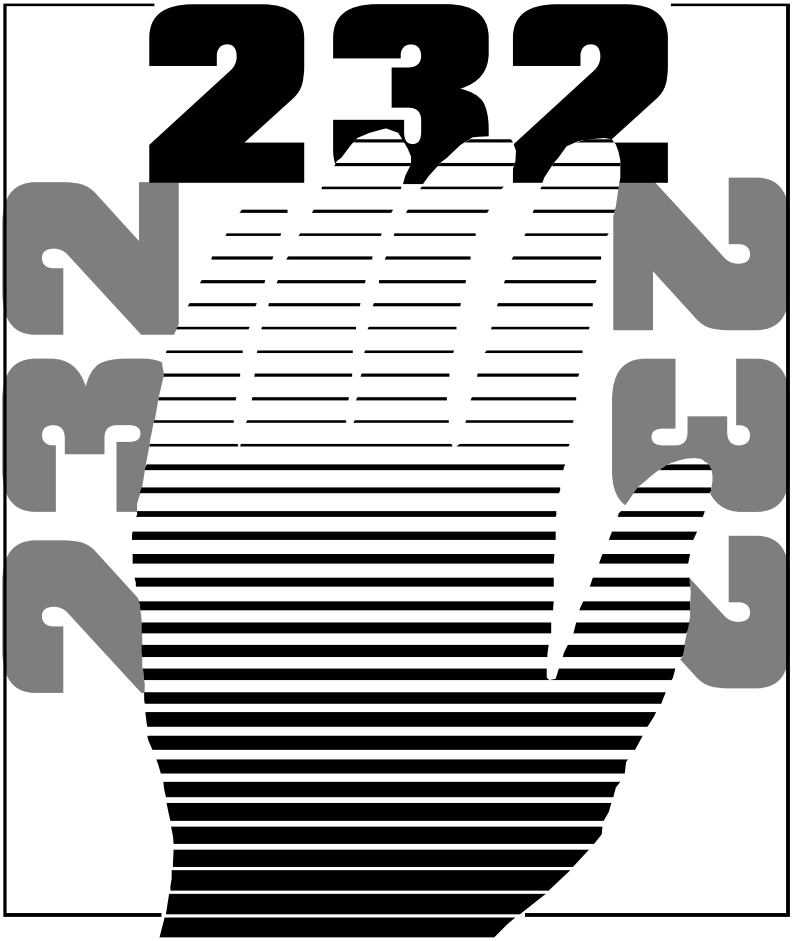
Hardware Manual



ISA Photon Twin 9 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.

COPYRIGHT.

Due to the Manufacturers commitment to quality, software is subject to continuous improvements: information regarding upgrades can be obtained from your supplier.

supplied to you by:

ACKNOWLEDGEMENTS.

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ISA PHOTON TWIN 9

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
FCC	Class A.

To comply with the requirements for UL certification, the following installation requirements should be observed:-

1. This card is intended for use in a UL listed IBM compatible PC.
2. The maximum current consumption of this card is less than 500mA DC; it should therefore be installed in a motherboard connection capable of delivering a minimum current of 500mA DC.

The Layout Of This Manual

THE LAYOUT OF THIS MANUAL

Chapter 1 - ISA Photon 4 Hardware Configuration,
Summarises the features of the ISA Photon 4 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 Software Installation
This chapter details how to install and configure the Photon 4 Card in Windows 3.x, Windows 95/98 and Windows NT.

Chapter 4 – RS232 Port Cabling

Table Of Contents.

CHAPTER 1
HARDWARE CONFIGURATION GUIDE

Introduction.

This chapter explains how to configure the ISA PHOTON TWIN 9 in a PC compatible, giving details for address and IRQ jumper selection.

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.

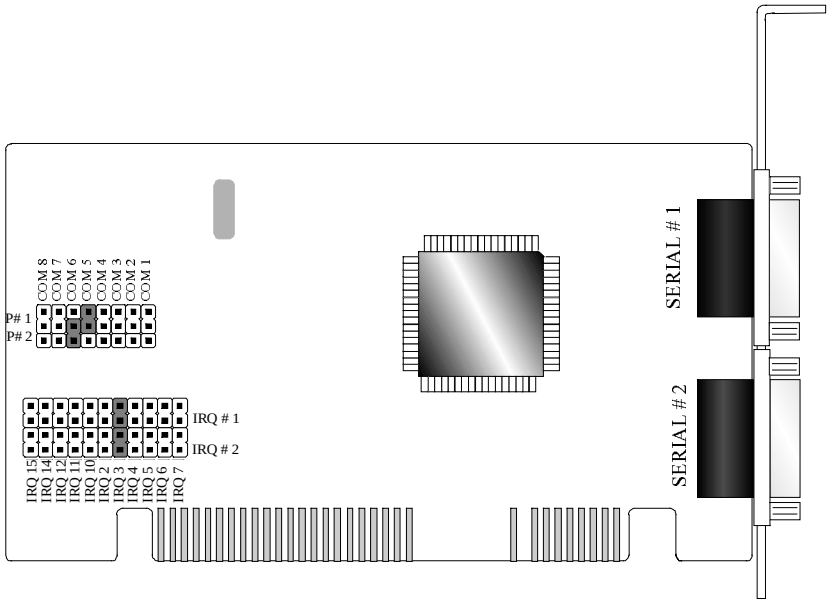
ISA PHOTON TWIN 9 Card Features.

* Two 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.
* Separate IRQ settings for each Port.
* 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 TWIN 9 card has the following features:

Baud Rate:	50 Baud to 230,400 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 Twin 9 Layout



ISA Photon Twin 9 Specifications

Dimensions:	3 x 5 in, 75 x 125 mm
I/O Connection:	Serial Port 1: 9 pin Male D type.
	Serial Port 2: 9 pin Male D type.

Configuring The ISA Photon Twin 9

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. PCI device settings can change, but are often reported by the BIOS at boot time.

For ISA cards the ideal situation is that each card port has it's own IRQ allocated to it, not shared by any other PCI or ISA device.

Serial Port Connectors

Each ISA Photon Twin 9 card has two serial ports. The port pin outs are given in Chapter 6.

Serial Port Address Selection.

The two configurable settings for each port on the card are:

1) **COM I/O address selection**. A choice of 8 fixed I/O addresses are available labeled as COM1 through to COM8. |Figure 1-3 lists the I/O address associated with each one. Which I/O address is selected depends on finding an I/O range unused by other devices

2) **The Interrupt Jumper selection.** A choice of 11 interrupts are available, IRQs 2-7, 10-12, 14-15. Again which IRQ selection is made depends on finding an IRQ unused by other devices.

The position of the movable jumper on the address jumper block, determines the I/O address of the serial ports, configuring the card as COM1, COM2, COM3, COM4 or COM5 - COM8.

The card has the following default settings:

	ADDRESS	INTERRUPT
Serial # 1	COM 5=1A0hex	IRQ 3
Serial # 2	COM 6=1A8hex	IRQ 3

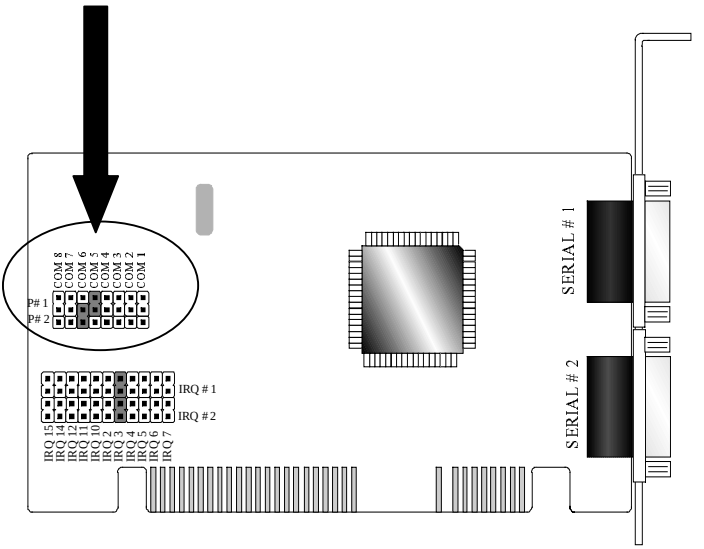
Depending on how many other serial port cards are already installed in the PC the I/O address may need to be changed.

Figure 1-2 Serial Port Address Jumper Block

JUMPER	PORT	ADDRESS	RECCOMENDED IRQ ALLOCATION.
COM1 COM2 COM3 COM4 COM5 COM6 COM7 COM8			
	COM1	03F8hex	IRQ 4
	COM2	02F8hex	IRQ 3
	COM3	0E38hex	IRQ 5*
	COM4	02E8hex	IRQ 10*
	COM5	01A0hex	IRQ 11*
	COM6	01A8hex	IRQ 15*
	COM7	01B0hex	IRQ 7*
	COM8	01B8hex	IRQ 2*

*FIND A FREE IRQ AND SET THE PORT TO THAT

The appearance of the Serial Port Address Jumper Block on the cards differs slightly from those above, the figure below shows the default arrangement found on the card.



Serial Port IRQ Interrupt Jumper Selection.

The position of the movable jumper on the interrupt jumper block, determines the IRQ vector of the serial ports.

Though the factory set default for the IRQ Jumper block is to have both ports set to IRQ 3, for best results each port should be on a separate IRQ and that IRQ should not be used by any other device in the PC.

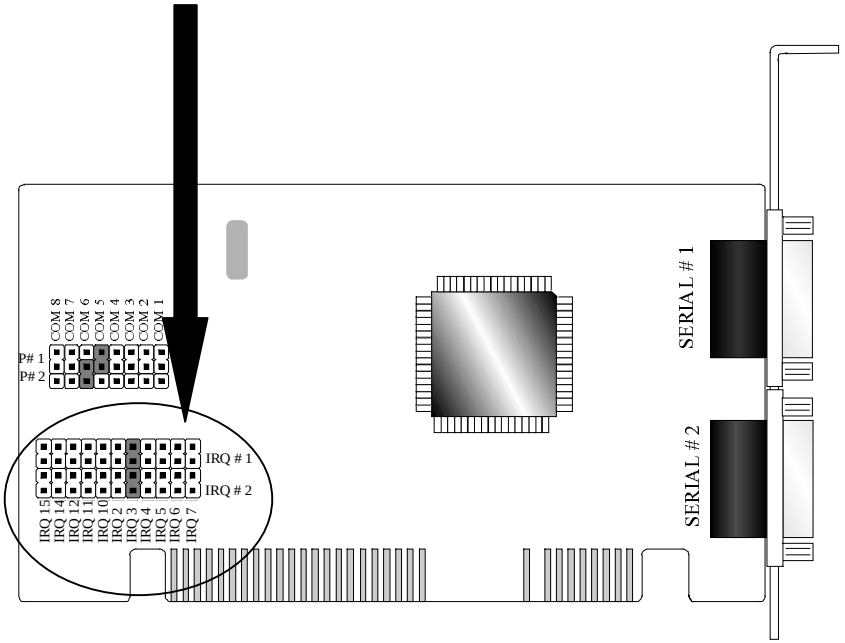
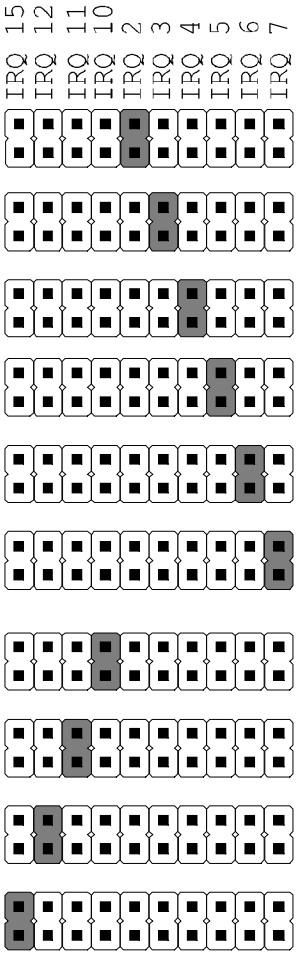


Figure 1-3 Serial Port IRQ Jumper Block.



NOTE:

IRQ 0 & 8 - Timer & Clock Interrupts, not on expansion bus
IRQ 1 - Keyboard interrupt, not on expansion bus
IRQ 9 - Best left Unexplained, not on expansion bus
IRQ 13 - Maths coprocessor interrupt, not on expansion bus

CHAPTER 2
INSTALLING IN YOUR COMPUTER

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 COM port 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!

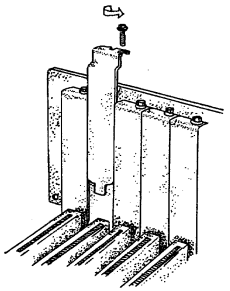
NOTE: Always turn the computer OFF before installing or removing any interface board..!!!

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!**

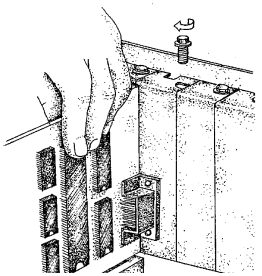
STEP 2: Remove the case.

Figure 3-1. 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 2-1).

Figure 3-2. 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 2-2).

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 3
SOFTWARE CONFIGURATION GUIDE

This section contains the installation procedures of the ISA Photon Twin 9 card, for the operating systems Windows 95 & 98, Windows NT and Windows 3.x.

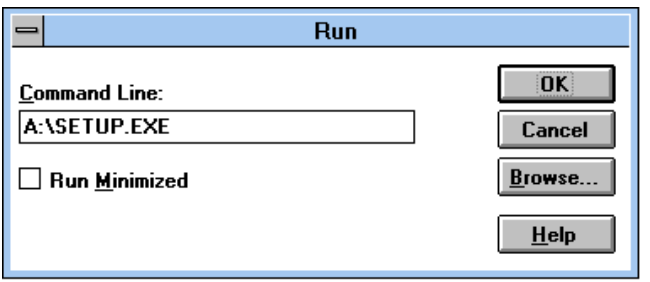
The Photon Twin 9 card has two independent serial ports.

For each port there are two configurable options, the COM port I/O address and the Interrupt line selection. Each of these options is set by way of a separate moveable jumper on the card. Which values are chosen depends entirely on what other devices are present in the PC.

The COM port I/O address and IRQ selection used in this chapter are given as examples **only** and may already be in use by other devices in your PC.

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).



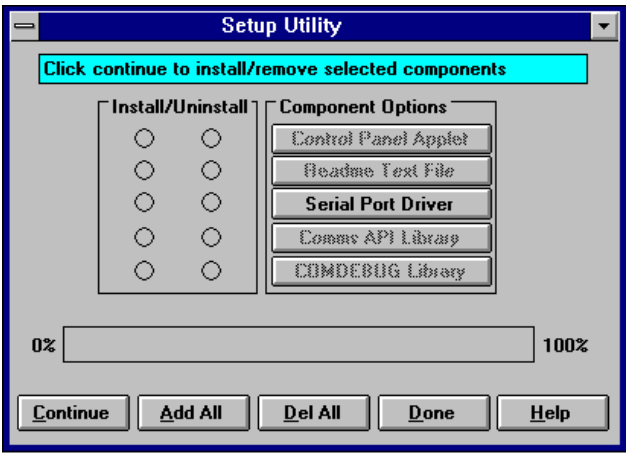
Selecting the "OK" button shows the setup program main screen, Figure 3-1, which will automatically select components for

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

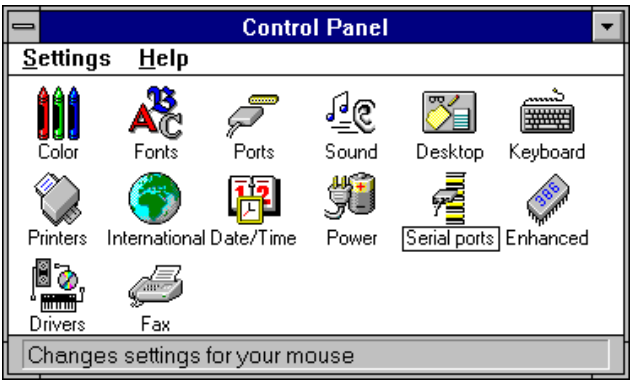
When installing serial cards the parameter that usually causes the greatest trouble is finding an unused Interrupt Request line, a free IRQ.

If the system already has a COM2 port installed IRQ 3 will be allocated to that. Change the COM Port address and the IRQ jumper setting to an unused values. Which are free depends on what other devices you have installed in your PC.

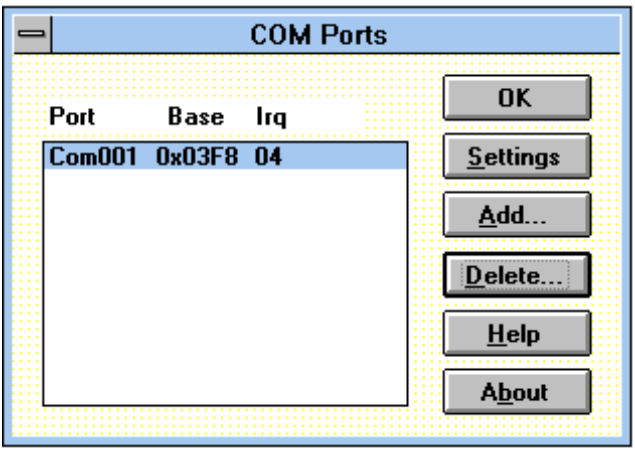
Serial Port Installation

Click on **Control Panel** from the **Main** Window:

Then click on **Serial Ports**:



The following dialogue should then appear:

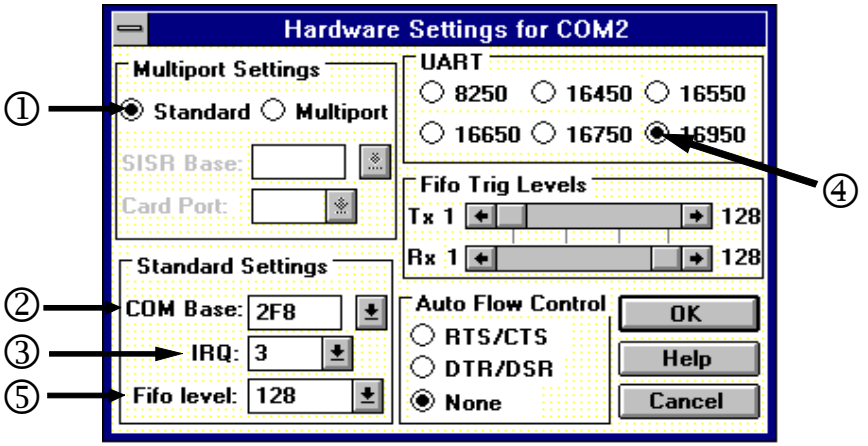


ISA Photon Twin 9 in Win 3.x Overview

The two configurable options on the Photon Twin 9 card are the COM Port I/O address jumper and the IRQ jumper block.
Both of these options as physically set on the card must match that entered later into the Hardware Settings box

Adding an ISA Photon Twin 9 Serial Card.

Figure 3-2. ISA Photon Twin 9 Serial Card Settings.



For both ports on the Photon Twin 9 card we need to **ADD** a port and fill in the following 5 settings in the order given.

①Each Port should have the **Standard** button selected, each port on the Photon Twin 9 Card is a independent serial port

Standard Settings:-

②The **COM Base** address is the COM port I/O address of each serial card.

③The **IRQ** as set on the IRQ jumper block as set by the Photon Twin 9 card jumper block.

④ The **UART** on the Photon port is an enhanced 16550 called the 16950.

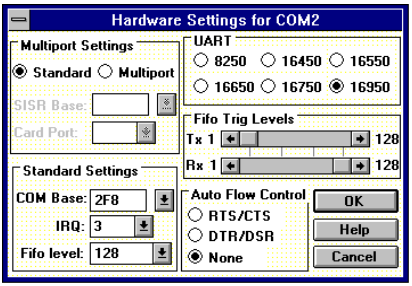
⑤ Having selected the 16950 you can then set the **FIFO level** at 128 bytes.

Settings for Photon Twin 9 Card COM1 Present

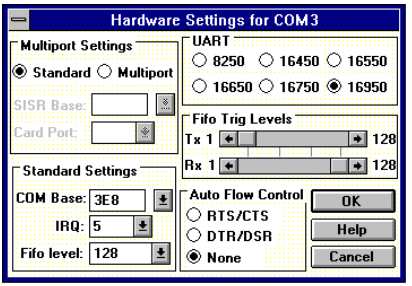
COM Port	COM Base	IRQ	UART	FIFO Trip
COM2	2F8	03*	16950	Default
COM3	3E8	05*	16950	Default

*Each COM Port should be set to a separate unused IRQ, IRQ3 and IRQ5 are used in this example.

Card Port 1



Card Port 2

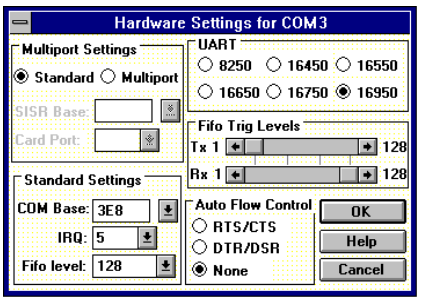


Settings for Photon Twin 9 Card COM1 & 2 Present

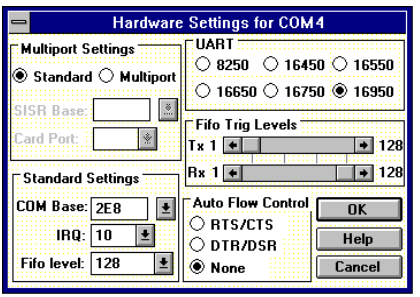
COM Port	COM Base	IRQ	UART	FIFO Trip
COM3	3E8	05*	16950	Default
COM4	2E8	10*	16950	Default

*Each COM Port should be set to separate unused IRQs, IRQ5 and IRQ10 are used in this example.

Card Port 1



Card Port 2



NOTE: Set Photon Twin 9 Hardware to reflect these settings

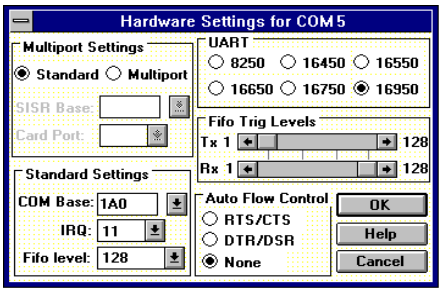
The only settings that change from port to port are the COM Base and the IRQ Settings

Settings for Photon Twin 9 Card COM1 to 4 Present

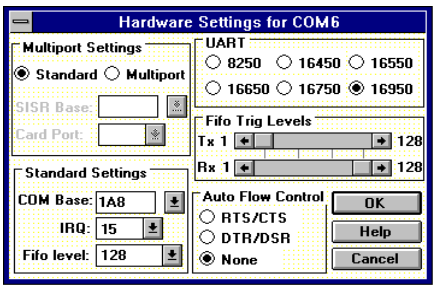
COM Port	COM Base	IRQ	UART	FIFO Trip
COM5	1A0	11*	16950	Default
COM6	1A8	15*	16950	Default

*Each COM Port should be set to separate unused IRQs, IRQ11 and IRQ15 are used in this example.

Card Port 1



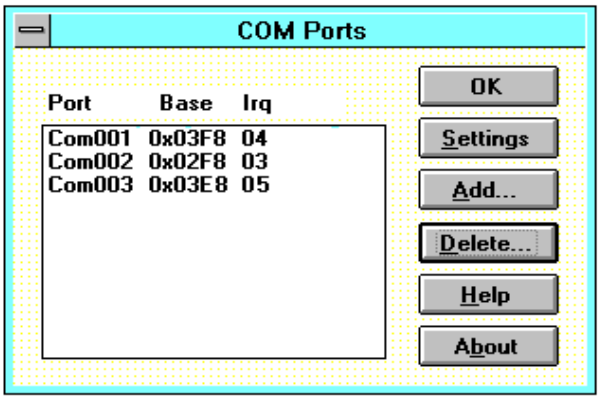
Card Port 2



NOTE: Set Photon Twin 9 Hardware to reflect these settings
The only settings that change from port to port are the COM Base and the IRQ Settings

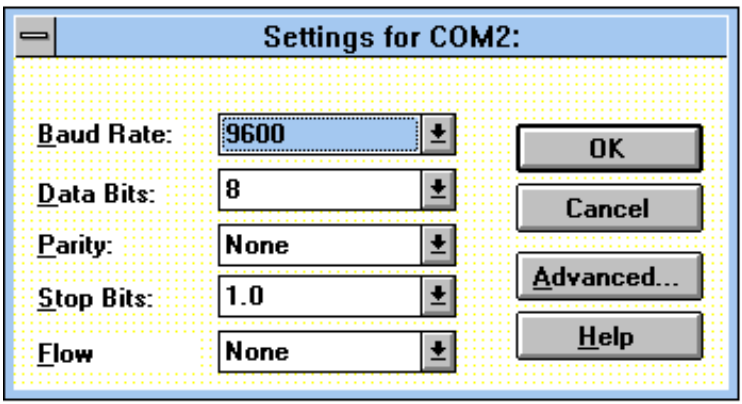
Select the **OK** button to finish adding the port. This will display a Windows restart message, but do not restart until you have installed all four ports. Be sure to restart Windows after all serial ports have been added so that the new configuration takes effect.

Figure 3-3. After Adding a PHOTON 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 Twin 9 Card Comms Settings.



Changing Serial Port Settings

Once the Photon Twin 9 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 Twin 9 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 5 options in the same manner as described in the section "Adding an ISA Photon Twin 9 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.

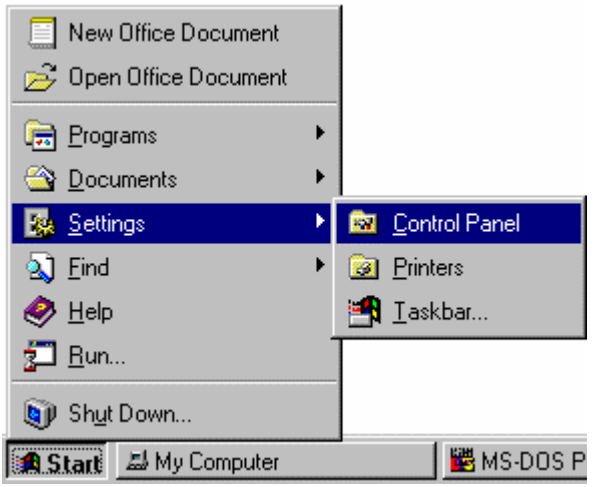
Restarting Windows.

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.

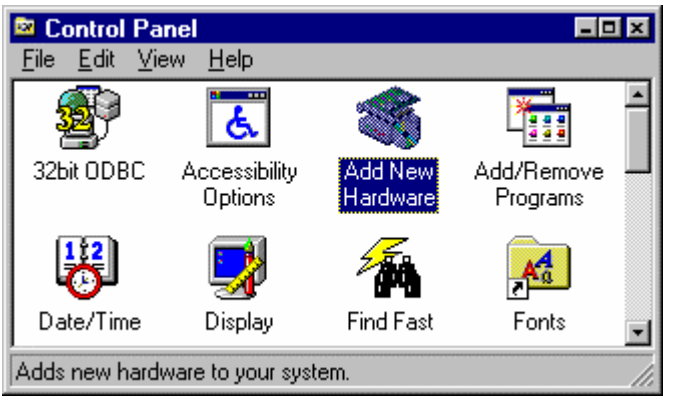
Serial Solutions Installation for Windows 95 & 98.

The following steps describe the installation of the Serial Solutions driver for Windows 95, which is supplied, on the Serial Solutions CDROM.

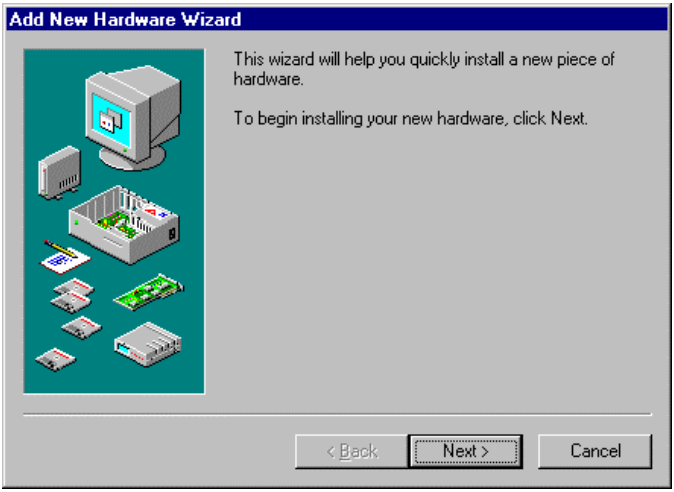
Open the **Control Panel** - there are several routes to the **Control Panel**, the simplest is to open the **Start** menu and select **Settings**.



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

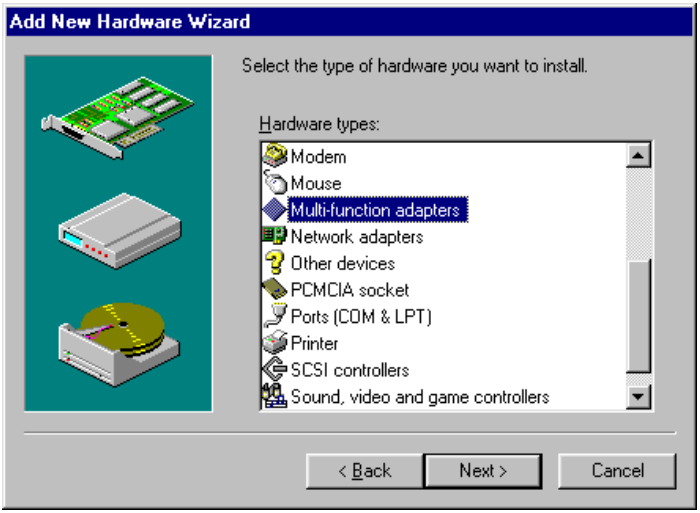


Click **next** on the applet dialogue.

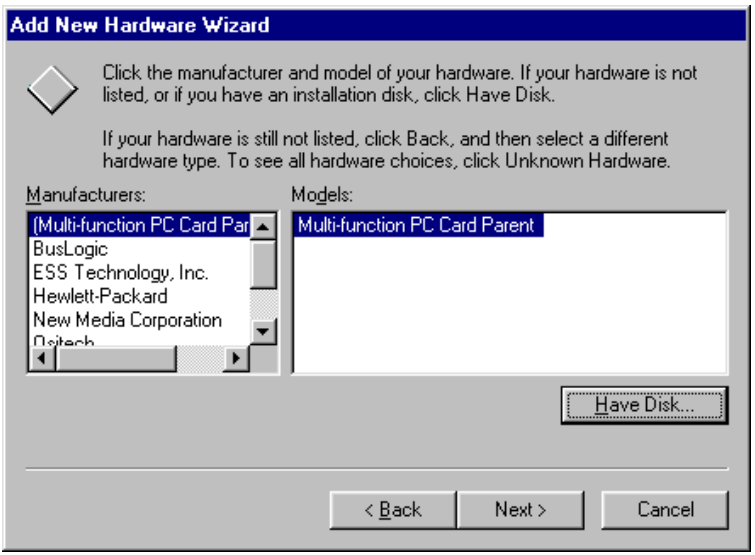


The **Add New Hardware** wizard will ask you if you wish Windows to search for your hardware. Click the **No** radio button since Windows cannot find Serial Solutions serial ports.
Click **next**

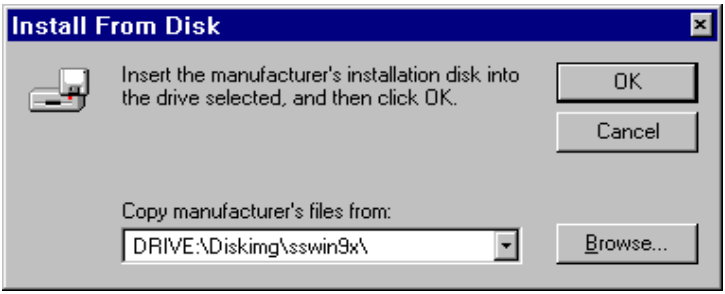
From the hardware types list on the next page select **Multi Function-Adapter**. Click **next**.



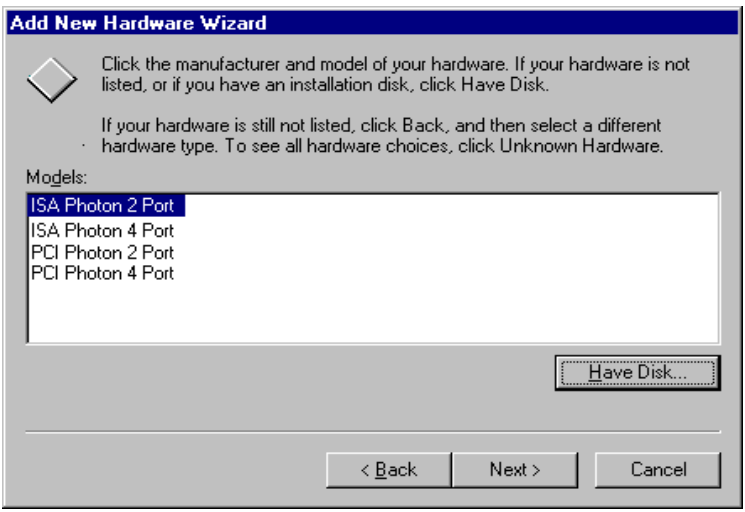
click **Have Disk**.



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

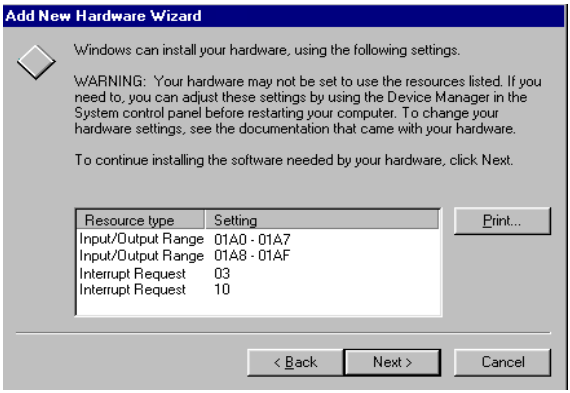


After the installation procedure, the Window will display a list of Serial Solutions cards:



Select the **Specialix ISA Photon Twin 9 Card**. Click **Next.**

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



Click **next.**

Click **finish**. Windows will install the card with it's own best guess settings.

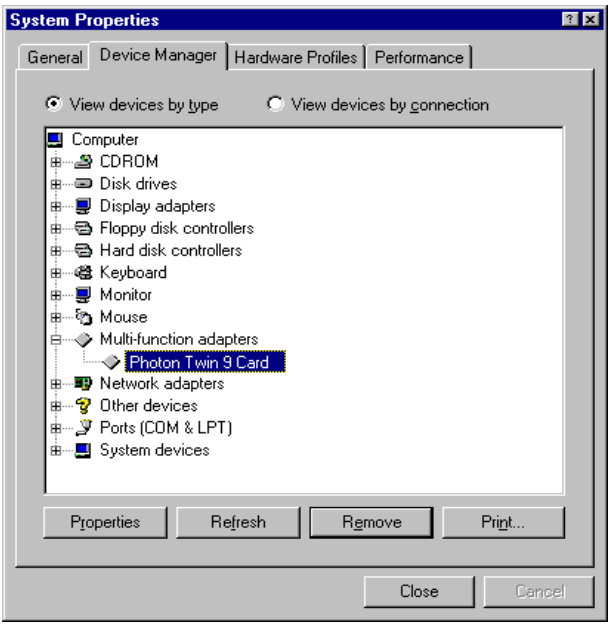
In general these settings should be ignored

You will then be asked if you wish to re-boot the system. Since the Photon Twin 9 card will now need to be installed, select yes. Turn the PC off and insert the Photon Twin 9 card . Restart the computer and allow Windows 95 to load normally. Upon loading it will then "detect" each of the ports on the Photon Twin 9 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 Twin 9 card as described above, despite the card not being installed - this is due to the nature of the driver software.

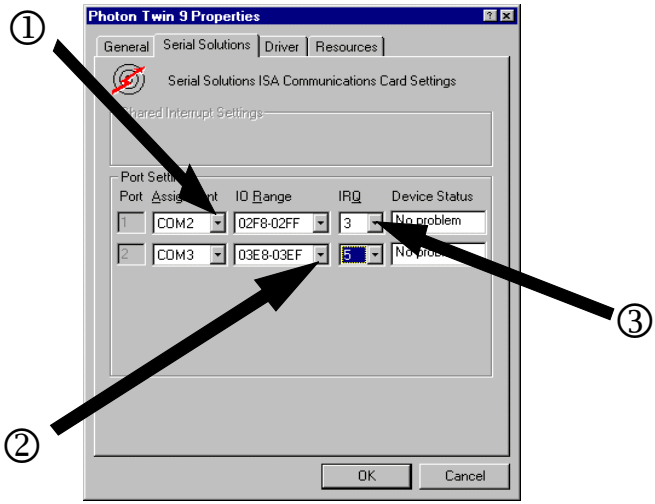
Photon Twin 9 Card Settings in Windows 95 & 98.

Upon installation of the Photon Twin 9 card and Windows being restarted, Click **Start-Seetings-Contol Panel-System** then the **Device Manager** will appear similar to the following:



It is now necessary to change the settings of the parent device (the Photon Twin 9 Card), to match those physically set on the card, double click the Photon Twin 9 card entry under the **Multi-Function adapter** branch, and select the Serial Solutions Tab:

For each port on the Photon Twin 9 card we need to and fill in the following 3 settings shown below



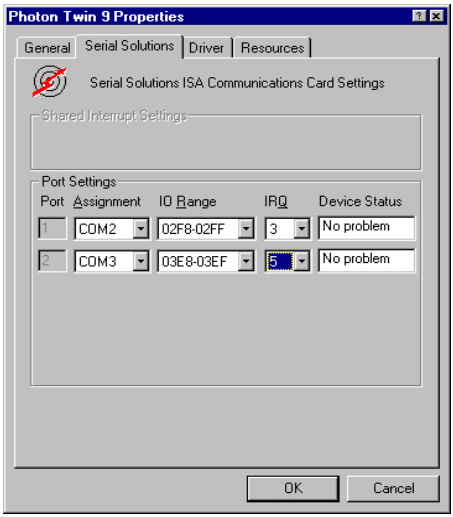
The adjustable options available in this window are:

① The **COM Port** assignment determines the names by which the Photon Twin 9 Ports are known to the system. Windows 95 supports up to 255 COM ports known as COM1 to COM255. The ports are numbered consecutively **i.e.** if port 1= COM3, then port 2 = COM4. This name is not the same as the COM port jumper setting on the card it is just the logical name by which the ports are accessed in the system

② **IO Range:** enter the I/O address corresponding to the COM port jumper set on the Photon Twin 9 card.

③ **IRQ.** Each port should have it's own separate IRQ setting. Win 95/98 will not allocate this automatically.

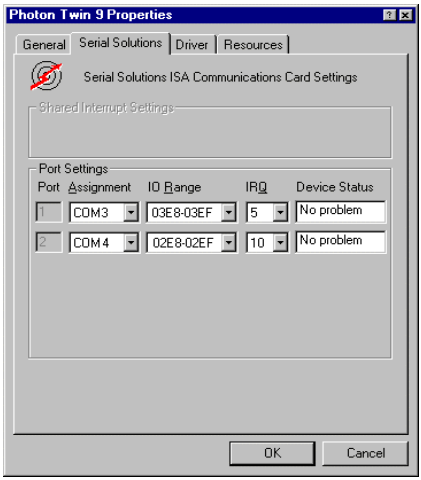
Default Settings for Photon Twin 9 COM1 Present



Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Each COM Port should be set to a separate unused IRQ, IRQ3 and IRQ5 are used in this example

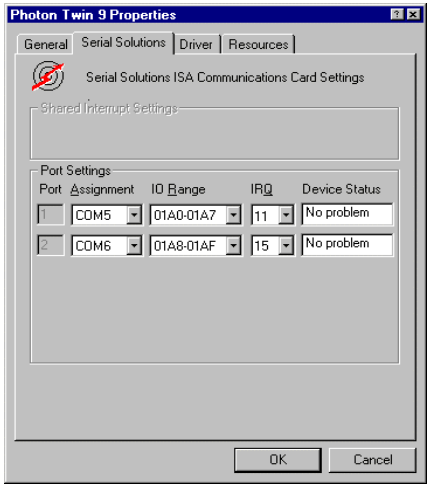
Settings for Photon Twin 9 Card COM1 & 2 Present



Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Each COM Port should be set to separate unused IRQs, IRQ5 and IRQ10 are used in this example

Settings for Photon Twin 9 Card COM1 to 4 Present

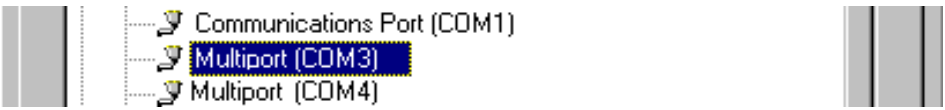


Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Each COM Port should be set to separate unused IRQs, IRQ11 and IRQ15 are used in this example

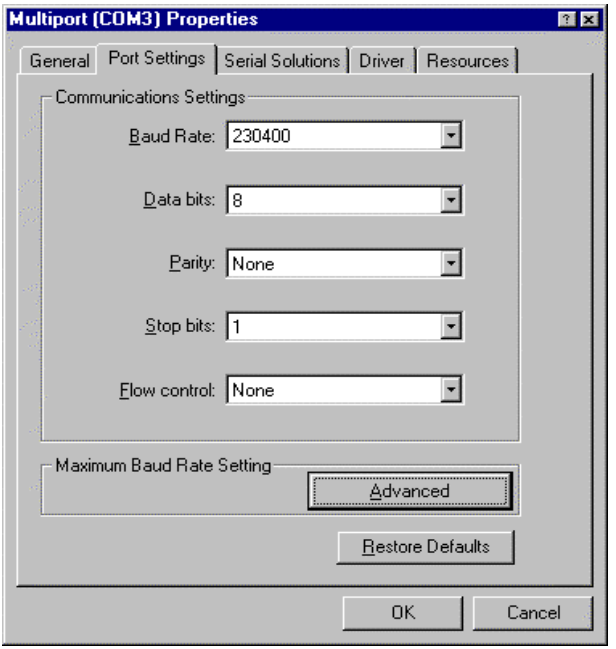
Changing COM Port Numbers in Windows 95 & 98.

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 Twin 9 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 COM5 and above are not installed, and therefore may be used.

ISA Photon Twin 9 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:

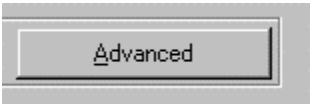
Baud Rate.
Data Bits.
Parity.
Stop Bits.
Flow Control.

} Change to suit remote device.

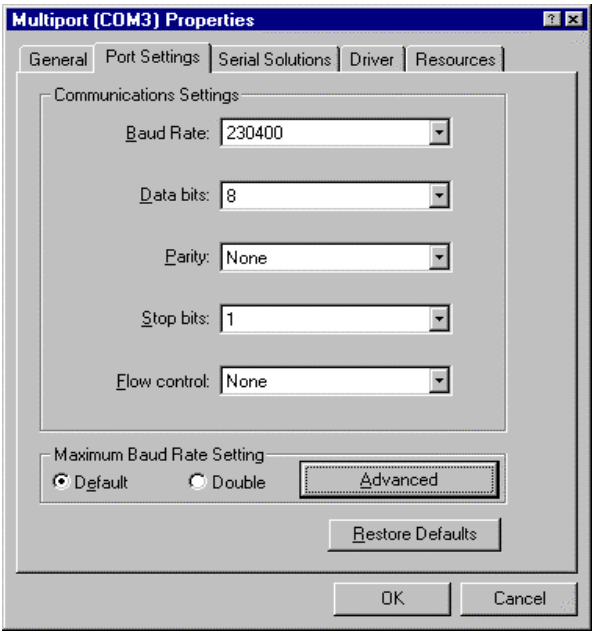
Restore Defaults - When clicked, this will reset the selected port to the default values of:

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.



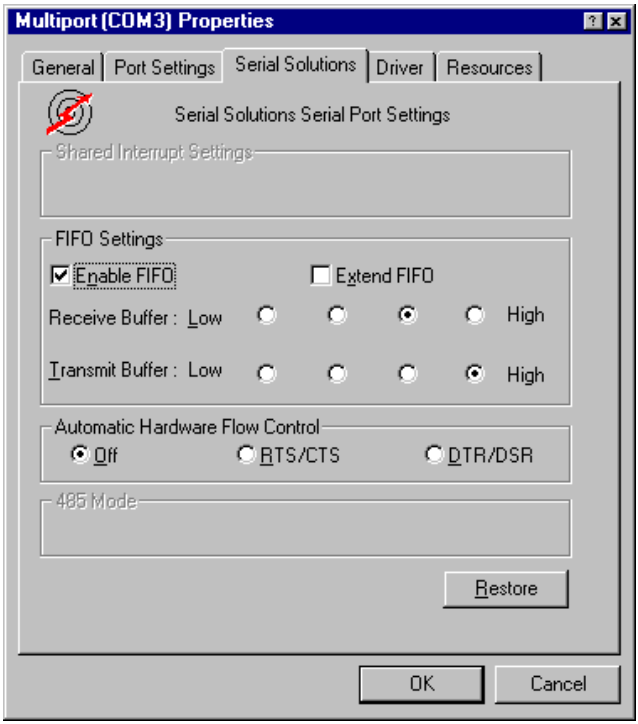
The **Default** behaviour of the driver is to operate on a wysiwyg (what you see is what you get) basis, meaning the Baud rate that applications select will be the Baud rate of the data leaving the port.

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:

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.

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 Twin 9 in Win NT4 Overview

The ISA Photon Twin 9 card consists of two independent serial ports. Each port requires an interrupt (IRQ) and an 8 Byte I/O address location. The two configurable options for each port on the Photon Twin 9 card are the COM port I/O address and the IRQ jumper blocks.

Serial Solutions Installation for Windows NT4

The suggested installation sequence is:

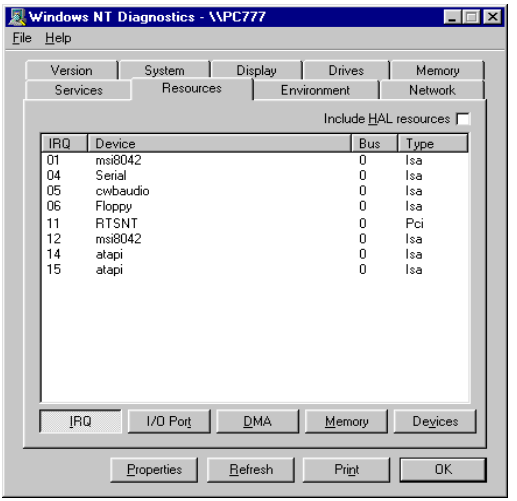
1. Check Windows NT's I/O usage, to determine which IRQs and I/O addresses are already in use on your PC and thus which are available.
2. For each port choose an unused IRQ and select a suitable I/O address range.
3. Configure the Photon Twin 9 Card to match these settings, noting down the settings of the IRQ jumper and COM port jumper 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 COM port I/O address as set on the Photon Twin 9 card into the card setting window when prompted.

The following section describes these steps in more detail.

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 two free IRQs and set the card to use these. Also click the **I/O Port** tab and make a note of a free address space for the card. This card requires two lots of 8 bytes of I/O space. See Chapter 1 Figure 1-2. Select **OK** to clear this dialogue.

TIP

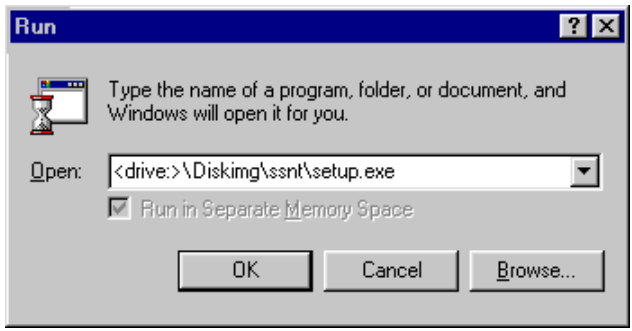
When installing serial cards the parameter that usually causes the greatest trouble is finding an unused Interrupt Request line, a free IRQ. Which IRQ is free depends on what other devices you have installed in your PC.

Configuring and Installing the Serial Card

Having chosen a free IRQ and COM port address for each port, physically set from the IRQ jumpers and the COM port address jumpers on the card as explained in **Chapter 1.**
Note down these settings for use later when entering the Photon Twin 9 card settings when configuring the driver.
Install the serial interface card in an available slot.

Installing the Serial Solutions Software

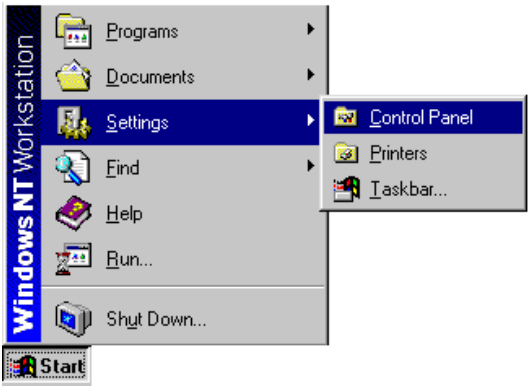
To install the software place the Serial Solutions CD-ROM into a suitable drive, from Start Menu choose "Run" and in the resulting window type:
<drive:>\diskimg\ssnt\setup.exe (where <drive:> is the path to the drive containing the installation disk).



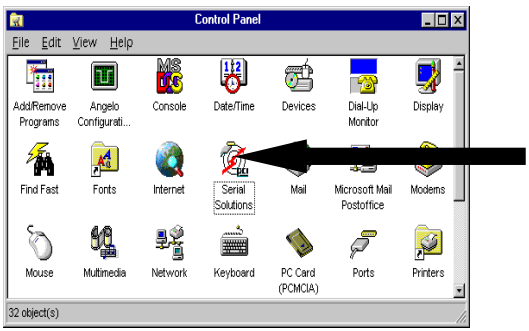
Selecting the "OK" button begins the conventional InstallShield setup process, there are no options for this installation, all items must be installed in the NT System32 directory. Once the software has been installed, you may run the **Serial Solution** applet by double clicking on it's icon from the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

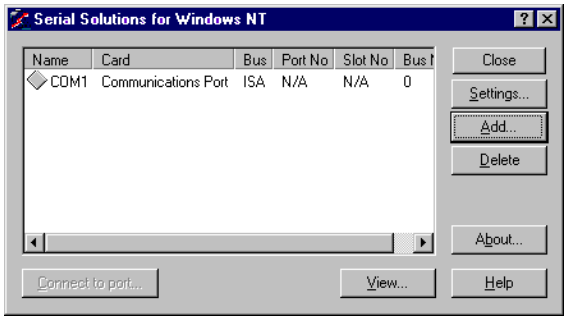
Adding the Photon Twin 9 Card to Windows NT4

All that remains is that the Photon Twin 9 card is added to NT4 using the installed Serial Solutions Control Panel Applet.
Click the start button, select **Settings** and then **Control Panel**



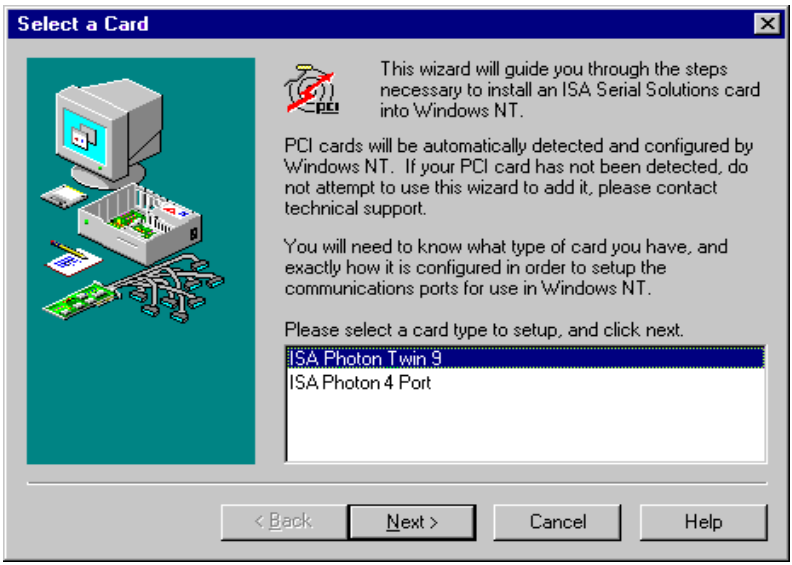
From control panel Double click the **Serial Solutions** icon.





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

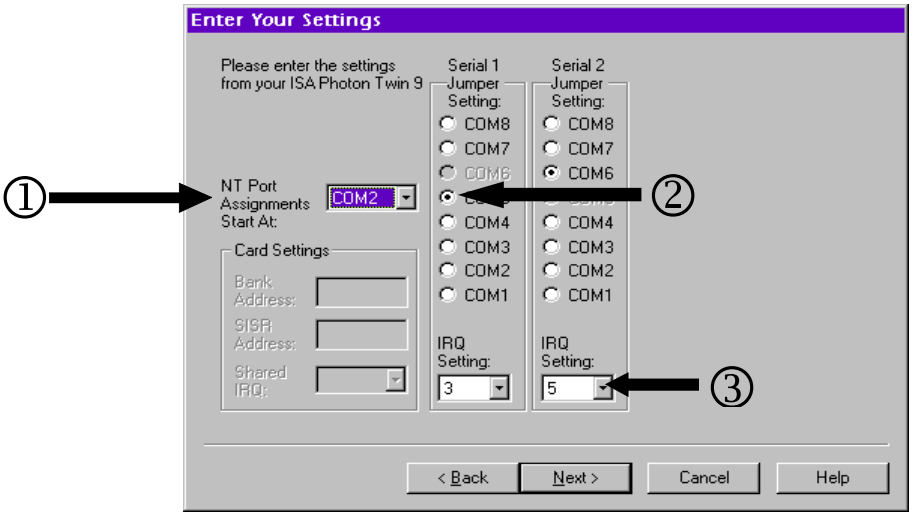
Click **Add**



Select **ISA Photon Twin 9 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 Twin 9 Card



For each Photon Twin 9 Card there are **Three** parameters to set:

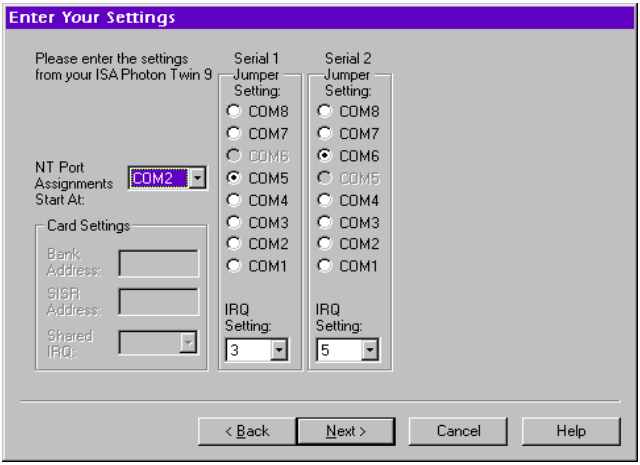
① The **NT Port Assignment** determines the logical names by which the Photon Twin 9 Ports are known to the system. Windows NT4 supports up to 255 COM ports known as COM1 to COM255. Selecting COM2 here will cause the first serial port on the Photon Twin 9 card to be known as COM2 and the second port to be known as COM3. This is not to be confused with the COM port I/O address jumper setting selected on the Photon Twin 9 card.

② The **Serial Jumper I/O Setting:** as set by the COM port I/O address jumper on the card.

③ The **IRQ** as set on the IRQ jumper block on the card.

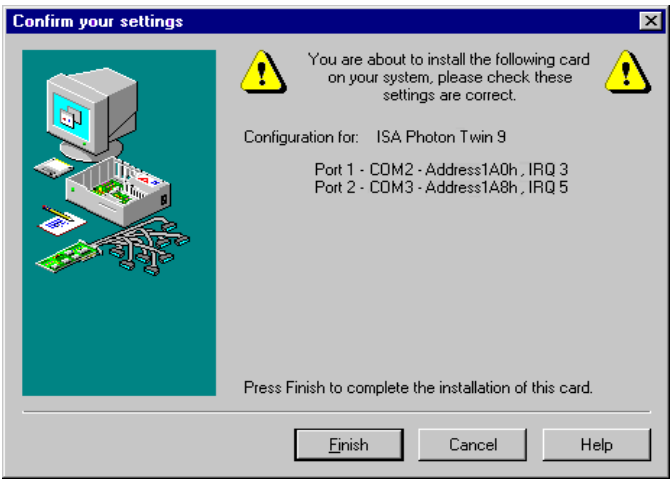
The following pages display suggested settings for adding a Photon Twin 9 card to a variety of systems where other ports are already present.

Settings for Photon Twin 9 Card COM1 Present



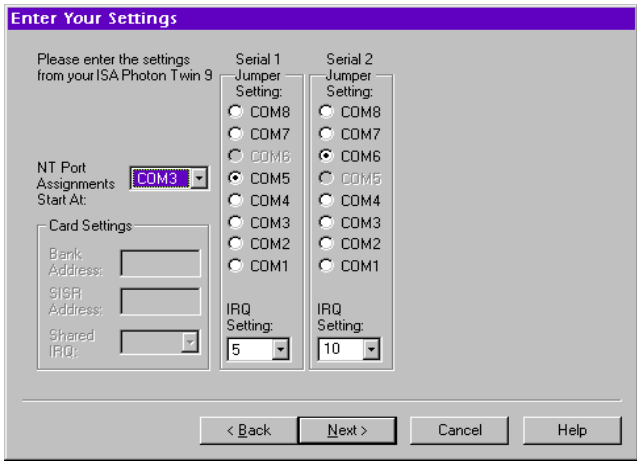
Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Change any of the settings in the box as appropriate to match your hardware. For this example the Photon Twin 9 Card's IRQ jumpers are set on IRQ3 and IRQ5 and the COM port I/O jumpers are set on COM5 and COM6. The Photon Twin 9 card's serial ports are known as COM2 and COM3 to WinNT.



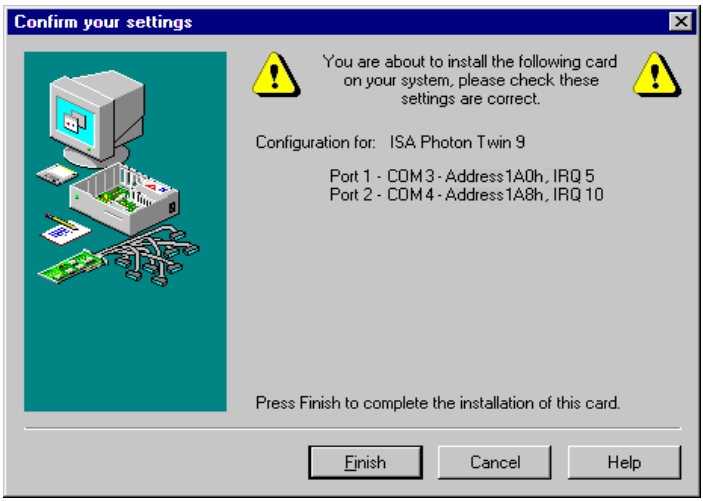
When you are happy with your settings, Click **Next**
Click **Finish**

Settings for Photon Twin 9 Card COM1 & 2 Present



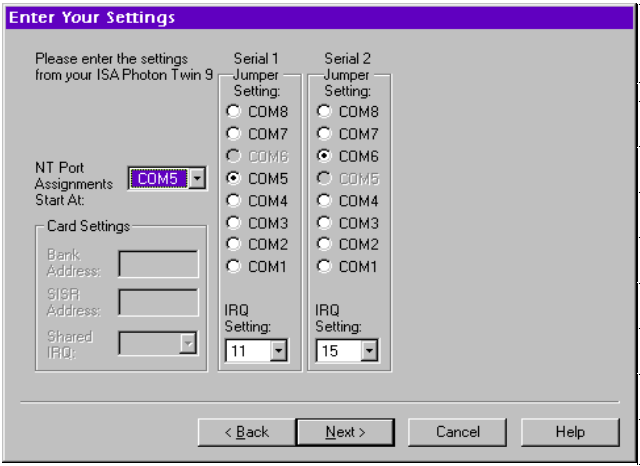
Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Change any of the settings in the box as appropriate to match your hardware. For this example the Photon Twin 9 Card's IRQ jumpers are set on IRQ3 and IRQ5 and the COM port I/O jumpers are set on COM5 and COM6. The Photon Twin 9 card's serial ports are known as COM3 and COM4 to WinNT



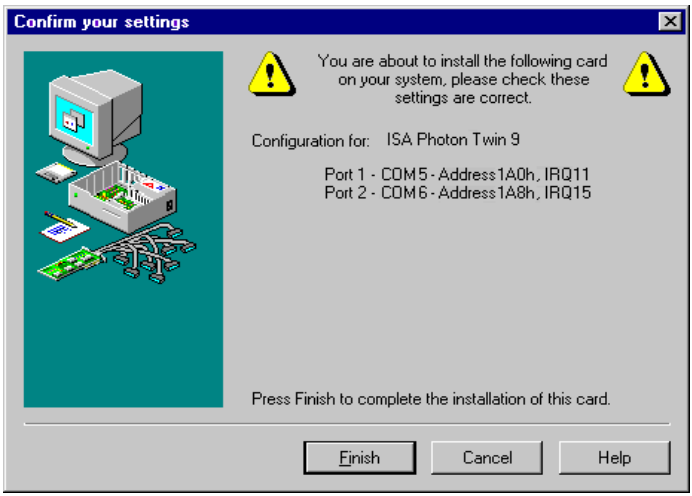
When you are happy with your settings, Click **Next**
Click **Finish**

Settings for Photon Twin 9 Card COM1 - 4 Present



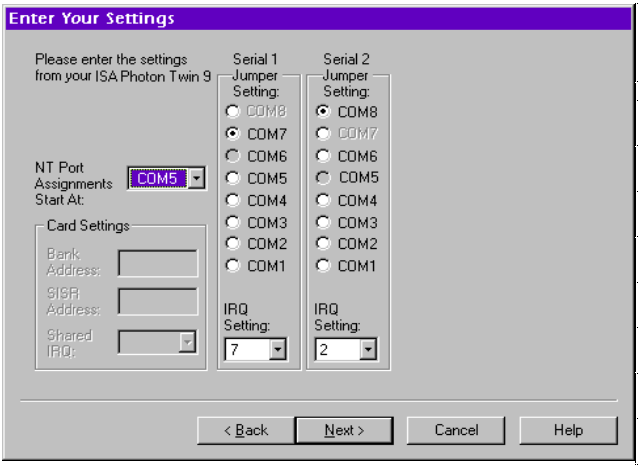
Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Change any of the settings in the box as appropriate to match your hardware. For this example the Photon Twin 9 Card's IRQ jumpers are set on IRQ11 and IRQ15 and the COM port I/O jumpers are set on COM5 and COM6. The Photon Twin 9 card's serial ports are known as COM5 and COM6 to WinNT



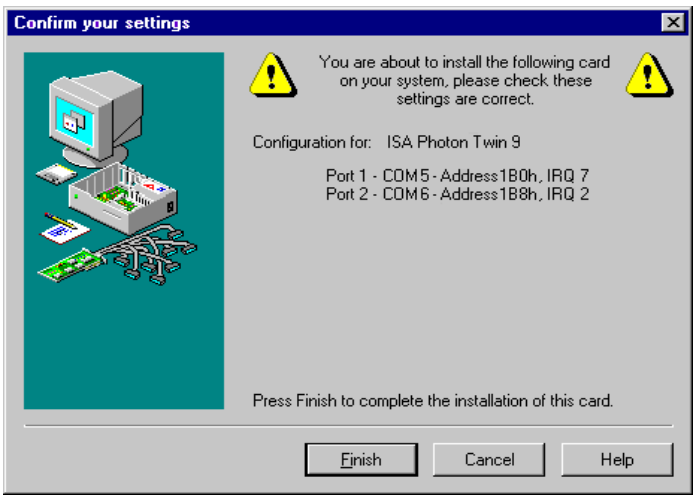
When you are happy with your settings, Click **Next**
Click **Finish**

Alternate Settings for Photon Card COM1-4 Present



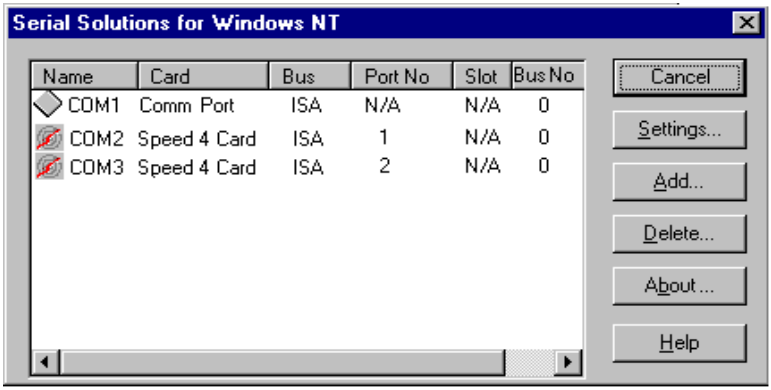
Jumper Set COM Port	Resulting I/O Address
COM8	01B8
COM7	01B0
COM6	01A8
COM5	01A0
COM4	02E8
COM3	03E8
COM2	02F8
COM1	03F8

Change any of the settings in the box as appropriate to match your hardware. For this example the Photon Twin 9 Card's IRQ jumpers are set on IRQ11 and IRQ15 and the COM port I/O jumpers are set on COM5 and COM6. The Photon Twin 9 card's serial ports are known as COM5 and COM6 to WinNT



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

After adding a Photon Twin 9 Card (COM 1 present) you will be presented with a Serial Solutions Port Configuration window:

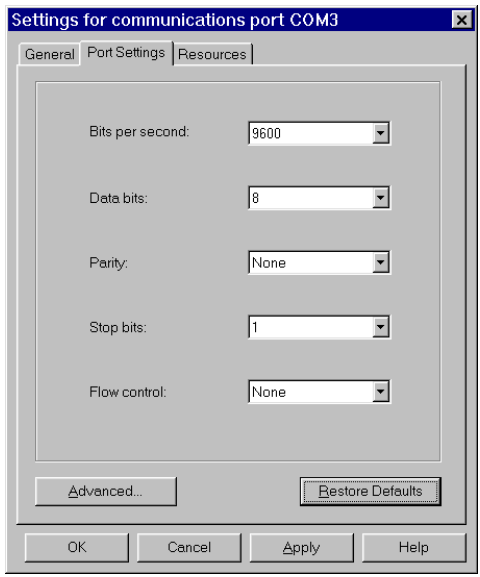


Changing Serial Port Settings

Adding a Photon Twin 9 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:

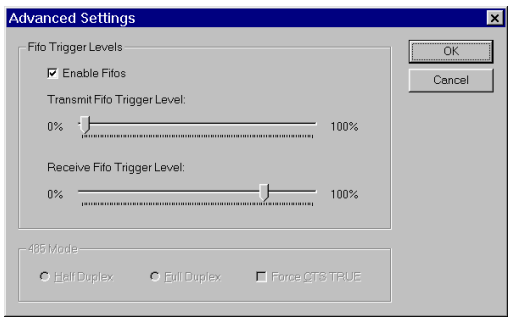
1. **Baud Rate** - determines the baud rate at which the selected port operates, providing it is not overridden by any serial comms applications in use. ISA Photon Twin 9 will operate correctly up to 230,400 baud at distances of up to 10 meters,
   Note: Many serial comms applications will not actually 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 Twin 9 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.

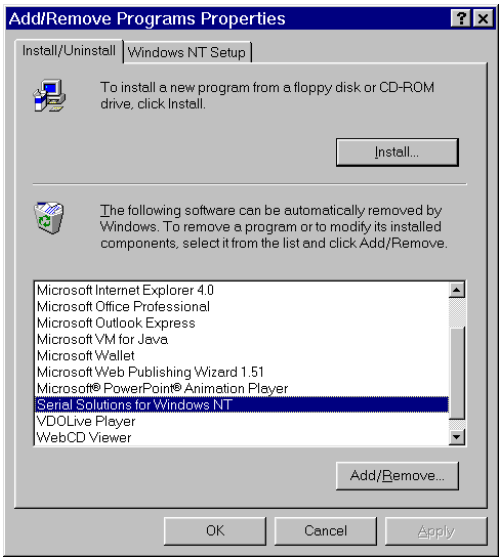
2. **Defaults -** When clicked this button resets the advanced properties to the followed settings:

    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.

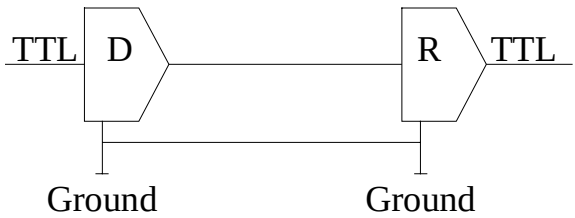
Introduction.

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 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 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.

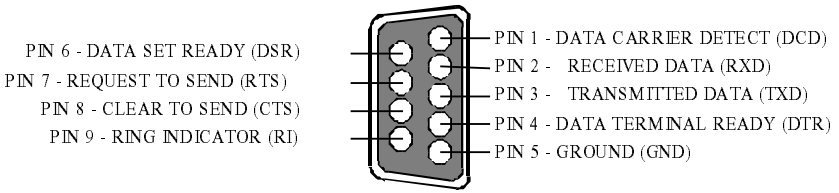


RS232C Standard 1 Driver 1 Receiver	
Line Length	Max Data Rate
50 Feet = 15m	20 Kbits/sec

Serial Port Pin Outs.

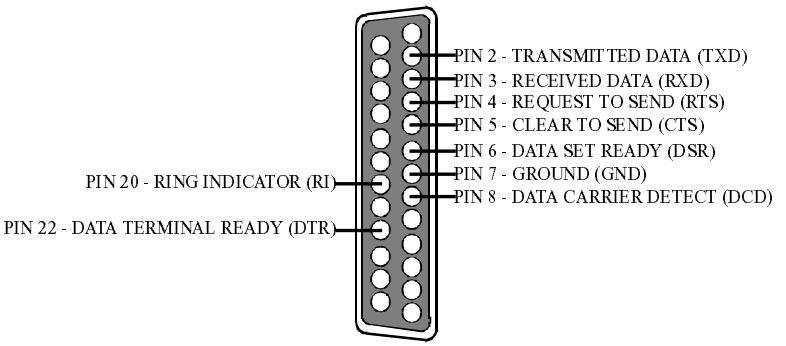
The pinouts of the 9 and 25 pin Male D connectors are given below.

Figure 4-2. 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. 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.

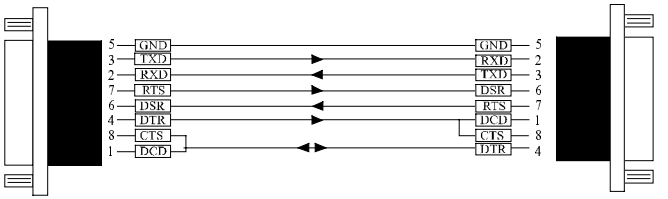
4) Connect the Port 2 RTS line, pin 7, to the other PC DSR line, pin 6. Also, connect the other PC RTS line, pin 4, to the Port 2 DSR line, pin 6.
   This RTS line is used to let the other device know that it is ready for data exchange.

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

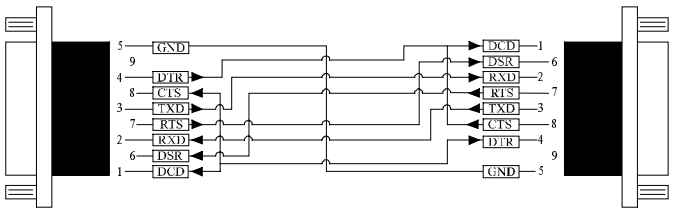
AT SERIAL PORT Side
9 PIN D CONNECTOR

Other PC SERIAL PORT Side.
9 PIN D CONNECTOR

SCHEMATIC REPRESENTATION:



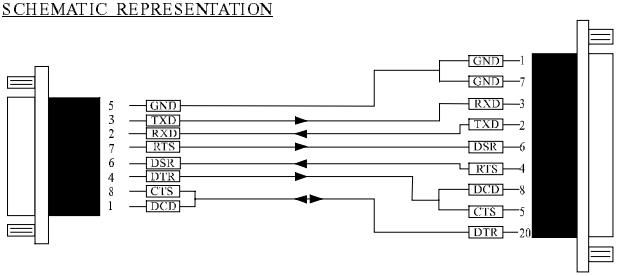
ACTUAL REPRESENTATION:



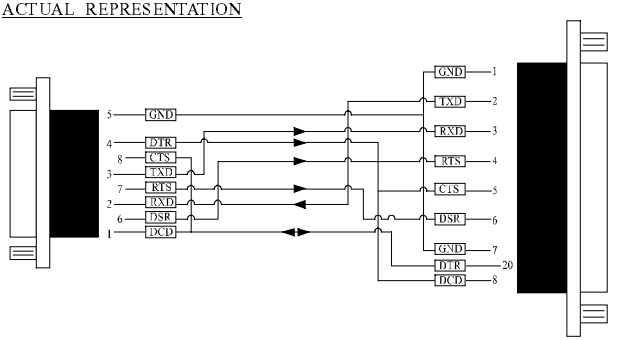
9 PIN D CONNECTOR

25 PIN D CONNECTOR

SCHEMATIC 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.

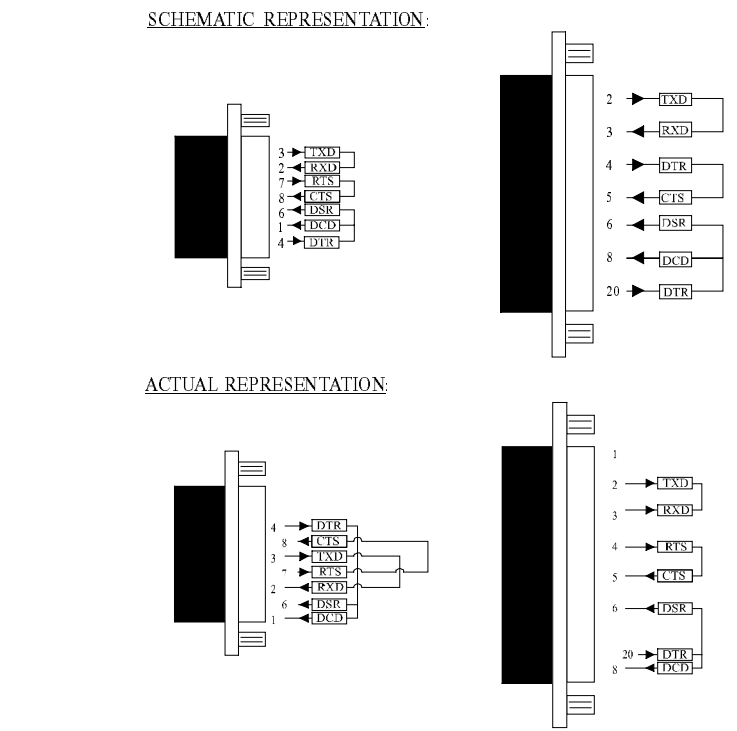
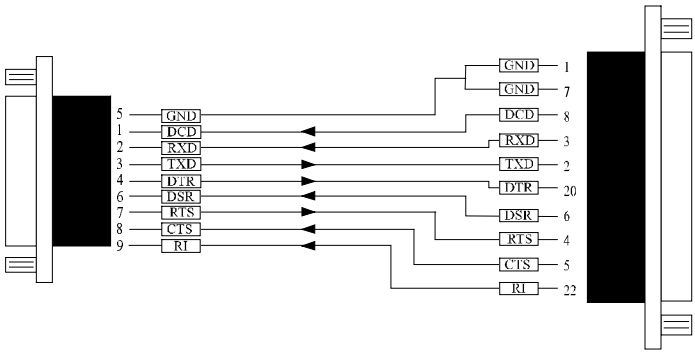


Figure 4-5. 9 To 25 Way Adapter.

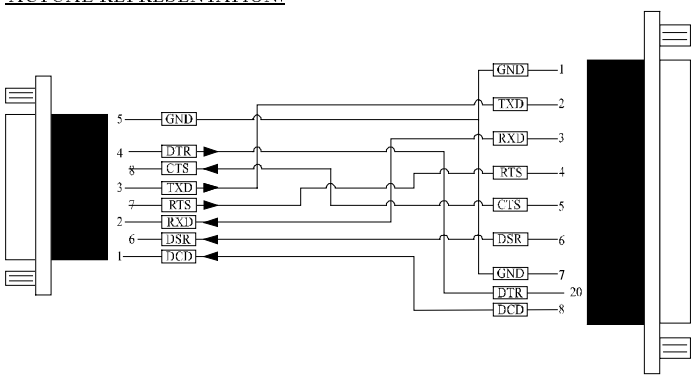
This adapter cable makes the AT style 9-pin serial port, look like the standard PC 25 pin serial port. It is NOT a cross over cable!

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

SCHEMATIC REPRESENTATION:



ACTUAL REPRESENTATION:



INDEX