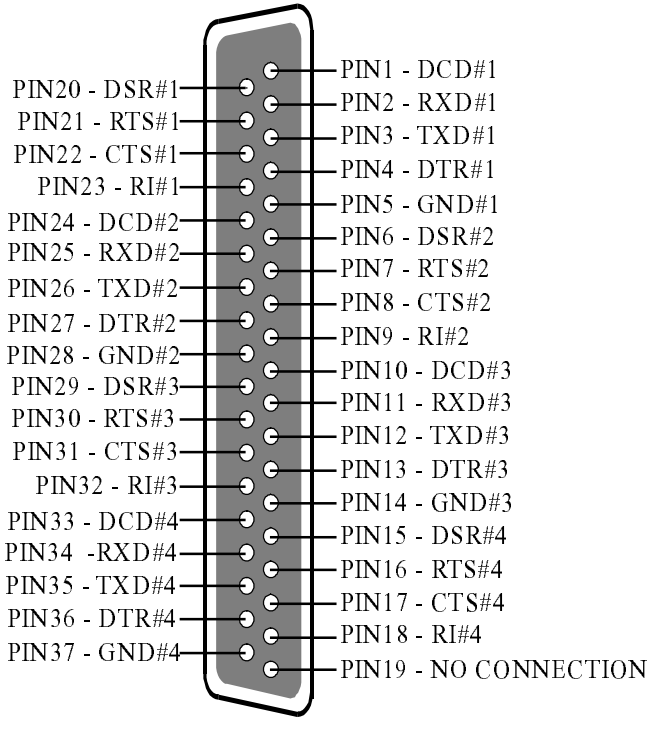
Figure 4-6. Photon 4 Port RS232 Cable by 9 & 25 pin D Connector

37 way D connector Pinouts

Port #1	Port #2	Port #3	Port #4	Pin Function	9 Pin	25 Pin
3	26	12	35	Transmitted Data (TXD)	3	2
2	25	11	34	Received Data (RXD)	2	3
21	7	30	16	Request To Send (RTS)	7	4
22	8	31	17	Clear To Send (CTS)	8	5
20	6	29	15	Data Set Ready (DSR)	6	6
5	28	14	37	Ground (GND)	5	7
1	24	10	33	DataCarrier detect(DCD)	1	8
4	27	13	36	Data terminal Ready (DTR)	4	20
23	9	32	18	Ring Indicator (RI)	9	22

NOTE: Pin 19 on the 37 pin D connector is not used.

Figure 4-7. Pin outs of the ISA Photon 4 Port RS232 37 pin D connector



NOTE: On the above diagram the # symbol followed by a number is used to notify a port on the cable. E.g. #4 means port 4, hence PIN36 - DTR#4 is pin 36 of the 37way connector, which corresponds to the DTR function on port 4.

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