User Guide for Microsoft Systems

Windows Server 2003
Windows XP
Windows 2000
Windows NT

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Table of Contents

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Overview

Install the NS-Link driver if you want to use the device serial ports as native COM ports. This section defines which hardware and software platforms are supported in this guide. It also provides information about:

- Hardware installation documentation, if you have not installed the hardware
- Latest released NS-Link™ drivers
- Overview of NS-Link and its requirements.

If you want to configure only ***DeviceMaster*** ports for socket mode or serial tunneling, you do not need to install the NS-Link device driver. See the appropriate *DeviceMaster User Guide* for socket configuration information that is listed in *Locating the User Guide or Hardware Installation Guide* on Page 8.

Only ***DeviceMaster*** ports can be configured as sockets after the NS-Link installation.

NS-Link Requirements

This guide discusses installing and configuring an NS-Link driver for the following hardware platforms:

- DeviceMaster® AIR
- DeviceMaster PRO
- DeviceMaster RTS
- DeviceMaster Serial Hub
- RocketPort® Serial Hub *Si*
- RocketPort Serial Hub ia

The NS-Link driver requires at least one of the following host systems running:

- Windows® Server 2003
- Windows XP
- Windows 2000
- Windows NT

Locating the User Guide or Hardware Installation Guide

Use the *User Guide* or hardware installation documentation to install the hardware before installing NS-Link. The *User Guide* or hardware installation documentation is available on the Comtrol CD that ships with your product or you can download the current version from the ftp site using the following links.

- http://support.comtrol.com/download.asp?partnumber=2000337
- http://support.comtrol.com/download.asp?partnumber=2000340
- http://support.comtrol.com/download.asp?partnumber=2000334
- http://support.comtrol.com/download.asp?partnumber=2000365
- http://support.comtrol.com/download.asp?partnumber=2000169
- http://support.comtrol.com/download.asp?partnumber=2000153

Locating NS-Link Software

You can download the latest NS-Link device driver updates at no charge from the Comtrol web site at:

- Windows 2000, Windows XP, and Windows Server 2003: http://support.comtrol.com/download.asp?partnumber=1800198.
- Windows NT: http://support.comtrol.com/download.asp?partnumber=1800237.

Always check the web site to make sure that you have the current driver and documentation. The software files that you download from the web site are self-extracting zipped files that you must extract before installing.

The Comtrol CD that ships with your product can streamline the installation of your product. When loaded on a system running a Microsoft operating system, the CD opens a menu system (unless the autorun feature is disabled).

Note: *If the autorun feature has been disabled, open the* ***Readme.pdf*** *file at the root of CD to start the menu system.*

NS-Link Overview

The following subsections discuss NS-Link features and topics that you may want to review before installation.

Connectivity Requirements

An Ethernet connection: either to an Ethernet hub, switch, or router; or to a Network Interface Card (NIC) in the host system. See the hardware installation documentation (*Locating the User Guide or Hardware Installation Guide* on Page 8) for information regarding hardware installation.

Product Type	Connected to	Ethernet Cable	Connector Name
DeviceMaster Serial Hub 8	NIC	Standard	DOWN
	Hub, switch, or router	Standard	UP
DeviceMaster Serial Hub 16	Hub, switch, router, or NIC	Standard	10/100 NETWORK
DeviceMaster RTS 1	Hub, switch, router, or NIC	Standard	10/100 ETHERNET
DeviceMaster RTS 1 Embedded	Hub, switch, router, or NIC	Standard	RJ45 port (not labeled)
DeviceMaster RTS 4/8/16 (external power supply)	NIC	Standard	DOWN
	Hub, switch, or router	Standard	UP
DeviceMaster RTS 16/32RM (internal power supply)	Hub, switch, router, or NIC	Standard	10/100 NETWORK
DeviceMaster PRO 8	NIC	Standard	DOWN
	Hub, switch, or router	Standard	UP
DeviceMaster PRO 16	NIC	Standard	DOWN
	Hub, switch, or router	Standard	UP
RocketPort Serial Hub *ia*	NIC	*Crossover*	Network
	Hub, switch, or router	Standard	
RocketPort Serial Hub *Si* (2-Port)	NIC	*Crossover*	10/100BASE-T
	Hub, switch, or router	Standard	

Note: *DeviceMaster AIR users can refer to the* DeviceMaster AIR User Guide.

IP or MAC Addressing Issues

This is an overview of IP and MAC addressing issues that may affect how you configure the Comtrol device with a brief discussion of advantages of each method.

The IP addressing scheme (IP mode) has the following advantages:

- Uses an IEEE industry standard protocol.
- Allows you to configure systems to use ports on the Comtrol device that are outside of the host system's local Ethernet segment.

Note: *This IP address must be a unique reserved IP address. Do not use an address from a dynamic address pool. If necessary, see the system administrator for an IP address.*

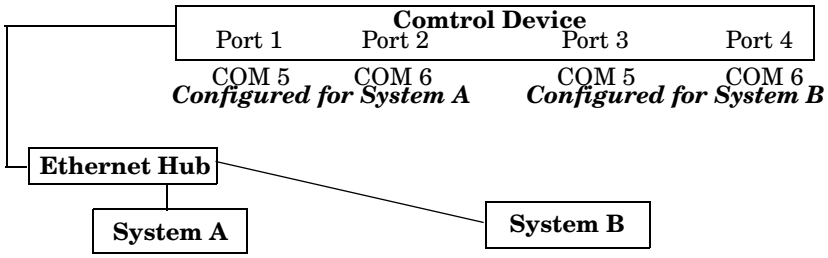
The MAC addressing method (MAC mode) has the following advantages:

- Simplifies implementation and ongoing support by eliminating the address administration issues inherent in network protocols. MAC addresses are predefined by Comtrol and there is no potential for an "address conflict" at setup.
- It is isolated from foreign LAN segments minimizing potential security issues.
- Maximizes throughput of serial data.

Using the Port Sharing Feature

The Comtrol device can be shared with multiple systems on a network. To do so, follow the *Installing NS-Link* discussion for each system that you want to permit access to the serial ports.

You can implement the port sharing feature in several ways. You can share the same port with multiple systems (only one system can have an open connection to a port at any given time) or you can set up multiple systems to share specific ports on the Comtrol device.



COM port names must be unique to each system.
Multiple systems can use the same COM port names.

Example:
To configure two ports for System A and two ports for System B, you could configure the drivers like this:

1. When installing NS-Link on System A, select "Not Configured" for the COM port names for Ports 3 and 4.
2. When installing NS-Link on System B, select "Not Configured" for the COM port names for Ports 1 and 2.

Port	System A	System B
1	COM5	Not Configured
2	COM6	Not Configured
3	Not Configured	COM5
4	Not Configured	COM6

Note: *Most applications do not release ports, so you may not be able to use port sharing across multiple systems with the same port. Also, if using port sharing, make sure that two computers do not try to access the same port at the same time. Only one computer can control a given port at a given time.*

Device Preparation for NS-Link

Use the appropriate table to verify that your hardware was installed properly and is ready for NS-Link installation. See the hardware installation documentation (Page 8) if you need to install the hardware.

DeviceMaster Serial Hub LEDs

Use this table to verify that your DeviceMaster Serial Hub is ready for NS-Link installation.

Model	How to tell if the DeviceMaster Serial Hub is working properly (loads NS-Link driver or default SocketServer):
DeviceMaster Serial Hub 8	• The **PWR** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **PWR** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
DeviceMaster Serial Hub 16	• The **Status** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED is lit, it indicates full-duplex activity. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).

DeviceMaster RTS LEDs

Use this table to verify that your DeviceMaster RTS is ready for NS-Link installation.

Model	How to tell if the DeviceMaster RTS is working properly (loads NS-Link driver or default SocketServer):
DeviceMaster RTS 1-Port	• The **Status** LED on the front of the unit is lit, which indicates that it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **Link Act** LED is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED is lit, it indicates full-duplex activity. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
DeviceMaster RTS 1-Port Embedded	The LEDs are located between the RJ45 connector and the power terminal block. • The amber **Status** LED (**D1**) on the adapter is lit, which indicates that it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **Link Act** LED (**D2**) is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED (**D3**) is lit, it indicates full-duplex activity. • If the red **100** LED (**D4**) is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
DeviceMaster RTS 4/8/16 With External Power Supply	• The **PWR** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **PWR** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
DeviceMaster RTS 16/32RM With Internal Power Supply	• The **Status** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED is lit, it indicates full-duplex activity. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).

DeviceMaster PRO LEDs

Use this table to verify that your DeviceMaster PRO is ready for NS-Link installation.

Model	How to tell if the DeviceMaster PRO is working properly (loads NS-Link driver or default SocketServer):
DeviceMaster PRO 8	• The **PWR** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **PWR** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
DeviceMaster PRO 16	• The **Status** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED is lit, it indicates full-duplex activity. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).

DeviceMaster AIR LEDs

Use this table to verify that your DeviceMaster RTS is ready for NS-Link installation.

Model	How to tell if the DeviceMaster RTS is working properly (loads NS-Link driver or default SocketServer):
DeviceMaster AIR 1-Port	• The **Status** LED on the front of the unit is lit, which indicates that it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle.* • The red **Link Act** LED is lit, which indicates a working Ethernet connection between the WLAN and LAN connectors. • If the red **Duplex** LED is lit, it indicates full-duplex activity between the WLAN and LAN connectors. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection between the WLAN and LAN connectors.

RocketPort Serial Hub *ia* LEDs

Use this table to verify that your RocketPort Serial Hub *ia* is ready for NS-Link installation.

Model	How to tell if the RocketPort Serial Hub *ia* is working properly:
RocketPort Serial Hub *ia*	• The yellow **PWR** LED is flashing, which means that the device is waiting for the driver installation. ***Note:*** *If the **PWR** LED is lit steady with only an occasional flash, it means that the device driver has loaded.* • The green **LNK LED** is lit, which indicates a working Ethernet connection. • The yellow **ACT LED** flashes, which indicates Ethernet activity on the network.

RocketPort Serial Hub *Si* LEDs

Use this table to verify that your RocketPort Serial Hub *Si* is ready for NS-Link installation.

Model	How to tell if the RocketPort Serial Hub *Si* is working properly:
RocketPort Serial Hub *Si* 2-port	• The **Power** LED in the front of the unit is flashing, which indicates that the device is waiting for the driver installation. ***Note:*** *If the **Power** LED is lit steady with only an occasional flash, it means that the device driver has loaded.* • Both **10/100BASE-T** LEDs are lit, which indicates a working Ethernet connection.

Initial NS-Link Installation

Use the appropriate subsection to initially install NS-Link on your operating system after verifying that your device is functioning properly, see *Device Preparation for NS-Link* on Page 11.

- *Windows XP and Windows Server 2003: NS-Link Installation* on Page 15
- *Windows 2000: NS-Link Installation* on Page 24
- *Windows NT: NS-Link Installation* on Page 31

If there is a NS-Link driver already installed on your system, see *Updating, Adding, or Removing NS-Link Devices* on Page 39 before install the new driver<.

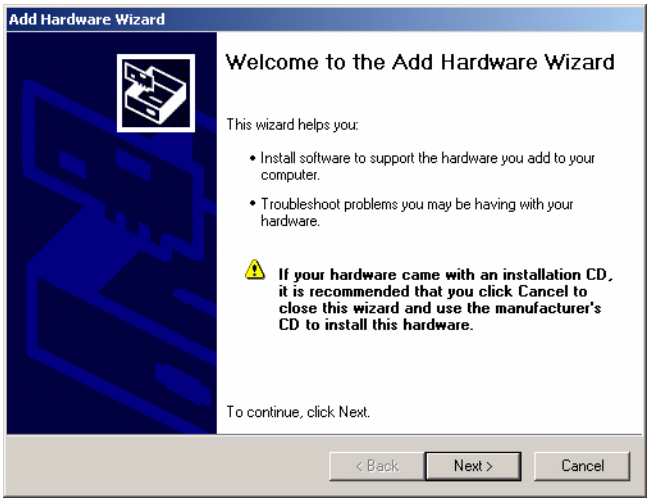
Windows XP and Windows Server 2003: NS-Link Installation

Use this procedure to install and configure the NS-Link device driver for your device.

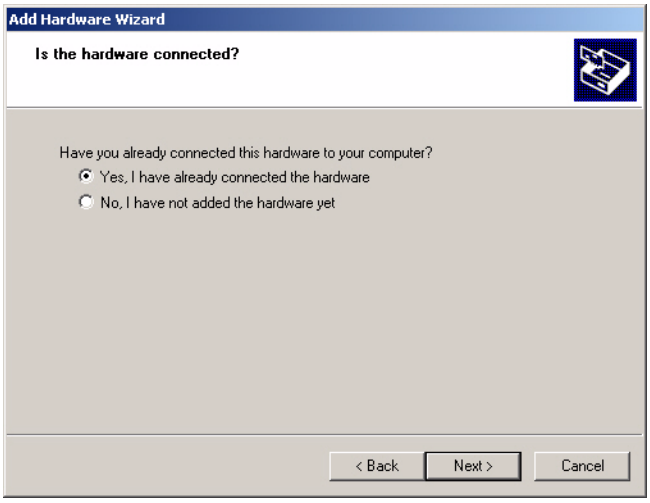
1. If necessary, install the NS-Link device. For a list of supported NS-Link devices, see *NS-Link Requirements* on Page 7.
2. If necessary, unzip the self-extracting files from the Comtrol media or ftp/web site. See *Locating NS-Link Software* on Page 8, if you need to locate the device driver.
3. From the **Start** button, select the **Control Panel**.

   Windows Server 2003: Select the **Add Hardware** item.

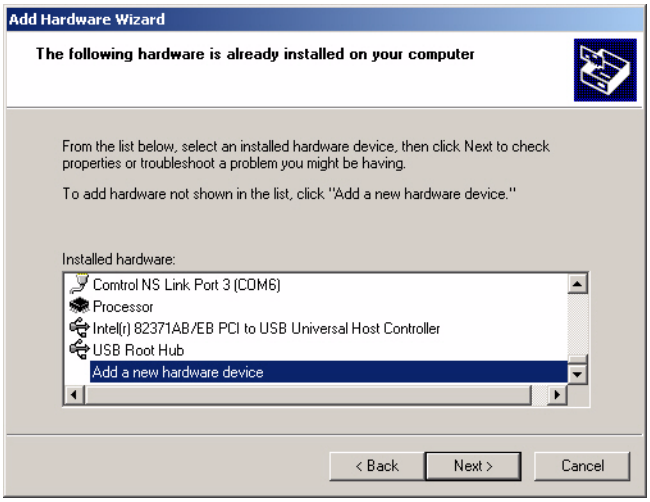
   Windows XP: Double-click on the **Add Hardware** icon.
4. Select **Next**.



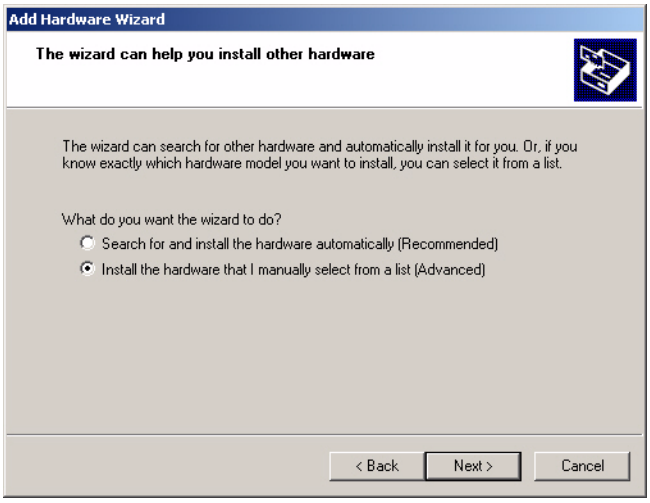
5. Select **Yes, I have already connected the hardware** and **Next**.



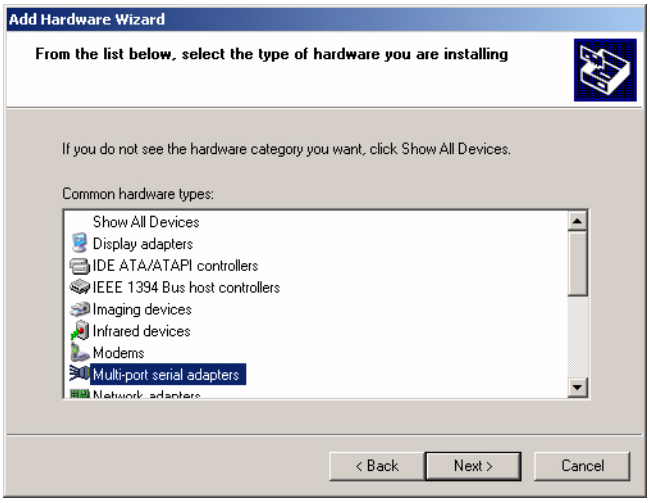
6. Highlight **Add a new hardware device** (at the end of the list) and select **Next**.



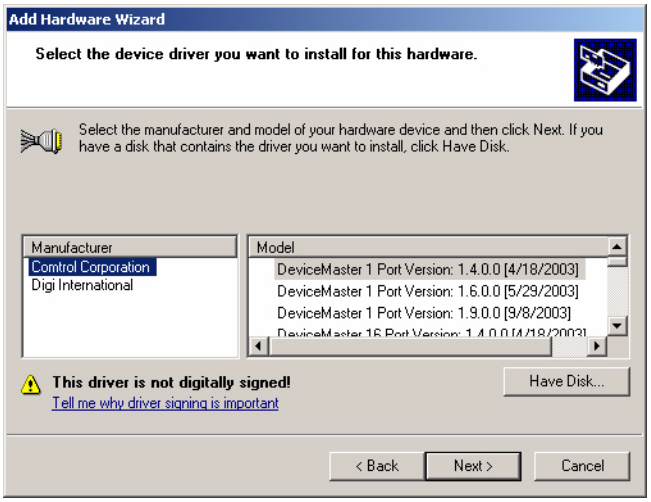
7. Select **Install the hardware that I manually select from a list (Advanced)** and **Next**.



8. Highlight **Multi-port serial adapters** and select **Next**.

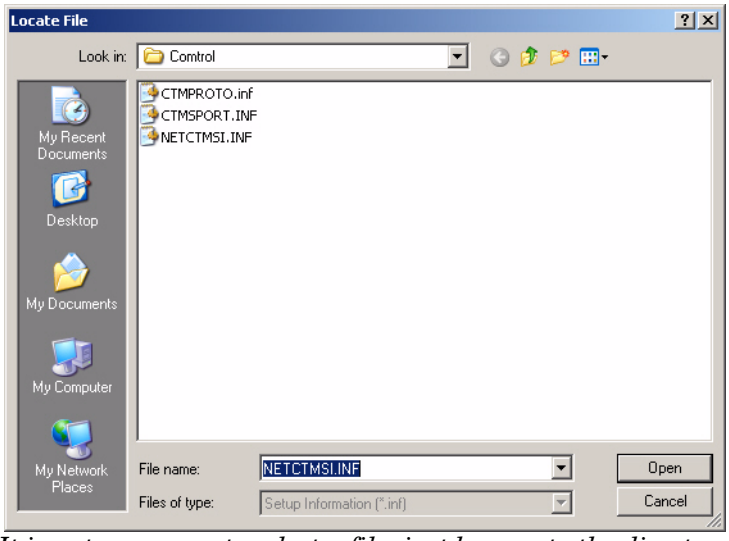


9. Select the **Have Disk** button.



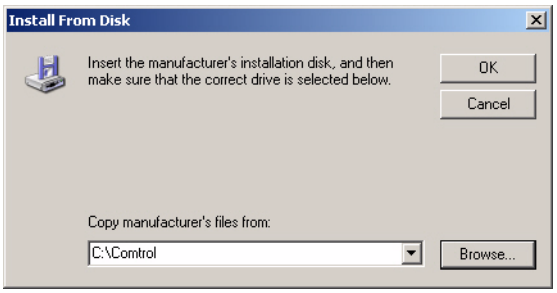
This screenshot shows a system that had drivers previously installed.

10. Use **Browse** button to locate the unzipped installation files and select **Open**.

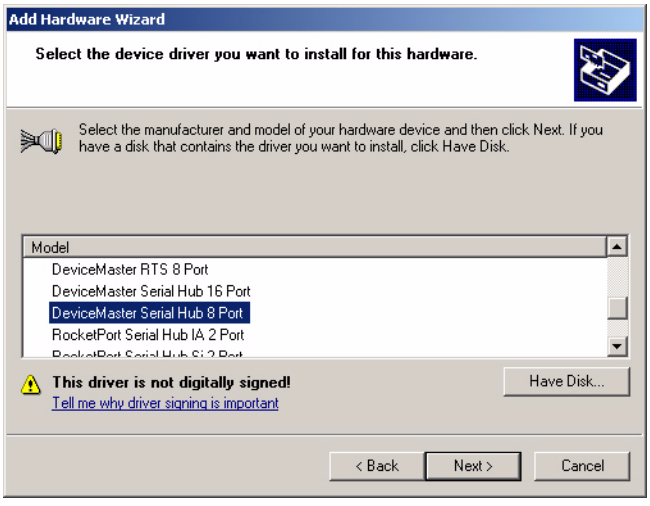


*It is not necessary to select a file, just browse to the directory and select **Open**.*

11. Select **OK**.

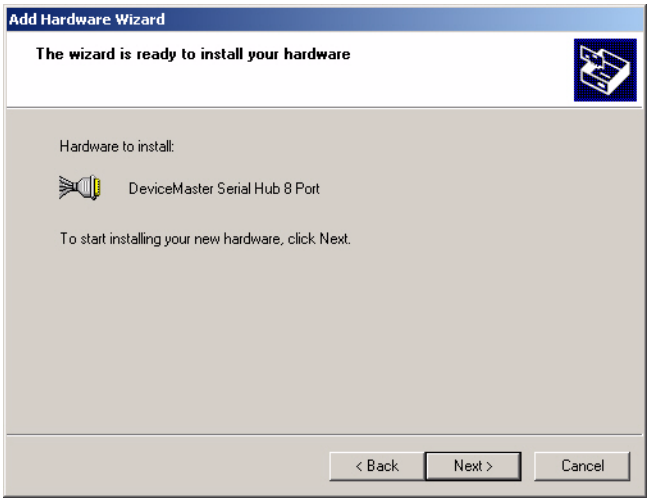


12. From the **Models** list, highlight the device you are installing and **Next**.

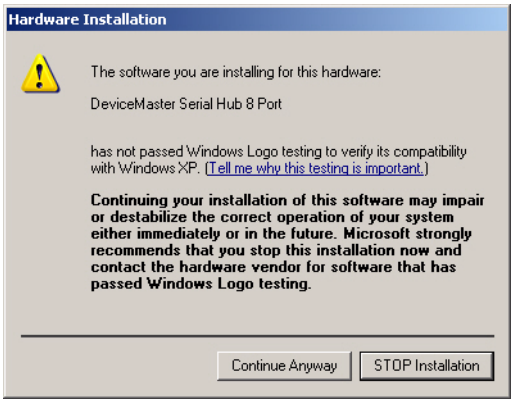


This example installs a DeviceMaster Serial Hub 8-Port.

13. Select the **Next** button to start the driver installation.

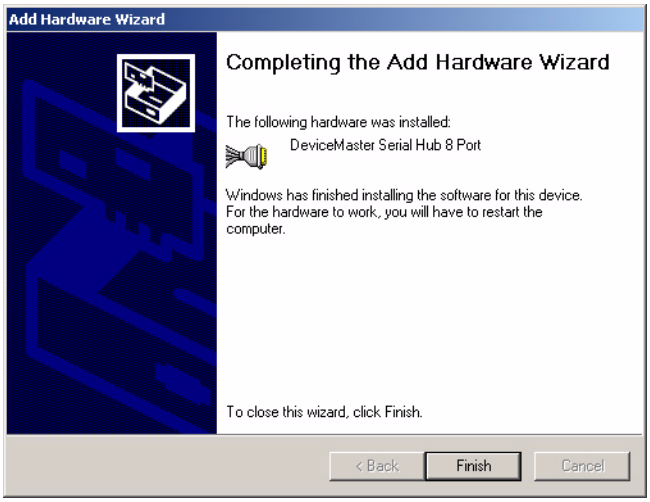


14. Select **Continue Anyway** to proceed.

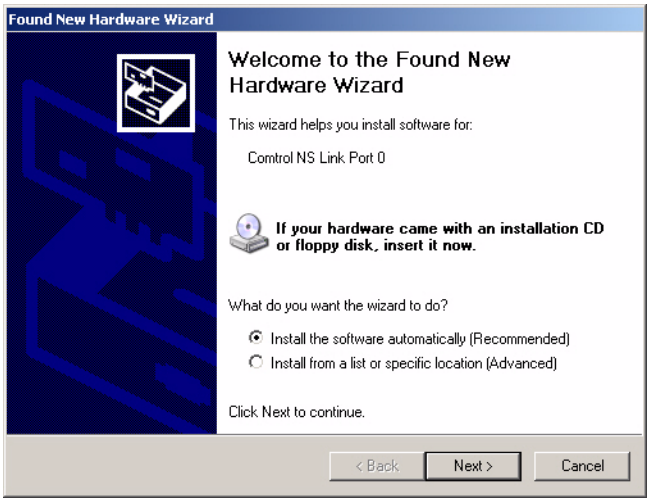


Note: *It may take up to several moments for the operating system to load the driver on the first port.*

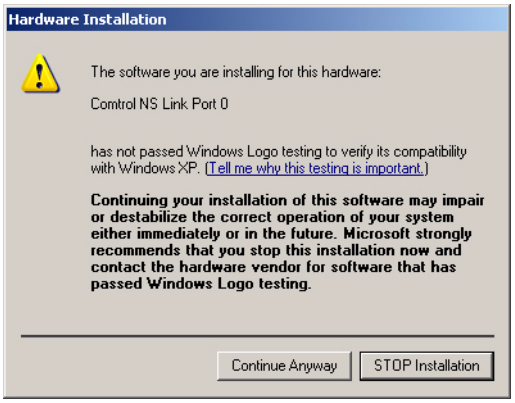
15. Select the **Finish** button to complete the installation process for the device.



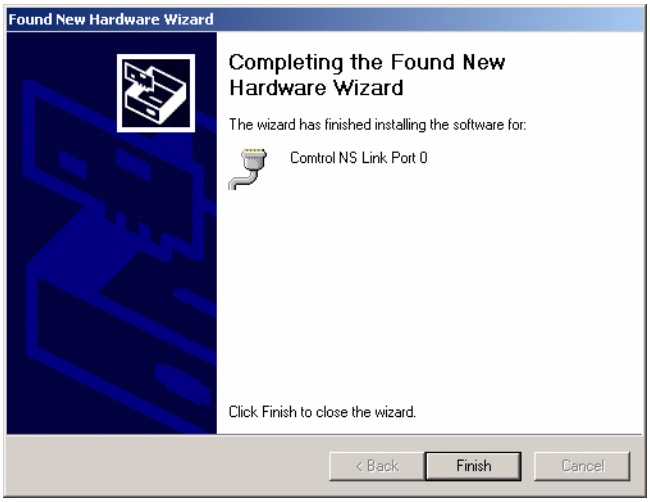
16. Select **Install the software automatically (Recommended)** and **Next**.



17. Select **Continue Anyway** to proceed.



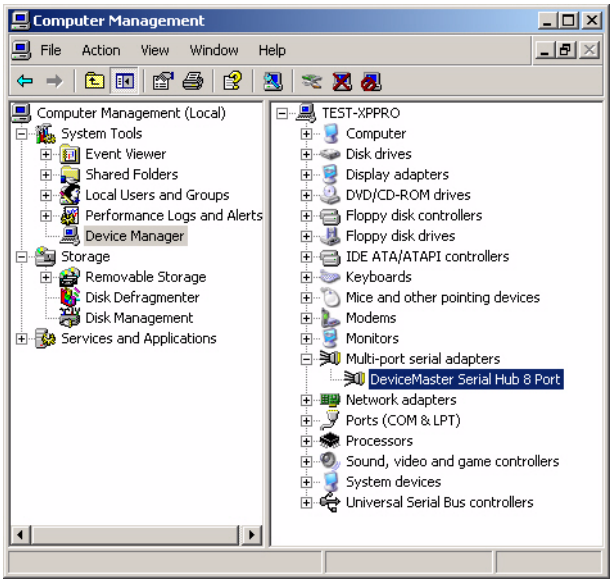
18. Select the **Finish** button to complete the driver installation process for this port.



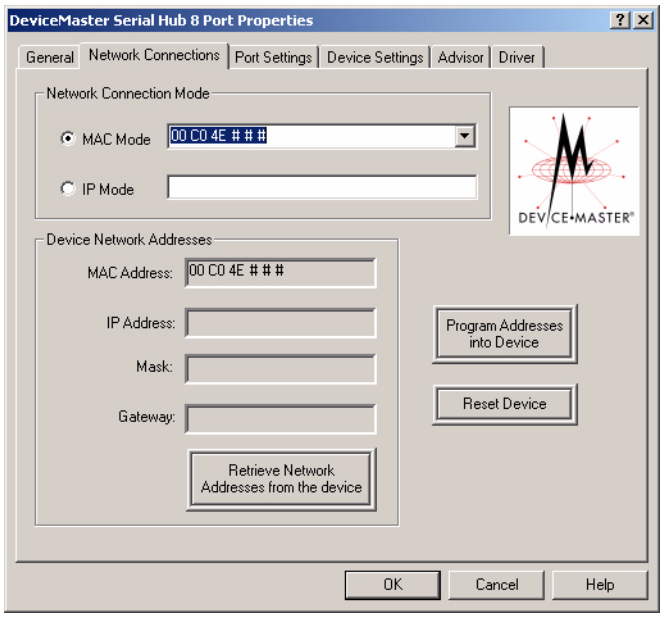
Note: *You may need to wait a few moments while the operating system creates a port for the device.*

19. Repeat Steps 16 through 18 for each remaining port on the device.

20. ***If Windows XP***, close the *Control Panel*.
21. Right-click **My Computer**, select **Manage**, and highlight **Device Manager**.
22. Expand the **Multi-port serial adapters** entry, right-click on the device you are installing, and select the **Properties** menu item.



23. Select the **Network Connections** tab.



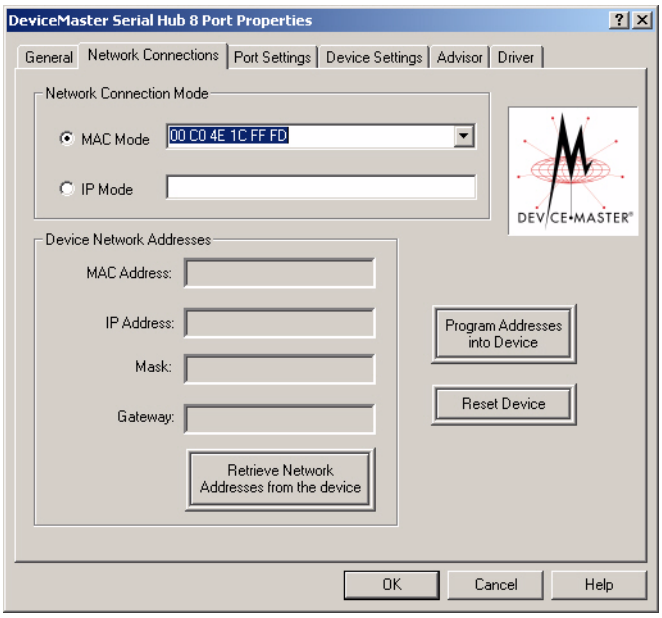
Note: *You can use the help system with the driver for information about this screen or see Network Connections Tab on Page 73.*

24. Select **MAC Mode** or **IP Mode** and follow the appropriate procedure below.

    To configure an IP address or DHCP usage for the device, you must associate a MAC address to the device before you can change the IP address. If you do not associate the MAC address to the device, you will not be able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

    Note: *See IP or MAC Addressing Issues on Page 10 for additional information about IP and MAC modes.*

MAC Mode



To use **MAC Mode** you must connect the device to the local network segment or a NIC on the host system.

If you do not associate the MAC address to the device, you will not be able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

a. Enter the address from the MAC address label on the device or select the MAC address from the droplist.

   If you enter the MAC address, make sure that you use the correct format: **00 C0 4E xx xx xx**. A space must separate each pair of digits.

   Note: *The MAC address does not appear in the droplist, if the device is on another network segment. In this case, you must manually enter the MAC address.*

b. Select **OK** to program the driver with the MAC address of the device. You must close the **Device Properties** page before you can program a different IP address into the device.

   To program the device for use with an IP address, see *Programming the IP Address* on Page 52. To configure NS-Link in MAC mode to run efficiently, see *Disabling DHCP Requests (MAC Mode)* on Page 55.

IP Mode

You can select **IP Mode** if the address in the device has been programmed with a suitable IP address for your network. If you do not associate the MAC address with the device, you will not able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

a. Select **IP Mode**.

b. Enter the IP address of the device.

25. If you are done configuring the device, close the *Device Manager*.

You can use the following information, if you require further installation information:

- To configure advanced COM port properties, see *COM Port Configuration* on Page 61.
- Connect your serial devices to the Comtrol device. If you need information about connecting your serial devices, see *Locating the User Guide or Hardware Installation Guide* on Page 8 for your product.
- To set up modems or printers see your operating system help system or use the *RRAS Configuration Overview for Windows XP*.

DeviceMaster Family: If you want to configure any of the ports as sockets:

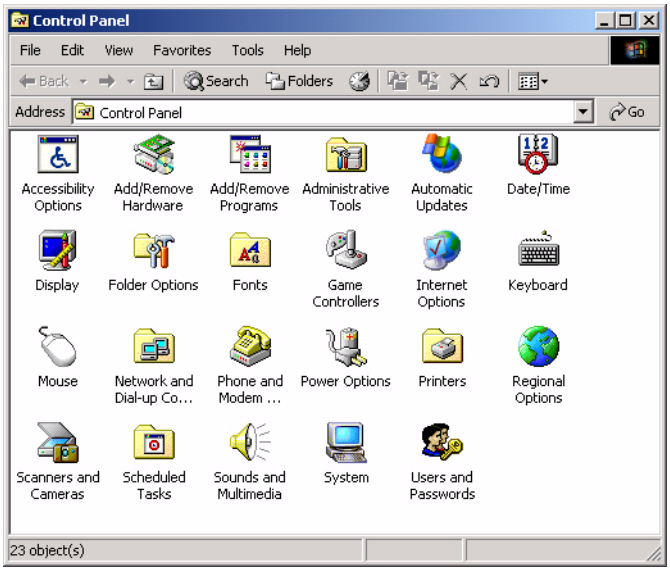
1. Enter the IP address of the device in your web browser URL field.
2. Select the port number that you want to configure as a socket.

Note: *See Locating the User Guide or Hardware Installation Guide on Page 8, if you need help configuring sockets.*

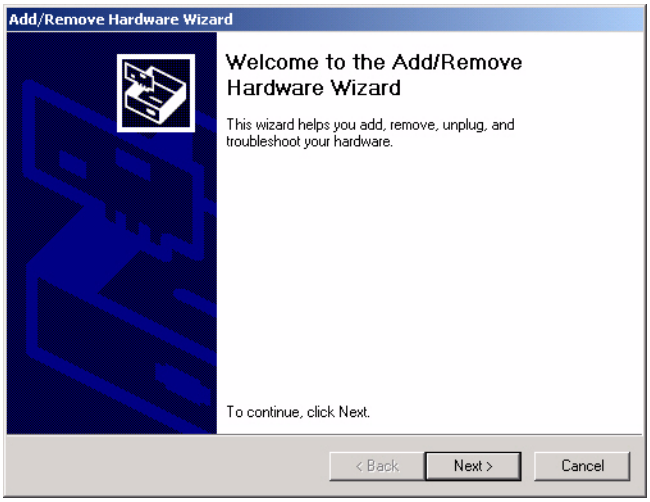
Windows 2000: NS-Link Installation

Use this procedure to install and configure the NS-Link device driver for your device.

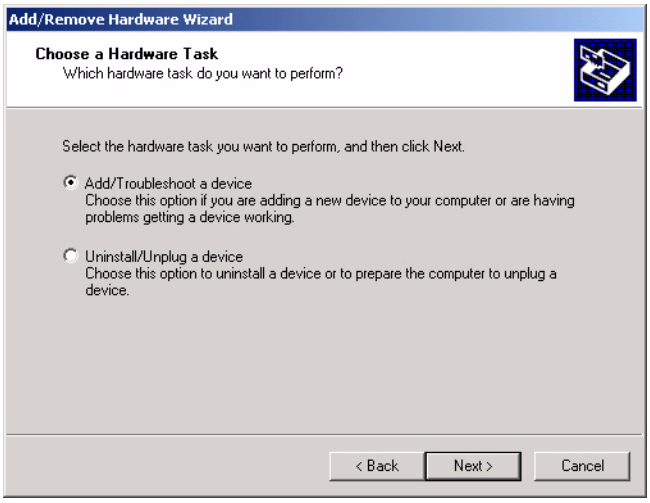
1. If necessary, unzip the self-extracting files from the Comtrol media or ftp/web site. See *Locating NS-Link Software* on Page 8, if you need to locate the device driver.
2. From the **Start** button, select **Settings**, **Control Panel**, and double-click on the **Add/Remove Hardware** icon.



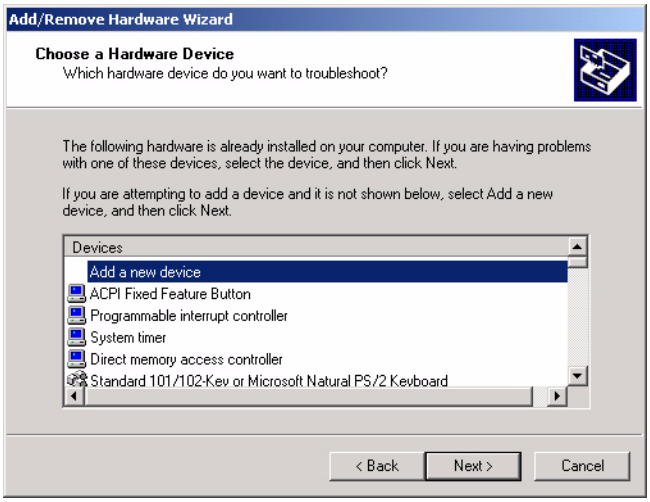
3. Select **Next**.



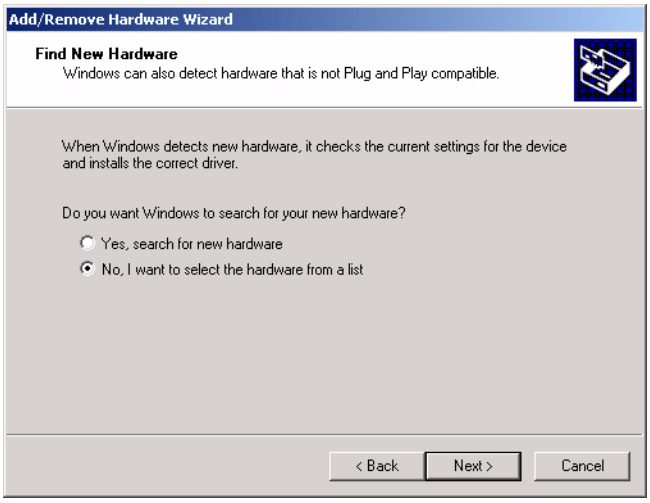
4. Select **Add/Troubleshoot a device** and **Next**.



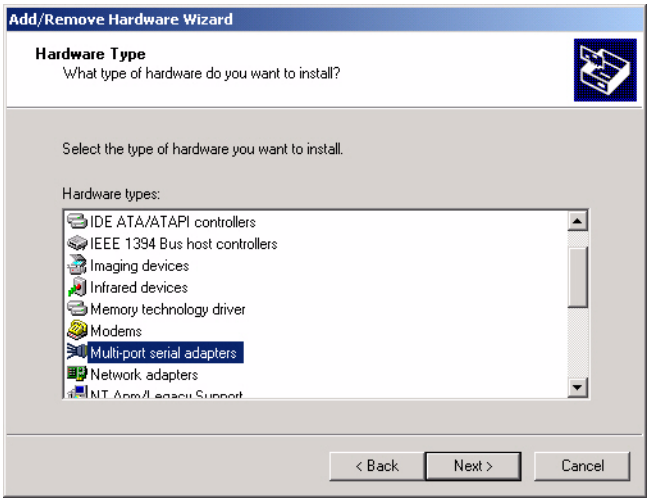
5. Highlight **Add a new device** and select **Next**.



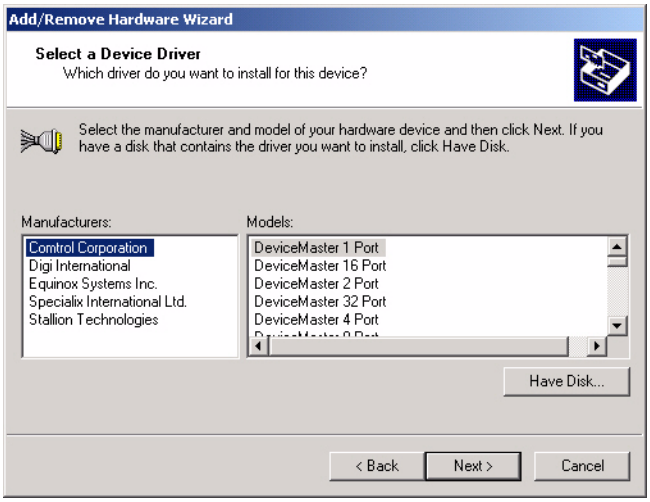
6. Select **No, I want to select the hardware from a list** and **Next**.



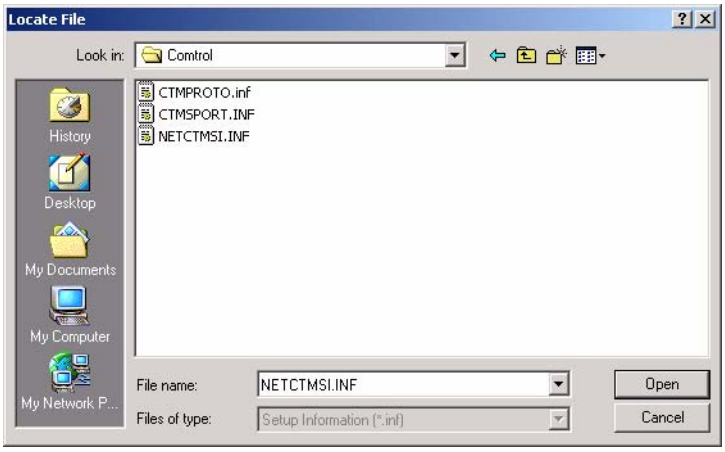
7. Select **Multi-port serial adapters** and select **Next**.



8. Select the **Have Disk** button.

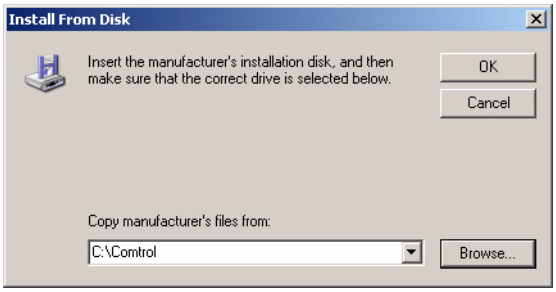


9. Use **Browse** button to locate the unzipped installation files or enter the path and select **OK**.

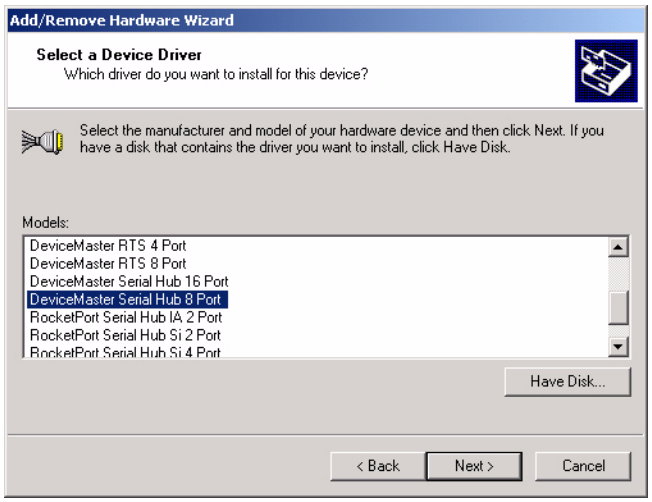


*It is not necessary to select a file, just browse to this directory and select **Open**.*

For example, if you extracted the driver to the default subdirectory, enter: **C:\COMTROL**.

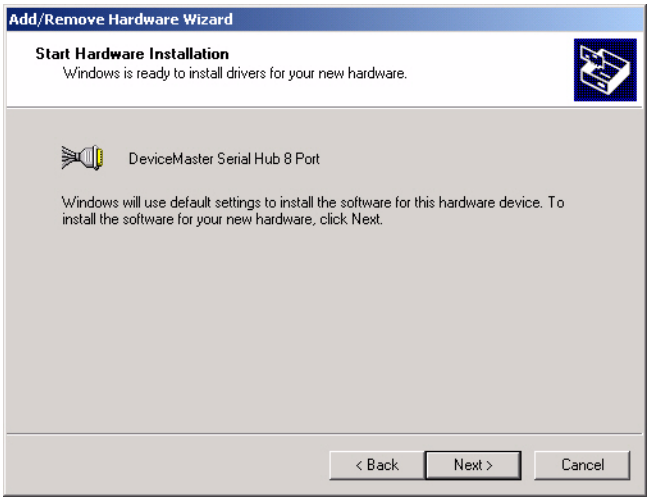


10. From the **Models** list, highlight the device you are installing and **Next**.

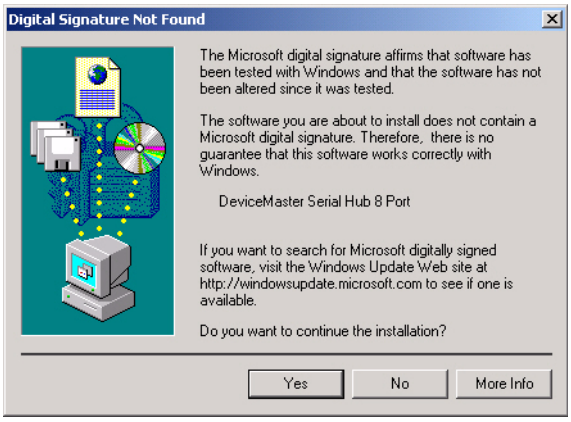


This example installs a DeviceMaster Serial Hub 8-port.

11. Select the **Next** button to start the driver installation.

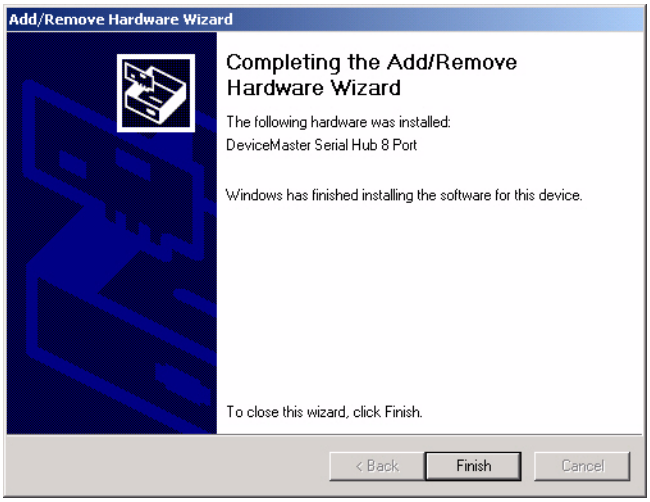


12. Select **Yes** to continue the installation.



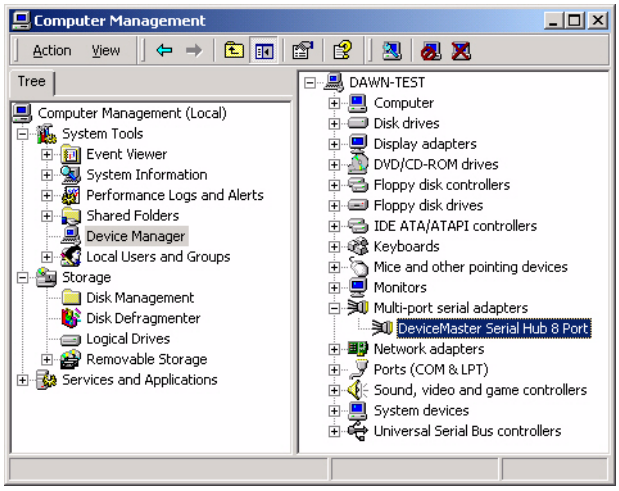
Note: *It may take up to several moments for Windows 2000 to load the driver for each port on the device. A* ***Found New Hardware*** *message will display for each port on the device.*

13. Select the **Finish** button to complete the driver installation process for this port.



14. Close the Control Panel.
15. Right-click **My Computer**, select **Manage**, and highlight **Device Manager**.

16. Expand the **Multi-port serial adapters** entry, right-click on the device you are installing, and select the **Properties** menu item.



Note: *If this is the first device you are installing, the **Device** screen will load over the **Properties** screen.*

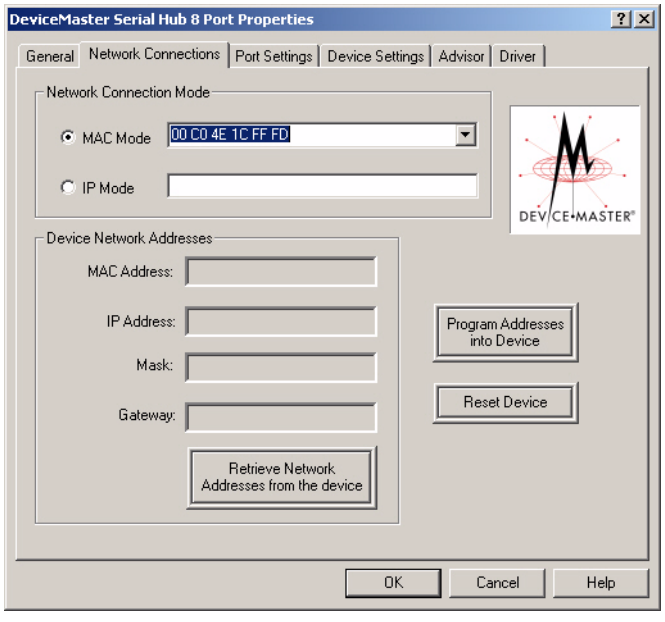
17. Select **MAC Mode** or **IP Mode** on the **Network Connections** tab and follow the appropriate procedure below.

    To configure an IP address or DHCP usage for the device, you must associate a MAC address to the device before you can change the IP address. If you do not associate the MAC address to the device, you will not be able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

    Note: *See IP or MAC Addressing Issues on Page 10 for additional information about IP and MAC modes. You can use the help system with the driver for information about this screen or see Network Connections Tab on Page 73.*

MAC Mode

To use **MAC Mode** you must connect the device to the local network segment or a NIC on the host system.



If you do not associate the MAC address to the device, you will not be able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

a. Enter the address from the MAC address label on the device or select the MAC address from the droplist.

   If you enter the MAC address, make sure that you use the correct format: **00 C0 4E xx xx xx**. A space must separate each pair of digits.

Note: *The MAC address does not appear in the droplist, if the device is on another network segment. In this case, you must manually enter the MAC address.*

b. Select **OK** to program the driver with the MAC address of the device. You must close the **Device Properties** page before you can program a different IP address into the device.

To program the device for use with an IP address, go to the *Programming the IP Address* on Page 52. To configure NS-Link in MAC mode to run efficiently, go to *Disabling DHCP Requests (MAC Mode)* on Page 55.

IP Mode

You can select **IP Mode** if the address in the device has been programmed with a suitable IP address for your network. If you do not associate the MAC address with the device, you will not able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

a. Select **IP Mode**.

b. Enter the IP address of the device.

18. If you are done configuring the device, close the *Device Manager*.

You can use the following information, if you require further installation information:

- To configure advanced COM port properties, see *COM Port Configuration* on Page 61.
- Connect your serial devices to the Comtrol device. If you need information about connecting your serial devices, see *Locating the User Guide or Hardware Installation Guide* on Page 8 for your product.
- To set up modems or printers see your operating system help system.

DeviceMaster Family: If you want to configure any of the ports as sockets:

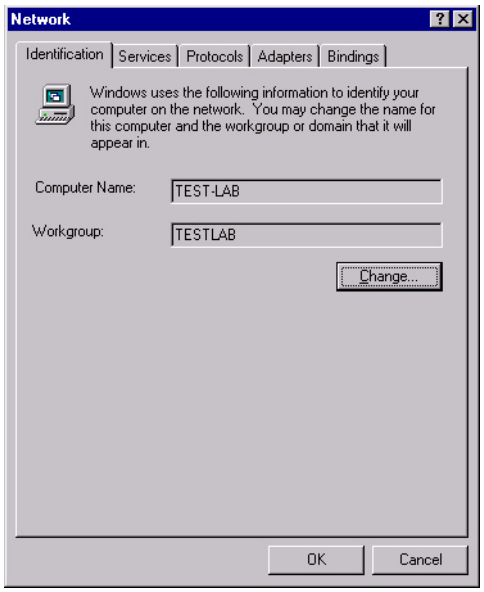
1. Enter the IP address of the device in your web browser URL field.
2. Select the port number that you want to configure as a socket.

Note: *See Locating the User Guide or Hardware Installation Guide on Page 8, if you need help configuring sockets.*

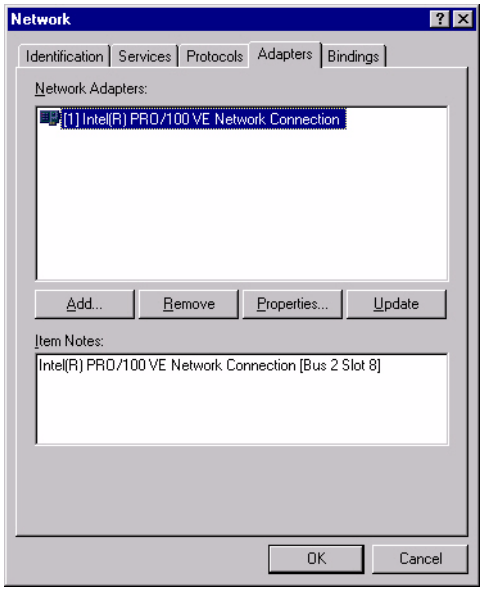
Windows NT: NS-Link Installation

Use this procedure to install and configure the NS-Link device driver for your Comtrol device.

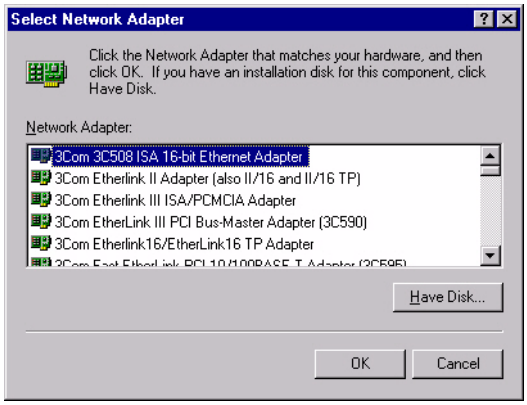
1. If necessary, unzip the self-extracting files from the Comtrol media or ftp/web site. See *Locating NS-Link Software* on Page 8, if you need to locate the device driver.
2. Right-click on the **Network Neighborhood**, and select **Properties**.



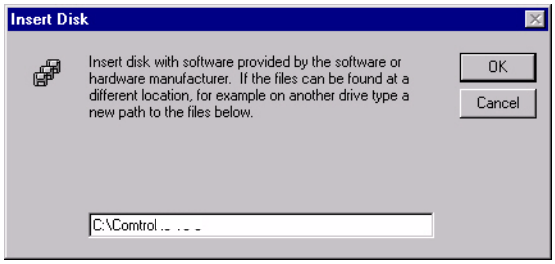
3. Select the **Adapters** tab and then the **Add** button.



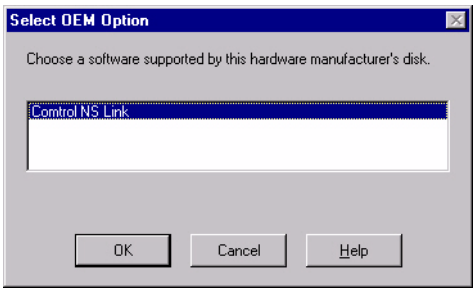
4. Select the **Have Disk** button.



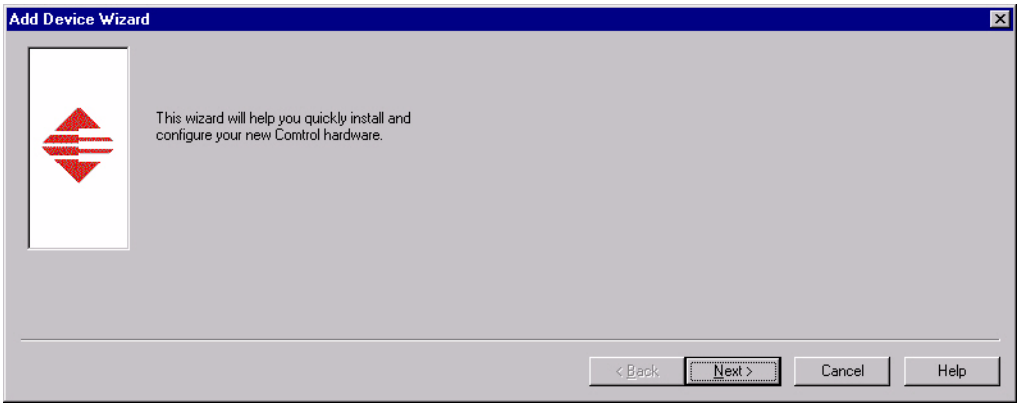
5. Enter the drive and directory path to the unzipped installation files and select the **OK** button. For example, if you extracted NS-Link to a subdirectory named comtrol, enter: **c:\comtrol**



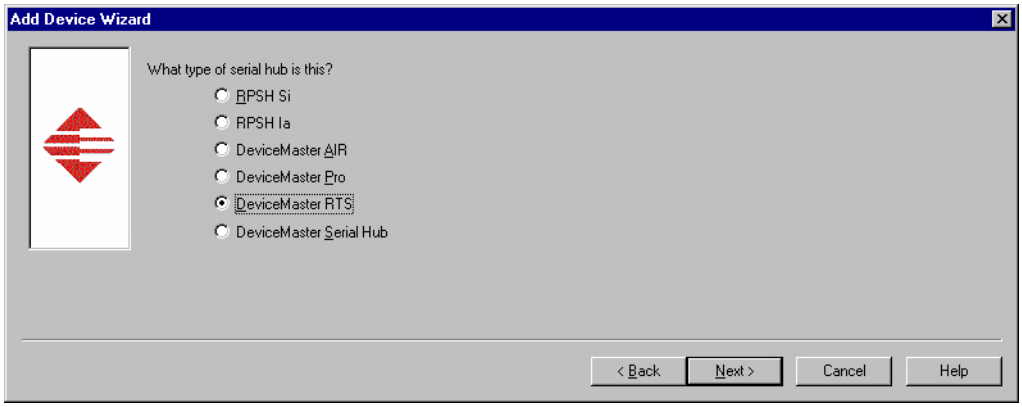
6. Select the **OK** button when the selection box appears with **Comtrol NS-Link** highlighted.



7. Select the **Next** button when the *Add Device Wizard* appears:

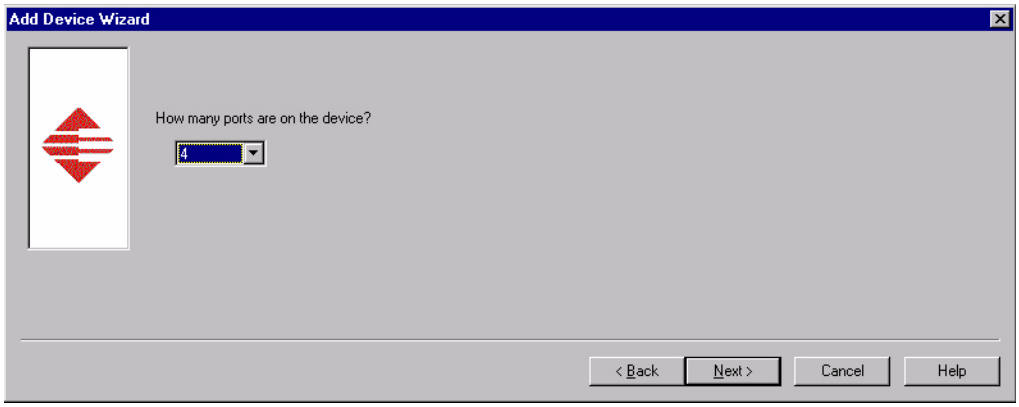


8. Select the Comtrol device you are installing.



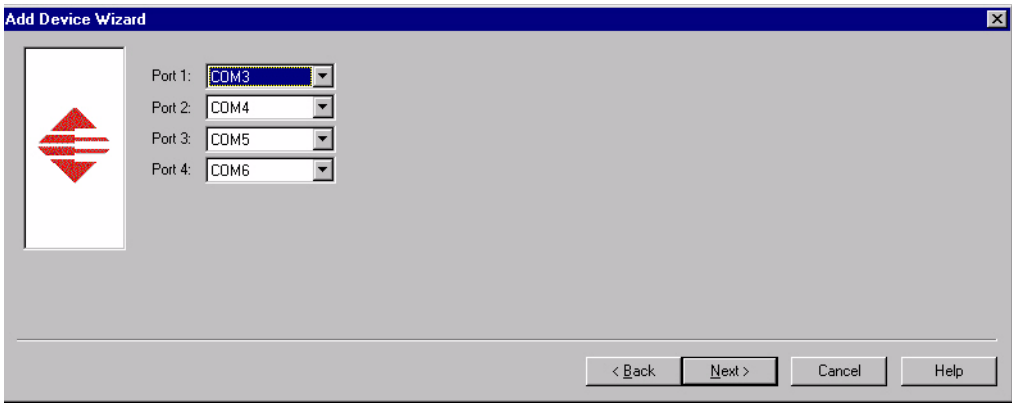
This example shows an installation for a DeviceMaster RTS4.

9. If queried, select the number of ports on this Comtrol device.



10. Select the COM port number for each port you plan to use on this system, if you do not want to allow access to a specific port for this system, scroll up to **Not configured**. When configuring ports among several systems, they can share the same COM port name or be assigned a unique COM port name on each system.

    See *Using the Port Sharing Feature* on Page 10 for an overview about port sharing.



This window is dependent on the number of ports.

11. Select **MAC** or **IP**, depending upon how you want to use the device and the **Next** button.

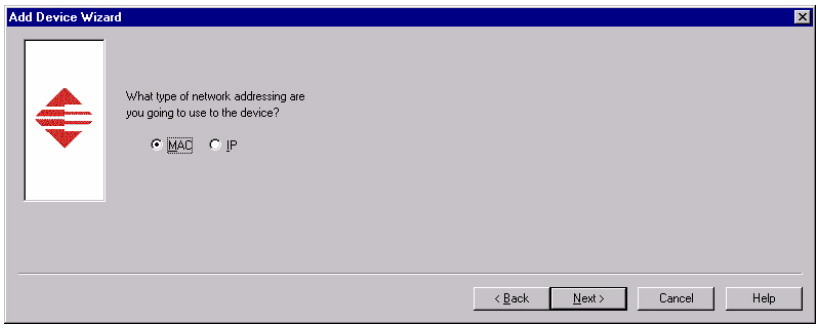
    To configure an IP address or DHCP usage for the device, you must associate a MAC address to the device before you can change the IP address. If you do not associate the MAC address to the device, you will not be able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the **Advisor** tab.

    Note: *See IP or MAC Addressing Issues on Page 10 for additional information about IP and MAC modes.*

    MAC Mode

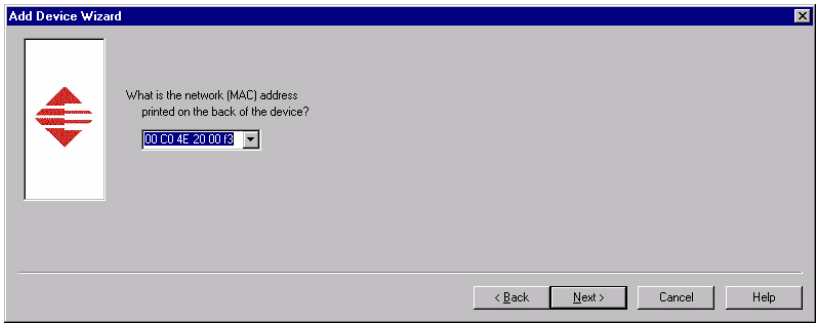
    To use **MAC Mode** you must connect the device to the local network segment or a NIC on the host system.

    a. Select **MAC**.



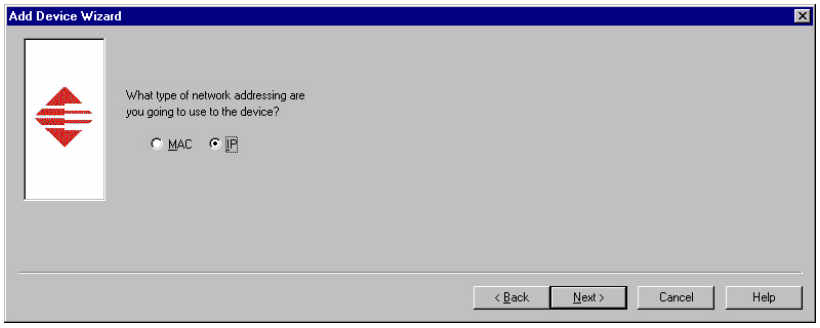
    Note: *When entering the MAC address, make sure that you use the correct format:* **00 C0 4E xx xx xx**. *A space must separate each pair of digits.*

    b. Enter the address from the MAC address label on the device. The MAC address of the first device installed must be manually entered. In subsequent device installations, the MAC address of all DeviceMaster or RocketPort Serial Hub ia or Si units will display in the droplist and can be selected.



    c. Go to Step 12 to continue.

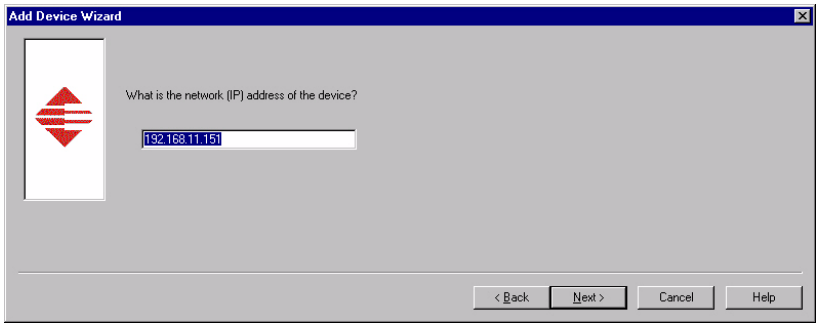
IP Mode



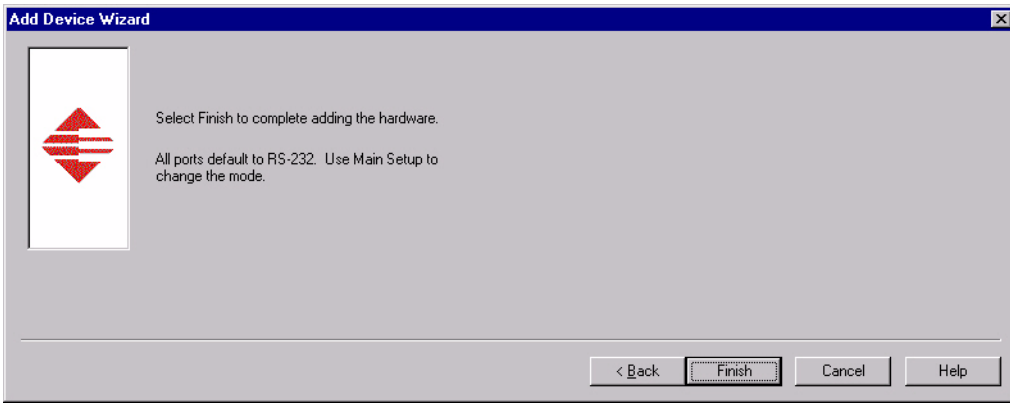
a. You can select **IP** mode if the address in the device has been programmed with a suitable IP address for your network.

Note: *If you do not associate the MAC address with the device, you will not able to change the IP address, disable DHCP discovery messages, retrieve device network information, reset the device, or use the* **Advisor** *tab.*

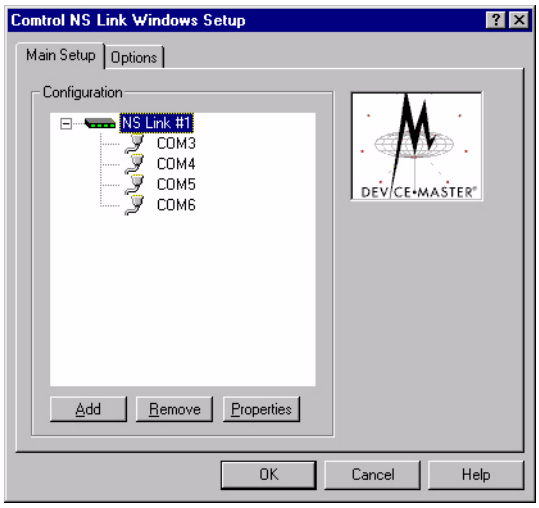
b. Enter the IP address of the device. The default address for the DeviceMaster family is 192.168.250.250 and the default value is set to 0.0.0.0 for other Comtrol devices.



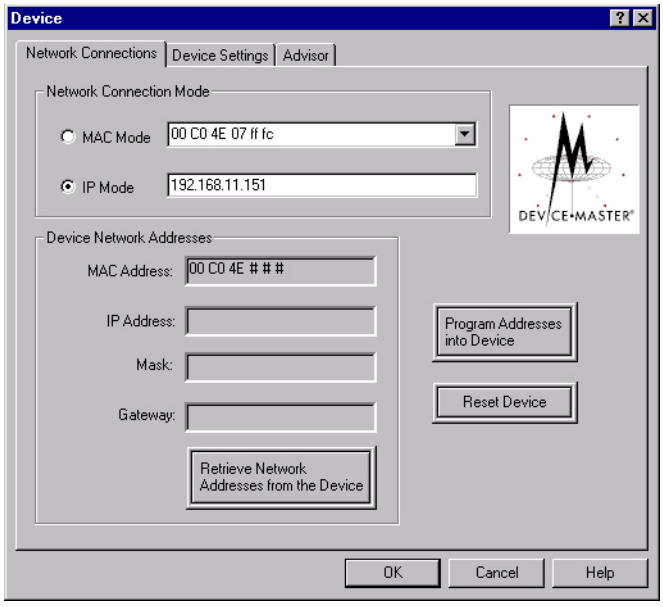
12. Select the **Finish** button when the following window appears:



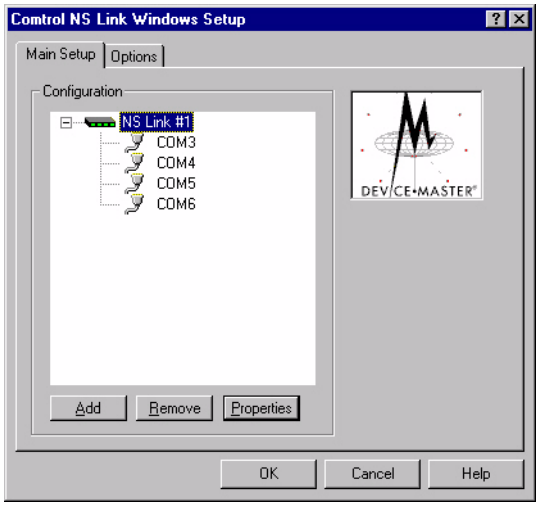
13. When the **Main Setup** window appears, highlight the device and select the **Properties** button.



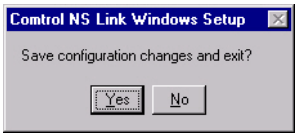
14. Verify that the MAC address and/or IP address is correct in the *Network Connections Mode* group, and select **OK**. If you entered an IP address on the initial installation, enter the MAC address.



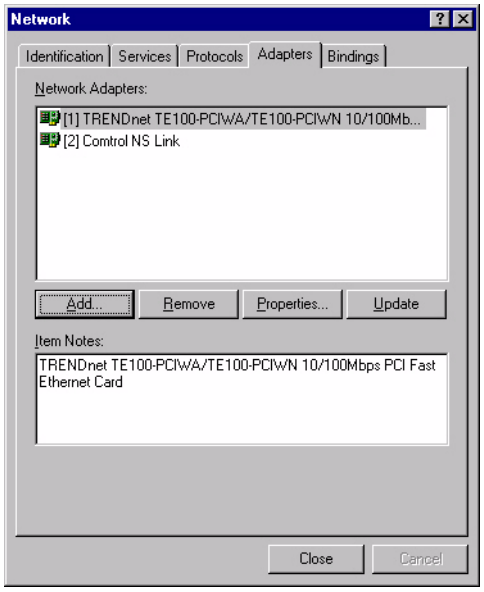
15. Select **OK** to close the *Main Setup* window.



16. Select **Yes** to save the configuration.
17. Select **OK** to restart the system.

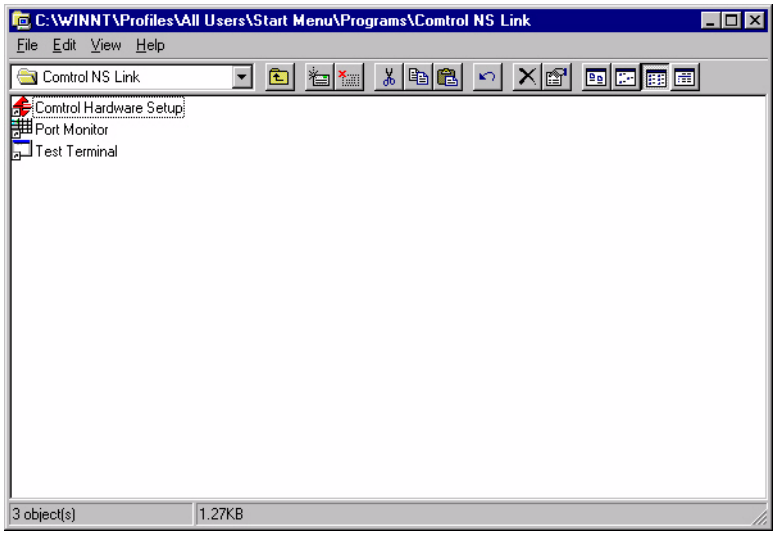


18. Select **Close**.



Note: *A few moments will be required for the system to complete the network binding.*

19. Close the Comtrol NS-Link program group.



20. Select **Yes** to restart the computer.

After rebooting, you can go to the appropriate subsection to complete any further configuration that is required for your site.

- To configure an IP address in the device, go to *Programming the IP Address* on Page 52.
- To configure NS-Link in MAC mode to run efficiently, go to *Disabling DHCP Requests (MAC Mode)* on Page 55.
- To configure COM port properties, go to *COM Port Configuration* on Page 61.

DeviceMaster Family: If you want to configure any of the ports as sockets:

1. Enter the IP address of the device in your web browser URL field.
2. Select the port number that you want to configure as a socket.

Note: *See Locating the User Guide or Hardware Installation Guide on Page 8, if you need help configuring sockets.*

Updating, Adding, or Removing NS-Link Devices

This section discusses how to

- Update existing installations
- Add additional NS-Link devices to an existing installation
- Remove devices
- Remove or disable the NS-Link driver

Note: *See the User Guide or Hardware Installation document for your product if you want to swap one NS-Link device for another NS-Link device. See* *Locating the User Guide or Hardware Installation Guide on Page 8.*

Updating an Existing Driver

Use the appropriate procedure for your operating system.

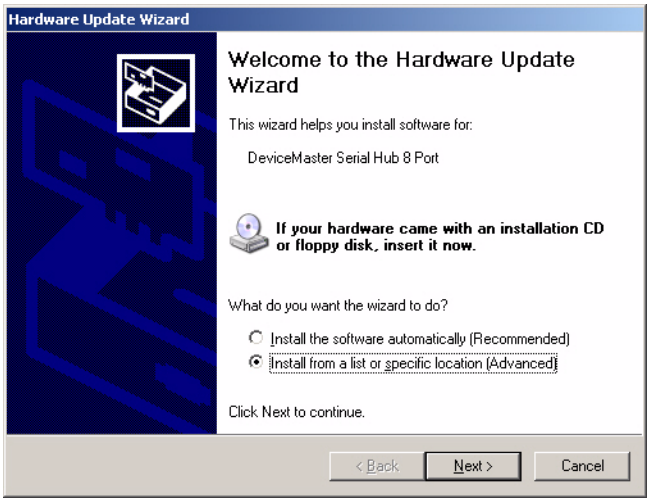
Windows NT

NS-Link drivers for Windows NT should not be updated but first removed and then installed. See the *Removing an Existing Driver* subsection for *Windows NT* on Page 48.

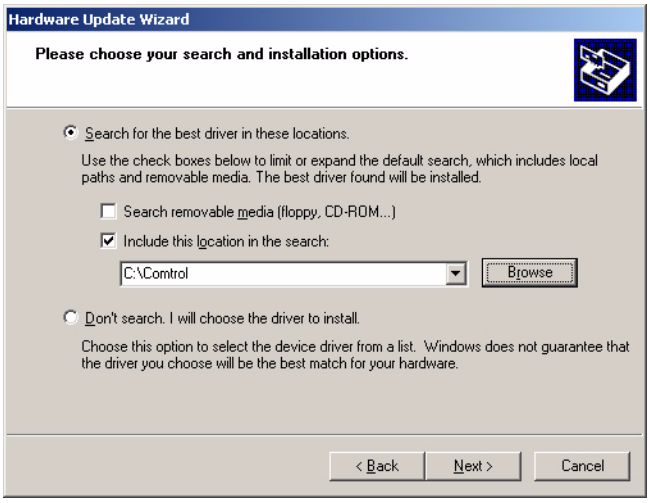
Windows XP and Windows Server 2003

Use the following procedure to update an existing NS-Link driver for the Windows XP and Windows Server operating systems.

1. If necessary, unzip the self-extracting files from the Comtrol media or ftp/web site. See *Locating NS-Link Software* on Page 8, if you need to locate the device driver.
2. Right-click **My Computer**, select **Manage**, and highlight **Device Manager**, expand the **Multi-port serial adapters** selection, right-click the device for which you want to update the driver, and select **Update Driver**.
3. Select **Install from a list or specific location (Advanced)** and **Next**.



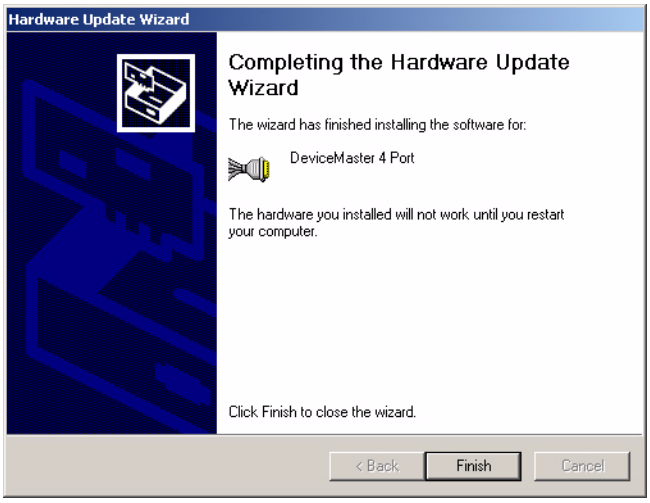
4. Select **Search for the best driver in these locations**, check **Include this location in the search**, use the **Browse** button to locate the unzipped driver assembly, and select **Next**.



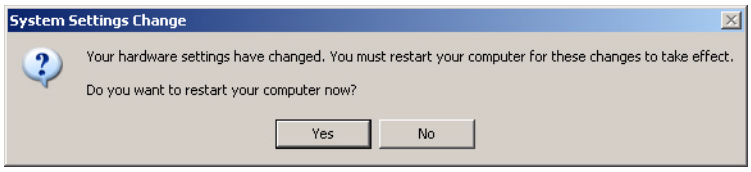
Note: *When you browse to the directory containing the NS-Link files, you do not need to select a specific file. The driver automatically selects the appropriate file.*

5. Select **Continue Anyway**.

6. Select **Finish**.



7. Select **Yes** to restart the system.

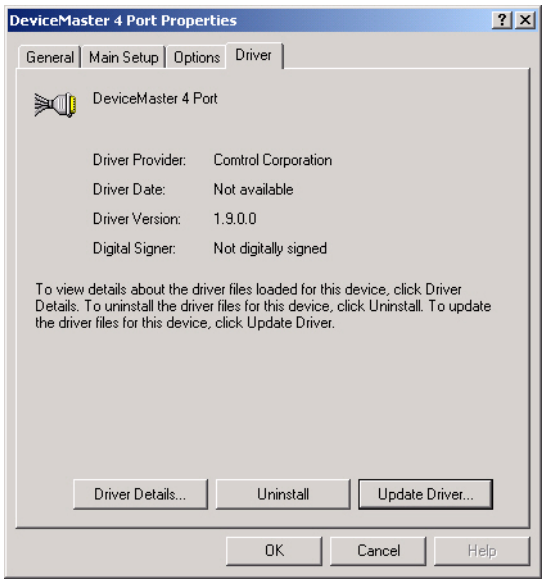


Note: *Make sure that you reboot the Comtrol device after rebooting your host PC.*

Windows 2000

Use the following procedure to update an existing NS-Link driver for the Windows 2000 operating system.

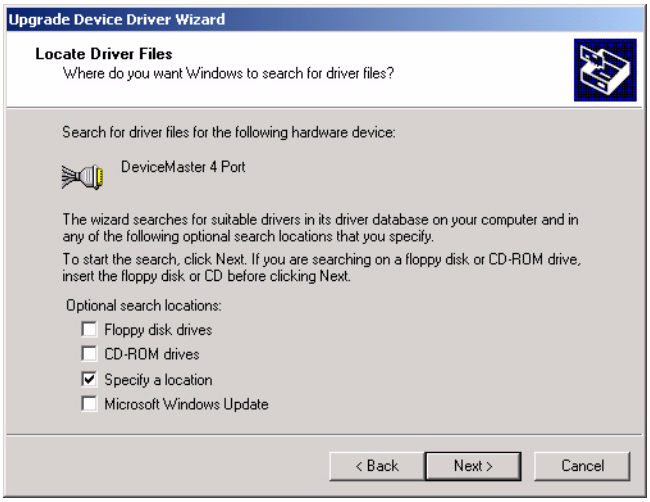
1. If necessary, unzip the self-extracting files from the Comtrol media or ftp/web site. See *Locating NS-Link Software* on Page 8, if you need to locate the device driver.
2. Right-click **My Computer**, select **Manage**, and highlight **Device Manager**.
3. Expand the **Multi-port serial adapters** selection, right-click the device for which you want to update the driver, and select **Properties**.
4. Select the **Driver** tab and the **Update Driver...** button.



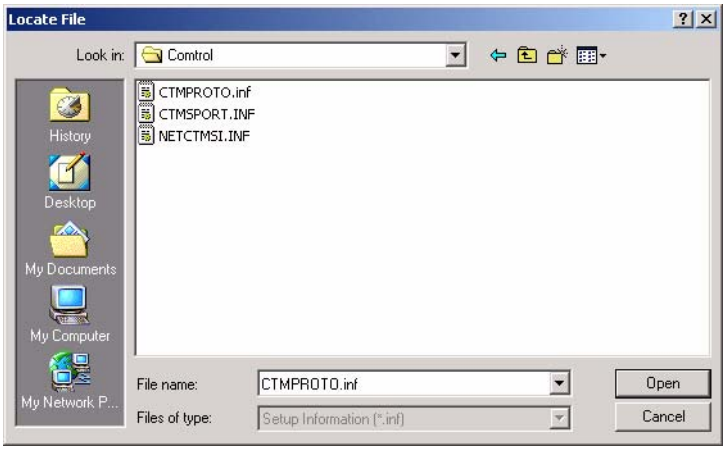
5. Select **Next** when the *Update Device Driver* wizard appears.

6. Select **Search for a suitable driver for my device (recommended)** and **Next**.

7. Select **Specify a location** and **Next**.

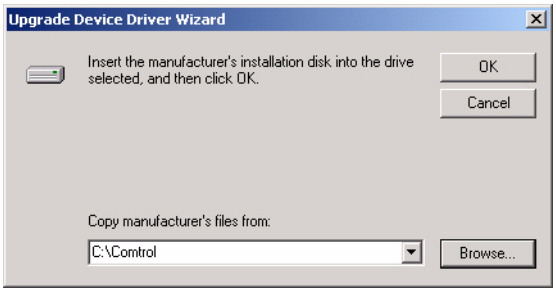


8. Use the **Browse** button to locate the driver update and select **Open**.

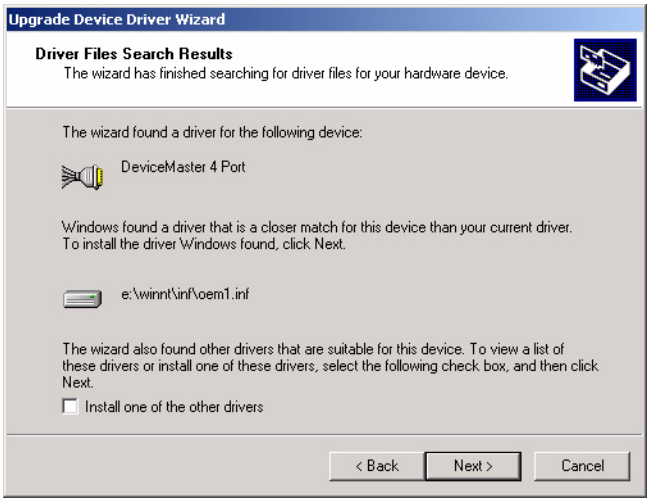


*It is not necessary to select a file, just browse to the directory and select **Open**.*

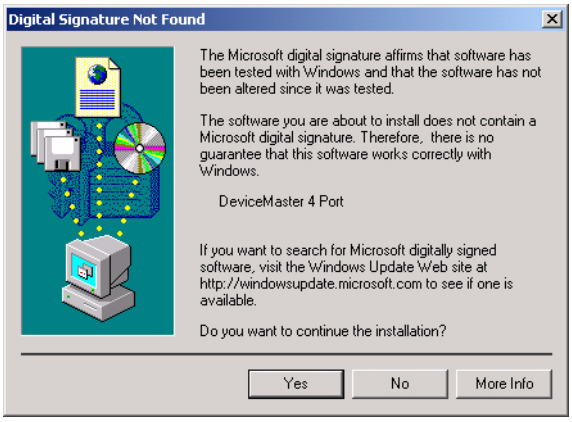
9. Select **OK**.



10. Select **Next**.

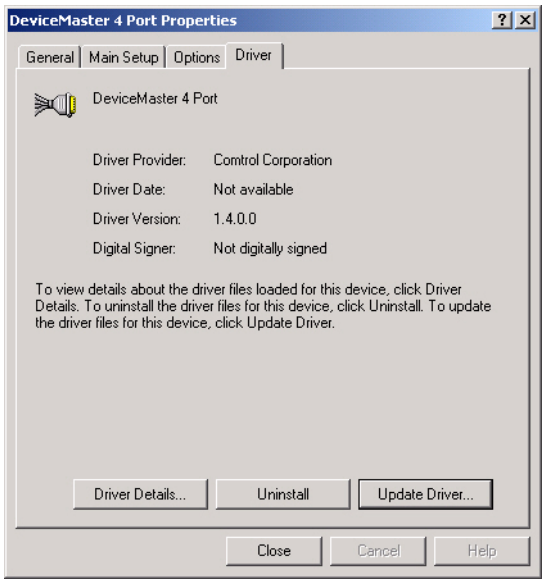


11. Select **Yes** to install the driver.

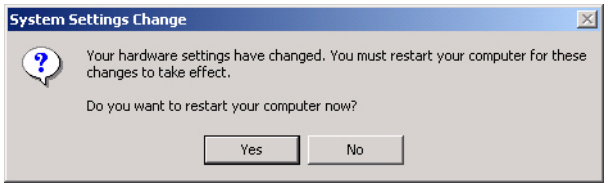


12. Select **Finish**.

13. Close the **Properties** page.



14. Select **Yes** to reboot the system.



Note: *Make sure that you reboot the Comtrol device after rebooting your host PC.*

Adding Additional Devices

Use the appropriate discussion for your environment.

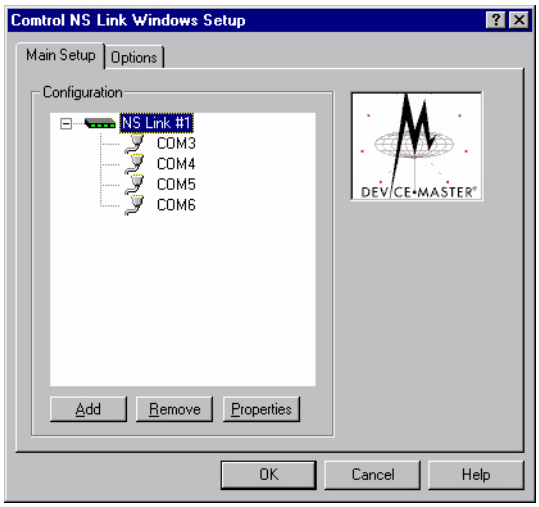
Windows 2000, Windows XP, and Windows Server 2003

Install the device and configure the ports using the same procedures reference in *Initial NS-Link Installation* on Page 15.

Windows NT

Use the following procedure to add more NS-Link Comtrol devices to an existing installation.

1. Connect the new device to the network and power it up.
2. Make sure that the device passes the power-on LED diagnostics.
3. Select the **Programs/Comtrol NS-Link/Comtrol Hardware Setup** option from the **Start** button.
4. Select the **Add** button.



5. For help with the remainder of the setup, start with Step 7 in the *Windows NT: NS-Link Installation* subsection on Page 32.
6. Reboot the system so that the new device initializes.

Removing Devices

Windows 2000, Windows XP, and Windows Server 2003

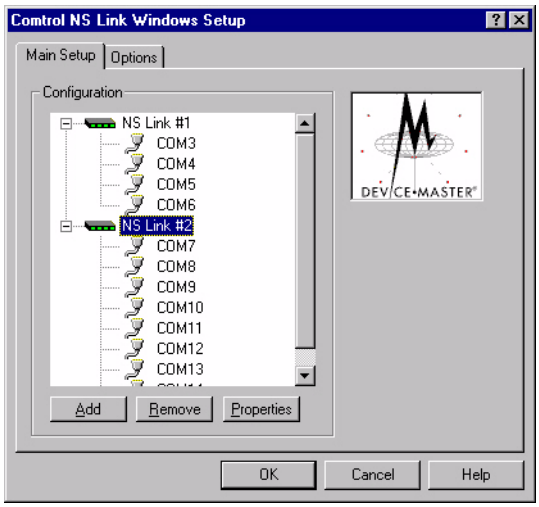
Use *Removing an Existing Driver* on Page 48 to remove each device from the system. When the last device is removed, the driver is also removed.

Windows NT

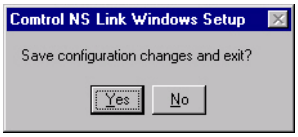
Use the following procedure to remove NS-Link devices in a multiple device environment. With the following procedure you can remove all NS-Link devices except for the last device. To remove the last device, follow the procedure in *Windows NT*: *Removing an Existing Driver* on Page 48.

If you have a single NS-Link that you want to remove, follow the procedure in *Windows NT*: *Removing an Existing Driver* on Page 48.

1. If necessary, access the **Main Setup** tab for the device (**Programs/Comtrol NS-Link/Comtrol Hardware Setup** option from the **Start** button).
2. Highlight the device that you want to remove and select the **Remove** button.



3. Select **OK** to close the Main Setup window.
4. Select **Yes** to save the configuration changes.



5. Close the **Network** control panel and restart your system so that the changes take affect.

Note: *If you attempt to remove the last device in the Main Setup window, you will receive the following error message and the device is not removed.*

Removing an Existing Driver

Use the appropriate procedure for your environment.

Windows 2000, Windows XP, and Windows Server 2003

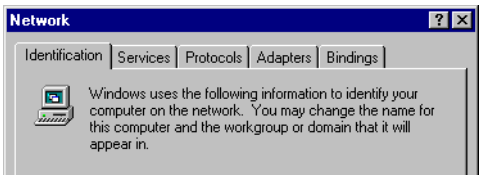
Use the following procedure to remove any existing NS-Link device driver for the Windows Server 2003, Windows XP, or Windows 2000 operating systems.

1. From the **Start** button, right-click on **My Computer**, and select **Manage** from the shortcut menu.
2. In the **Tree** panel of the Computer Management window, highlight **Device Manager**.
3. Expand the **Multi-port serial adapters** entry to view the list.
4. Right-click on the device you want to remove and select the **Uninstall** menu item.
5. Select **OK** at the *Confirm Device Removal* popup.
6. Close the *Device Manager* window and resume normal operations.

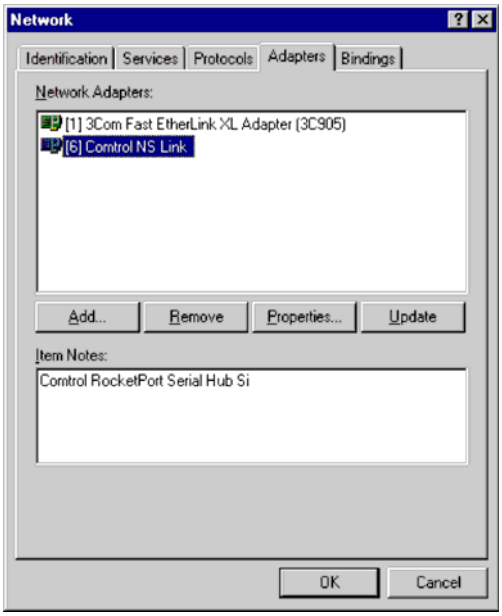
Note: *This procedure only discusses a single device installation. If there are other NS-Link devices, the driver remains and stays running.*

Windows NT

Use the following procedure to remove the existing Windows NT driver. If updating (not reconfiguring) NS-Link for Windows NT, make sure that you remove the existing version before installing an updated driver.



1. Right-click on the **Network Neighborhood**, and select **Properties**.
2. Select the **Adapters** tab.
3. Highlight **Comtrol NS-Link** and select the **Remove** button.
4. Select **Yes** to the warning that notifies you that this will permanently remove the driver.
5. Select the **Close** button. Several messages display as the system updates.
6. Select the **Yes** option to shut down and restart the system, so that your changes take effect.



Device Configuration

If you are installing the NS-Link device for the first time, use the appropriate procedure in the *Initial NS-Link Installation* section starting on Page 15 to first configure NS-Link with an IP or MAC address.

Use this section to configure network information or change the default configuration. This section contains the following procedures.

- *Associating the MAC Address*
- *Programming the IP Address*
- *Disabling DHCP Requests (MAC Mode)* on Page 55
- *Retrieving IP Address Information from the Device* on Page 57
- *Changing Device Properties* on Page 58

You may want to refer to *Using the Advisor* on Page 59, which may provide valuable information about the device and your network, in the event that you are having problems.

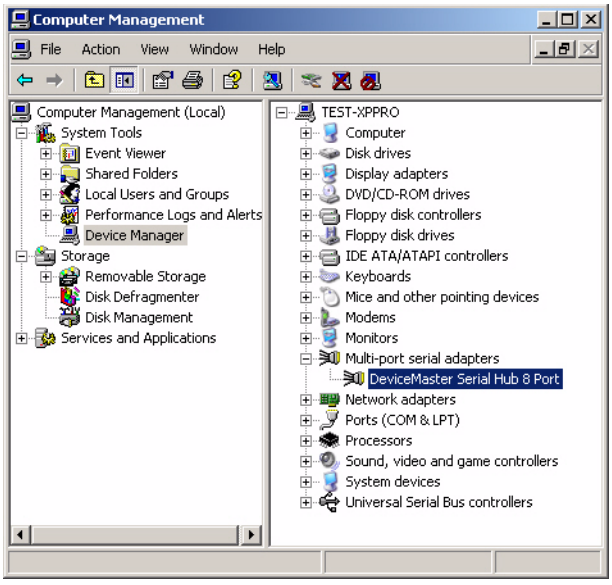
Accessing the Properties Page

Use the appropriate procedure for your operating system.

Windows 2000, Windows XP, and Windows Server 2003

To change device or COM port configuration, you need to access the **Properties** page for that device. You can use the following procedure to access the **Properties** page:

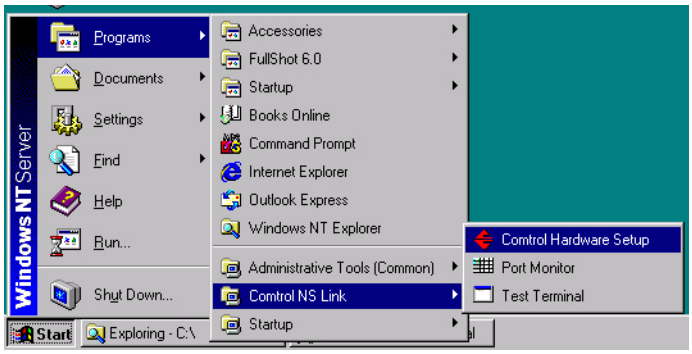
1. Right-click **My Computer**, select **Manage**, and highlight **Device Manager**.
2. Expand the **Multi-port serial adapters** entry, right-click on the device you are configuring, and select the **Properties** menu item.



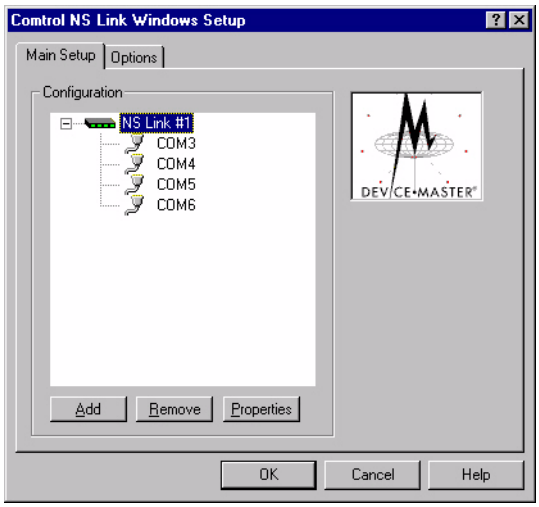
Windows NT

To change device or COM port configuration, you need to access the **Properties** page for that device. You can use the following procedure to access the **Properties** page:

1. From the **Start** button, select **Programs/Comtrol NS-Link/Comtrol Hardware Setup**.



2. With **NS-Link** highlighted in the **Main Setup** window, select the **Properties** button.



Associating the MAC Address

The device must be connected to the local network segment or directly to a NIC on the host system to operate in MAC mode.

If you do not associate the MAC address to the device, you will not be able to:

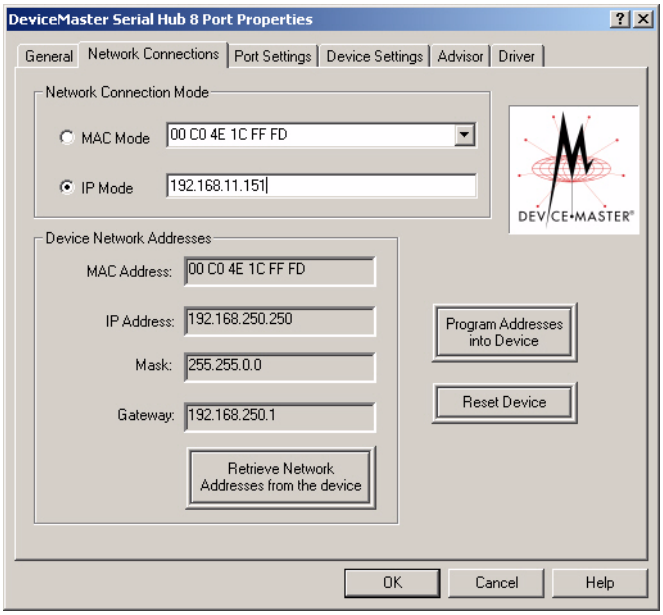
- Change the IP address
- Disable DHCP discovery messages
- Retrieve device network information
- Reset the device
- Use the **Advisor** tab

Use the following procedure to associate a MAC address to a device.

1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Select the **Network Connections** tab.
3. Enter the address from the MAC address label on the device or select the MAC address from the droplist.

   Note: *If you enter the MAC address, make sure that you use the correct format:* **00 C0 4E xx xx xx**. *A space must separate each pair of digits.*

4. Select **OK** to program the driver with the MAC address of the device. You must close the **Properties** page before you can program a different IP address into the device.
5. To program the device for use with an IP address, see *Programming the IP Address* on Page 52.
6. To configure NS-Link in MAC mode to run efficiently, see *Disabling DHCP Requests (MAC Mode)* on Page 55.



This screenshot shows a Windows 2000 installation. A Windows NT installation does not display the ***General****,* ***Port Settings****, and* ***Driver*** *tabs. Windows NT users must use the* ***Main Setup*** *tab to configure advanced COM port properties.*

Programming the IP Address

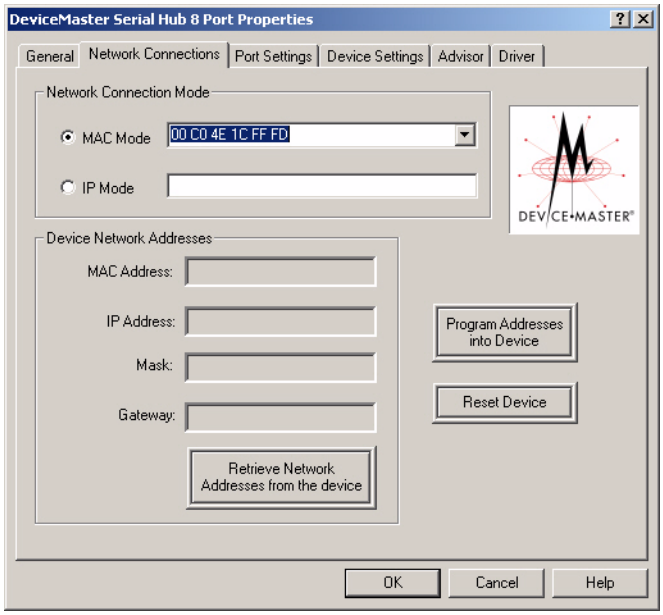
Use the following procedure to program an IP address or change the existing values or program the device for use with DHCP.

The DeviceMaster family default IP address is 192.168.250.250. The default value is set to 0.0.0.0 for other Comtrol devices.

See your System Administrator if you need to acquire a unique reserved (static) IP address for using DHCP. They will need the MAC address of the unit to provide you with a reserved (static) IP address.

Note: *To configure the device with an IP address or for use with DHCP, you must associate a MAC address to the device before you can change the IP address. If necessary, see Associating the MAC Address on Page 51.*

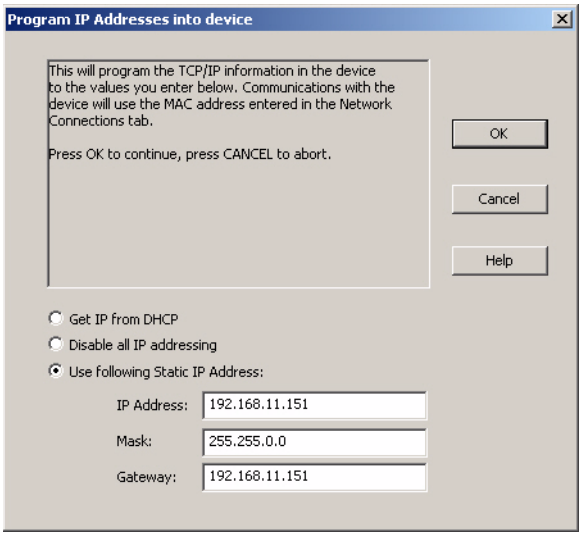
1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Select the **Network Connections** tab.



3. Select the **Program Addresses into Device** button.

   Note: *You must have a MAC address associated with the device.*

4. Select either **Get IP from DHCP** or the **Use following Static IP Address** option, depending on the type of IP address you want to program into the device.

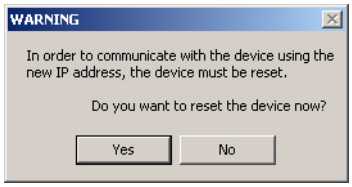


This example shows programming a static IP address.

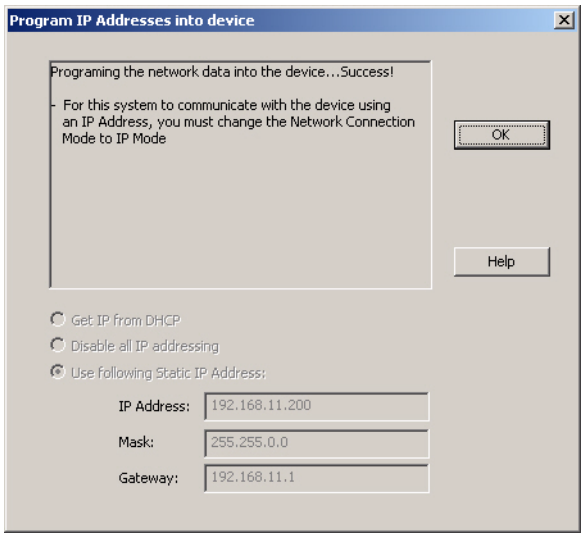
5. If you selected the **Use following Static IP Address** option, enter the appropriate IP address, subnet mask, and default gateway values for your network.
6. Select **OK** to begin programming the device.
7. Select **Yes** to reset the device or **No** if you want to reset it later.

   Note: *The device will not use the new network settings until the device has been reset.*

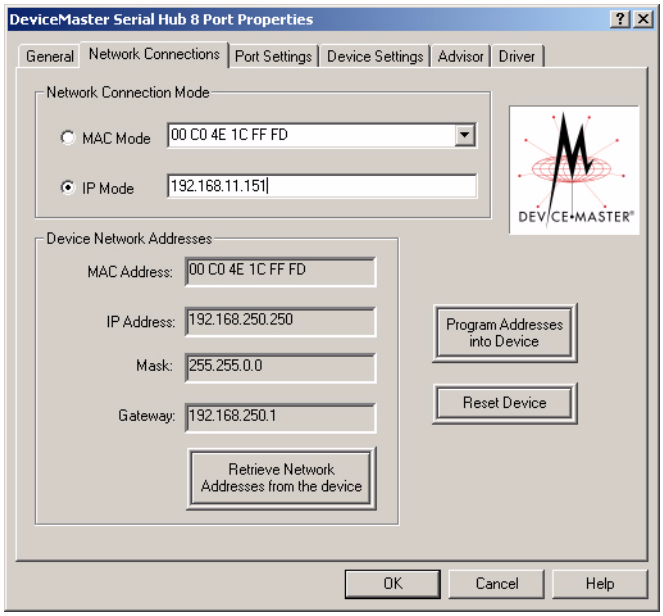
   The 10/100 Network LEDs on the device will cycle when the device reboots.



8. Select **OK** to close the *Program IP Addresses into Device* screen.



9. Select **IP Mode** in the *Network Connection Mode* group.



10. If you are done configuring the device, select **OK** and close the *Device Manager* or the *Network Property* page (depending on the operating system).

You can use the following information, if you require further installation information:

- To configure advanced COM port properties, see *Configuring Advanced COM Port Properties* on Page 64.
- Connect your serial devices to the Comtrol device. If you need information about connecting your serial devices, see *Locating the User Guide or Hardware Installation Guide* on Page 8 for your product.
- To set up modems or printers see your operating system help system or you can use the *RRAS Configuration Overview for Windows XP* or *Windows NT: Configuration Overview* on Page 87.

DeviceMaster Family: If you want to configure any of the ports as sockets:

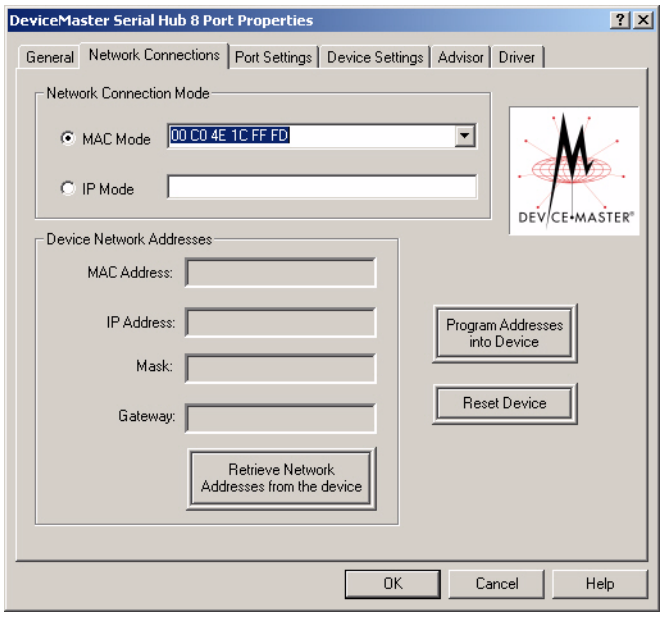
1. Enter the IP address of the device in your web browser URL field.
2. Select the port number that you want to configure as a socket.

   Note: *See Locating the User Guide or Hardware Installation Guide on Page 8, if you need help configuring sockets.*

Disabling DHCP Requests (MAC Mode)

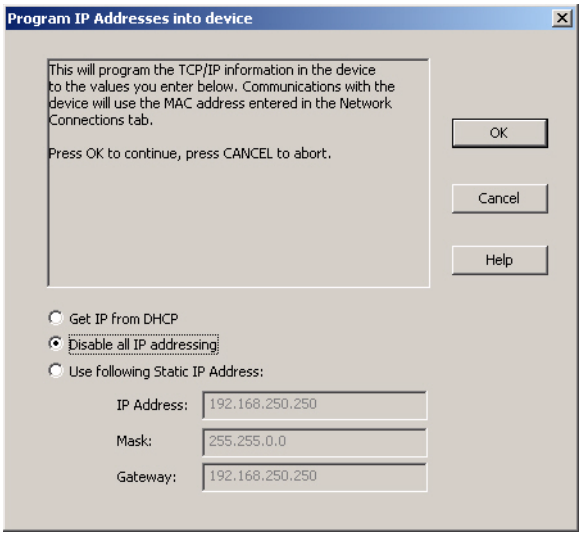
To disable the DHCP requests that are periodically sent from the device when running the device in MAC mode (not using a static IP address), use the following procedure:

1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Select the **Network Connections** tab and select the **Program Addresses into Device** button.

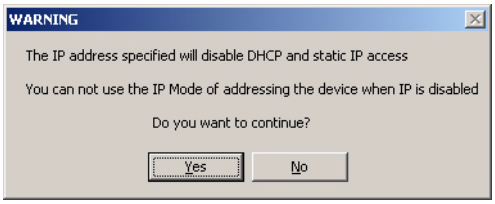


Note: *You must have a MAC address associated with the device.*

3. Select **Disable all IP Addressing** and **OK**.

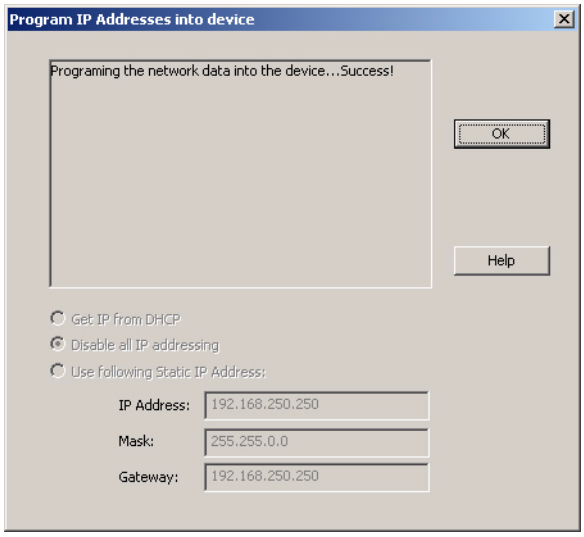


4. Select **Yes** to disable DHCP and static IP addressing.
5. Select **Yes** to reset the device.

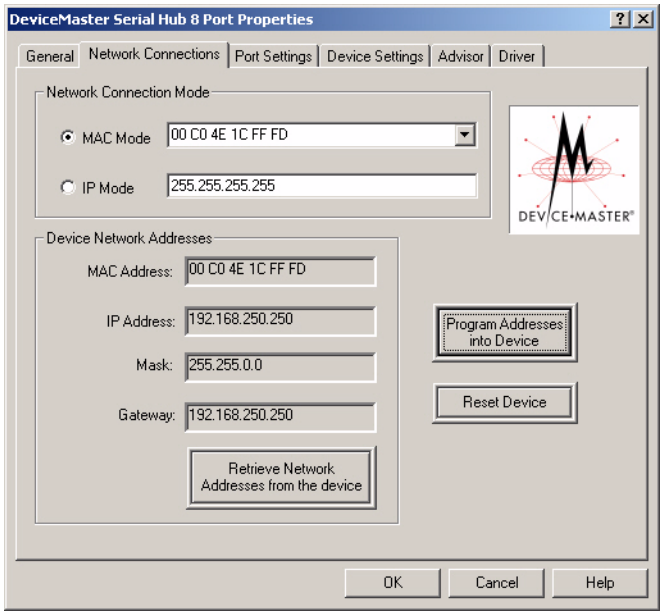


The 10/100 Network LEDs on the device will cycle when the device reboots.

6. Select **OK** to close the **Program IP Addresses into Device** window.



7. If you are done configuring the device, select **OK** and close the *Device Manager* or the *Network Property* page (depending on the operating system).



You can use the following information, if you require further installation information:

- To configure advanced COM port properties, see *Configuring Advanced COM Port Properties* on Page 64.
- Connect your serial devices to the Comtrol device. If you need information about connecting your serial devices, see *Locating the User Guide or Hardware Installation Guide* on Page 8 for your product.
- To set up modems or printers see your operating system help system or you can use the *RRAS Configuration Overview for Windows XP* or *Windows NT: Configuration Overview* on Page 87.

DeviceMaster Family: If you want to configure any of the ports as sockets:

1. Enter the IP address of the device in your web browser URL field.
2. Select the port number that you want to configure as a socket.

   Note: *See Locating the User Guide or Hardware Installation Guide on Page 8, if you need help configuring sockets.*

Retrieving IP Address Information from the Device

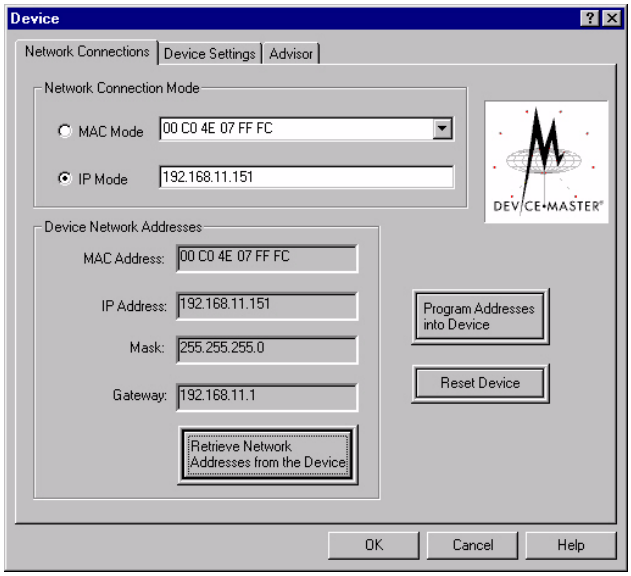
Use the following procedure if you want to find out what values are currently programmed into the device.

Note: *To retrieve network information on the device, you must associate a MAC address to the device before you can change the IP address. If necessary, see Associating the MAC Address on Page 51.*

1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Select the **Network Connections** tab.

   Note: *You must have a MAC address associated with the device.*
3. Select the **Retrieve Network Addresses from the device** button to check if the device has been programmed with IP address, gateway, and subnet mask values.

   Note: *The default address for the DeviceMaster family is 192.168.250.250. The default value is set to 0.0.0.0 for other Comtrol devices.*



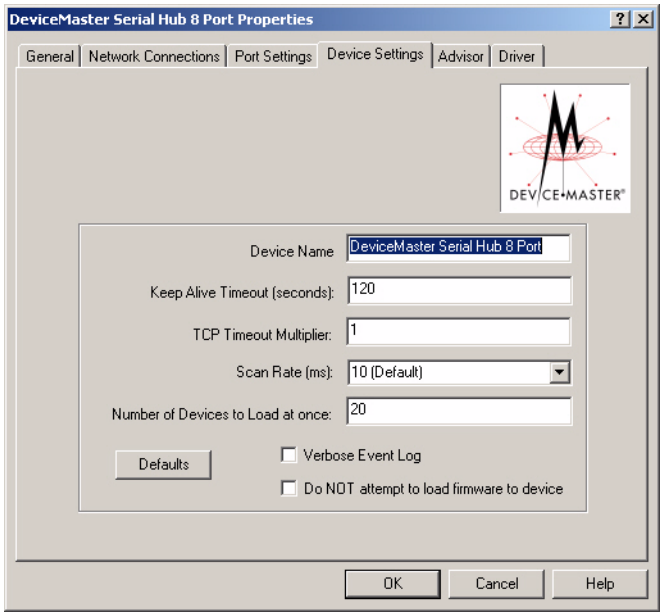
This screenshot shows the tabs on a Windows NT installation.

4. If necessary, go to *Programming the IP Address* on Page 52 or *Disabling DHCP Requests (MAC Mode)* on Page 55 if you need to change the existing network values.

Changing Device Properties

After installation and configuration, you may want to change device properties, such as the device name or configure the Keep Alive Time-out Period or the TCP Time-out Multiplier. Use the following to change these values.

1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Select the **Device Settings** tab.



3. Optionally, rename the NS-Link default name by entering a unique name in the **Name** field.
4. Optionally, set a different **Keep Alive Timeout Period.** You can set the amount of time in seconds that this device waits until it closes this connection and frees all the ports associated with it. For information about the Keep Alive feature see, *Keep Alive Timeout (seconds)* on Page 81.
5. Optionally, set the **TCP Timeout Multiplier** value. See *TCP Timeout Multiplier* on Page 82 for information about this feature.
6. Optionally, select a different **Scan Rate**. See *Scan Rate (ms)* on Page 82 for more information.
7. Optionally, change the **Number of Devices to Load at once**. See *Number of Devices to Load at Once* on Page 82 for more information.
8. Optionally, select **Verbose Event Log** if you want to log additional device information into the event log.
9. If necessary, select **Do NOT attempt to load firmware in device**. See *Do not attempt to load firmware to the device* on Page 83 for more information.
10. Select the **OK** button to close the *Device* window.
11. Close the *Device Manager* or the *Network Property* page (depending on the operating system).

Use the appropriate procedure for your environment.

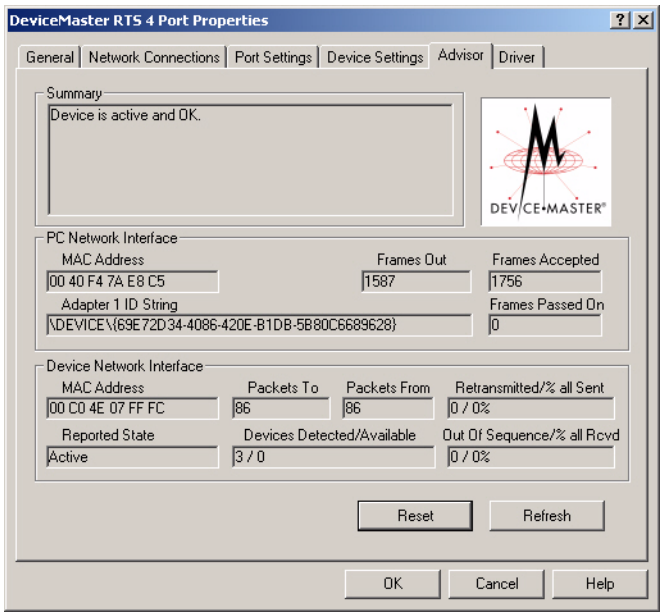
Using the Advisor

You can use the **Advisor** tab to get a summary of the device status. The **Advisor** tab can be useful for troubleshooting network problems with your device.

Note: *To use the **Advisor** tab, you must associate a MAC address to the device before you can change the IP address. If necessary, see* *Associating the MAC Address on Page 51.*

Use the following procedure to access the Device Advisor:

1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Select the **Advisor** tab.



Note: *You must have a MAC address associated with the device.*

See *Advisor Tab* on Page 83 for information about the **Advisor** tab fields and for a list of messages and meanings.

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COM Port Configuration

Use this subsection if you want to configure standard or advanced COM port properties. See the following subsection for standard COM port configuration and see *Configuring Advanced COM Port Properties* on Page 64.

To change the default communications mode on supported models from RS-232 to RS-422 or RS-485, see *Configuring Advanced COM Port Properties* on Page 64.

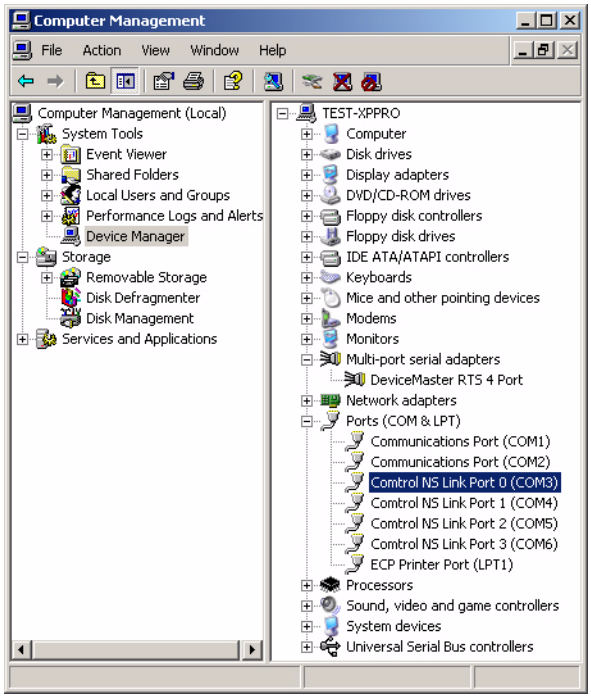
Configuring Standard COM Port Properties

Use the appropriate procedure for your operating system if your application does not set COM port properties. If the application sets COM port properties, those settings take precedence over the standard COM port settings. The exception to this guideline is if you use the *Override and Lock Baud Rate* advanced COM port setting (Page 64).

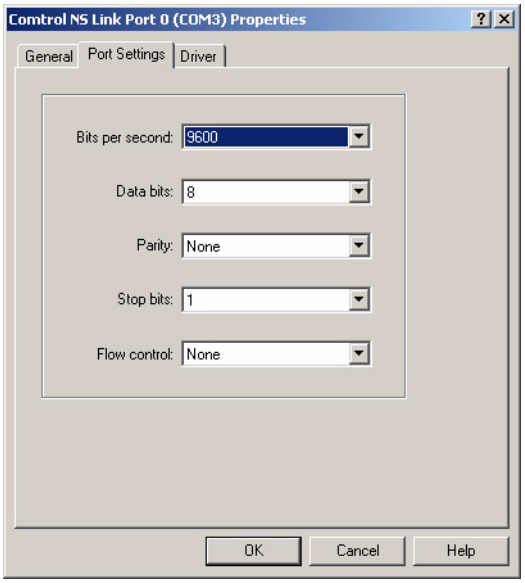
Windows 2000, Windows XP, and Windows Server 2003

Use the following information if you need assistance configuring standard COM port properties.

1. Right-click **My Computer**, select **Manage**, and highlight **Device Manager**.
2. Expand the **Ports (COM & LPT)** entry, right-click on the COM port you want to configure, and select the **Properties** menu item.



3. Select the **Port Settings** tab.



Note: *The Windows Server 2003 screen is slightly different and includes a* ***Restore Defaults*** *and* ***Advanced*** *button.*

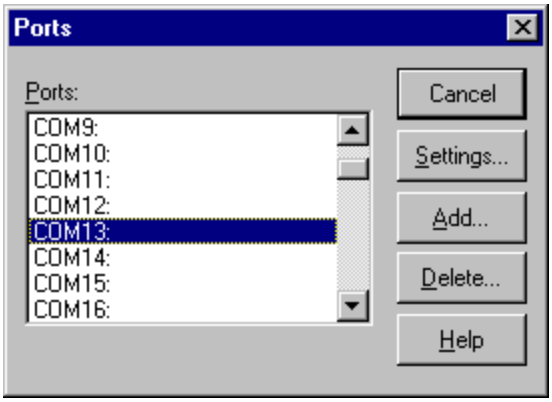
4. Make any necessary changes for the port.
5. Repeat Steps 2 through 4 for each port you want to configure port attributes.

Windows NT

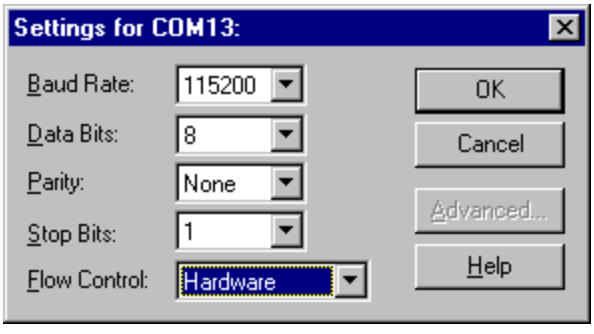
Use the following information if you need assistance configuring standard COM port properties.

1. From the **Start** button, open the **Ports** control panel.

2. Select the port that you want to configure.



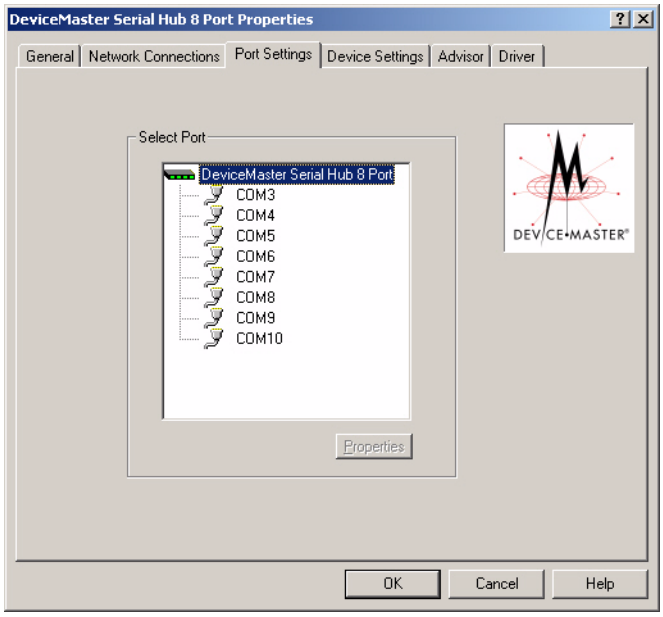
3. Make any necessary changes for the port.



Configuring Advanced COM Port Properties

Use this subsection to configure advanced COM port properties.

1. If necessary, access the **Properties** page or **Main Setup** tab (Windows NT) for the device (*Windows 2000, Windows XP, and Windows Server 2003* on Page 49 or *Windows NT* on Page 50).
2. Highlight the **COM port** that you want to configure and select **Properties**.



This screenshot shows the tabs on a Windows 2000 installation.

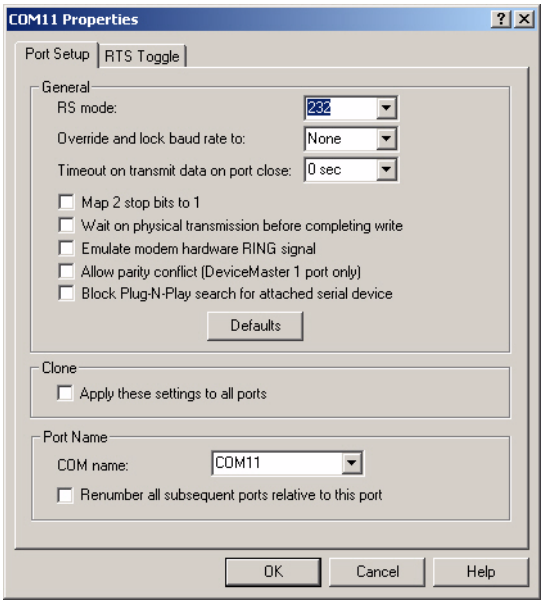
3. If applicable for your model, select the appropriate RS mode to match the communications mode of the peripheral that you are connecting to that particular COM port.
4. Optionally, make any necessary changes to fit your environment.

   Note: *Use the driver help system or refer to the Port Setup Tab subsection starting on Page 78.*

   a. Select a baud rate from the droplist or enter a baud rate value to access higher or lower rates than are normally permitted by your Windows applications.

   b. If applicable, set a time delay on the transmit data before a port closes.

   c. If applicable, select **Map 2 stop bits to 1**.



*The DeviceMaster Serial Hub only supports RS-232. The **RTS Toggle** tab only appears on products that support RS-485.*

d. If appropriate, select **Wait for physical transmission before completing write**.

e. If required, select **Emulate modem hardware ring signal**.

f. ***DeviceMaster 1-port, only***: if necessary, select **Allow parity conflict (DeviceMaster 1 port only)**. This option allows a parity conflict on a DeviceMaster 1-port. It may be necessary to use this option after you have determined that the cabling is correct and you are able to transmit data but not receive proper data.

g. Select the **Block Plug-N-Play search for attached serial device** option if you want to disable *Plug and Play* from searching for a device attached to the serial port.

h. If you want all ports on this device configured to the same settings, select **Clone**.

i. Change the COM port name of this port by selecting a new name in the **COM name** droplist. If you do not want to allow access to a specific port for this system, scroll up to **Not configured**. When configuring ports among several systems, they can share the same COM port name or be assigned a unique COM port name on each system.

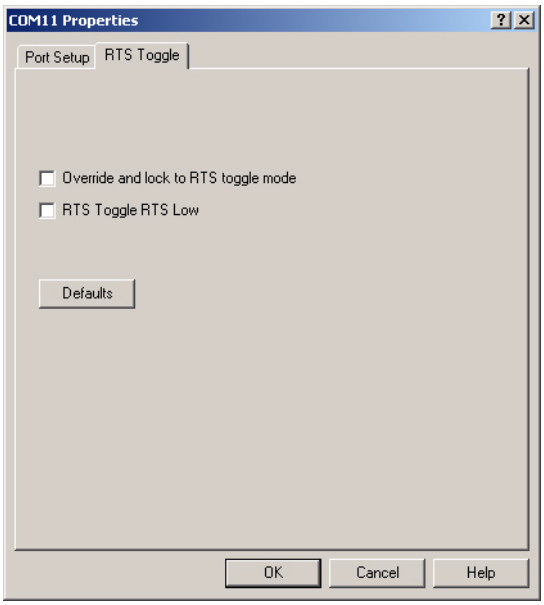
Note: *See Using the Port Sharing Feature on Page 10 for an overview about port sharing.*

j. To renumber all subsequent ports on the device relative to the port displayed in the COM name droplist, select **Renumber all subsequent ports relative to this port**.

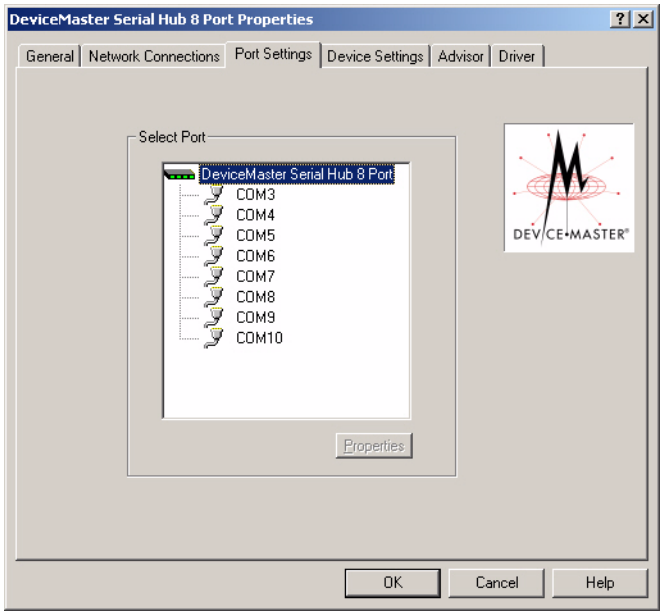
k. If you need to configure RTS (Request to Send) options for RS-485, select the **RTS Toggle** tab.

Configure the port and select **OK** after making the appropriate selections.

See *RTS Toggle Tab (Excludes RS-232 Only, Devices)* on Page 80 for more information.



5. After configuring your port (COM) properties, select the **OK** button. The **Port Settings** tab returns.
6. If you did not clone all the COM ports, repeat Steps 2 through 5 until all of the COM ports that you want to use are configured.
7. Select the **OK** button after you have configured each port.
8. Close the *Device Manager* or the *Network Property* page (depending on the operating system).



Troubleshooting and Technical Support

This section contains troubleshooting information for your Comtrol device. You should review the following subsections before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

- Troubleshooting checklist
- *General Troubleshooting* on Page 69
- *NS-Link Driver Troubleshooting* on Page 70

If you cannot diagnose the problem, you can contact *Technical Support* on Page 71.

How to Find Comtrol Diagnostic Tools and Utilities

There are several tools and utilities that Comtrol provides to diagnose serial port problems or to monitor data.

- The **Test Terminal** program can be used to troubleshoot communications on a port-by-port basis.
- The **Port Monitor** program can check for errors, modem control, and status signals. In addition, it provides you with raw byte input and output counts.
- The **Peer Tracer** program can trace driver events.
- The **FreePort** program can free a specified port.
- The **PortVision** program is available for DeviceMaster users using a Windows 2000, Windows XP, or Windows Server 2003 system. PortVision provides the following features:
  - Auto-discover and organize DeviceMaster servers on your network.
  - Remotely access, manage, and configure DeviceMaster units from a central console.
  - Load network configuration settings onto multiple devices - quickly and easily.
  - Instantly view connection status, firmware revision, and network settings of all servers.
  - Configure serial ports using TCP sockets, port communication, and interface settings.
  - Visualize each server and port with instant links to connector, power, and serial pinout information.
  - Conveniently customize and save your network view and commands for replication across all servers.
  - Includes the **Test Terminal** and **Port Monitor** programs for easy access.

  Note: *DeviceMaster users can also install the Comtrol Utilities package if you need the Peer Tracer or FreePort applications.*

To locate the applications and procedures for using the applications, refer to the discussion for your operating system.

Windows NT

The applications are automatically installed during the NS-Link for Windows NT driver installation. See *Windows NT: Comtrol Tools* on Page 99 for information about using these applications.

Windows 2000, Windows XP, and Windows Server 2003

DeviceMaster users can install PortVision or the Comtrol Utilities package.

RocketPort Serial Hub ia and RocketPort Serial Hub *Si* users should install the Comtrol Utilities package.

You can download the latest version of the applications or use the *Comtrol Software and Documenation CD* that came with your product for installation.

- PortVision

  Note: *PortVision does not support the RocketPort Serial Hub ia or RocketPort Serial Hub* Si.

- Comtrol Utilities package

Note: *Use the installation wizard to install either application and the help system if you need assistance using any utility. You can refer to Using FreePort on Page 109 for information about using FreePort.*

Troubleshooting Checklist

The following checklist may help you diagnose your problem:

- Verify that you are using the correct types of cables on the correct connectors and that all cables are connected securely using the hardware documentation.
- Most customer problems reported to Comtrol Technical Support are eventually traced to cabling or network problems.
- Isolate the unit from the network by connecting the device directly to a NIC in a host system. See *Connectivity Requirements* on Page 9 for cabling information.
- Reduce network traffic by installing a second NIC in the host and connect directly to the device.
- Verify that the Ethernet hub, switch, or router and any other network devices between the system and the Comtrol device are powered up and operating.
- Reset the power on the Comtrol device and watch the **PWR** or **Status** light activity.

Product Type	PWR or Status LED	Description
DeviceMaster Serial Hub **DeviceMaster RTS** **DeviceMaster PRO** **DeviceMaster AIR**	5 sec off, 3 flashes, 5 sec off, 3 flashes ...	Redboot checksum failure.
	5 sec off, 4 flashes, 5 sec off, 4 flashes ...	SREC load failure.
	5 quick flashes	The default application is starting up.
	10 sec on, .1 sec off, 10 sec on .1 sec off ...	The default application is running.
RocketPort Serial Hub *ia*	Flashing	Bootloader is running.
RocketPort Serial Hub *Si* (2-Port, only)	On	Firmware (**rpshsi2p.bin**) is running.

- If the device has a power switch, turn the device's power switch off and on, while watching the LED diagnostics.
- If the unit does not have a power switch, disconnect and reconnect the power cord.
- Verify that the hardware MAC address in NS-Link matches the address on the Comtrol device.

- Verify that the network IP address is correct. If IP addressing is being used, the system should be able to ping the Comtrol device.
- Verify that the IP address programmed into the Comtrol device matches the unique reserved IP configured address assigned by the system administrator.
- If using a driver for Microsoft systems and an in-house application, verify that you are addressing the port correctly. In many applications, device names above COM9 require the prefix **\\.** in order to be recognized. For example, to reference COM20, use **\\.\COM20** as the file or port name.
- If using NS-Link for a Microsoft system, you can use one of these tools:
  - PortVision
  - Comtrol Utilities

    Note: *See How to Find Comtrol Diagnostic Tools and Utilities on Page 67 for information about PortVision or the Comtrol Utilities package.*
  - **Advisor** tab, which helps identify problems with the driver in the **Device** window of the driver (*Using the Advisor* on Page 59).
- If using NS-Link for Windows hosts, enable the **Verbose Event Log** feature under the **Setup Options** tab and then reboot the system.
- Reboot the system and the Comtrol device.
- Remove and reinstall NS-Link.
- If you have a spare Comtrol device, try replacing the device.

General Troubleshooting

This table illustrates some general troubleshooting tips.

Note: *Make sure that you have reviewed the Troubleshooting Checklist on Page 68.*

General Condition	Explanation/Action
PWR or **Status** LED flashing	Indicates that boot program has not downloaded to the unit. 1. Make sure that you have downloaded the most current driver from http://support.comtrol.com/download.asp?partnumber=1800198. 2. Install the driver and configure the device using the MAC address. Make sure that you reboot the system. ***Note:*** *If the PWR or Status LED is still flashing, contact Technical Support.* 3. If you want to program an IP address into the Comtrol device, you can use the procedure outlined in *NS-Link Driver Troubleshooting* on Page 70. 4. Remove the NS-Link driver.
PWR or **Status** LED not lit	Indicates that power has not been applied or there is a hardware failure. Contact Technical Support.

General Condition	Explanation/Action
Can ping the Comtrol device, but cannot open the ports from a remote location. (You must have previously programmed the IP address, subnet mask, and IP gateway.)	The NS-Link driver uses Port 4606 (**11FE** h) to communicate with the Comtrol device. When using a "sniffer" to track NS-Link packets, filtering for Port 4606 will easily track the packet. The packet should also contain the MAC address of the device and the originating PC so that it can be determined if the packet is able to travel the full distance one way or not. If the 4606 packet is found on one side of a firewall or router, using sniffer, and not on the other side, then that port needs to be opened up to allow the 4606 to pass. This will most often be seen with firewalls, but is also seen in some routers.
Cannot ping the device through Ethernet hub, switch, or router	Isolate the unit from the network. Connect the device directly to the NIC in the host system (see *Connectivity Requirements* on Page 9).
Cannot ping or connect to the DeviceMaster	The DeviceMaster family default IP address is often not accessible due to the subnet masking from another network unless **192.168** is used in the network. ***Note:*** *The default value is set to 0.0.0.0 for other Comtrol devices.* In most cases, it will be necessary to program in an address that conforms to your network. If you do not use the NS-Link driver to program the IP address, you only have 10 seconds to disable the bootloader with Redboot to get into the setup utility. See the User Guide (Page 8) for your product for the Redboot method of programming an IP address.

NS-Link Driver Troubleshooting

This table includes some tips related to NS-Link drivers.

NS-Link Condition	Explanation/Action
Need to program IP address into the device.	Before programming an IP address it is critical that the unit be operational and passes the power on tests when configured for the MAC address. ***Note:*** *If the unit is NOT operational, do NOT attempt to program or use an IP address with the unit.* See *Programming the IP Address* on Page 52 for more information.

NS-Link Condition	Explanation/Action
Cannot open port	1. Verify that MAC address in the NS-Link driver matches the address on the Comtrol device. 2. Verify that you are using the correct NS-Link driver. If necessary, remove and reinstall a new driver. 3. Isolate the unit from the network (see Page 69). 4. Check to see if another program or computer is active on this port.
The Comtrol device has a lower limitation of network bandwidth requirement of 64 Kbps.	At this speed the entire available bandwidth is required for the purpose of uploading the firmware from the driver to the Comtrol device. At lower speeds, timing issues will prevent the firmware from being successfully installed to the Comtrol device, thus preventing the device from normal operation. When using the Comtrol device over a WAN link that is less than the recommended 64 Kbps, a timing modification may be made that will allow uploading of the firmware. Load the driver locally to the device for the purpose of getting the firmware installed. The PC on the other side of the slow link can then “share” the port. The sharing may be exclusive as the firmware loader PC may not need to access the ports.

Technical Support

If you need technical support, contact Comtrol using one of the following methods.

Contact Method	Corporate Headquarters	Comtrol Europe
FAQ/Online	http://support.comtrol.com/support.asp	
Downloads	http://support.comtrol.com/download.asp	
Email	support@comtrol.com	support@comtrol.co.uk
Web site	http://www.comtrol.com	http://www.comtrol.co.uk
Fax	(763) 494-4199	+44 (0) 1 869-323-211
Phone	(763) 494-4100	+44 (0) 1 869-323-220

Appendix A. NS-Link Screens

For installation procedures see *Initial NS-Link Installation* on Page 15.

This section provides you with reference information about the NS-Link screens.

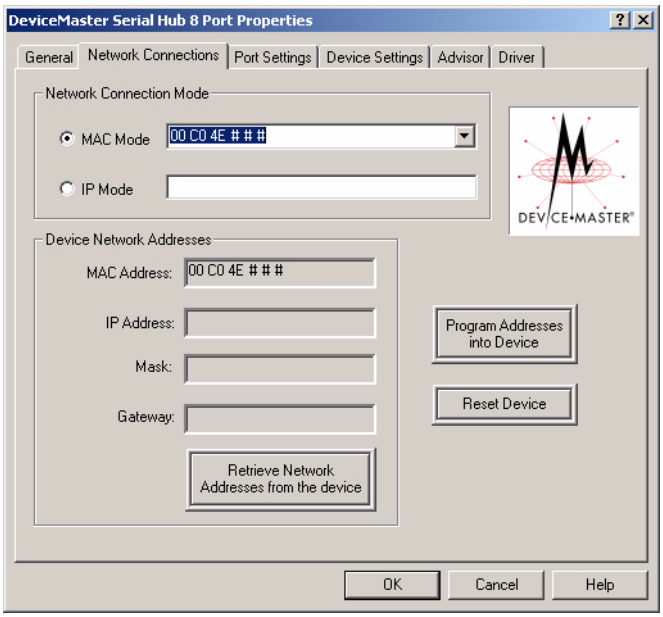
Note: *The screenshots illustrate a Windows 2000, Windows XP, or Windows Server 2003 installation. Windows NT installations do not include the* **General***,* **Port Settings***, and* **Driver** *tabs.*

Network Connections Tab

The **Network Connections** tab is initially used to configure the device to run in MAC mode or IP mode.

If you need to *program* an IP address in the device, you must first associate a MAC address to the device. To associate a MAC address to the device, you must be connected to the local network segment.

Note: *A device that has not been programmed with a MAC address is displayed with # # # as the last three pairs of digits of the MAC address.*



You will also need to associate the MAC address to the device if you want to do any of the following:

- Disable DHCP discovery messages
- Retrieve network address information from the device
- Reset the device
- Use the **Advisor** tab

MAC Mode

To use **MAC Mode**, the device must be connected to a *local network segment*.

You can select or enter the MAC address of the device. The MAC address is limited to the MAC address range of the device type that you selected during the driver installation. If you enter the MAC address, make sure that you use the correct format: **00 C0 4E xx xx xx**. A space must separate each pair of digits.

Note: *The MAC address does not appear in the droplist, if the device is on another network segment. In this case, you must manually enter the MAC address.*

See *IP or MAC Addressing Issues* on Page 10 for more information about MAC Mode.

IP Mode

You can select **IP Mode** and enter the IP address of the device, if the device has been previously programmed with an IP address.

If you want to change the IP address on the device, you must first associate a MAC address to the device by entering or selecting the MAC address from the droplist, and closing the **Network Connections** tab by selecting **OK**.

When you re-open the **Network Connections** tab, you will be able to program a different IP address into the device.

MAC Address Field

This field contains the MAC address of the NS-Link device, if a MAC address has been associated to this device. If this field contains **00 C0 4E # # #**, you will be unable to use the features on this screen such as, retrieving network information or programming a different IP address.

IP Address Field

NS-Link will try to retrieve and display the IP address of the device in this field if a MAC address is present when the driver is launched. The DeviceMaster family default IP address is 192.168.250.250. The default value is set to 0.0.0.0 for other Comtrol devices.

Mask Field

NS-Link will try to retrieve and display the subnet mask of the device in this field if a MAC address is present when the driver is launched. The DeviceMaster family default subnet mask is 255.255.0.0. The default value is set to 0.0.0.0 for other Comtrol devices.

Gateway Field

NS-Link will try to retrieve and display the IP gateway address of the device in this field if a MAC address is present when the driver is launched. The DeviceMaster family default IP address is 192.168.250.1. The default value is set to 0.0.0.0 for other Comtrol devices.

Retrieve Network Address from the Device Button

Selecting this button updates the fields in the *Device Network Addresses* group, if a MAC address has been associated to this device.

Note: *If the **Network Connection Mode** is set to IP, then a temporary MAC connection is established to perform this function. If the device is on another network segment, you must manually enter the MAC address.*

Program Addresses into Device Button

Selecting this button opens the *Program IP Addresses into Device Screen*, if a MAC address has been associated to this device.

Note: *If the **Network Connection Mode** is set to IP, then a temporary MAC connection is established to perform this function. If the device is on another network segment, you must manually enter the MAC address.*

Reset Device Button

Selecting this button resets the device, if a MAC address has been associated to this device.

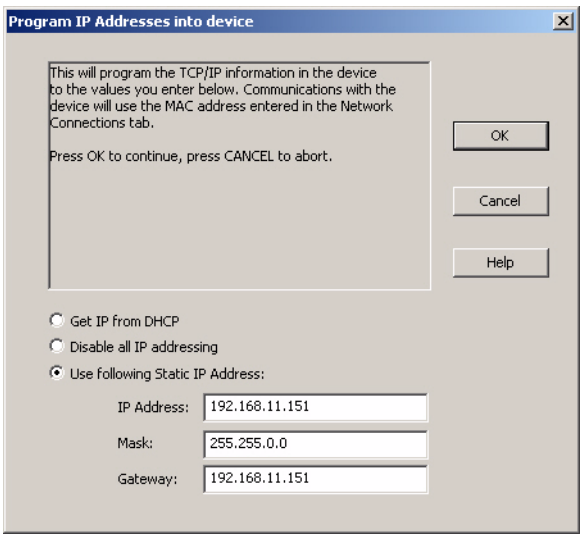
Note: *If the **Network Connection Mode** is set to IP, then a temporary MAC connection is established to perform this function. If the device is on another network segment, you must manually enter the MAC address.*

Program IP Addresses into Device Screen

The **Program IP Addresses into Device** screen appears when you select the **Program Addresses into Device** button on the *Network Connections* tab.

The screen also displays status messages when programming IP address information into the device. If there are any problems during programming the device, a check list appears in this screen. Resolve any problems before continuing.

The fields and buttons on the **Program IP Addresses into Device** screen are discussed below.



Get IP from DHCP

Select this option to allow DHCP to assign the IP address. Make sure that you provide the MAC address of the device for the network administrator to assign a static IP address from the pool. The DHCP server should assign the IP address, mask, and IP gateway.

Note: *Make sure an IP gateway is assigned.*

The IP address (0.0.0.0) and subnet mask (255.255.0.0) values are set for NS-Link after rebooting the device.

Disable all IP addressing

Use this option if you are not using IP addressing (DHCP or static) and operating the device in MAC mode. The option disables DHCP discovery messages that are related to IP mode. After the device is rebooted, the IP address displays as disabled in the IP Address field.

The MAC addressing method has the following advantages:

- Simplifies implementation and ongoing support by eliminating the address administration issues inherent in network protocols. MAC addresses are predefined by Comtrol and there is no potential for an “address conflict” at setup.
- Isolated from foreign LAN segments minimizing potential security issues.
- Increases throughput of serial data.

The IP address (255.255.255.255) and subnet mask (255.255.0.0) values are set for NS-Link after rebooting the device.

Use following Static IP Address

Select this option to program a static IP address. If you select this option, you must enter static IP address information in the fields below.

IP Address

Enter a valid IP address for your network. The **IP Address** field is the IP address programmed into the DeviceMaster after applying the changes and rebooting the device. See your network administrator for a valid IP address.

The DeviceMaster family default IP address programmed from the factory is **192.168.250.250**. The default value is set to 0.0.0.0 for other Comtrol devices.

Mask

The subnet mask is a 32-bit value (255.x.x.x) that enables IP packets to distinguish the network ID and host ID portions of the IP address that filters traffic.

The DeviceMaster family default subnet mask programmed from the factory is **255.255.0.0**. The default value is set to 0.0.0.0 for other Comtrol devices.

Gateway

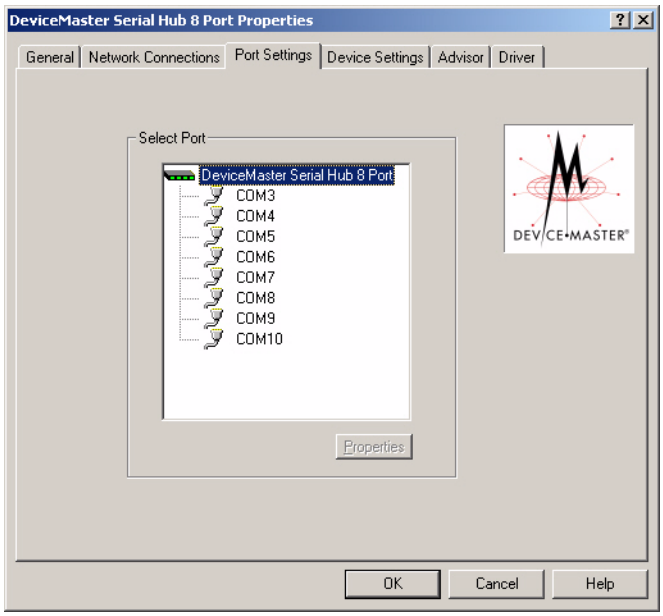
The default gateway is a TCP/IP configuration item that is the IP address of a directly reachable IP router.

The DeviceMaster family default gateway programmed from the factory is **192.168.250.1**. The default value is set to 0.0.0.0 for other Comtrol devices.

Port Settings Tab (Windows 2000, Windows XP, and Windows Server 2003)

The **Port Settings** tab provide access to programming advanced Comtrol COM properties for a specific COM port or ports for Windows 2000, Windows XP, or Windows Server 2003 installations.

To configure a port, highlight a COM port and select **Properties**.



Screenshot on a Windows 2000, Windows XP, or Windows Server 2003 system.

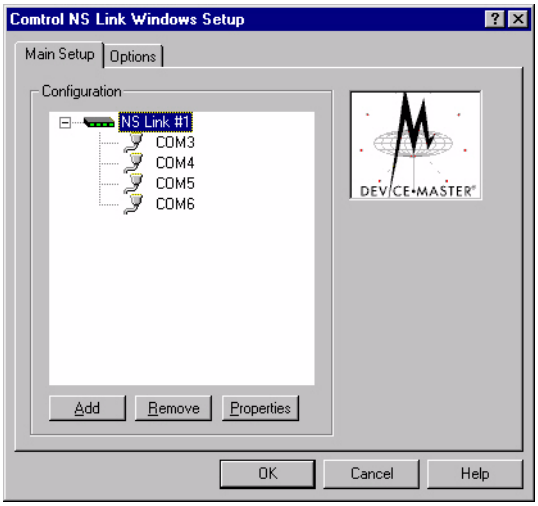
After you select **Properties** or double-click on a port, the **COM Properties** screen for that port opens. See the *Port Setup Tab* on Page 78 to configure advanced COM port properties.

Main Setup Tab (Windows NT)

The **Main Setup** tab displays installed devices and allows you to add or remove devices. It also provides access to configuration screens for the device and advanced COM port properties.

Note: *To remove a single or the last device in the **Main Setup** tab, you must remove the driver (see Windows NT: Removing an Existing Driver on Page 48).*

If you highlight a device and select the **Properties** button, you can access the following tabs, which are used to configure the device.



- The **Network Connections** tab, which is used to program IP address information into the device is discussed in *Network Connections Tab* on Page 73.
- The **Device Settings** tab, which is used to configure device properties is discussed in *Device Settings Tab* on Page 81.
- The **Advisor** tab, which may identify problems with the driver is discussed in *Advisor Tab* on Page 83.

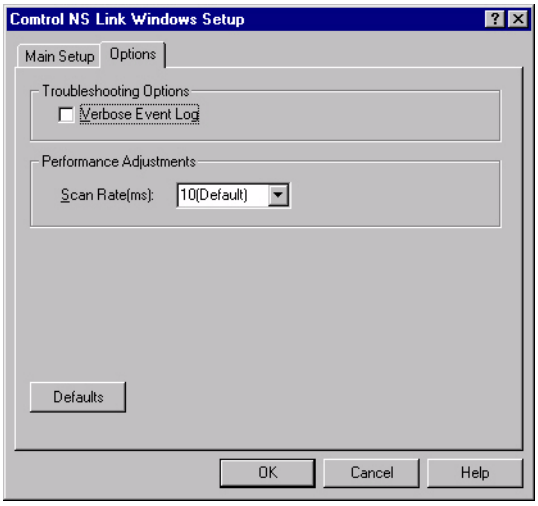
If you highlight a COM port and select the **Properties** button, you can access the **Port Setup** tab, which is used for advanced COM port configuration. See the *Port Setup Tab* discussion on Page 78 for more information.

Options Tab (Windows NT)

The **Options** tab provides access to several options, which are duplicated in the **Device Settings** tab.

The difference between the **Options** tab and the **Device Settings** tab is that when you use the **Options** tab, the selected option is controlled at the driver level. Setting the option in the **Device Settings** tab controls the option at the device level.

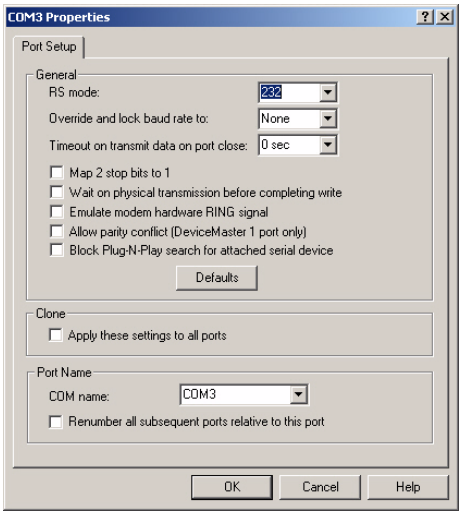
See the help system or *Device Settings Tab* on Page 81 for information about these options.

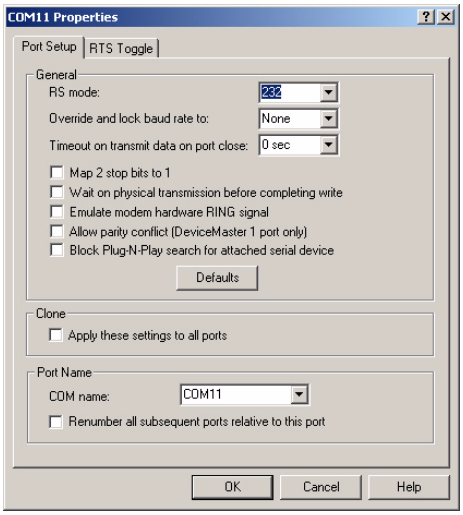


Port Setup Tab

The **Port Setup** tab allows you to configure advanced COM port properties.

DeviceMaster Serial Hub *Other models that support RS-485.*





*The **Block Plug-N-Play search for attach serial device** option is not displayed in a Windows NT installation.*

Note: *Devices that do not support RS-485, such as, the DeviceMaster Serial Hub, do not display the **RTS Toggle** tab in the **COM Properties** screen.*

The groups, fields and buttons on the **Port Properties** tab are discussed below.

RS mode

RS mode refers to the Comtrol supported communications mode of the serial device that you are connecting to that particular COM port. Make sure that you select the mode that matches the device. The DeviceMaster Serial Hub only supports RS-232; other Comtrol devices support RS-232, RS-422, and RS-485.

Override and lock baud rate to:

Override and lock baud rate to allows you to select a default baud rate from the droplist or enter a default baud rate value to access higher or lower rates than are normally permitted by your Windows applications.

Timeout on transmit data on port close

Timeout on transmit data on port close allows you to set a time delay on the transmit data before a port closes. Select the length of time to wait for data to clear the transmit buffer, before a close request from a host application is completed. If data is still in the transmit buffer, you can set a delay time to allow the buffer to empty before a close request is completed. This is typically used with slower peripheral devices such as printers, to give the data sufficient time to flush through the system.

Map 2 stop bits to 1

Map 2 stop bits to 1 allows you to map 2 stop bits to 1 bit. If the application you are using is hard coded to use two stop bits and you are receiving framing errors, you can implement this option. Leave this box unchecked to enable stop bits to pass through unchanged.

Wait for physical transmission before completing write

Wait for physical transmission before completing write allows you to force all write packets to wait until the transmit data has physically completed the transmission before returning completion to the host application. The default mode (box not checked) is to buffer the data in the transmit hardware buffer and return completion as soon as the packet is in the buffer. This is typically used with slower

peripheral devices such as printers, to give the data sufficient time to flush through the system.

Emulate modem hardware ring signal

Emulate modem hardware ring signal allows you to emulate a hardware RI (ring indicator) signal.

Allow parity conflict (DeviceMaster 1 port only)

This option allows a parity conflict on a DeviceMaster 1-port. It may be necessary to use this option after you have determined that the cabling is correct and you are able to transmit data but not receive proper data

Block Plug-N-Play search for attached serial device

The **Block Plug-N-Play search for attached serial device** option disables Plug and Play from searching for a device attached to the serial port. For example, streaming data during device discovery on a device is assumed to be a mouse to Plug and Play. This option is not included in Windows NT.

Defaults

Selecting the **Defaults** button returns all the values in the **Port Setup** tab to the default state as illustrated in the following table.

Port Setup Fields and Controls	Default Value
General	RS-232
Override and lock baud rate to	None
Timeout on transmit data on port close	0 sec
Map 2 stop bits to 1	*Disabled*
Wait on physical transmit before completing write	*Disabled*
Emulate modem hardware RING signal	*Disabled*
Allow parity conflict (DeviceMaster 1-port only)	*Disabled*
Block Plug-N-Play search for attached serial devices	*Disabled*
Clone	*Disabled*
COM name	First available COM port
Renumber all subsequent ports relative to this port	*Disabled*

Clone

Clone allows you to configure all ports on this device to the same settings.

If this box is checked, the changes in the **General** category area are applied to all ports on this device. If this box is not checked, the changes you make to the Port Setup options apply to the selected port only.

COM name

The **COM name** droplist allows you to renumber this COM port.

If you see a COM port number followed by **(in use)**, this means that *Plug and Play* sees those COM port numbers in use by another device.

If you renumber this COM port and select the **Renumber all subsequent ports relative to this port** option, NS-Link will renumber all of the ports on the device, starting with the number you select in this droplist.

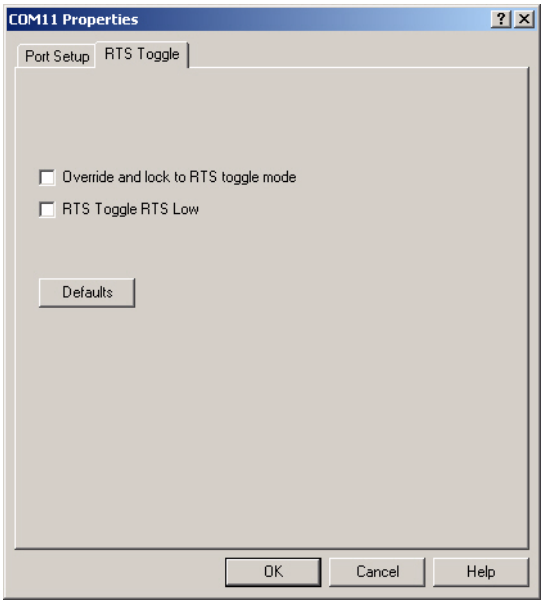
If you rename the port to a COM name used by another port, a dialog appears indicating that the port is already in use.

Renumber all subsequent ports relative to this port

The **Renumber all subsequent ports relative to this port** option allows you to renumber all subsequent ports on the device relative to the port displayed in the COM name droplist.

RTS Toggle Tab (Excludes RS-232 Only, Devices)

The **RTS Toggle** tab allows you to configure RTS (Request to Send) options for RS-485 mode.



Override and lock to RTS toggle mode

The **Override and lock to RTS toggle mode** option allows you to lock the port in RTS (Request to Send) toggle mode, then set the mode (low or high) as desired for RS-485 mode.

RTS Toggle RTS Low

The **RTS Toggle RTS Low** option allows you to toggle the RTS output signal low during data transmission, which may be needed for relay devices for RS-485.

If the option box is not checked, RTS is toggled high (asserted) during data transmission for RS-485 mode.

Defaults

Selecting the **Defaults** button returns all the values in the **RTS Toggle** tab to the default state as illustrated in the following table.

RTS Toggle Controls	Default Value
Override and lock to RTS toggle mode	*Disabled*
RTS Toggle RTS Low	*Disabled*

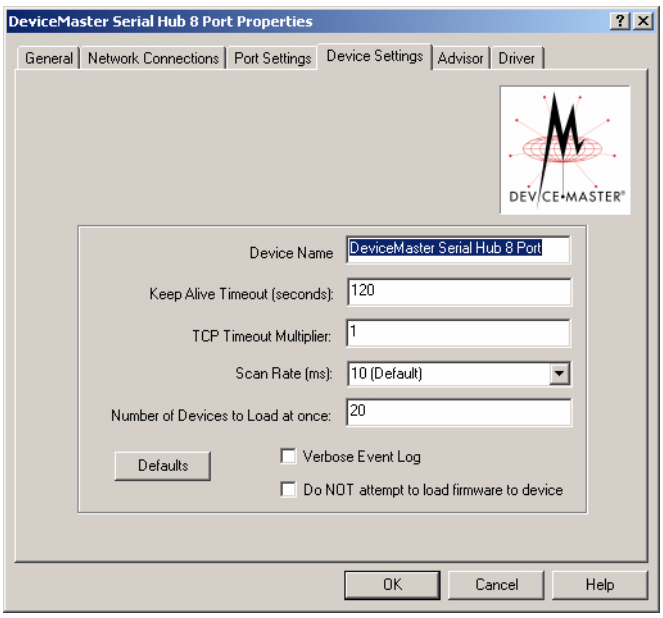
Device Settings Tab

The **Device Settings** tab allows you to change the default device values for the name, Keep Alive Timer, TCP Timeout Multiplier, scan rate, and active verbose event log messages.

The **Device Settings** tab fields are discussed below.

Note: *The screenshot (right) illustrates a Windows 2000, Windows XP, or Windows Server 2003 installation.*

Windows NT installations do not include the ***General, Port Settings****, and* ***Driver*** *tabs.*



Device Name

This field contains the device name. You can change the default name to a unique device name that you want to use, which will be reflected in the *Device Manager* or *Main Setup* tab in Windows NT.

Keep Alive Timeout (seconds)

This option allows you to set the amount of time in seconds that this device waits until it closed this connection and frees all the ports associated with it. The *Keep Alive feature* works in the following way.

During normal operation the driver periodically sends a connection check to the NS-Link device, and the device then returns a response. There are two timers: one in the driver, and one in the device. These timers are reset when a connection check signal is received. If a connection is broken, that is, a check is not received, the data is stored in the computer and/or the device. Depending on the amount of time that has expired since the connection was lost, the following happens:

- When the computer loses its connection to the device but re-establishes it before the timeout period expires, any data transmitted during this period is queued and sent when the connection resumes.
- When the computer loses its connection to the NS-Link device and does not re-establish it before the timeout period expires; the driver then purges any pending I/O data for ports on that connection and returns all pending, and future I/O commands, with the exception of the **Close** command, to the application with an error indicating the disconnected status.

  This is similar to the processing which occurs when the computer receives a notification from the device that a port release request, from **FreePort**, was processed on a port it owns with the exception that a different status is returned. When the connection is re-established, the computer will attempt to re-acquire the ports that were open when the connection was lost. If the attempt is successful, normal operations resume for the port. If any port fails to be acquired, then the computer will continue to fail all further I/O operations, with the exception of a **Close** request. When the **Close** request is received, the port can then be re-opened.

- If the computer loses its connection and the time period expires, the device places the port into a state that another computer can establish a connection, locking out the original driver when a connection is made. The driver will respond to all I/O commands, with the exception of the **Close** command, with an error indicating the disconnected status. If the port is still available when the driver re-establishes a connection, then it will claim the port and allow I/O to resume.
- If you need the ability to reconnect with a port that another server is currently using, Comtrol provides **FreePort** and its source code which makes the API calls that would force a port closure. The source code for **FreePort** demonstrates the calls an application would make to perform the same operation.

  FreePort is available in the Comtrol Utilities, http://support.comtrol.com/download.asp?partnumber=1800097 for Windows 2000, Windows XP, and Windows Server 2003 users. **FreePort** is installed on your hard drive during the NS-Link installation for Windows NT systems. See *Using FreePort* for information about FreePort.

TCP Timeout Multiplier

Use the **TCP Timeout Multiplier** to modify two timers used in TCP/IP socket communications. The first identifies how long the TCP protocol should wait before timing out an attempt to open a TCP channel. The TCP Multiplier default is 1 and the timer defaults to 500 ms when the TCP/IP address method is used to communicate with a device. If the TCP Multiplier is set to 2, the timer would now be 1000 ms, or 1 sec. If the multiplier is 4, the new timeout period would be 2000 ms, or 2 sec.

The second timer defines how long the driver will wait for a response from the device when a forced release of a port is requested (i.e. as when the **Freeport** utility is being used). This timer defaults to 8 seconds. If the TCP Multiplier is changed to 2, the timer would now be 16 seconds. If the multiplier is 4, the new timeout period would be 32 seconds.

Scan Rate (ms)

Typically, you should leave the scan rate set to the default value (10 ms) for most applications. To adjust latency for time-critical applications, select a longer or shorter interval from the droplist, or type in the rate (1 to 50). If a value larger than 50 is entered, the maximum of 50 is implemented. Changes to Scan Rate do not take effect until you restart the system.

Windows NT users: This is the same scan rate illustrated in the **Options** tab except that changes made on the **Device Settings** tab only affects this device. If you want to set the scan rate at the driver level, use the **Options** tab (*Options Tab (Windows NT)* on Page 77).

Number of Devices to Load at Once

This field determines how many NS-link devices will have firmware loaded by the NS-Link driver at one time. Increasing the number will increase network traffic, decreasing the number will decrease network traffic but may increase total load time.

Defaults

Resets this screen to its default values.

Device Settings Tab	Default Value
Device Name	NS Link #
Keep Alive Timeout (seconds)	120
TCP Timeout Multiplier	1
Scan Rate (ms)	10
Number of Devices to Load at Once	20

Device Settings Tab	Default Value
Verbose Event Log	*Disabled*
Do NOT attempt to load firmware to the device	*Disabled*

Verbose Event Log

Select this option if you want to log additional device information into the operating system's event log.

Windows NT users: This is the same **Verbose Event Log** option illustrated in the **Options** tab except that changes made on the **Device Settings** tab only affects this device. If you want to enable the **Verbose Event Log** option at the driver level, use the **Options** tab (*Options Tab (Windows NT)* on Page 77).

Do not attempt to load firmware to the device

Select this option if you do not want the NS-Link driver firmware to upload to the DeviceMaster. You may want to use this option when custom firmware is loaded as the default application. The custom firmware must support communications with the NS-Link driver if you want to access the ports as Windows COM ports.

Advisor Tab

The **Advisor** tab may be useful when troubleshooting possible network problems.

The **Advisor** tab only works if a MAC address has been associated to the device even if the device is not on the local network segment.

The **Advisor** contains the following fields.

Summary

The **Summary** field displays information regarding the current state of the interface to selected device. This information is updated constantly. See *Advisor Messages* on Page 85, for a list of messages and meanings.

PC Network Interface

The **PC Network Interface** group contains the following fields.

- **MAC Address** is the reported MAC address of the Ethernet network interface card (NIC) card in the server. Since a server may contain more than one NIC, identifying exactly which NIC is being used by NS-Link may help you to identify and resolve problems.
- **Frames Out** is the count of the number of frames output by NS-Link through the identified network interface. This includes all administrative, data, and

control frames, and should be incriminated whenever the device and NS-Link are operating, even if the device is idle.

- **Frames Accepted** is the count of the number of received frames accepted by NS-Link for further processing. These must be well-formed packets with the correct protocol identifiers for NS-Link.
- **Adapter 1 ID string** is the NIC binding string. Every network entity that needs to be uniquely identified has a Globally Unique Identifier (GUID), which is used to form unique binding strings. The presence of this string indicates that NS-Link has been bound to a specific NIC.
- **Frames Passed On** is when a NIC receives a packet, it passes the packet around to each driver or application that is bound to the NIC until one of them recognizes and accepts the packet.

  This field shows the count of the number of received frames that have gone into NS-Link and been returned to the NIC layer for processing by other software.

  If a received packet is not accepted by NS-Link or any other driver, it is discarded.

Device Network Interface

The **Device Network Interface** group contains the following fields:

- **MAC address** is the network (MAC) address of the NS-Link device that is currently selected. It should match both the MAC address on the **Network Connections** tab and the MAC address on the physical device.
- **Packets To Device** is the count of information frames sent to a layer in NS-Link and indicates actual data traffic sent.
- **Packets From Device** is the count of information frames received by a layer in NS-Link, and indicates actual data traffic received.
- **Retransmitted % all sent** is the percentage of information frames requiring retransmission due to network errors. If this value is not zero, you have network problems.
- **Reported State** contains a message showing the status of the NS-Link software interface to the selected device.
- **Devices Detected/Available** is the number of NS-Link devices found on the network and how many of the devices are available.
- **Out of Sequence % all Rcvd** is the percentage of information frames received out of order, possibly due to network errors. If this value is not zero, you have network problems.
- **Reset** clears the data values from the fields.
- **Refresh** immediately updates the data displayed in the event that you want review data before the automatic refresh cycle occurs.

Advisor Messages

The following lists **Advisor** messages.

Message	Description
A disruption in communications between the server and the NSLink device has occurred.	Check network connections.
A MAC address has not yet been specified for this device. Return to **Device** property page, input the correct MAC address for this device, save configuration, and restart server.	The driver may have only been configured with an IP address. The appropriate MAC address must be input in the MAC field in the **Network Connections** tab in order for the Advisor to report the device status.
Can't detect any Comtrol devices. Check Ethernet connectors and ensure device is powered on.	Network traffic is being received, but not from a NS-Link device. Check the network connections and verify that the NS-Link device is powered up.
Can't detect device with specified MAC address on any network. Verify MAC address of unit, check Ethernet connectors and ensure device is powered on.	Network traffic is being received from a NS-Link device, but not the one specified in the **Network Connection** tab. Check the device to make sure that you are using the correct MAC address.
Check connectors, cabling, and ensure proper LAN termination. Check for indications of low network bandwidth.	Excessive collisions to device, check for duplicate IP addresses.
Code upload failed due to a timeout and the server is attempting to resynchronize with the device.	NS-Link has not successfully uploaded the microcode to the assigned device.
Code upload has completed.	NS-Link has successfully uploaded the microcode to the assigned device.
Code upload was restarted after a timeout.	The uploading of the microcode did not complete in the expected time frame, and will try again.
Device detected and is configured for this server, but is not yet assigned to this server.	Either the NS-Link device is currently being controlled by another server or the device power has been cycled and the device is waiting for a server to acquire it.
Device detected, initializing.	The server has acquired the NS-Link device and is downloading the control program. The device will be available shortly.
Device detected, microcode upload in progress.	NS-Link is attempting to upload the microcode to the device. This should complete momentarily.
Device is active and OK, no data traffic exchanged since last inquiry.	Device and ports are operational. There is currently no active serial traffic.
Device is active and OK.	Device is ok and ready to use.
Device with specified MAC address was detected, but isn't configured for this server. Return to 'Device Setup' dialog, configure, save configuration, and restart server.	Either the NS-Link device in question is not assigned to this server, or it is not assigned to *any* server, or it has been configured for this server but the configuration has not been saved. If the latter, save and exit, and restart the server.

Message	Description
Initialization complete. Waiting on response from device before making the connection active from the server to the NSLink	Waiting for a response from the device.
Possible bandwidth problems on the network, resulting in packet retransmission, packet loss, and/or excessive latency times.	There has been no response from the device for an extended period. It may be in an idle state. This is an informational type of message only and is not necessarily a networking issue. Ping the device and if the ping responses are normal, troubleshoot the Comtrol device. It may be that the IP programming is incomplete. If the gateway address has not been installed a ping may succeed while the driver is still unable to load.
The driver is not running. If you just installed the driver you will need to exit the program before the driver starts.	Close the NS-Link properties and then re-open to confirm that the driver starts.
The NSLink device has failed to respond for an extended period of time. The NSLink device may have lost power or is in an unresponsive state.	The NS-Link driver is no longer able to communicate with the device. Check the LED status, see *Device Preparation for NS-Link* on Page 11 to locate the LED table for your product.
The server is attempting to resynchronize with the NSLink device after the connection with the device timed out.	Check in a few moments to see if has initialized.
Timeout occurred while server was waiting for ADMIN command reply from device.	There may be network traffic problems, an unresponsive device, or a problem with the server sending out network data. NS-Link is trying to locate the device on the network by sending out the ID request and not receiving a response from the device, which may indicate that the device is either not on the network, on a different segment (if using MAC mode of addressing), or the bandwidth of the network (or server) is so saturated that the device response is not received in time
Timeout occurred while server was waiting for Assign Reply response from the NSLink device prior to making the connection active.	There may be network traffic problems, an unresponsive device, or a problem with the server sending out network data. A handshake that occurs after an ID response is received and NS-Link is trying to establish a communication channel with the device.
Unable to find a Network Interface Controller (NIC) card.	Install a NIC in that PC or check that the NIC is operational.
Uninitialized.	Microcode has not uploaded to the device.

Appendix B. Windows NT: Configuration Overview

Configuring Modems

After installing the hardware and driver for Windows NT, you can use this discussion to configure modem COM ports.

The Comtrol device can support any asynchronous serial modem for use by any application that uses TAPI. For information regarding port pinouts and signals, see the *User Guide* for the device (*Locating the User Guide or Hardware Installation Guide* on Page 8).

Working with NT RAS

Comtrol products are frequently used to provide Dial-Up Networking access with NT RAS (Remote Access Service).

- If RAS is *not* installed, note that you must install at least one RAS-capable device (for example, modem) before installing and configuring RAS.
- If RAS *is* installed, note that the modem installation process automatically launches RAS Setup after modem installation is complete.

Installing Modems

The following instructions were developed using Comtrol modem products. If you are using another brand of modem, note that some prompts and window descriptions may differ from those shown.

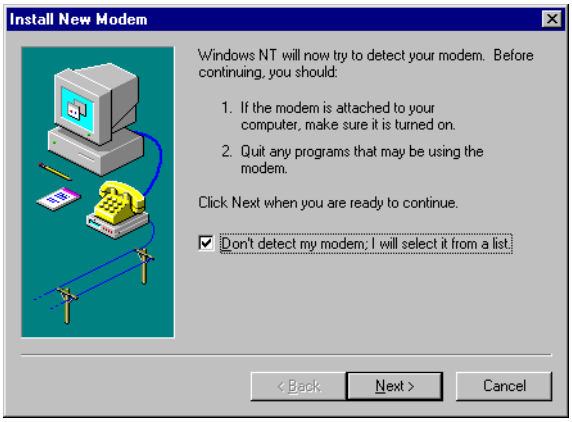
Follow these steps:

1. Connect the modem to the desired port.
2. Power up the modem.
3. Open the **Control Panel** window.
4. Double-click the **Modems** icon.

   If you have no other modems installed, skip to Step 5.

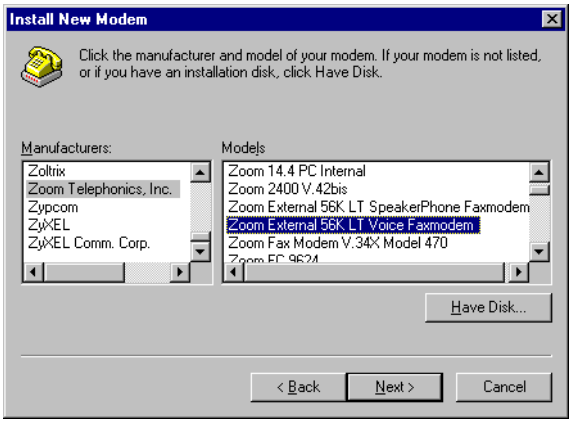
If you have already installed another modem, the *Modems Properties* window displays. Select the **Add** button.

5. Check the **Don't detect my modem...** box and select **Next**.

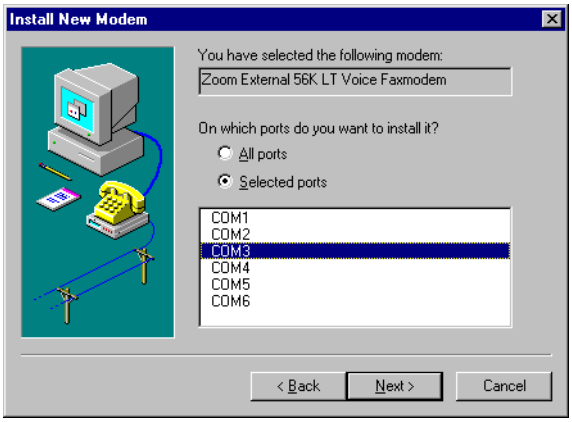


Note: *While Windows NT can automatically detect modems, we advise against using this option as auto-detect feature may cause some multiprocessor systems to lock up, and the modems may be installed in reverse order.*

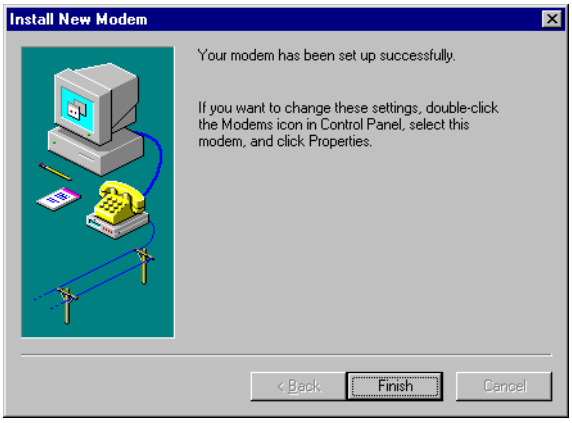
6. Select the appropriate manufacturer and model and select **OK**. If the correct manufacturer and model do not appear on the list, select **Have Disk** to install software from a manufacturer-supplied installation diskette.



7. Select the COM port number.



8. Select **Finish**. The modem software is installed on the selected ports.



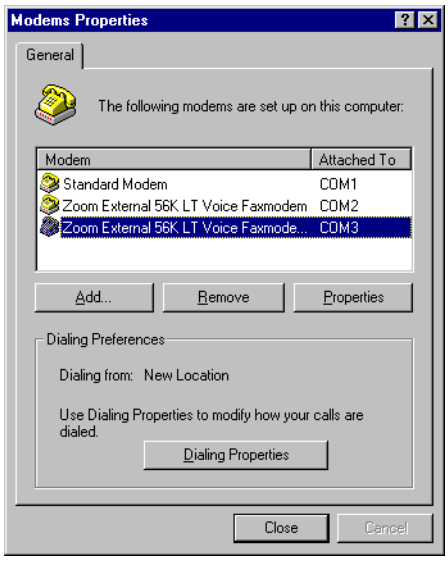
Depending on prior configuration, you may be asked to enter your country of use, area code, the number you dial to get an outside line, and whether you have tone or pulse dialing at this time.

9. If you need to configure modem properties (maximum baud rate, data bits, parity, and so on), select the **Properties** button, make the needed changes, then select **OK** to return to this window.

   Note: *For help configuring modem properties, see the Windows Help System.*

10. If you need to configure dialing properties (country, area code, calling card number, and so on), select the **Dialing Properties** button, make the needed changes, then select **OK** to return to this window.

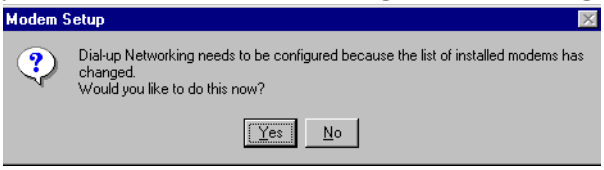
11. Select **Close**.



Further Modem Configuration

At this point:

- If you are not using RAS, you are now finished. Reboot the system so that your changes take effect and resume normal operations.
- If you plan to use RAS but do not have it installed yet, reboot your system, then go to *Installing RAS Initially* on Page 90.
- If you already have RAS installed and configured, this dialog box displays.



If you do *not* want to configure this modem for use with RAS at this time, select **No**, then reboot and resume normal operations.

If you *do* want to configure this modem for use with RAS, do *not* reboot. Instead, select **Yes**, then go directly to *Adding or Reconfiguring a RAS Device* on Page 91.

Installing and Configuring RAS

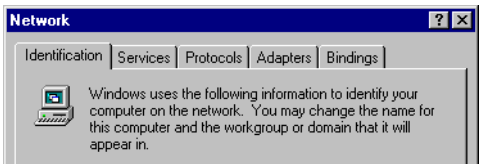
After installing the hardware and driver, and installing and configuring at least one RAS device (for example, a modem), use this section to install and configure Remote Access Service (RAS).

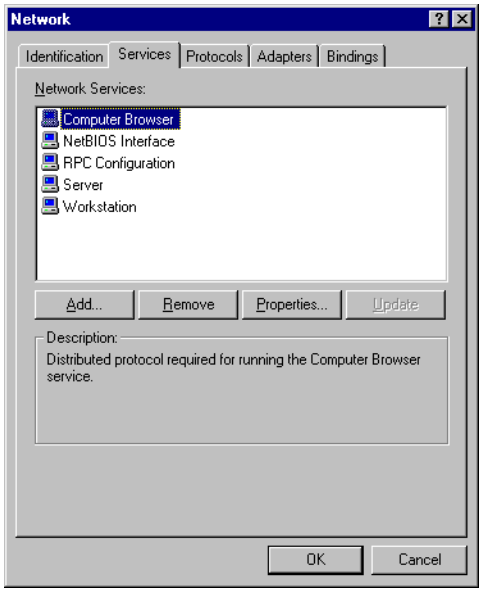
Installing RAS Initially

If you have not previously installed RAS in your Windows NT system, log into the system with Administrative rights and follow these steps:

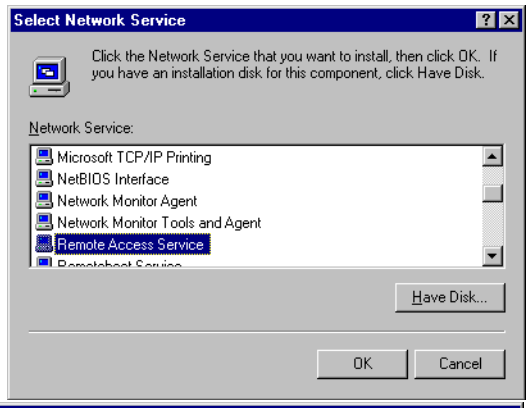
Note: *This example shows how to install and configure RAS for use with modems, but you can use it as a guide to setting up other serial devices.*

1. Open the Control Panel and start the **Network** applet, or right-click on the Network Neighborhood and select **Properties**.
2. Select the **Services** tab and select the **Add** button.





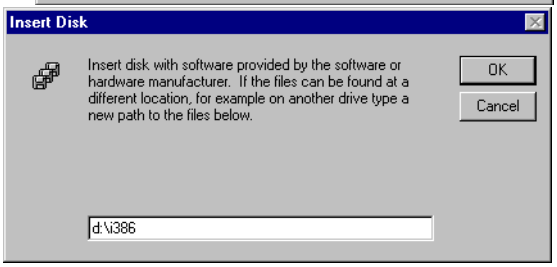
3. Highlight **Remote Access Service** and select the **OK** button.



4. Enter the location of the Windows NT files (for example, **d:\i386**) and press the **Continue** button.

   The appropriate files are copied onto your hard drive.

   The RAS installation process automatically launches the Add RAS Device process. Go to *Adding or Reconfiguring a RAS Device* on Page 91, Step 5.



Note: *If you install or reinstall RAS from your original Windows NT 4.0 distribution media, you must install or reinstall the latest Windows NT Service Pack* **after** *installing/reinstalling RAS. This is necessary because most Service Packs include RAS-related files that are newer than the files on the NT distribution media.*

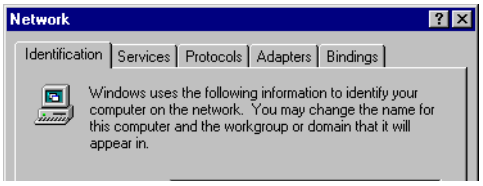
Adding or Reconfiguring a RAS Device

There are several different ways to start this procedure:

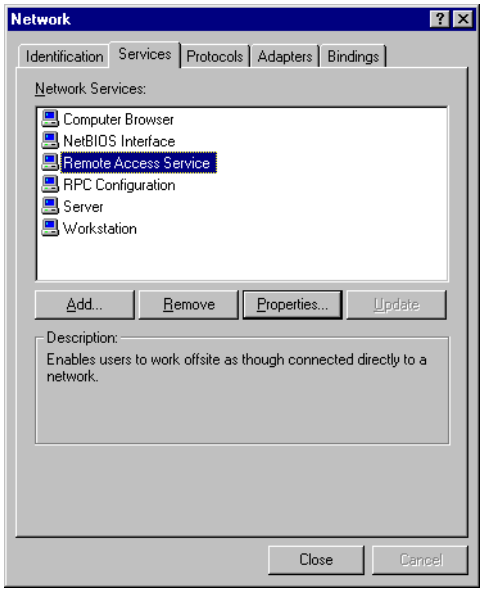
- If you have previously installed RAS and configured at least one RAS device, and are now adding or reconfiguring RAS devices, begin with Step 1.
- If you have previously installed RAS and were in the process of installing a modem when this process started automatically, begin with Step 3.
- If you were in the process of installing RAS when this process started automatically, begin with Step 5.

Follow these steps:

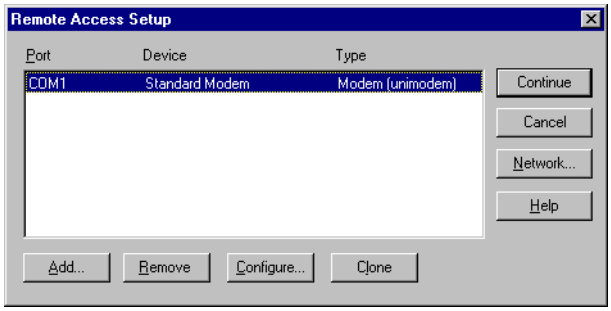
1. Open the Control Panel and start the **Network** applet, or right-click on the Network Neighborhood and select **Properties**. The *Network* window displays.
2. Select the **Services** tab.



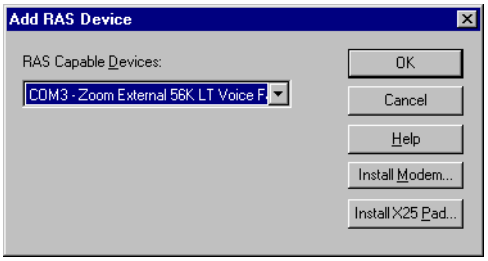
3. Highlight **Remote Access Service** and select the **Properties** button.



4. To reconfigure an existing RAS port, highlight the port/device and select the **Configure** button. Then go to Step 7.



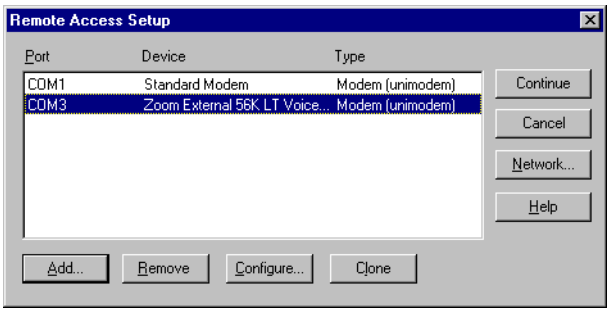
5. To add a new RAS device—for example, if you are configuring a new modem—select the **Add** button. The *Add RAS Device* window displays:



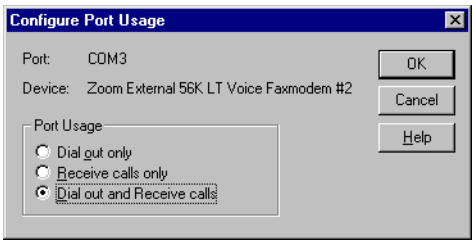
6. Use the droplist to select the COM port (modem) that you want to configure and select the **OK** button.

   Note: *If no modems appear on this list, you need to install a modem, see Installing Modems on Page 87.*

   The *Remote Access Setup* window displays again.



7. Highlight the desired COM port (Modem) and select the **Configure** button. The *Configure Port Usage* window displays.

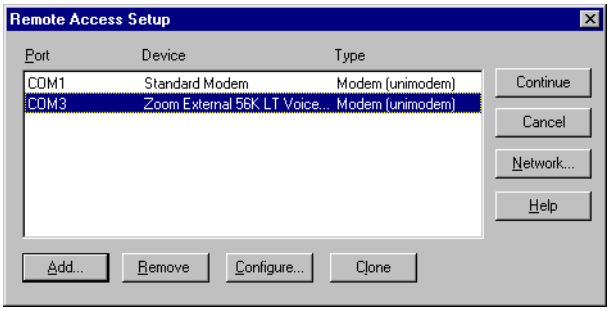


8. Select the appropriate radio button, based on the role the modem will perform, and select the **OK** button.

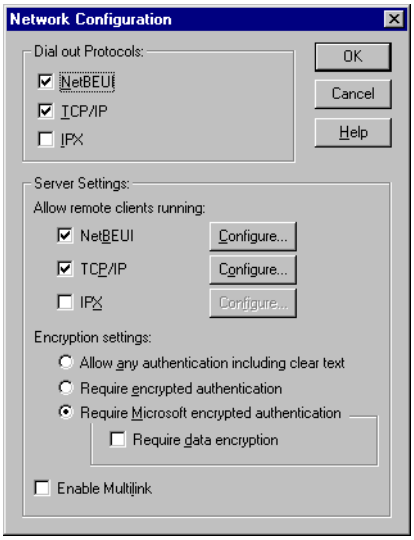
   Note: *When configuring multiple simultaneous RAS dial-in ports, configure the ports to "Receive calls only" not "Dial out and Receive." Configuring a port to dial-out requires a separate memory pool for each dial-out port, while all ports configured for receive-only share the same memory pool.*

   If you configure too many ports for dial-out unnecessarily, resources can become an issue. If you require dial-out on the RAS server, configure one port to "Dial out and Receive" and all the other ports to "Receive calls only."

   The *Remote Access Setup* window displays again.



9. Highlight the COM port (modem) again and select the **Network** button.



10. Select the appropriate dial out protocols, dial in protocols, logon security levels, enable multilink (if required) and select **OK**.

    Note: *Only previously configured protocols are selectable. If you want to set up a protocol that is grayed out, you must first add it using the Network* **Protocols** *tab.*

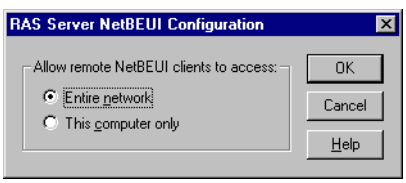
    If you selected "Receive calls only" on all ports while configuring the port usage, the "Dial out Protocols" area will be shaded.

    If you want to use Multilink PPP (bonding), make sure that you select the **Enable Multilink** checkbox.

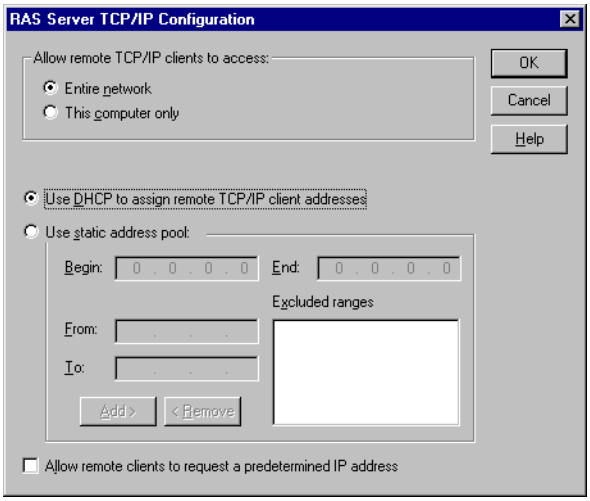
    For detailed information about the configuration windows, use the Help button or the Windows NT CD-ROM (**Support/books/server.hlp** file to locate information).

Note: *The following steps are dependent upon the protocol selections made in this window.*

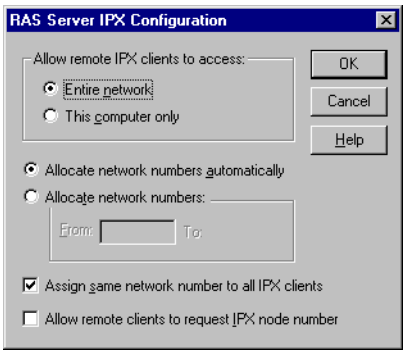
11. If you select **NetBEUI** on the *Network Configuration* window, the following window displays. Make the appropriate selection for your environment and select **OK**.



12. If you select **TCP/IP**, the following window displays. Make the appropriate selections for your environment and press **OK**.



13. If you select **IPX**, the following window displays. Make the appropriate selection for your environment and press **OK**.



14. Select **OK** to exit the *Network Configuration* window and return to the *Remote Access Setup* window.

    Note: *Choices made during network configuration will effect the entire system.*

15. If you want to duplicate the configuration you just created on any other COM port (modem), highlight the COM port number and select **Clone**. Otherwise, repeat Steps 7 through 14 for each COM port (modem) you want to set up.
16. After setting up all the COM ports, select the **Continue** button.
17. Select the **Close** button at the *Network / Services* tab to complete the RAS installation.
18. Select **Yes** when asked to reboot the computer. Windows NT RAS installation is complete.
19. If necessary, install the latest NT Service pack or packs from Microsoft.

Configuring Printers

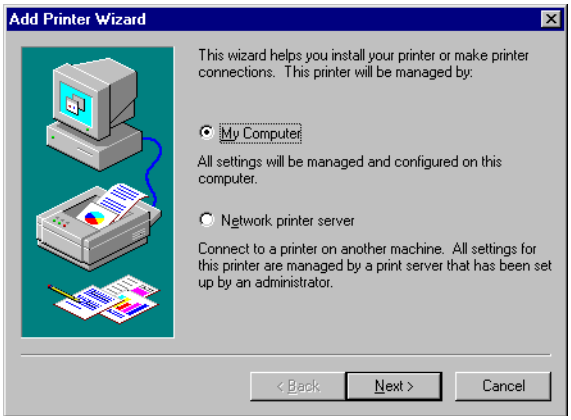
Use this subsection to configure printers for the Comtrol device after installing the hardware and driver.

Adding Serial Printers

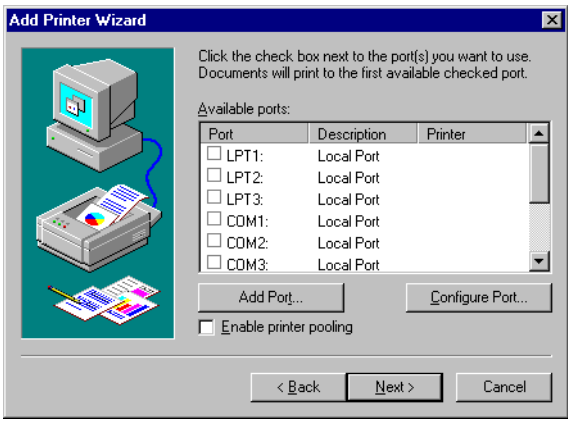
Follow these steps to configure a serial printer in Windows NT:

1. Connect the printer to the desired port. Use a DTE-to-DTE null modem cable unless the printer maker specifies otherwise.
2. Open the **Printers** control panel and double-click on the **Add Printer** icon.

3. Select the **My Computer** checkbox, then the **Next** button.



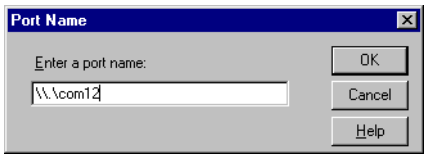
4. If the desired COM port is on this window, select it, select on the **Next** button, and skip to Step 6.
5. If the desired COM port is not on this list, select the **Add Port** button and follow these steps:

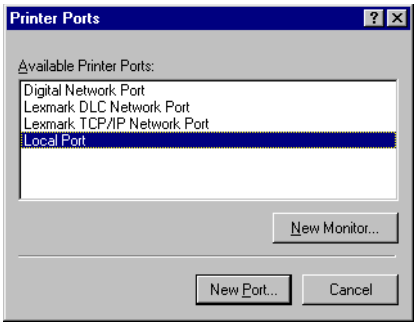


a. A list of printer ports is displayed. Select **Local Port**.

b. Select **New Port**.

c. Type in the name of the port.



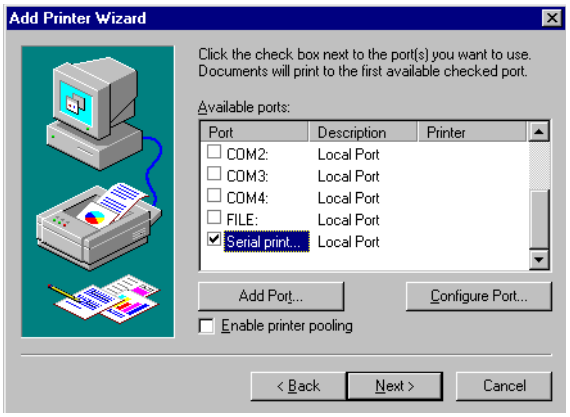


Note: *Port names above COM9 require the \\.\ prefix. For example, to reference COM12, enter* **\\.\COM12:** *(make sure that you add the colon)*

d. Select the **OK** button.

e. Select the **Close** button to return to the Add Printer Wizard.

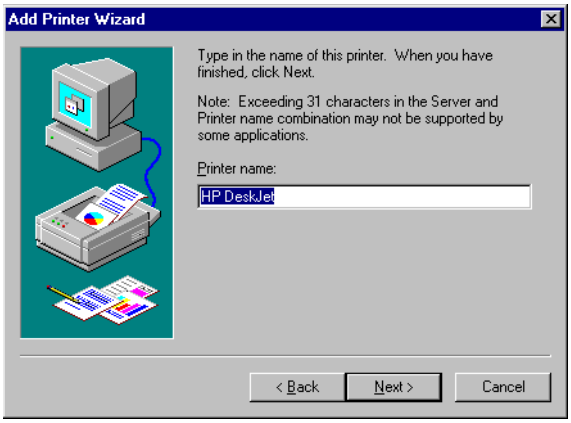
f. Select the **Next** button.



6. Select the printer make and model and select the **Next** button.

   If your printer is not on the make and model lists, but you have a manufacturer-supplied printer diskette, select the **Have Disk** button.

   If you have already installed another printer using this driver, you are asked if you want to keep the existing driver.



7. To keep driver: check **Keep existing driver**, select **Next,** and go to Step 8.

   If you choose **Replace existing driver**, or if you have not previously installed this driver, you are prompted to insert either the Windows NT CD-ROM or the manufacturer's printer diskette. Do so and select **Next**.

8. Select whether you want this printer to be the Windows NT default printer, and select on the **Next** button.

9. Select whether or not you want to share this printer with other computers on the network. If you select **Shared**, you are asked to indicate the operating systems of all the computers that will be sharing this printer. (You may also be required to insert the operating system media so that Windows NT can extract the necessary driver files.)
10. Select whether to print a test page and select on the **Finish** button.

    You are now ready to begin using the printer. No reboot is needed.

Changing Printer Port Configuration

If the printer does not successfully print the test page, it may be necessary to change the port baud rate, parity, and so on. If the Ports applet does not configure the port properly, you may have to use the **mode** command from a DOS prompt. Also, check the printer for DIP switches or other hardware configuration options.

Changing Printer Port Assignment

To change the port assigned to a printer, follow these steps:

1. Open the Printers control panel.
2. Right-click on the icon for the printer you want to change.
3. Select the **Properties** option from the menu. The *Properties* window is displayed.
4. Select the **Ports** tab.

   Note: *The **Properties** window also gives you access to printer test and setup options that can be very helpful when debugging a serial printer installation.*
5. Check the port you want to switch to. Remember to change your cabling accordingly.

   Note: *The* **Configure** *button on the **Ports** tab does not recognize Comtrol ports. This is a limitation of Windows NT. If you need to reconfigure the port, use the Ports option on the Control Panel.*
6. Select on the **OK** button. Any changes you make take effect immediately. No reboot is needed.

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Appendix C. Windows NT: Comtrol Tools

This section discusses the applications that are installed during the NS-Link driver installation, if you want to test or monitor the device.

- Test Terminal program (**wcom32.exe**), which can be used to troubleshoot communications on a port-by-port basis (*Using Test Terminal* on Page 99).
- Port Monitor program (**portmon.exe**), which checks for errors, modem control, and status signals (*Using Port Monitor* on Page 102). In addition, it provides you with raw byte input and output counts.
- Peer Tracer program (**peer.exe**), which traces driver events (*Using Peer Tracer* on Page 108).
- FreePort program, which frees a specified port, is bundled with the NS-Link assembly (*Using FreePort* on Page 109).

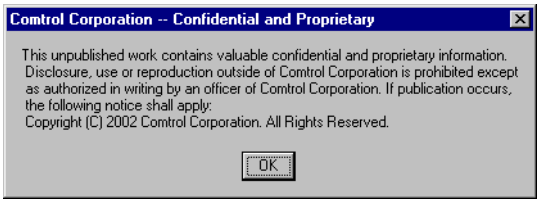
Using Test Terminal

WCOM32 is a terminal program that enables you to open a port, send characters and commands to the port, and toggle the control signals.

Note: *WCOM32 will **not** work on ports used by RAS **if Remote Access Service is running** or any other application using the port. If you are using RAS, you must stop the service before starting WCOM32 to test RAS COM ports. To test ports that are not used by RAS, you do not need to stop RAS.*

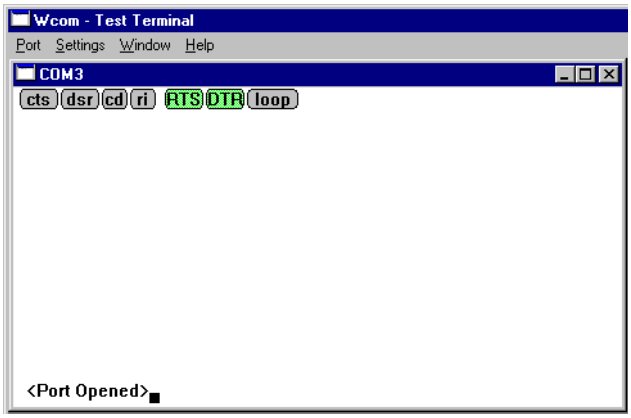
Follow these steps:

1. Start the Test Terminal from the **Comtrol Utilities** program group by selecting **WCOM32.exe**.
2. Select **OK** if this screen appears:



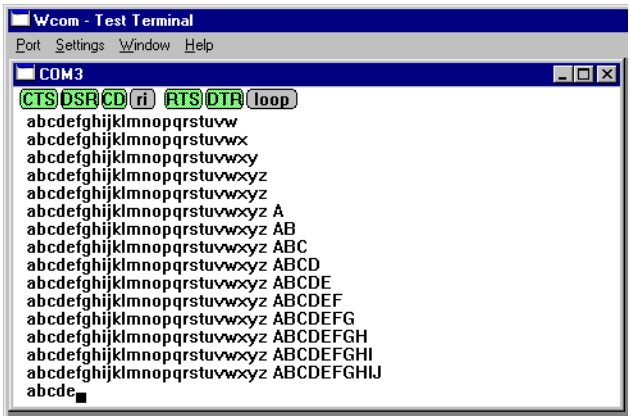
3. Select **Open Port** from the **Port** menu. A list of possible COM port numbers displays.

4. Select the COM port you want to test.



If the COM port does not exist or if it is currently being used by another program, a *Create File Error* message displays.

If the COM port is available, a **Test Terminal** window pops up:



Note: *Notice the <**loop**> button in the terminal window. If this option is activated, it is green and uppercase (LOOP), the COM port internal loopback feature is activated, and the data is returned by the COM port hardware. If this option is deactivated, it is gray and lowercase (loop), the internal loopback is deactivated, and the data is sent out the COM port.*

Testing a Comtrol Device

Use the following procedure to test the Comtrol device.

1. Place a loopback plug on the COM port you are testing. Make sure all connectors are seated firmly and that the loop button is **off**.

   Note: *The loopback plug works for RS-232 and RS-422 mode.*

   To build loopback plugs, see the hardware installation document for the Comtrol device.

2. From the **Port** menu, select **Send Test Data**. The program sends out a repeating data stream.

   Note: *To stop the data stream, select **Send Test Data** again.*

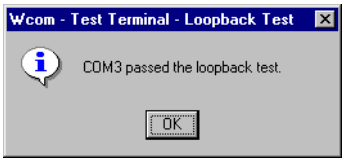
   - If the loopback plug is in place and the port is working correctly, the test data should be echoed back to the screen.
   - If the loopback plug is **not** in place or the port is not working correctly, no data or garbled data is echoed back to the screen.

   Note: *If no characters appear, insure that the loopback plug is attached to the correct port.*

3. If further testing is required, select **Loopback Test** from the **Port** menu.

Note: *The Loopback Test only works for ports configured for RS-232.*

If the loopback plug is in place and the port is working correctly, the system should return the message *Passed*.



If the loopback plug is not in place or the port is not working correctly, the system will return the message *Failed*.

Note: *If the port is set to RS-422 or RS-485 mode, the Loopback test will send a "Port failed loopback test" message.*

Testing a Comtrol Device (RS-485)

Perform the following procedure to determine if a port or ports are functioning properly.

1. Connect a straight-through cable from Port 1 to Port 2.

   Note: *See hardware installation documentation for the device if you need to build a cable. If testing ports other than Ports 1 and 2, simply connect the cable between any two ports.*

2. Open a session for each port.
3. Enter data into the Port 1 session, the data should appear in the *Port 2* window.
4. Enter data into the Port 2 session, the data should appear in the *Port 1* window.

   Note: *If the data appears as described in Steps 3 and 4, the hardware is functioning properly.*

Test Terminal Modem Control Signals

The **Test Terminal** window displays the modem control signals as gray or green lights at the top of the window. The first four are inputs:

The lights are green if they are turned on, or gray if off. The text on the light also changes from uppercase (CTS), which is on, to lowercase (cts), which is off.

The next two lights are outputs: 

Note: *If you have a loopback plug connected and you click on one of the outputs, the corresponding signal is sent to the input and the input lights should toggle accordingly.*

This test will only work if hardware handshaking is turned off.

Using Port Monitor

The Port Monitor program (**portmon.exe**) offers a summary of all Comtrol device statistics in one spreadsheet view. It also enables you to verify operation of all Comtrol device ports from a single window.

The Port Monitor display follows the familiar spreadsheet model: each COM port is a horizontal row, and each vertical column displays a variable or value for the respective COM port. For definitions of the abbreviations used, see *Port Monitor Variables* on Page 105.

Port Monitor can also produce statistics and reports that can help you verify the operation of the COM ports and connected peripherals. Some immediate feedback includes:

- The state of the modem control and status signals
- Open ports
- Raw byte input and output counts obtained from the device driver
- Port errors

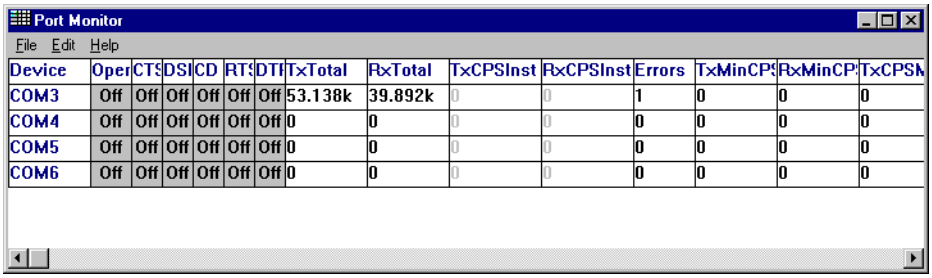
The available statistics include:

- Instantaneous characters per second (CPS) calculations
- Minute, hour, and day CPS averages and peaks
- Carrier detect (CD) signal runtime and transition count

Reports can be automatically generated on an hourly and/or daily basis, and can cover all ports collectively or a separate report for each port. You can also set how often the values are recalculated, fine-tuning thoroughness against system efficiency.

Starting Port Monitor

To run Port Monitor, select **Port Monitor** from the **Comtrol Utilities** program group. The **Port Monitor** window displays:



Note: *To change the appearance of the screen, see the following discussion.*

Once the monitor window displays, Port Monitor is active and collecting data. If any cumulative data has been saved from previous sessions, it is automatically brought in and used.

Port Monitor continues to run and collect data until you terminate it, at which point all accumulated data is automatically saved for use in the next session.

To reset all values back to zero, right-click on the upper left cell in the table and select Reset from the pop-up menu.

Changing Screen Appearance

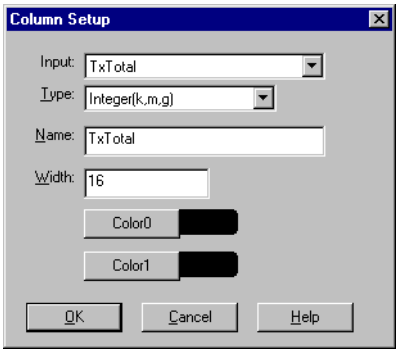
While Port Monitor is running, there are a number of commands and controls that change the appearance of the screen.

Desired Change	Procedure
Change the monitor window font.	Select **Font** from the **Edit** menu.
Change width of a single column.	Left-click on the column separator (vertical) line and drag it to the desired width.
Change column placement.	Left-click in the middle of the column you want to move and drag it to the desired location.
Remove a column.	Right-click on the column you want to remove and select **Remove** from the pop-up menu.
Clear all fields and reset them to null values.	Right-click on the upper left cell in the table and select **Reset** from the pop-up menu.*
Clear any single field *except* the upper left cell.	Right-click on the field to be cleared and select **Reset** from the pop-up menu.*
Add a column.	Right-click on the column now occupying the desired location and select **Add** from the pop-up menu. You are prompted to name the variable you want to display, as well as other information. (See *Column Setup*, below.) After you click **OK**, the column is inserted in the selected location and the existing column is moved to the right.
Change other properties of a column.	Right-click on the column and select **Properties** from the pop-up menu. (See *Column Setup*, below.)

* *The **Reset** command does not clear raw data from the **calcs.dat** file. It simply resets the selected display fields to their null values. For more information regarding **calcs.dat** see Port Monitor Files on Page 105.*

Column Setup

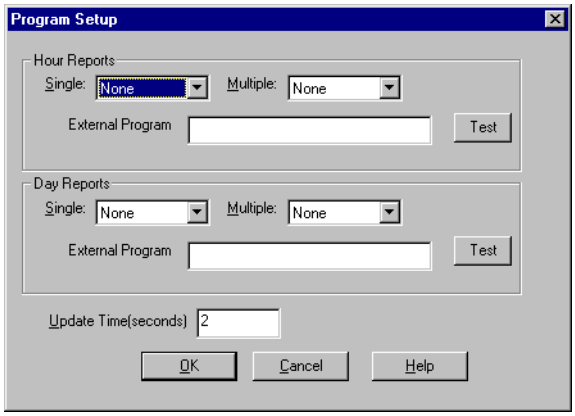
When you select **Add** or **Properties** from the column pop-up menu, the *Column Setup* window displays:



- Use the **Input** droplist to select the variable displayed in the column.
- Use the **Type** droplist to select the way in which the value displays: either as an integer, as an on/off state, as an integer with a kilo, mega, or giga suffix, or as an hh:mm:ss time stamp. This defaults to the appropriate type for the selected Input variable.
- Use the **Name** variable to change the column heading name.
- Use the **Width** variable to specify the column width in characters.
- Use **Color0** to set the column character color when the value is zero.
- Use **Color1** to set the column character color when the value is not zero.
- When done, click **OK** to save your changes and return to Port Monitor.

Report Configuration

To configure reports, select **Config** from the Edit menu.



The **Single** report options cover all ports and are overwritten each time the reports are generated. The **Multiple** report options generate a separate report for each port, and each report file is appended each time the report is generated.

For **Hour** reports, use the Single and Multiple droplists to select whether you are generating single or multiple reports, or both. For each report type, select from the following types of data to include:

- None: no report is generated.
- Hour Data: only variables with “Hour” in the name are included.
- All Data: all variables are included.
- View Data: only variables that appear on-screen are included.

The **External Program** field is used to enter a command line to run another program after the hourly reports have been generated. For example, you can use this to run a batch file that performs custom report processing. The **Test** button causes the command line to be executed immediately.

For **Day** reports, the single and multiple droplists behave the same, but your choices are:

- None: no report is generated.
- Day Data: only variables with the words “Day” or “Raw” in the names are included.
- All Data: all variables are included.
- View Data: only the variables that appear in the **Port Monitor** window are included.

Likewise, the **External Program** field is used to enter a command line to be executed after the daily reports have been generated.

The **Update Time** option allows you to set the rate at which the port information is obtained and the calculations performed. There is a trade-off between Port Monitor efficiency and response time. If you are using Port Monitor to view the port activity on the screen, you may want to set the update time to 1 or 2 seconds, so that the screen is updated frequently. If you are concerned about the monitor program using CPU resources, set this to a higher value, (6 to 20 seconds) in order to decrease the time required by the program to perform the calculations and update the screen.

If Port Monitor is left active to generate reports, minimizing or reducing the display area of the program will help reduce the CPU overhead of updating the screen.

Port Monitor Files

Port Monitor creates and uses the following files:

- **portmon.vew**
- **calcs.dat**

The default column layout is saved in **portmon.vew**. If you have been experimenting with the appearance of the monitor screen, you can use the File menu **Save** option to save your customized layout in another**.vew** file. You can retrieve this file later by using the File menu **Open** option, or you can use the Edit menu **View Default** option to retrieve **portmon.vew** and restore the default view.

All Port Monitor calculations are saved at program exit and on the hour in a binary file named **calcs.dat**. This enables you to halt Port Monitor execution without losing accumulated data.

Port Monitor also creates a **\REPORTS** directory. All hourly and daily reports are saved in this directory, under the following names:

- **hall.txt** — hourly single report
- **dall.txt** — daily single report
- **hcomx.txt** — hourly multiple reports, where *x* is the port number
- **dcomx.txt** — daily multiple reports, where *x* is the port number

Caution: *Since multiple reports append new data each time they are written, the multiple report files grow in size. It is up to you to delete them periodically.*

Some safeguards are built into the program to avoid filling up a hard disk drive due to growing report files. The monitoring program stops writing additional data to the multiple reports if they reach a size of 2 MB. Also, the program will not write out data files to the disk drive if the spare room on the drive is less than 2 MB in size.

To view or edit an hourly or daily report, use the Edit Report option on the File menu, or use a system tool such as NOTEPAD.

For more information, see the Port Monitor **Help** file.

Port Monitor Variables

The following table lists Port Monitor variables.

Variable	Description
Open	Open status, on if open, off if closed.
Cts	Input CTS pin status.
Dsr	Input DSR pin status.
Cd	Input CD (carrier detect) pin status.
Rts	Output RTS pin status.
Dtr	Output DTR pin status.
TxTotal	Total bytes transmitted.
RxTotal	Total bytes received.
TxCPSInst	Instantaneous average of transmit characters per second.
RxCPSInst	Instantaneous average of receive characters per second.
Errors	Total hardware receive errors (parity, framing, and overruns.)
TxMinCPS	Last minute average of transmit characters per second.

Variable	Description
RxMinCPS	Last minute average of receive characters per second.
TxCPSMinAvMax	Peak TxCPSInst for the last minute.
RxCPSMinAvMax	Peak RxCPSInst for the last minute.
TxCPSHourAvMax	Peak TxMinCPS for the last hour.
RxCPSHourAvMax	Peak RxMinCPS for the last hour.
TxCPSDayAvMax	Peak TxMinCPS for the last day.
RxCPSDayAvMax	Peak RxMinCPS for the last day.
TxTotalRaw	Total number of transmit bytes raw data from the device driver.
RxTotalRaw	Total number of receive bytes raw data from the device driver.
TxMinCnt	Count of transmit bytes sent in last minute.
TxHourCnt	Transmit bytes count sent in the last hour.
TxDayCnt	Transmit bytes count sent in the last day.
RxMinCnt	Receive bytes count sent in the last minute.
RxHourCnt	Receive bytes count sent in the last hour.
RxDayCnt	Receive bytes count sent in the last day.
TxMinCntWrk	Transmit bytes count sent in this minute.
TxHourCntWrk	Transmit bytes count sent in this hour.
TxDayCntWrk	Transmit bytes count sent in this day.
RxMinCntWrk	Receive bytes count sent in this minute.
RxHourCntWrk	Receive bytes count sent in this hour.
RxDayCntWrk	Receive bytes count sent in this day.
TxCPSMinAvMaxWrk	Peak TxCPSInst for the current minute.
TxCPSHourAvMaxWrk	Peak TxMinCPS for the current hour.
TxCPSDayAvMaxWrk	Peak TxHourCPS for the current day.
RxCPSMinAvMaxWrk	Peak RxCPSInst for the current minute.
RxCPSHourAvMaxWrk	Peak RxMinCPS for the current hour.
RxCPSDayAvMaxWrk	Peak RxHourCPS for the current day.
CDRuns	Carrier detect turn-on count.
CDDayRuns	Carrier detect turn-on count in the last day.
CDDayRunsWrk	Carrier detect turn-on count in the current day.
CDRunTime	Time in seconds carrier detect has been on.
CDHourRunTime	Time in seconds carrier detect has been on in the last hour.
CDDayRunTime	Time in seconds carrier detect has been on in the last day.
CDHourRunTimeWrk	Time in seconds carrier detect has been on this hour.
CDDayRunTimeWrk	Time in seconds carrier detect has been on this day.
StatusFlags	Bit flags, Open, CTS, DSR, CD, RTS, DTR

Variable	Description
TxPkts	Raw count of total transmit packets sent.
RxPkts	Raw count of total receive packets sent.
OverrunErrors	Total count of receive overrun errors.
FramingErrors	Total count of receive framing errors.
ParityErrors	Total count of receive parity errors.
OverrunErrorsRaw	Total count of receive overrun errors, from the device driver.
FramingErrorsRaw	Total count of receive framing errors, from the device driver.
ParityErrorsRaw	Total count of receive parity errors, from the device driver.

Using Peer Tracer

The **Peer Tracer** program (**peer.exe**) is specifically designed to view the internal operations of the device driver for the purpose of troubleshooting communications on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems. **Peer** enables you to see:

- Receive and transmit data
- Internal driver event traces
- Advanced configuration and status information

Like Test Terminal, **Peer** acts as a simple terminal session, and is used to send and receive text information to and from the device driver. To use **Peer**, you type in commands, and status and information are sent back.

Unlike Test Terminal, **Peer** enables you to keep a continuous log of the commands sent and the results received in a file named **peer.log**. Comtrol Technical Support may ask you to run **Peer** in order to help diagnose reported problems.

Starting Peer

Start **Peer** from the Comtrol Utilities program group by selecting **peer.exe**. The **Peer Tracer** window displays (at right).

Log Functions

All logging functions are found under the File menu. To start keeping a log, select **Log to Disk** from the File menu. The other options on this menu are View Disk Log, Clear Disk Log, Clear Screen, and Exit.

Using Peer

To use peer, simply type in commands at the **: prompt**. (It may be necessary to press **Enter** to make the **: prompt** appear.) For example, to examine COM5, type: **PORT COM5 <Enter>**

To gather some information about the port, type: **STAT <Enter>**. This should return details about the port.

To turn on monitoring of any calls into driver (events), type: **MON EV <Enter>**

To send strings and commands to attached peripherals—for example, to send "ATH0" to a modem—type: **SEND ATH0 <Enter>**. A return and linefeed are always appended to each string sent.

Other Peer Commands

Enter commands at the **:** prompt and follow each command with **Enter**.

Command	Effect
MON TX	Monitor data being transmitted through the selected port.
MON RX	Monitor data being received through the selected port.
M	Turn off all monitoring.
?	Display Peer Tracer command summary.
PORT COM*xx*	Change port being examined to COM*xx*.

Keep in mind that all commands are processed in the device driver, and that **Peer** simply acts as a conduit for this information. For more information, see the **Peer.hlp** help file.

Using FreePort

FreePort is an application utility that provides a simple mechanism to communicate to the NS-Link device driver that it should request the physical device to close the physical ports which are associated with the specified logical ports.

See the **Freeport.cpp** file (bundled with the driver) for a simple example on how other applications could implement this capability themselves. The **Freeport.cpp** file can be found in the **C:\WINNT\System32\RpshSi** subdirectory after driver installation.

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