NS-LINK

Installation and Configuration

Windows NT Operating System

COMTROL

Document Number: 2000190 Rev. C

Table of Contents

Overview

This subsection discusses the following topics:

- How to locate the latest version of the NS-Link device driver and related installation documentation.
- Information about NS-Link, such as:
    - Installation quick reference for experienced users.
    - NS-Link hardware, software, and device connectivity requirements.
    - IP or MAC addressing issues.
    - Overview of port sharing.

How to Use this Document

You can use the interactive *Table of Contents* to locate the information you need. Red, underscored items are links to URLs. Blue, underscored items are links within this document or to another document on the media.

Note: *If you copy this document from the ftp/web or CD and do not use the procedure discussed on the CD, you will get an error message when selecting hyperlinks outside of this document.*

Locating Hardware Installation Documentation

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

- *DeviceMaster RTS Hardware Installation and Configuration* or ftp://ftp.comtrol.com/Dev_Mstr/RTS/HW_Doc/RTS-Install.pdf.
- *RocketPort Serial Hub ia Hardware Installation* document or ftp://ftp.comtrol.com/RPSH_ia/HW_Doc/2000169.pdf).
- *RocketPort Serial Hub Si 2-Port Hardware Installation* document or ftp://ftp.comtrol.com/RPSH_Si/HW_Doc/2_Port/2000153A.pdf.

Locating NS-Link Software and Installation Documentation

You can download the latest NS-Link device driver updates at no charge from the Comtrol web site at: http://support.comtrol.com/download.asp. Always check the web or ftp sites 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.

NS-Link Installation - Quick Reference

If you are familiar with installing Comtrol software, you can use the following procedure as a quick reference:

1. Install the hardware.
2. Run the self-extracting NS-Link file.
3. If necessary, remove the existing NS-Link device driver.
4. Install NS-Link and the configure the port characteristics in NS-Link setup.
5. Shut down and restart the system.
6. If necessary, program the IP address into the device.
7. Connect your serial devices.

NS-Link Requirements

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

- DeviceMaster™ RTS

   Note: *Install the NS-Link driver if you want to use the ports as native COM ports. You can also configure the ports as sockets after the NS-Link installation.*

   If you want to configure the port for socket mode or serial tunneling, you do not need to install NS-Link. See the DeviceMaster RTS Installation and Configuration Guide *for socket configuration information.*

- RocketPort® Serial Hub *ia* or RocketPort Serial Hub *Si*

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

- Microsoft® Windows® NT 4.0, RAS or RRAS is required to support Remote Access Service and Microsoft supports up to 256 RAS ports.

- Windows Terminal Server and Citrix® MetaFrame®

Connectivity Requirements

An Ethernet connection, either to an Ethernet hub or to a network interface card (NIC) in the host system. See the hardware installation documentation (Page 5) for information regarding hardware installation.

Product Type	Connected to	Ethernet Cable	Connector
DeviceMaster RTS 1	Ethernet hub or NIC	Standard	10/100 ETHERNET
DeviceMaster RTS 1 Embedded	Ethernet hub or NIC	Standard	RJ45 port
DeviceMaster RTS 4/8/16 with external power supply	NIC	Standard	DOWN
	Ethernet hub	Standard	UP
DeviceMaster 16/32RM with internal power supply	Ethernet hub or NIC	Standard	10/100 NETWORK

Product Type	Connected to	Ethernet Cable	Connector
RocketPort Serial Hub *ia*	NIC	Crossover	Network
	Ethernet hub	Standard	
RocketPort Serial Hub *Si* (2-Port)	NIC	Crossover	10/100BASE-T
	Ethernet hub	Standard	

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 either method.

The IP addressing scheme has the following advantages:

- Uses an industry standard protocol.

- Allows you to configure systems to use ports on the Comtrol device that are outside of the host system's 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.
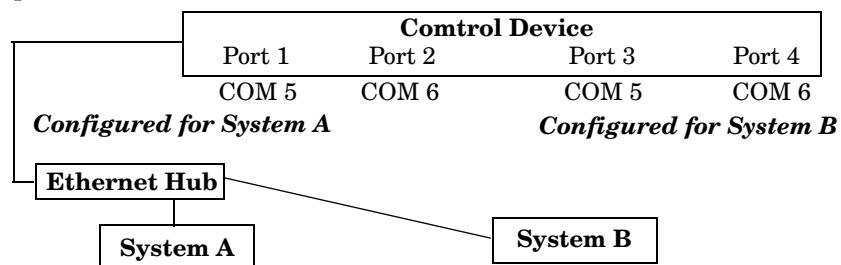
The MAC addressing method has the following advantages:

- 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.

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 or you can set up multiple systems to share specific ports on the Comtrol device.

Comtrol Device			
Port 1	Port 2	Port 3	Port 4
COM 5	COM 6	COM 5	COM 6

Configured for System A   *Configured for System B*

Ethernet Hub

System A   **System B**

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

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.

NS-Link Installation and Configuration

This subsection discusses the following installation and configuration issues:

- Removing an existing driver
- Installing the software
- Verifying the installation
- Programming the IP addresses
- Changing configuration parameters
- Adding additional Comtrol devices to an existing configuration
- Replacing devices

Removing an Existing Driver

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

*Note: Using the **Remove** button on the Comtrol Main Setup sheet only discards the software configuration, it does not remove the software.*

1. Right-click on the **Network Neighborhood**, and select **Properties**.
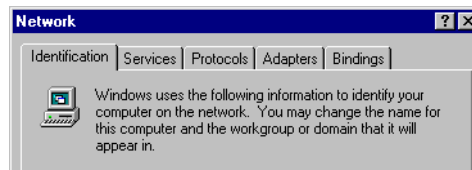
2. Select the **Adapters** tab.

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.

After removing the existing driver, use the following subsection to install a new version.
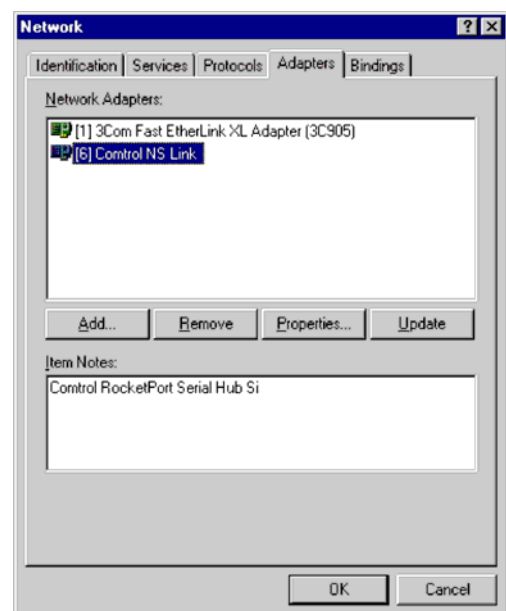
Installing the NS-Link Device Driver

Use the following procedures to install NS-Link for Windows NT 4.0 operating systems.

Note: *If updating NS-Link, first* remove *the existing version of NS-Link. Do* ***not*** *use the* ***Update*** *option.*

The following procedures assume that you have already:

1. Installed the hardware.

2. Determined that the hardware is working properly.

| Model	How to tell if the hardware is working properly:
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 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 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).

Model	How to tell if the hardware is working properly:
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).
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, 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* 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, it means that the device driver has loaded.* • Both **10/100BASE-T** LEDs are lit, which indicates a working Ethernet connection.

3. If necessary, unzip the self-extracting files from the Comtrol media or ftp/web site (*Locating NS-Link Software and Installation Documentation* on Page 5).
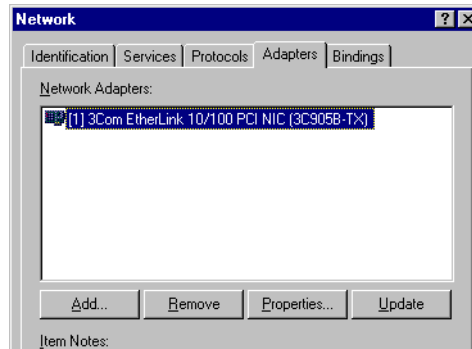
   Note: *The self-extracting zip file name has this format: **1800031#.exe**, where # represents an alphabetic version such as **E** or **F**.*

   Double-click on the file name and follow the Winzip wizard, which creates a subdirectory on your hard drive and extracts the files.
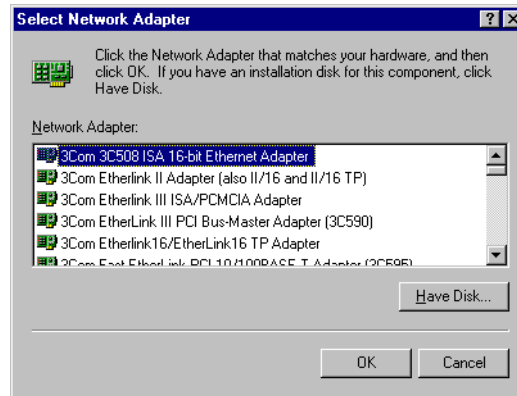
4. Right-click on the **Network Neighborhood**, and select **Properties**.
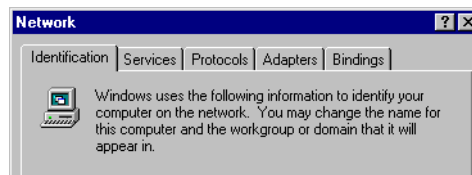
5. Select the **Adapters** tab and then the **Add** button.

6. Select the **Have Disk** button.

7. Enter the drive and directory path to the installation files and select the **Ok** button. For example, if you extracted NS-Link to a subdirectory named comtrol, enter: **c:\comtrol**
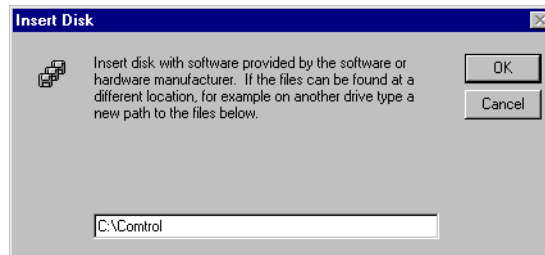
    Note: *This screen shot illustrates installing NS-Link from the default installation directory.*

8. Select the **Ok** button when the selection box appears with **Comtrol NS-Link** highlighted.
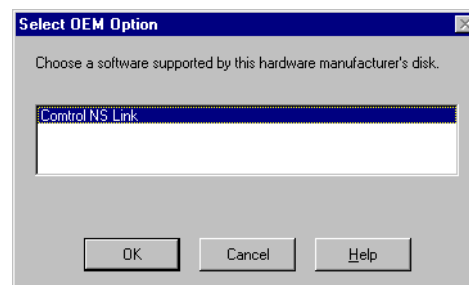
9. Select the **Next** button when the Add Device Wizard appears:

Note: The Add Device Wizard *also contains help for each window.*

10. Select the Comtrol device you are installing.

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

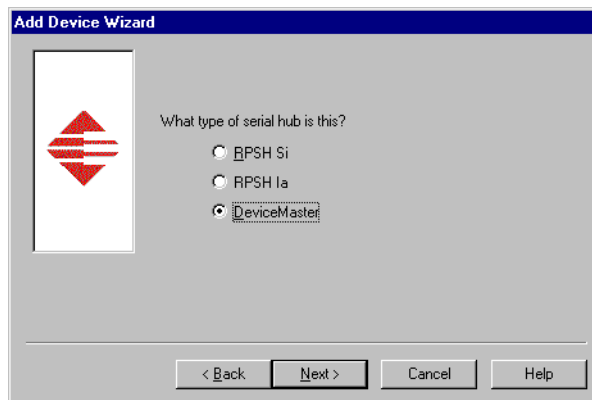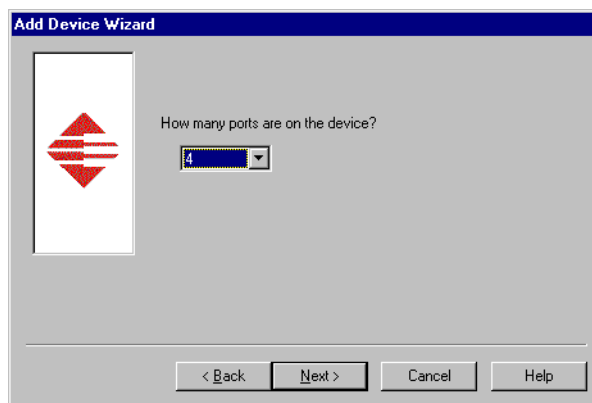12. Select the starting COM port number for each port you plan to use on this system, if you do not want to allow access to a specific port for this system, scroll up to **Not configured**. When configuring ports among several systems, they can share the same COM port name or be assigned a unique COM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

    Note: *This window is dependent on the number of ports on the device.*
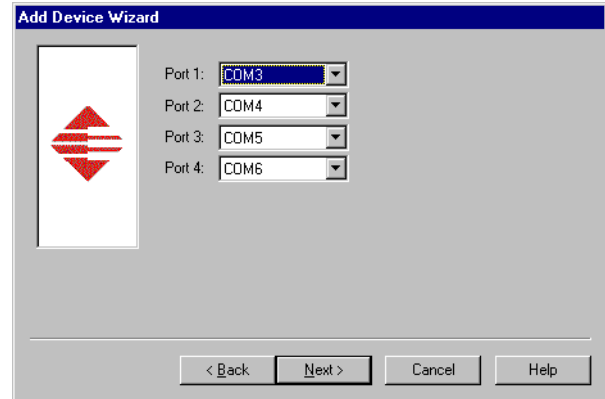
13. If this is the initial NS-Link installation and you have not programmed an IP address into the device, select **MAC.** If the device has been *previously* programmed with an IP address, you can select **IP**.

    Note: *If you want to use the device in an IP networking environment, you must first install NS-Link with a MAC address and then configure the IP address using the IP Programming tab (Page 21) in the NS-Link Device Properties window.*
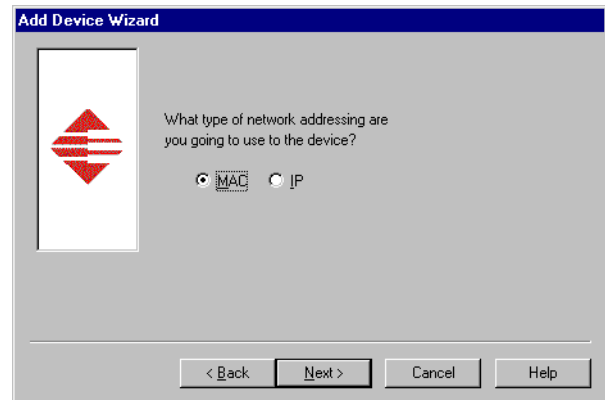
    a. If you selected **MAC**, enter the **MAC Address** of the device that you are installing and select the **Next** button.

    Note: *The MAC address label is on the device and the format is:* **00 C0 4E xx xx xx.** *A space must separate each two digits, as illustrated in the following screen shot.*

    If your site has other Comtrol network devices on the network, their MAC addresses will display in the drop list after initial installation.
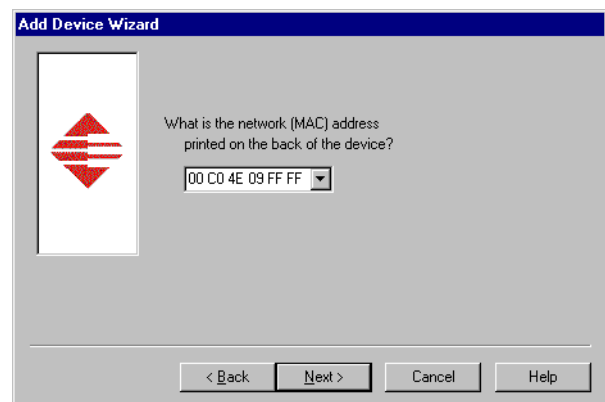
b. If you selected **IP**, enter a unique reserved IP address or a qualified domain name (DNS) and select the **Next** button.

Note: *If using DHCP or ARP, the administrator must reserve the MAC address of the Comtrol device to the IP address assigned to the device. If necessary, see your system administrator for a unique reserved IP address or qualified domain name.*
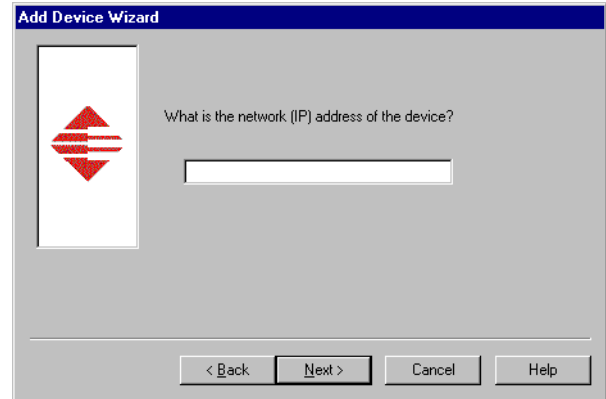
14. Select the **Finish** button when the following window appears:
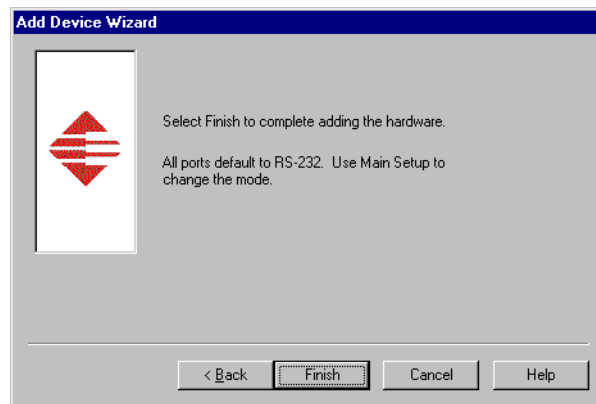
The **Device Properties** window appears after selecting the **Finish** button.
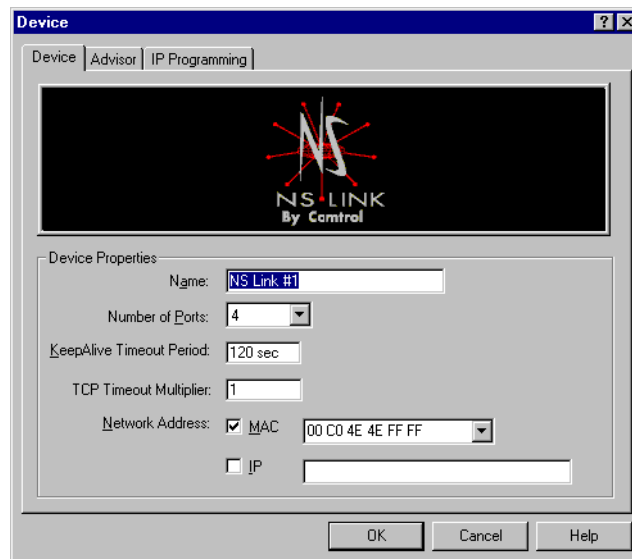
Note: *If you select IP address in the previous window, the window is similar to the MAC version displayed.*

15. Optionally, rename the NS-Link default name.

16. Verify the **Number of Ports** on the device.

17. Optionally, set a different **KeepAlive 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. The KeepAlive feature works in the following ways:

    • 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 and goes to the next signal. If a connection is broken, the data is stored in the computer and 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 has been 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.

        - When the computer loses its connection to the NS-Link device, and the time period expires, the device places the port into a state from which another computer can establish a connection, locking out the original driver when the connection is made. The driver will respond to all I/O commands, with the exception of the **Close** command, with an error indicating the disconnect status.

    If you need the ability to reconnect with a port that another system is currently using, Comtrol includes an utility called **FreePort** () and its source code which makes the API calls that would force a port closure. The included source code for **FreePort** demonstrates the calls an application would make to perform the same operation.

18. Optionally, set the **TCP Timeout Multiplier** value.

    Use the TCP 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. This timer defaults to 500 ms when the TCP/IP address method is being used to communicate with a device. If the TCP Multiplier is changed 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.

19. Verify the **Network Address**.

20. Select the **Ok** button. The NS-Link Setup window appears.

21. If you want to enable Verbose mode for Windows NT error messages or select a scan rate, select the **Options** tab. The Device Options window appears.
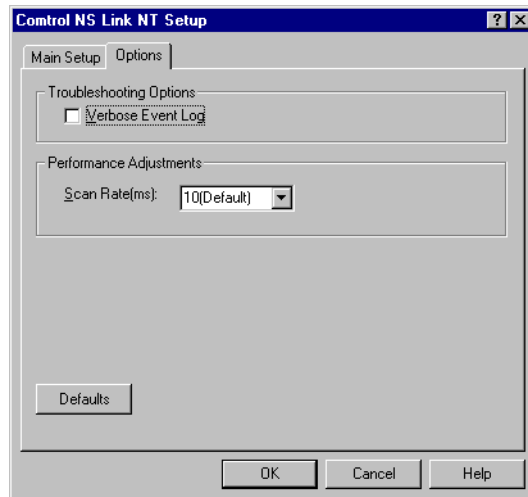
  a. Select the options you want to implement.

  Note: *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.

  b. Select the **Main Setup** tab.

22. Highlight the **COM port** that you want to configure and select the **Properties** button.

23. Select the appropriate RS mode to match the communications mode of the peripheral that you are connecting to that particular COM port.

24. Optionally, make any necessary changes to fit your environment:

    a. Lock the baud rate to access higher or lower rates than are normally permitted by your Windows NT applications.

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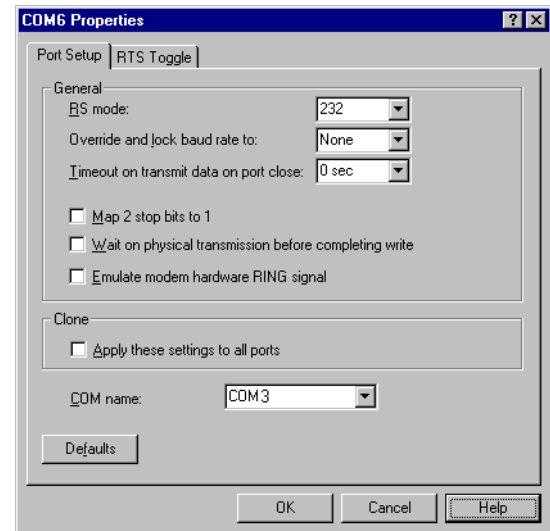
       Note: *You can select the length of time to wait for data to clear the transmit buffer, before a close request from a host application is completed. If data is still in the transmit buffer, you can set a delay time to allow the buffer to empty. This is typically used with slower peripheral devices such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

    c. Map 2 stop bits to 1.

       Note: *You can use this option 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.*

    d. Wait for physical transmission before completing write.

       Note: *Use this option 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.*

e. Emulate modem hardware ring signal.

Note: This emulates a hardware RI (ring indicator) signal.

f. Clone port settings.

*Note: If this box is checked, the changes you make in the general COM Properties window are applied to **all NS-Link ports in the system**.*

The check mark is not permanent. It is only visible until the COM Properties window is closed. Upon re-opening the COM Properties window, the check mark is not visible.

If this box is not checked, the changes you make to the Port Setup options apply to the selected port only.

g. If you need to configure RTS options, select the **RTS Toggle** tab.

h. Configure the port and select **Ok** after making the appropriate selections.

The Override and lock to RTS (Ready to Send) toggle mode option allows you to lock the port in RTS toggle mode, then set the mode (low or high) as desired.

The RTS Toggle RTS Low option allows you to toggle the RTS output signal low during data transmission. If the option box is not checked, RTS is toggled high (asserted) during data transmission.
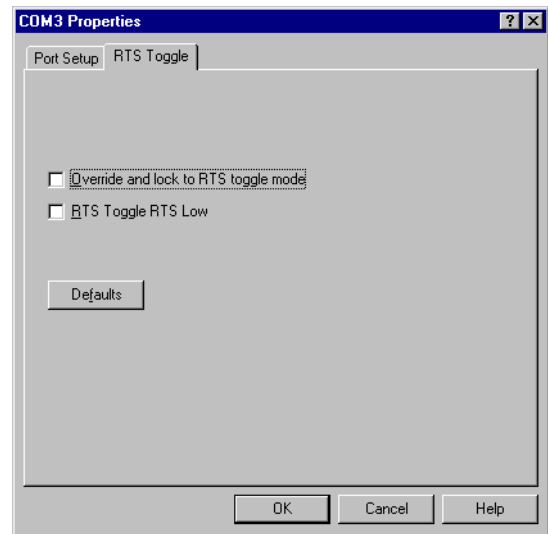
25. After configuring your port (COM) properties, select the **Ok** button. The Main Setup window returns.

26. If you did not clone all the COM ports, repeat Steps 22 through 25 until all of the COM ports that you want to use are configured.

27. Select the **Ok** button after you have configured each port.

28. To add another NS-Link device, highlight the first device and select the **Add** button. Follow Steps 9 through 29 to complete installation.

29. Select **Yes** to save the configuration and exit.

30. Select the **Ok** button to restart Windows.

31. Select the **Add** button if you want to add a device (from another manufacturer) at this time or the **Close** button in the Network window. See *Adding Devices After the Initial Installation* on Page 29 to install multiple Comtrol devices.

    Note: *You must configure at least one valid NS-Link Device.*

32. Select **Yes** to shut down and restart the system.

    Note: *Initial installation is not complete until you have rebooted the system.*

33. After rebooting, verify that you have a working installation.

    To verify your installation, test a port using Test Terminal (Page 31) or check the Device Advisor tab to see if the device is functioning properly (Page 39).

34. Go to the appropriate subsection to configure NS-Link for your installation.

    • To configure an IP address in the device, go to *Programming the IP Address* on Page 21.

    • To configure NS-Link in MAC mode to run efficiently, go to *Disabling DHCP Requests (MAC Mode)* on Page 19.
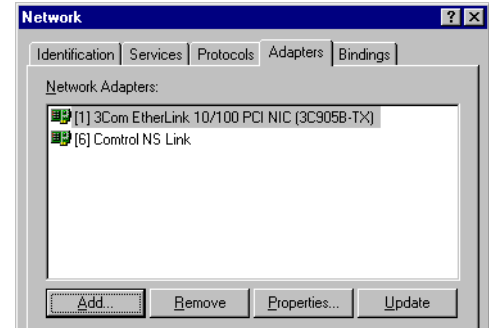
Disabling DHCP Requests (MAC Mode)

After installing NS-Link and restarting the system, you may want to disable the DHCP requests that are periodically sent from the device. Use the following procedure to disable DHCP requests sent from the Comtrol device.

1. Go to the **Start** button and select **Programs/Comtrol NS-Link/Comtrol Hardware Setup**.

2. Highlight the device name of the unit you want to program and select **Properties**.
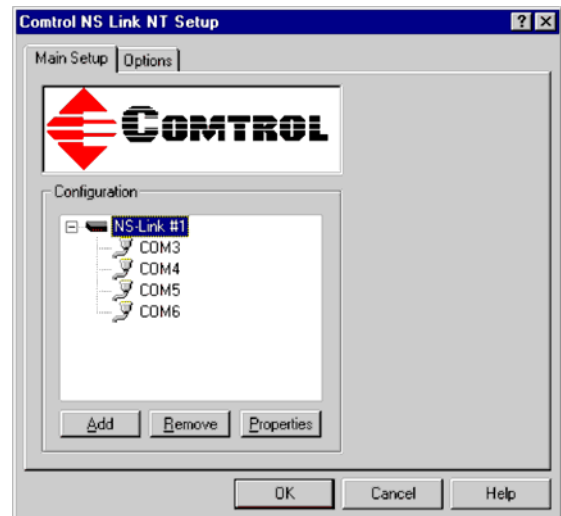
3. Select the **IP Programming** tab.

4. Select the **Disable** button.

   Note: *Not available on all NS-Link devices. If the button is greyed out, then this feature is not available.*

5. Select the **Reset button** and wait until the device reloads.

   Note: *The Comtrol device cycles its LEDs.*

6. Select **Ok** to close the Device window.

7. Select **Ok** to close the Properties window.

8. Set up modems or printers using *Windows NT Configuration Overview* on Page 45, if necessary.
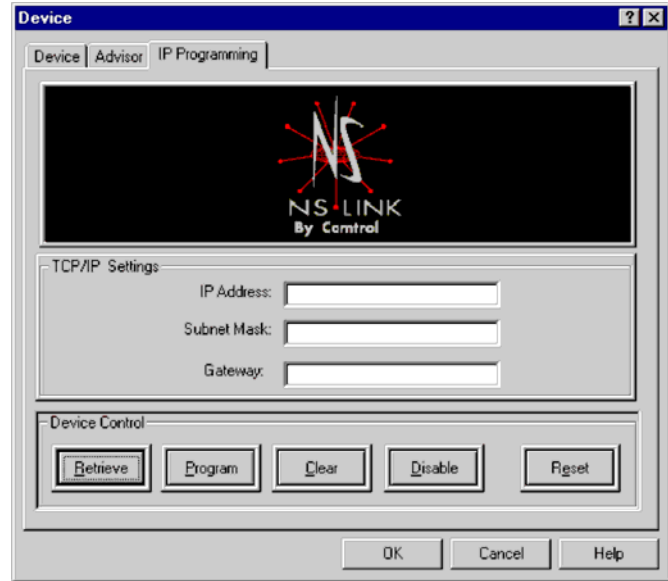
Programming the IP Address

After installing NS-Link and restarting the system, use the following procedure to program the IP address in the Comtrol device.

Note: To perform the following procedure, you must have previously entered the MAC address in the Device Setup tab and rebooted your system to access the device using the MAC address.

Programming the IP address can only done in a system that is operational in MAC mode. Verify that your ports are functional before proceeding using Test Terminal (see *Using Test Terminal* on Page 31).

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

1. Go to the **Start** button and select **Programs/Comtrol NS-Link/Comtrol Hardware Setup**.

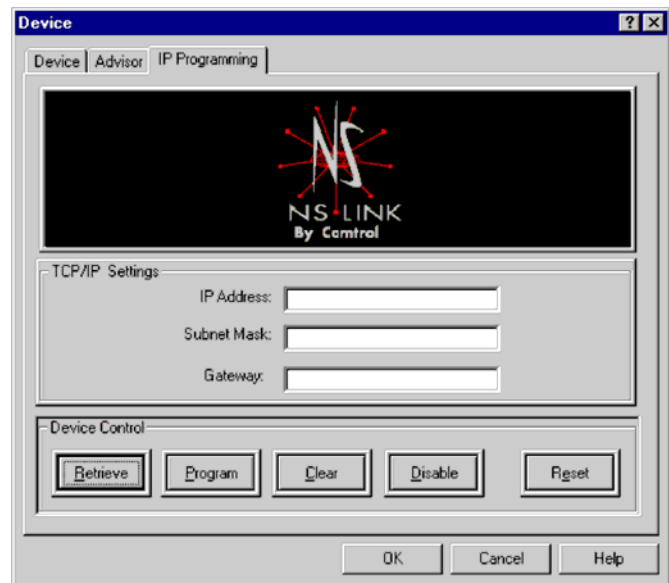2. Highlight the device name of the unit you want to program and select **Properties**.

3. Select the **IP Programming** tab.

4. Select the **Retrieve** button to check to see if the Comtrol device has been programmed with an IP address, gateway, and subnet mask.

5. Select the **Ok** button to retrieve the values.

6. If NS-Link *retrieves the values* assigned by the System Administrator, this means that the hardware has been previously configured and go to Step 21.
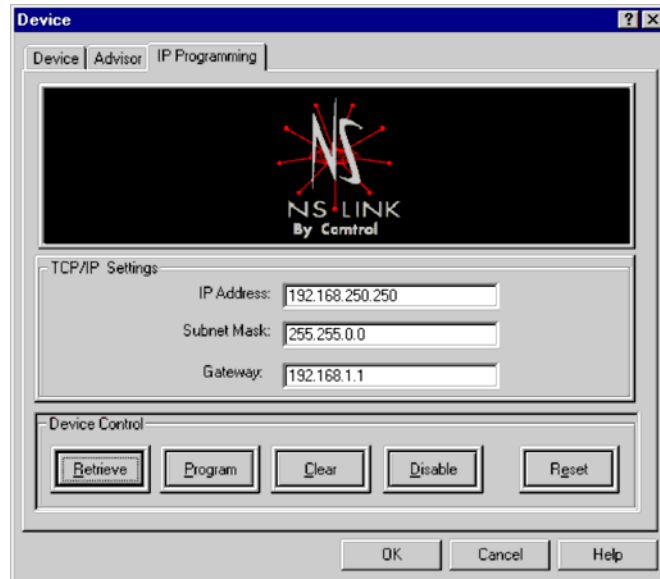
Note: The default address for the DeviceMaster RTS is 192.168.250.250.

If NS-Link returns *all zeros*, go directly to Step 7.

If NS-Link *did not retrieve the correct values* (not zeros):

a. Select the **Clear** button.

b. Select the **Ok** button to clear the IP programming in the device.

c. Select the **Ok** button to the *IP programming not complete until the device is reset* popup.

d. Select the **Reset** button and wait until the device reloads.

e. Repeat Steps 4 through 6

   Note: The Comtrol device cycles its LEDs.

7. Enter the **IP address**, **subnet mask**, and **gateway** values in the IP Settings area.

In the event that this unit is to be used on the same Ethernet segment as the PC that has NS-Link installed, the following options may be valid.

If you do not have an assigned gateway address to use, you may use as the gateway address the IP address of the PC that has the NS-Link driver installed. If necessary, execute **IPCONFIG** from a
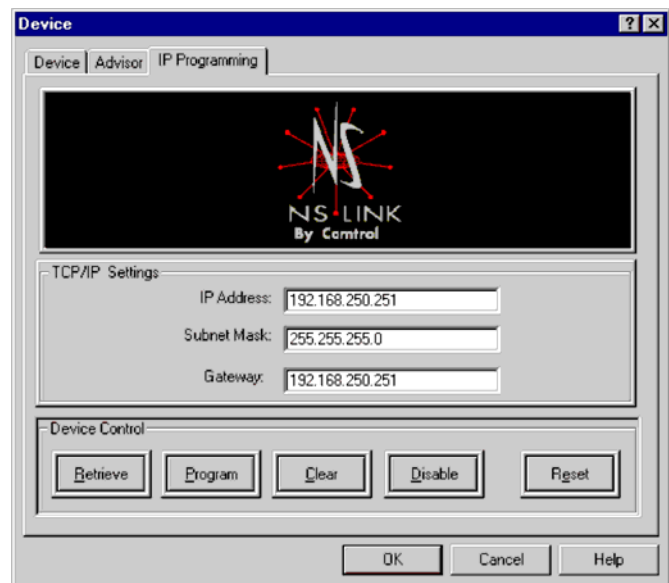
command prompt to determine your IP address. Use the address of the default gateway if shown.

If a default gateway is not shown, use the IP address displayed. The subnet mask value used in the Comtrol device should be the same as shown for the PC in this instance.

In the event that this will be used on another Ethernet segment, the IP address, subnet mask and gateway must be configured appropriately for that Ethernet segment. If you are unsure of these values, contact your system network administrator.

If you program the Comtrol device for a different Ethernet segment, after you put the IP address into NS-Link, you will be unable to use the device until it is physically connected to that network due to not having appropriate routing.
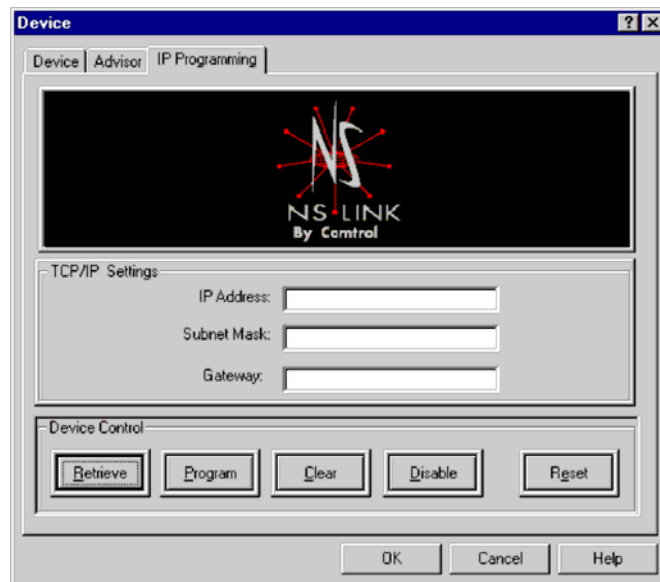
8. Select the **Program** button.

9. Select the **Ok** button to begin programming the device.

10. Select the **Ok** button to the *IP programming not complete until the device is reset* popup.

11. Delete the contents of the IP Address, Gateway, and Subnet Mask fields.

12. Select the **Reset** button.

13. Select the **Retrieve** button.

14. Select the **Ok** button to retrieve IP programming from the device.

15. Verify that the information that loads into the IP Address, Gateway, and Subnet Mask fields matches the information that you previously entered.

If not, re-enter the IP Address, Gateway, and Subnet mask information and repeat Steps 8 through 13.

16. If you are not using DHCP or ARP, then select the **Disable** button.

    Note: Not available on all NS-Link devices. If the button is greyed out, then this feature is not available.
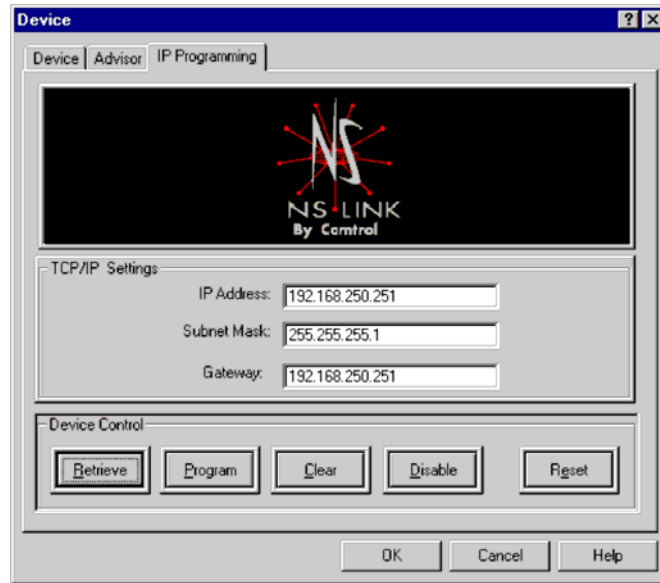
17. Select the **Reset** button to soft boot the device.

    Note: The Comtrol device cycles its LEDs.

18. Select the **Ok** button to reset the entire device.

19. Select the **Device** tab.

20. Uncheck the **MAC** box and then check the **IP** checkbox.
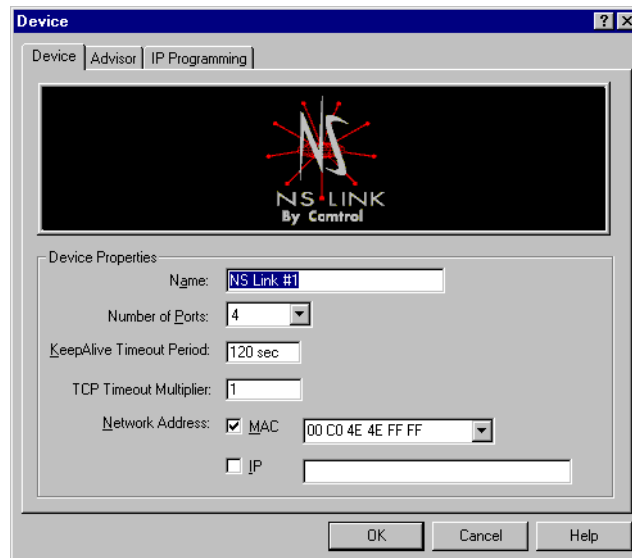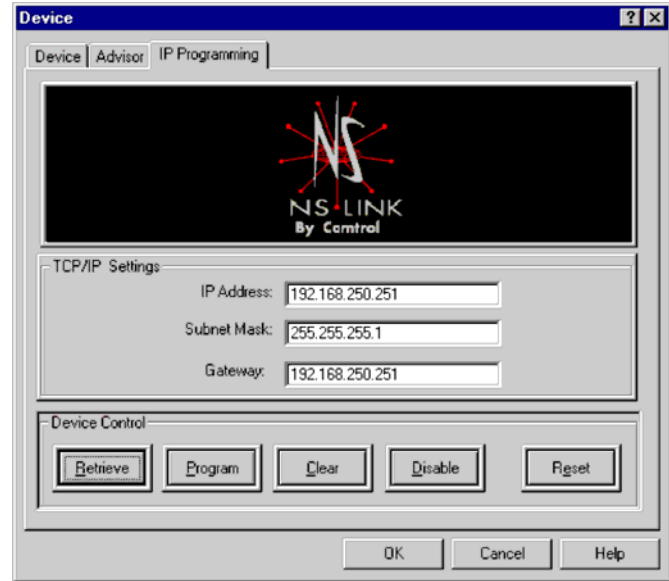
21. Select the **Ok** button to close the Device window.

22. Select the **Ok** button to close the Setup window:

23. Save the configuration changes and exit.

24. Reboot the system and verify that the device is running properly using Step 33 on Page 19.

25. Connect your serial devices to the Comtrol device. If you need information about connecting your serial devices, see *Locating Hardware Installation Documentation* on Page 5 for your product.

26. Set up modems or printers using *Windows NT Configuration Overview* on Page 45, if necessary.

27. *DeviceMaster RTS*: If you want to configure any of the ports as sockets:

    a. Enter the IP address of the device in your web browser URL field.

    b. Select the port number that you want to configure as a socket.

    Note: See the DeviceMaster RTS Installation and Configuration Guide, *if you need help configuring sockets. You can download the latest version at:* ftp://ftp.comtrol.com/Dev_Mstr/RTS/RTS_Library.pdf.

Changing Configuration Parameters

Use the following procedure to change the:

- NS-Link properties, such as:
  - Name of the Comtrol device
  - Keepalive timeout period
  - Number of ports being used by this host system
  - TCP Multiplier value
  - Network address

  Note: *You can change the network address type by clicking on the current checkbox type, followed by placing a check in the other network type and entering the appropriate address. If replacing hardware, you have to change the MAC address. If necessary, see* Programming the IP Address *on Page 21.*
  - Device options, for example, Verbose mode or using a scan rate.

- COM port properties, such as the port mode (RS-232, RS-422, or RS-485) and application-related options discussed in Step 23 of the installation process.

> ⚠️ **Caution**
>
> *Before changing the communications mode in NS-Link for an existing port, make sure that you disconnect the peripheral device from the port.*

Use the following procedure to change configuration parameters.

1. Select the **Programs/Comtrol NS-Link/Comtrol Hardware Setup** option from the **Start** button.

2. To change the NS-Link properties for the device (name, number of ports, or network address) **highlight** the device name and select the **Properties** button.

3. Make the desired changes and select the **Ok** button.

4. To change device options (Verbose mode or scan rate), select the **Options** tab, make the changes, and toggle back to the Main Setup tab.

5. To change port configuration, **highlight the COM port** that you want to change and select **Properties**.

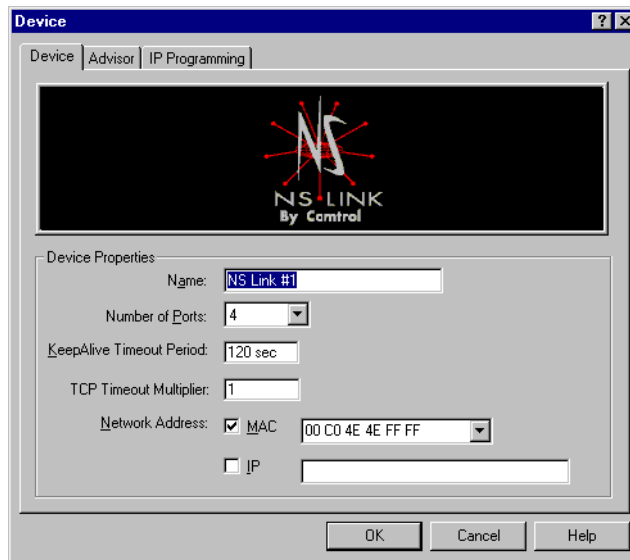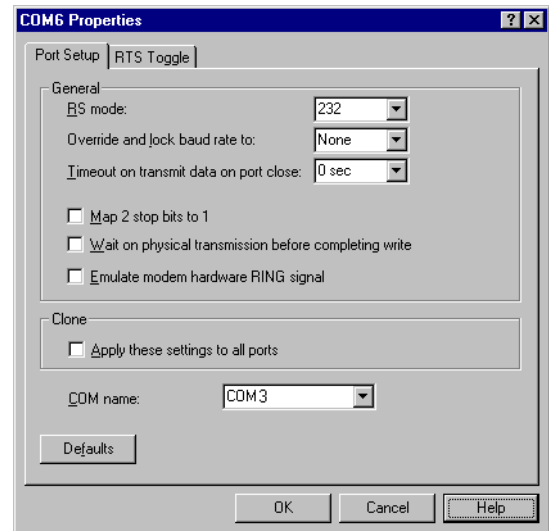6. Make the **port configuration changes** and select the **Ok** button.

   a. Before changing the communications mode in NS-Link for an existing port, make sure that you disconnect the peripheral device from the port.

   b. If you change the mode of the port, select **Ok** to the popup regarding changing the mode of connected devices:

7. Select **Ok** to save your configuration changes.

Note: *Depending upon the type of configuration changes you made, you may or may not need to reboot your system. The driver will prompt you to save the changes, if necessary.*

8. Select **Yes** to save the configuration and exit.

9. Select the **Ok** button to restart windows.

Adding Devices After the Initial Installation

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, use *Installing the NS-Link Device Driver* and start with Step 9 (Page 12).

6. Reboot the system so that the new device initializes.

Replacing NS-Link Devices

On occasion, it may be necessary to replace an existing and configured Comtrol device with an identical device, without downing the system or reconfiguring ports. To do so, follow these steps:

1. Shut off the old device, connect all cables to the corresponding ports on the spare device, and power up the new device.

   ⚠️ **Caution** — *Make sure that you re-cable the spare exactly like the original. A remote chance exists that you could damage a peripheral if it is incorrectly connected to a port configured for the wrong communications mode.*

2. Write down the Network (MAC) Address of the spare device on the customer service label provided.

3. Select the **Programs/Comtrol NS-Link/Comtrol Hardware Setup** option from the **Start** button.

4. Highlight the name of the NS-Link device that you want to swap out and select the **Properties** button.

5. Enter the new network (MAC or IP) address of the new Comtrol device.

   Note: *Leave all other properties the same.*

6. If necessary, program the IP address (Page 21).

7. Select **Ok** to exit the Device window and **Ok** to exit NS-Link Setup window.

8. Select **Ok** to save the new configuration.

The new device immediately replaces the old one under the old device's device name.

Note: *Restarting the system is not needed.*
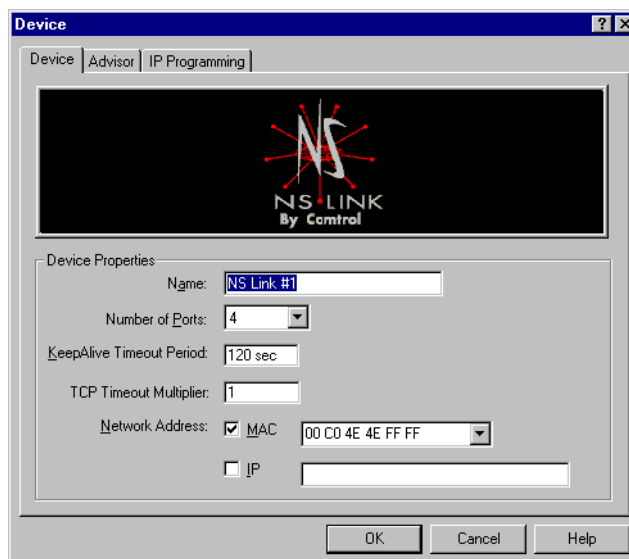
Comtrol Tools

This section discusses the following utilities that are installed with most Comtrol drivers for Microsoft operating systems:

- Test Terminal program (**wcom32.exe**), which can be used to troubleshoot communications on a port-by-port basis (*Using Test Terminal* on Page 31).
- Port Monitor program (**portmon.exe**), which checks for errors, modem control, and status signals (*Using Port Monitor* on Page 33). In addition, it provides you with raw byte input and output counts.
- Device Advisor, which helps identify problems is a tab in the **Device** window of the NS-Link driver (*Using the Device Advisor* on Page 39).
- Peer Tracer program (**peer.exe**), which traces driver events (*Using Peer Tracer* on Page 42).

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 is 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 **Test Terminal** from the Comtrol program group for your product.

Product	Operating System	Program Group
RocketModem and RocketPort	Windows 98, Windows NT	Comtrol RocketPort RocketModem
RocketModem and RocketPort	Windows 2000, Windows XP	Comtrol Utilities
DeviceMaster RTS, RocketPort Serial Hub *ia*, and RocketPort Serial Hub *Si*	Windows 98, Windows NT, Windows 2000, Windows XP	Comtrol NS-Link

2. Select **Ok** if this screen appears:
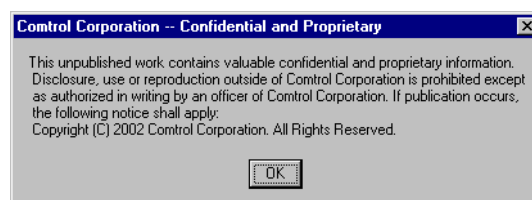
3. Select **Open Port** from the **Port** menu. A list of possible COM port numbers displays.

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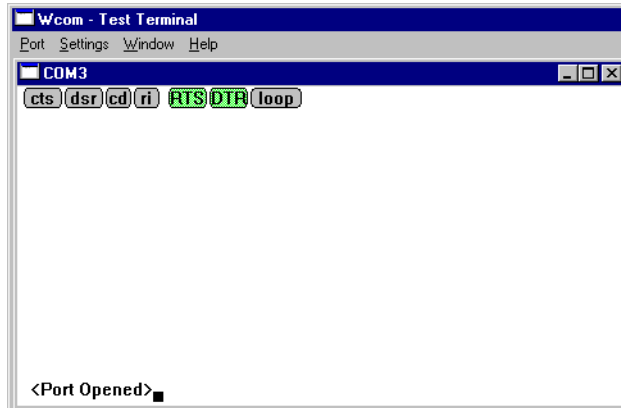
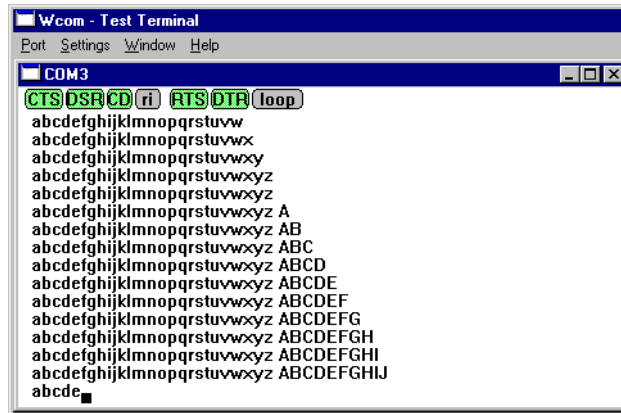If the COM port does not exist or if it is currently being used by another program, a *Create File Error* message displays.

If the COM port is available, a 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: *Test terminal 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.*

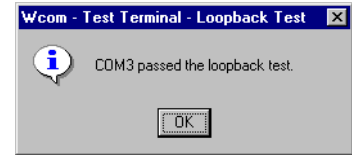3. If further testing is required, select **Loopback Test** from the **Port** menu.
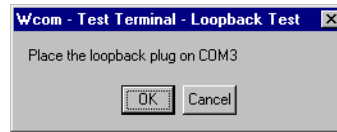
If the loopback plug is in place and the port is working correctly, the system should return the message *Passed*.

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

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 the hardware installation document for the Comtrol 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 terminal window displays the modem control signals as gray or green lights at the top of the window. The first four are inputs: [cts] [dsr] [cd] [ri]

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: [RTS] [DTR]

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.*

The rightmost light is the loop indicator: [loop]

If this is on, the COM port internal loopback feature is activated and any information or code entered in the terminal window loops back through the COM port circuitry. If this is off, the COM port internal loopback is deactivated, and any information or code entered in the terminal window is sent out of the port.

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 37.

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
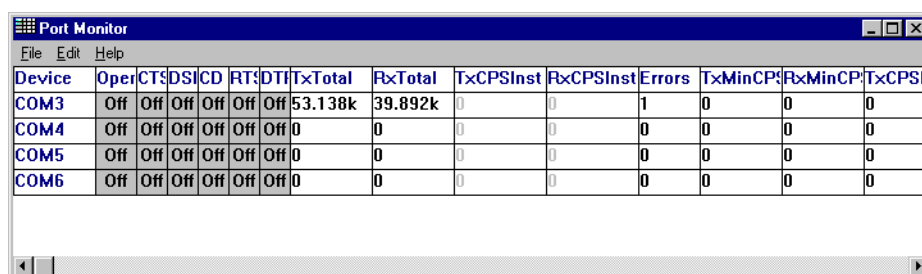- Carrier detect (CD) signal runtime and transition count

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, and automatically run external batch files to perform additional processing and analysis.

Starting Port Monitor

To run Port Monitor, select **Port Monitor** from the appropriate Comtrol program group.

Product	Operating System	Program Group
RocketModem and RocketPort	Windows 98, Windows NT	Comtrol RocketPort RocketModem
RocketModem and RocketPort	Windows 2000, Windows XP	Comtrol Utilities
DeviceMaster RTS, RocketPort Serial Hub *ia*, and RocketPort Serial Hub *Si*	Windows 98, Windows NT, Windows 2000, Windows XP	Comtrol NS-Link

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.

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 Page 36.*

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.
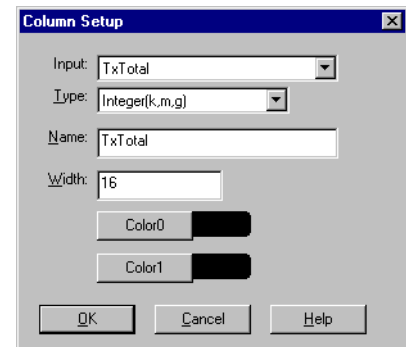
Report Configuration

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:

Program Setup

Hour Reports
- Single: None   Multiple: None
- External Program [   ]   Test

Day Reports
- Single: None   Multiple: None
- External Program [   ]   Test

Update Time(seconds) [2]

[OK]   [Cancel]   [Help]

- 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.
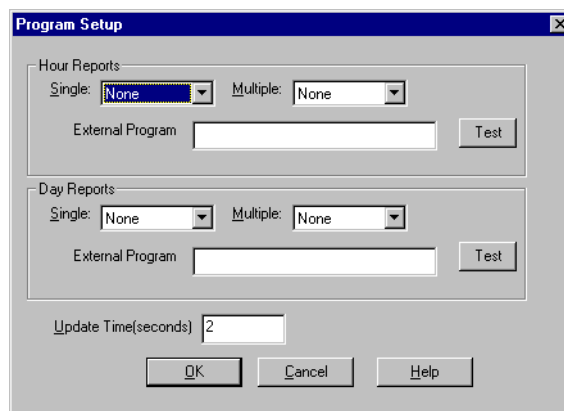
Port Monitor Files

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.
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.

Variable	Description
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
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.

Variable	Description
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 the Device Advisor

You can use the Device Advisor to determine the following information:

- Summary of the device status
- The MAC address of the network interface card (NIC)
- The Adapter ID string
- The Comtrol device's MAC address
- Detailed state of the Comtrol device
- Total number of successful load attempts
- Total number of devices on the network
- Transmit statistics, such as the number of:
    - Frames out
    - Packets to device
    - Retransmitted frames
- Receive statistics, such as the number of:
    - Frames accepted
    - Frames passed on
    - Packets from device
    - Out of sequence frames

Note: *For detailed information about the fields in the Device Advisor, use the on-line help available in the application.*

Starting the Device Advisor

Use the following procedure to access the Device Advisor:

1. Start the **NS-Link** menus using the **Start** button.

2. Highlight the device that you want to review and select the **Properties** button.

3. Click on the **Device Advisor** tab.
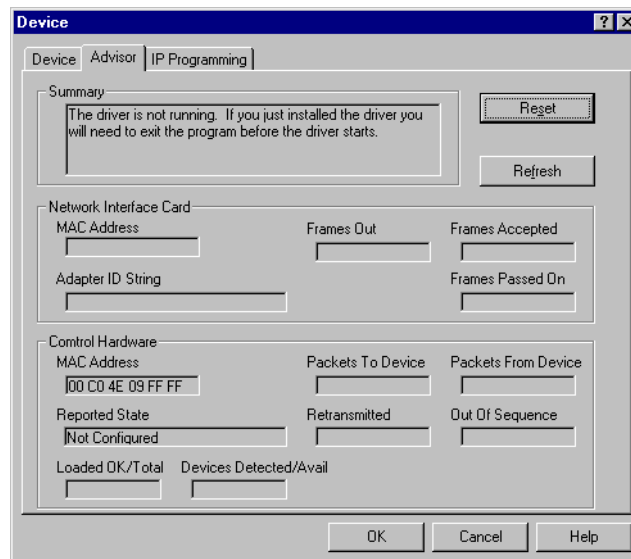
The Device Advisor screen appears providing you with information that you may find useful.

Note: For information about the fields in the Device Advisor, use the on-line help available in the application.

Device Advisor Driver Messages

The following tables provide information about device driver summary messages and reported state messages.

Message	Description
Unintialized	Comtrol device has not been installed correctly.
Unable to contact the NS-Link driver	The Comtrol device NS-Link is not installed or is not responding to Device Advisor requests.

Message	Description
Unable to contact a Network Interface Controller (NIC)	The server NIC card may not be installed, may be malfunctioning, or may not be bound to the Comtrol device.
Cannot detect network	No inbound traffic of any sort Comtrol device may be inoperative or you may have a network cabling problem.
Cannot detect any NS-Link.	Network traffic is being received, but not from a Comtrol device. Check the network connections and verify that the Comtrol device is powered up.
Cannot detect NS-Link with specified MAC address.	Network traffic is being received from a Comtrol device, but not the one specified in Device Setup. Check the device to make sure that you are using the correct MAC address in Device Setup, and check the Main Setup window to verify that you are working with the correct device.
NS-Link device with specified MAC address was detected, but is not configured for this server.	Either the Comtrol 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, return to the Setup window, save and exit, and restart the server
NS-Link device detected and configured for this server, but is not yet assigned to this server.	Either the Comtrol 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.
NS-Link detected, initializing.	The server has acquired the Comtrol device and is downloading the control program. The device will be available shortly.
NS-Link responsive, but no data traffic exchange since last inquiry.	The Comtrol device appears to be installed correctly and active, but no data traffic has been sent or received since the last time you clicked the **Refresh** button. If there should have been traffic, check the Comtrol device port configuration and external cabling.
NS-Link responsive; data traffic received, but nothing sent since last inquiry.	Similar to above, except the Comtrol device has received data successfully.
NS-Link responsive; data traffic sent, but nothing received since last inquiry.	Similar to above, except the Comtrol device has sent data successfully.
NS-Link active.	Normal state: the Comtrol device is installed correctly and active with data traffic.
Poor connection to NS-Link.	This message displays if retransmissions occur, frames arrive out of sequence, or more than 2% of the total packets arrive out of sequence. This generally indicates a cable, connector, or LAN termination problem.
Counts reset.	This message displays immediately after you click the **Reset** button.

Message	Description
Invalid	An illegal Comtrol device state has been detected. Reset the Comtrol device.
Init	This is the normal state for undetected and inactive Comtrol device.
InitOwn	The server has acquired the Comtrol device but has not downloaded the control software.
SendCode	The server has acquired the Comtrol device and is in the process of downloading the control software.
Connect	The server has completed the download and is completing initialization.
Active	The normal state for a Comtrol device that is attached to a server and is ready for data traffic.
Not found	The specified MAC address is not configured on this server.
Undefined	No Comtrol devices are configured on this server.

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, and Windows XP 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

Peer Tracer does not appear in most Comtrol program groups and you may need to start the application from the Windows Explorer. Use the table below to determine whether you can start **Peer** from a program group or where to locate the executable.

Product	Operating System	Starting Peer
DeviceMaster RTS, RocketPort Serial Hub *ia*, RocketPort Serial Hub *Si*	Windows NT, Windows 2000, Windows XP	**\WINNT\system32\rpshSi\peer.exe**
RocketModem and RocketPort	Windows NT	**\WINNT\system32\rocket\Peer.exe**
RocketModem and RocketPort	Windows 2000, Windows XP	Comtrol Utilities

To start Peer, you may need to open the **Windows Explorer**, access a specific directory, and double-click on **peer.exe** or start **peer** using the Comtrol Utilities program group. 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.

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 *Locating Hardware Installation Documentation* on Page 5.

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.

---
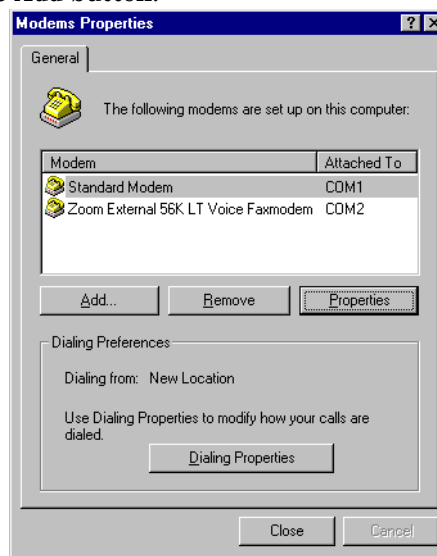
5. Check the "Don't detect my modem..." box and select **Next**.
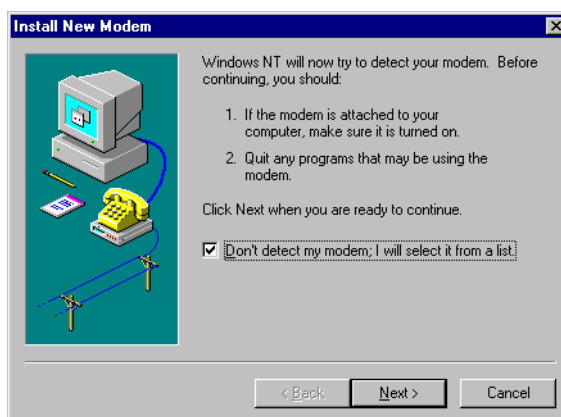
> *Note:* *While Windows NT can automatically detect modems, we advise against using this option as auto-detect feature may cause some multiprocessor systems to lock up, and the modems may be installed in reverse order.*

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.
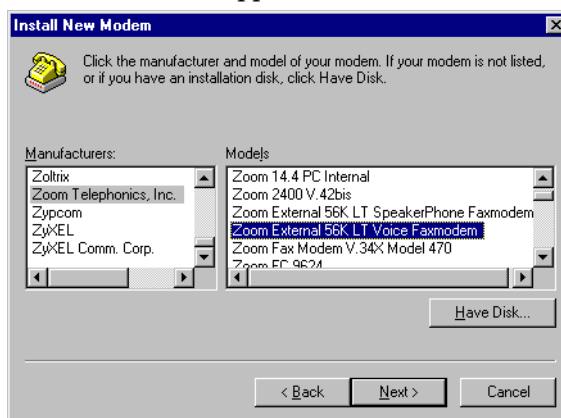
7. Select the COM port number.
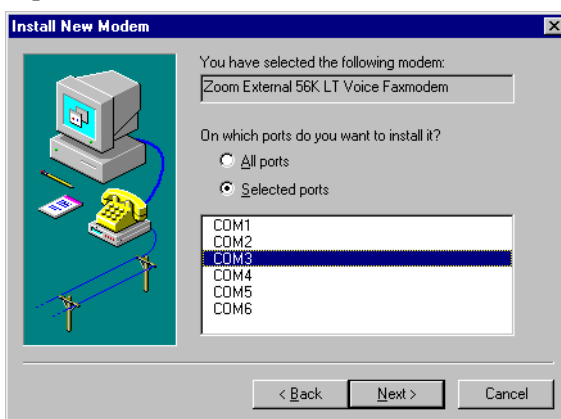
8. Select **Finish**. The modem software is installed on the selected ports.
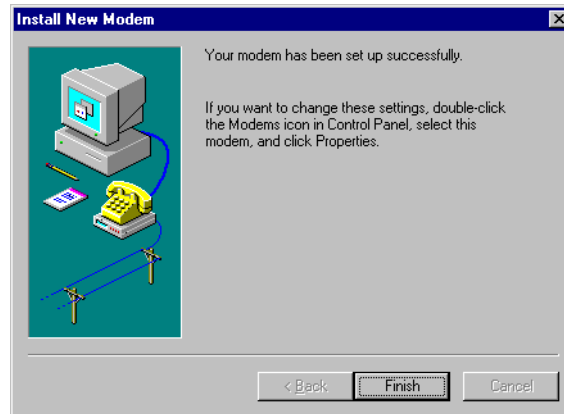
Depending on prior configuration, you may be asked to enter your country of use, area code, the number you dial to get an outside line, and whether you have tone or pulse dialing at this time.

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**.
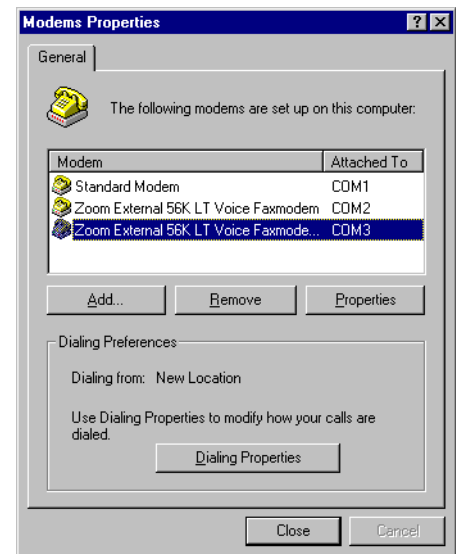
Further Modem Configuration

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 48.
- If you already have RAS installed and configured, this dialog box displays.
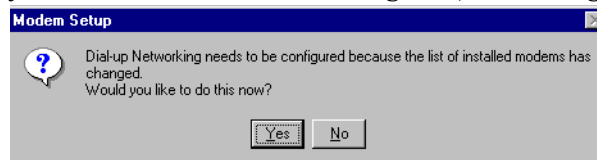
If you do *not* want to configure this modem for use with RAS at this time, select **No**, then reboot and resume normal operations.

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 49

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.
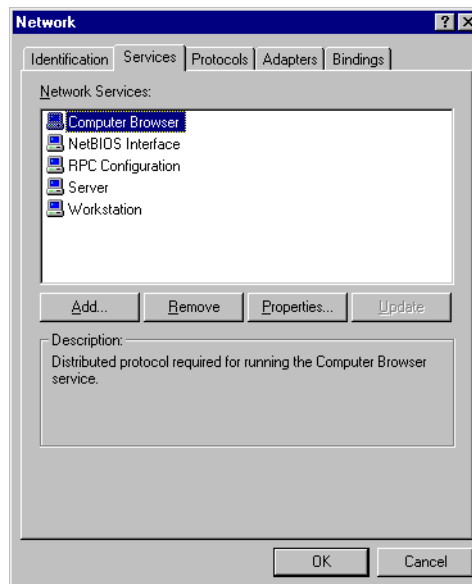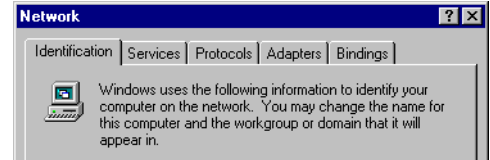
3. Highlight **Remote Access Service** and select the **OK** button.
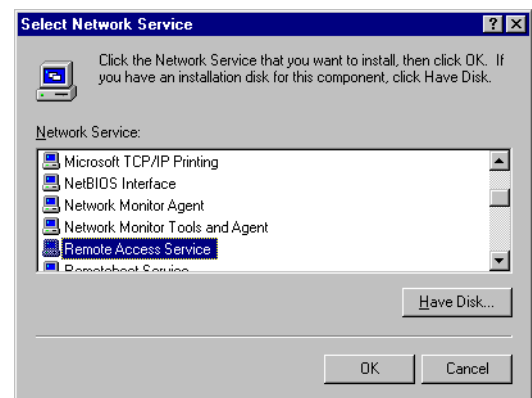
4. Enter the location of the Windows NT files (for example, **d:\i386**) and press the **Continue** button.

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 49, <u>Step 5</u>.
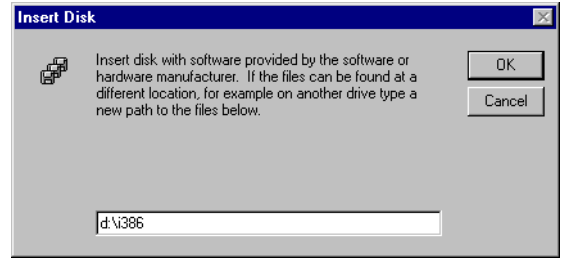
Note: *If you install or reinstall RAS from your original Windows NT 4.0 distribution media, you must install or reinstall the latest Windows NT Service Pack* **after** *installing/reinstalling RAS. This is necessary because most Service Packs include RAS-related files that are newer than the files on 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 <u>Step 1</u>.

• If you have previously installed RAS and were in the process of installing a modem when this process started automatically, begin with <u>Step 3</u>.

• If you were in the process of installing RAS when this process started automatically, begin with <u>Step 5</u>.

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.
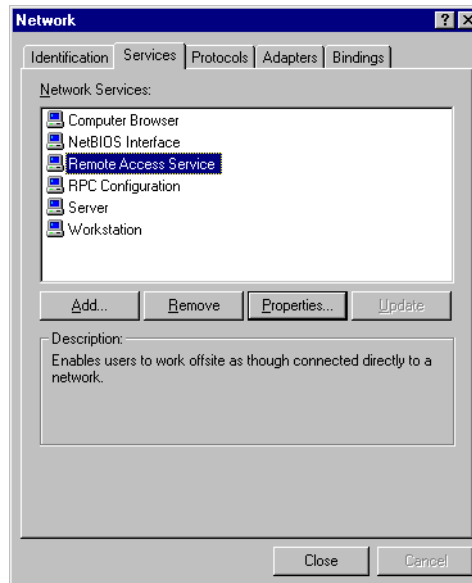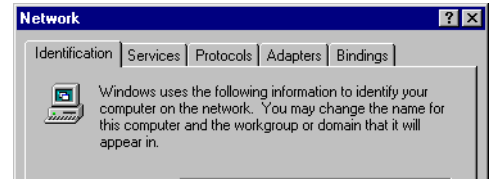
4. To reconfigure an existing RAS port, highlight the port/device and select the **Configure** button. Then go to Step 7.
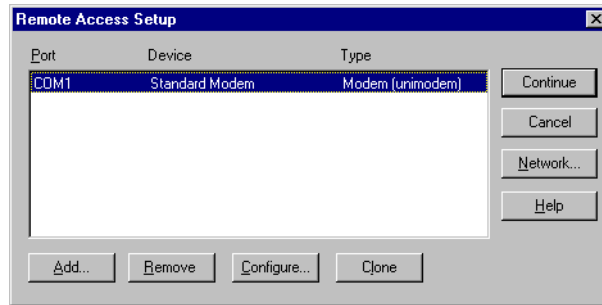
5. To add a new RAS device—for example, if you are configuring a new modem—select the **Add** button. The Add RAS Device window displays:
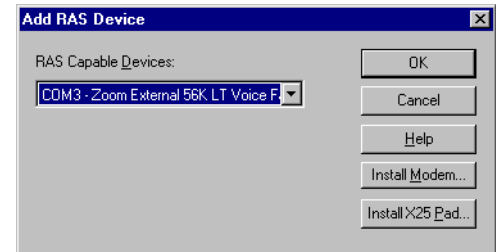
6. Use the droplist to select the COM port (modem) that you want to configure and select the **OK** button.

   Note: If no modems appear on this list, you need to install a modem, see Installing Modems on Page 45.

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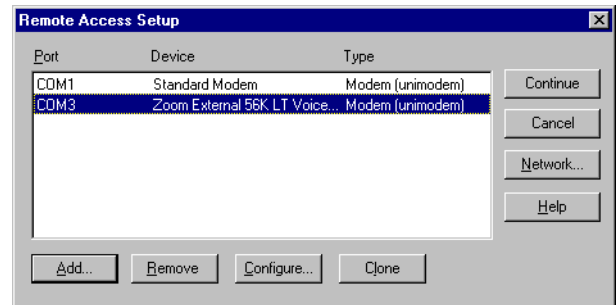
7. Highlight the desired COM port (Modem) and select the **Configure** button. The Configure Port Usage window displays.

8. Select the appropriate radio button, based on the role the modem will perform, and select the **OK** button.
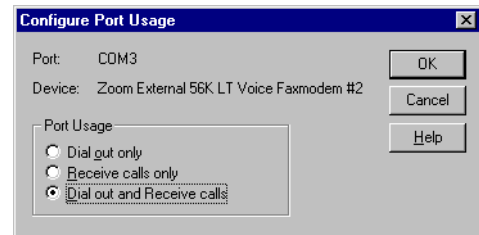
   Note: When configuring multiple simultaneous RAS dial-in ports, configure the ports to "Receive calls only" not "Dial out and Receive." Configuring a port to dial-out requires a separate memory pool for each dial-out port, while all ports configured for receive-only share the same memory pool.

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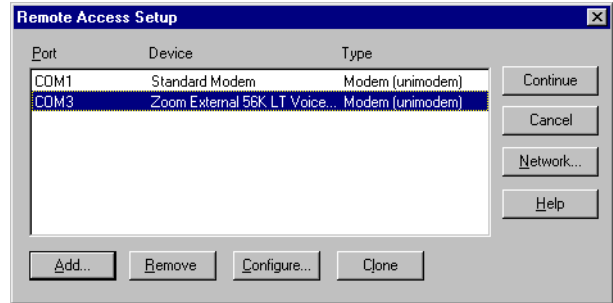
9. Highlight the COM port (modem) again and select the **Network** button.

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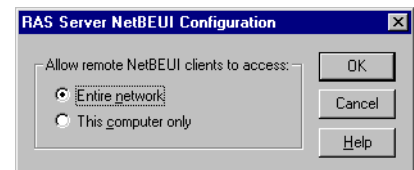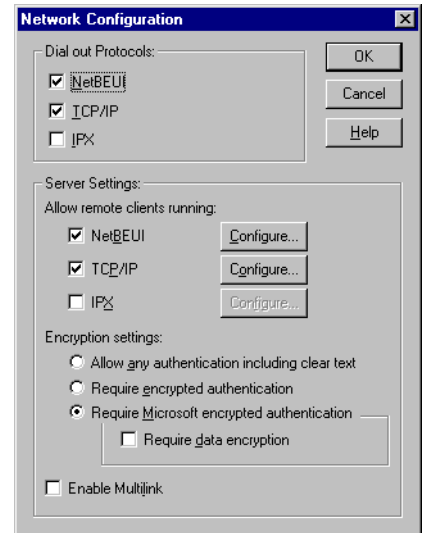
12. If you select TCP/IP, the following window displays. Make the appropriate selections for your environment and press **OK**.
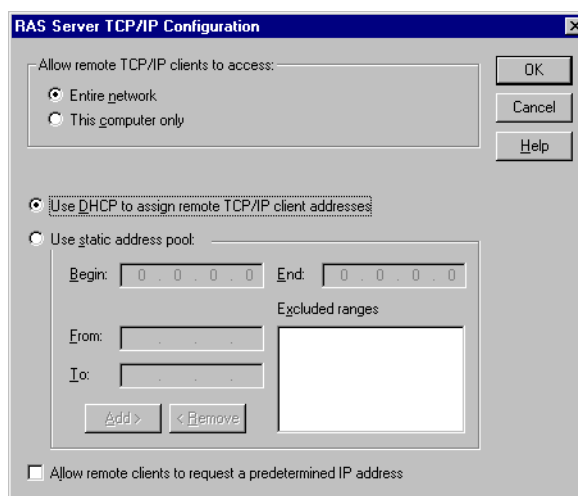
13. If you select IPX, the following window displays. Make the appropriate selection for your environment and press **OK**.

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.
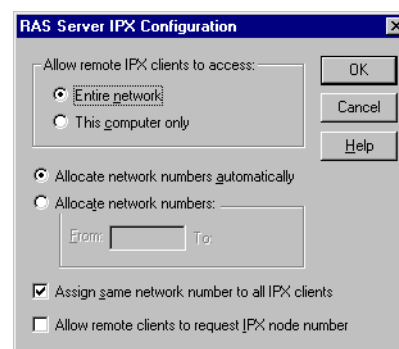
Configuring Printers

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.
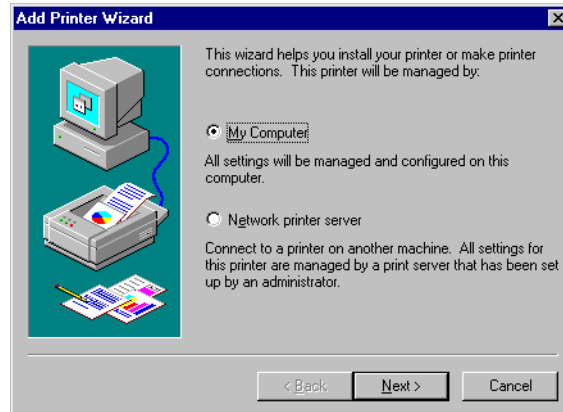
4. If the desired COM port is on this window, select it, select on the **Next** button, and skip to [Step 6](#).

5. If the desired COM port is not on this list, select the **Add Port** button and follow these steps:
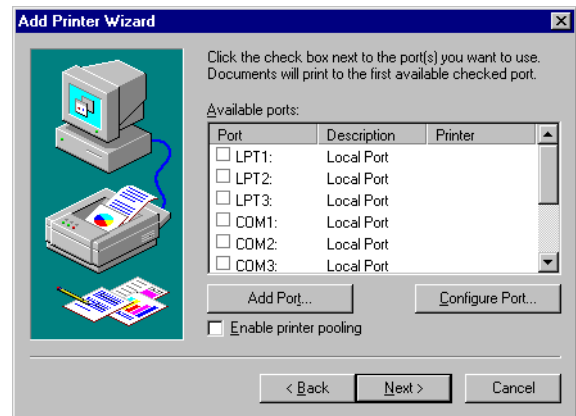
a. A list of printer ports is displayed. Select **Local Port**.

b. Select **New Port**.

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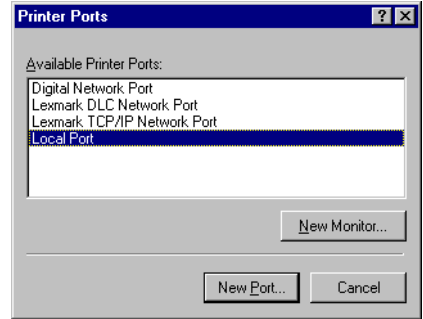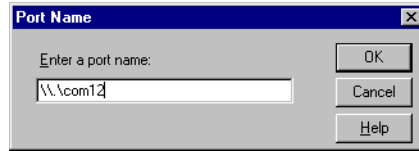
Note: *Port names above COM9 require the \ \. \ prefix. For example, to reference COM12, enter* **\\.\COM12:** *(make sure that you add the colon)*

d. Select the **OK** button.

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

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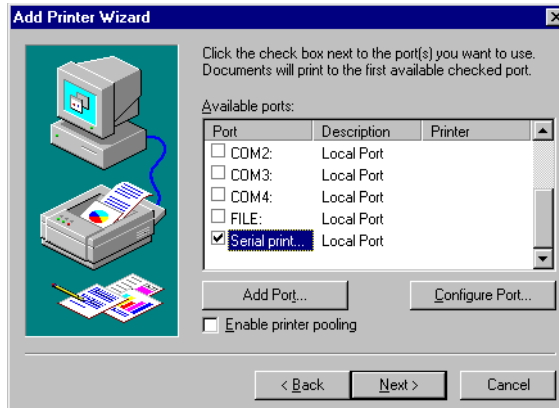
6. Select the printer make and model and select the **Next** button.

   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 .

   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.
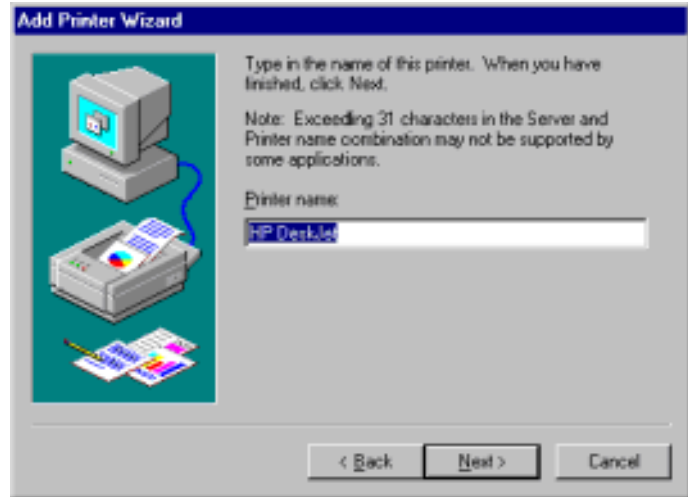
Changing Printer Port Configuration

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.

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 58
- *NS-Link Driver Troubleshooting* on Page 59
- *Daisy-Chaining DeviceMaster RTS 4/8/16 Units* on Page 60

If you cannot diagnose the problem, you can contact *Technical Support* on Page 61.

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.

    Note: *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.

Product Type	Connected to	Ethernet Cable	Connector
DeviceMaster RTS 1	Ethernet hub or NIC	Standard	10/100 ETHERNET
DeviceMaster RTS 1 Embedded	Ethernet hub or NIC	Standard	RJ45 port
DeviceMaster RTS 4/8/ 16 with external power supply	NIC	Standard	DOWN
	Ethernet hub	Standard	UP
DeviceMaster 16/32RM with internal power supply	Ethernet hub or NIC	Standard	10/100 NETWORK
RocketPort Serial Hub *ia*	NIC	Crossover	Network
	Ethernet hub	Standard	
RocketPort Serial Hub *Si* (2-Port)	NIC	Crossover	10/100BASE-T
	Ethernet hub	Standard	

- Verify that the Ethernet hub 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 RTS 1 1 Embedded 4/8/16 (2 Ethernet ports) 16/32RM	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, 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 the tools bundled with the drivers:
    - Test Terminal program (**wcom32.exe**), which can be used to troubleshoot communications on a port-by-port basis.
    - Port Monitor program (**portmon.exe**), which checks for errors, modem control, and status signals. In addition, it provides you with raw byte input and output counts.
    - Device Advisor, which helps identify problems is a tab in the **Device** window of the driver.
    - If Windows NT, Peer Tracer program (**peer.exe**), which traces driver events.
- If using NS-Link for Windows NT 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*

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. 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 59. 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.
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 not uncommon in some routers.
Cannot ping the device through Ethernet hub	Isolate the unit from the network. Connect the device directly to the NIC in the host system (see Page 56).
Cannot ping or connect to the DeviceMaster RTS.	The default IP address is often not accessible due to the subnet masking from another network unless **192.168** is used in the network. 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 15 seconds to disable the bootloader with Redboot to get into the setup utility. See ftp://ftp.comtrol.com/Dev_Mstr/RTS/RTS_Library.pdf 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.* This is a general procedure for drivers on Microsoft operating systems. 1. In the Comtrol Setup, highlight the Comtrol device. 2. Select **Properties**. 3. Select **IP Programming**. 4. Select **Retrieve** and confirm or modify addresses as necessary. *Note: Enter in all 3 categories. The unit must have Address, Mask and Gateway IP values entered.* 5. Select **Program**. 6. Select **Reset** - power LED should begin blinking. 7. Select **Device Setup**. 8. Uncheck **MAC**. 9. Check **IP** and enter IP number that you configured earlier. 10. Select **Ok** (several times) and reboot the system. IP addressing will now be in effect.
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 56). 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.

Daisy-Chaining DeviceMaster RTS 4/8/16 Units

The DeviceMaster RTS 4/8/16 models with external power supplies follow the IEEE specifications for standard Ethernet topologies.

When using the **UP** and **DOWN** ports, the DeviceMaster RTS 4/8/16 is classified as a switch. When using the **UP** port only, it is a simple end node device.

The maximum number of DeviceMaster RTS 4/8/16 units, and the maximum distance between units is based on the Ethernet standards and will be determined by your own environment and the conformity of your network to these standards.

Comtrol has tested with seven DeviceMaster RTS 4/8/16 units daisy-chained together using 10 foot CAT5 cables, but this is not the theoretical limit. You may experience a performance hit on the devices at the end of the chain, so it is recommended that you overload and test for performance in your environment. The OS and the application may also limit the total number of ports that may be installed.

Following are some quick guidelines and URLs of additional information. Please note that standards and URLs do change.

- Ethernet 10BASE-T Rules

    - The maximum number of repeater hops is four.
    - You can use Category 3 or 5 twisted-pair 10BASE-T cables.
    - The maximum length of each cable is 100m (328ft).

        Note: *Category 3 or 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.*

- Fast Ethernet 100BASE-TX rules

    - The maximum number of repeater hops is two (for a Class II hub). A Class II hub can be connected directly to one other Class II Fast Ethernet hub. A Class I hub cannot be connected directly to another Fast Ethernet hub.
    - You must use Category 5 twisted-pair 100BASE-TX cables.
    - The maximum length of each twisted-pair cable is 100m (328ft).
    - The total length of twisted-pair cabling (across directly connected hubs) must not exceed 205m (672ft).

        Note: *Category 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.*

- IEEE 802.3 specification: A network using repeaters between communicating stations (PCs) is subject to the "5-4-3" rule of repeater placement on the network:

    - Five segments connected on the network.
    - Four repeaters.
    - Three segments of the 5 segments can have stations connected. The other two segments must be inter-repeater link segments with no stations connected.

        See http://www.optronics.gr/Tutorials/ethernet.htm for more specific information.

        Additional information may be found at http://compnetworking.about.com/cs/ethernet1/ or by searching the web.

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

Index