DEVICE•MASTER®
500

Installation and Configuration Guide

COMTROL®

Table of Contents

Installation Overview

This section provides an installation and configuration overview for the DeviceMaster 500. In addition, it provides links to download the latest files for the DeviceMaster 500 installation. Optionally, you can use the *Software and Documentation CD* to install the DeviceMaster 500.

Installation and Configuration

Use the following steps, which are discussed in detail in the subsequent sections, to install and configure the DeviceMaster 500.

You may not need to perform all of the steps outlined below depending upon how you are using the DeviceMaster 500.

Step 1: Hardware Installation

Power up the DeviceMaster 500. Technical Support suggests installing one DeviceMaster 500 at a time to avoid configuration problems.

Refer to *Hardware Installation* on Page 9 for detailed installation procedures.

Note: *Comtrol recommends connecting the DeviceMaster 500 to a PC or laptop running Windows® 2000/XP/2003/Vista during initial configuration. Install PortVision Plus™ for an easy and successful configuration.*

Step 2: DeviceMaster 500 Configuration

Configure the network address and update the default application, *SocketServer*, on the DeviceMaster 500 using PortVision Plus or Redboot™.

SocketServer is a web interface to TCP/IP socket mode configuration and services. Technical Support recommends updating SocketServer before device driver installation to avoid device driver configuration problems.

See *Initial Configuration* on Page 19 for detailed configuration procedures.

Step 3: Driver Installation and Configuration

Optionally install the device driver for your operating system. You must install an NS-Link device driver if you want to use COM or tty ports. After driver installation, you may need to configure the device driver parameters for your serial devices.

See *Device Driver Installation* on Page 25 for information about driver installation and configuration Linux® and Windows.

Step 4: Socket Port Configuration

Optionally, configure socket port characteristics. See *Socket Port Configuration* on Page 37 for information about configuring sockets.

Step 5: Serial Device Connection

Connect your serial device to the DeviceMaster 500. If you need pinout or cabling information, see *Connecting Serial Devices* on Page 33.

Locating Software and Documentation

You can access the appropriate software assembly, PortVision Plus, and the *DeviceMaster 500* documentation from the CD shipped with the DeviceMaster 500. Optionally, if you know what you need for your installation, you can download the latest files using these internet links.

If you are not sure what files are required for your installation, each installation and configuration procedure also provides links to the required files in this *Guide*.

PortVision Plus	
Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32-bit)	
SocketServer	
Firmware update	
Bootloader	
Firmware update	

NS-Link Device Drivers and Installation Documentation		
Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32/64-bit)	Device driver (COM ports)	
	NS-Link User Guide for Windows	
Linux (32/64-bit)	Device driver (tty ports)	

Port Testing and Monitoring Applications		
Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32-bit)	Comtrol Utilities (Test Terminal and Port Monitor)†	
Linux (32-bit)	LCOM	
† Test Terminal and Port Monitor are included in PortVision Plus.		

Hardware Installation

Installation Overview

The DeviceMaster 500 enables communications with serial devices over an Ethernet network. The DeviceMaster 500 provides for remote management, configuration, and connectivity through its 10/100BASE–T Ethernet connection.

Default Network Settings

IP address:
192.168.250.250

Subnet mask:
255.255.0.0

Gateway address:
192.168.250.1

Use the links below to locate installation procedures for the following models:

Ports	DeviceMaster 500	Installation Procedure
1	DB9 serial port with one Ethernet port	*1-Port Installation* on Page 10
1	Embedded system	*1-Port Embedded Installation* on Page 12
4†	DB9 serial ports with two Ethernet†† ports	*4-Port Installation* on Page 16

† *DeviceMaster 500 4 -port models also include DB9 to RJ45 adapters.*

†† *One of the Ethernet ports on the DeviceMaster 500 4-port is a built-in downstream port for daisy-chaining DeviceMaster 500 systems or other network-ready devices.*

1-Port Installation

Use the following procedure to install the DeviceMaster 500 1-Port.

1. Record the MAC address, model number, and serial number of the DeviceMaster 500 on the customer service label provided.

   You may need the MAC address during driver configuration. The model number, MAC address (starts with **00 C0 4E**), and serial number are located on a label on the DeviceMaster 500.

2. Place the DeviceMaster 500 1-Port on a stable surface and skip to Step 3 or optionally mount the DeviceMaster 500 using the mounting flanges or DIN rail adapters.

   a. Pick up the DeviceMaster 500 so that the front of the device is facing you.

   b. Pick up a DIN rail clip. (The three tines should be on top and the **M4** label should face you.)

   c. Slide the DIN rail clip behind the DeviceMaster 500 and line it up with one of the screw holes on the DeviceMaster 500.

   d. Insert a screw into the hole and tighten with a Phillips screwdriver.

   e. Repeat Steps b through d with the second DIN rail clip. Make sure the screws on both DIN rail clips line up.
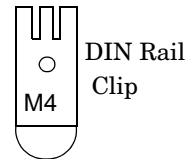
      Note: *If you need to remove the DeviceMaster 500 from the DIN rail, exert pressure on the backside of the tabs at the bottom of both DIN rail clips.*

   f. Attach the DeviceMaster 500 to the DIN rail.
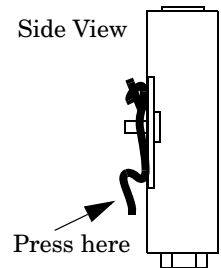
Note: *For optimal operation, make sure that the device is mounted in a vertical orientation with a minimum of 1.0" space on either side and a minimum of 4.5" clearance from the center of the rail to any device or wire trough above the unit and a minimum of 5.0" below.*
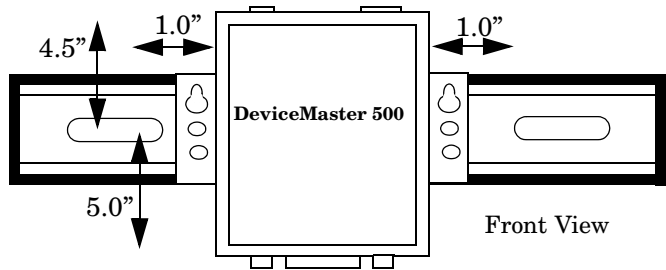
3. Connect the DeviceMaster 500 port labeled **10/100 ETHERNET** to the same Ethernet network segment as the host PC using a standard network cable.

   If you plan on using the NS-Link device driver, make sure that you do not connect RS-422/485 devices until the appropriate port interface type has been configured in the driver. The NS-Link default port setting is RS-232.

4. Apply power to the DeviceMaster 500 using the appropriate procedure for your power supply.

   Note: *The supported input voltage 5-30VDC is printed on the DeviceMaster 500. If you want to replace the power supply that is shipped with the DeviceMaster 500 and use your own power supply, see Power Supply for the 1-Port on Page 61.*

5. Connect the power supply to the DeviceMaster 500 and to a power outlet.

Note: *Align the power plugs properly. The scalloped side of the screw terminal power connector should be aligned with the scalloped side of the power jack on the unit.*

6. Verify that the **Status** LED has completed the boot cycle and network connection for the DeviceMaster 500 is functioning properly using the table below.

LED Descriptions	
Status	The amber **Status** LED on the device is lit, indicating you have power and it 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. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 30 seconds.*
Link Act	If the red **Link Act** LED is lit, it indicates a working Ethernet connection.
Duplex	If the red **Duplex** LED is lit, it indicates full-duplex activity.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

7. Go to *Initial Configuration* for default network settings and how to configure the DeviceMaster 500 for use.

1-Port Embedded Installation

Installing the DeviceMaster 500 1-Port Embedded system follows these basic steps:

- Building the serial ribbon cable (below).
- *Mounting the Embedded 1-Port* on Page 13 and installing light pipes.
- *Attaching the Network and Serial Cables* on Page 14.
- *Connecting the Power and Verifying Installation* on Page 14.

  Observe proper ESD techniques when handling the DeviceMaster 500.

Caution

Building the Serial Ribbon Cable

Use the following information to build a DB9 serial ribbon cable to connect to the DeviceMaster 500 1-Port Embedded IDC10 connector (**J3**).

IDC10	1	2	3	4	5	6	7	8	9
DB9M	1	6	2	7	3	8	4	9	5
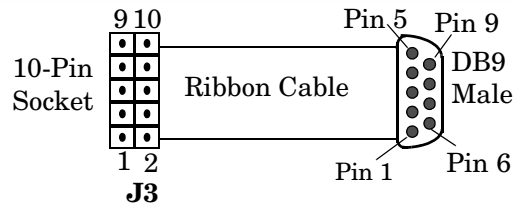
J3 Header	RS-232	RS-422	RS-485
1	CD	Not used	Not used
2	DSR	Not used	Not used
3	RxD	RxD-	Not used
4	RTS	TxD+	TRX+
5	TxD	TxD-	TRX-
6	CTS	RxD+	Not used
7	DTR	Not used	Not used
8	RI	Not used	Not used
9	GND	Not used	Not used
10	Not connected		

Mounting the Embedded 1-Port

⚠️ **Caution**

Use the following procedure to mount the DeviceMaster 500 1-Port Embedded with the 5-30VDC power supply.

Observe proper ESD techniques when handling the DeviceMaster 500.

1. Carefully remove the DeviceMaster 500 from the anti-static bag, following standard electrostatic device handling procedures.

   Note: *Write down the MAC address located on a label on the bottom (solder side) center of the DeviceMaster 500 because you may need it during configuration.*

2. Mount the DeviceMaster 500 for your environment using 1/4" stand-offs to separate the DeviceMaster 500 from the base.
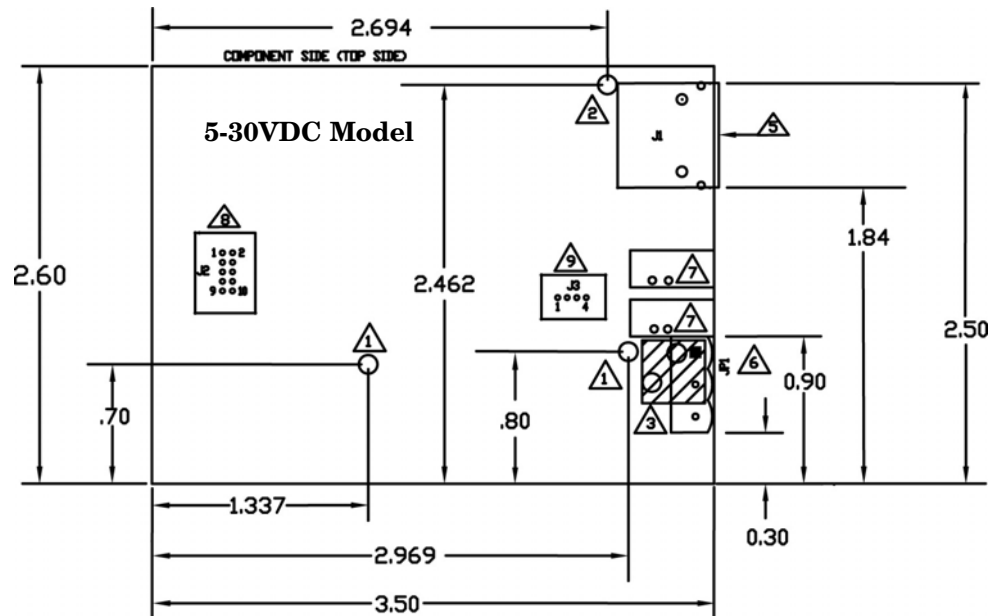
$\triangle$ 1 Non-plated/non-grounded mounting holes 0.116" diameter (+/-0.003").

$\triangle$ 2 Plated/chassis grounded mounting hole 0.116" diameter (+/-0.003").

$\triangle$ 3 WARNING: Holes in hatched area are not mounting holes.

$\triangle$ 4 Maximum component height above board is 0.55".

$\triangle$ 5 Ethernet connection J2: J2 overhangs board edge by 0.14" and the height is 0.55".

$\triangle$ 6 Power connector; the mating connector is Weidmuller P/N: 152651.

$\triangle$ 7 LED light pipe mounting holes. The LED light pipes are not provided.

$\triangle$ 8 Serial port connector J3: 0.1" pin spacing, 0.025" square pin diameter, and 0.230" pin height.

$\triangle$ 9 Debug port connector J4: 0.1" pin spacing, 0.025" square pin diameter, and 0.230" pin height.

⚠️ **Caution**

3. Use one of the following methods to ground the DeviceMaster 500.

   • Through the **power supply** by connecting the ground wire on the power cable using plastic or metal stand-offs.

   • Through the **chassis**, using metal stand-offs. If plastic stand-offs are used to mount the board, then you must ground the DeviceMaster 500 using the power cable.

   Note: *The maximum diameter of the metal stand-offs should be 0.175" with a 4-40 machine screw. Metal stand-offs are not provided with the DeviceMaster 500.*

4. Optionally, attach the light pipes. The following light pipes have been tested and found to function; Bivar, Inc. (P/N:LP-230) and Ledtronics, Inc. (P/N:LTP003-0CW-001).

After mounting the DeviceMaster 500, you are ready to connect the cables.

Attaching the Network and Serial Cables

Use the following procedure to attach the serial ribbon and Ethernet cables. For a larger illustration of the system, see *Notices* on Page 62.

1. Attach the ribbon cable built in *Building the Serial Ribbon Cable* on Page 12 to the header labeled **J3**.
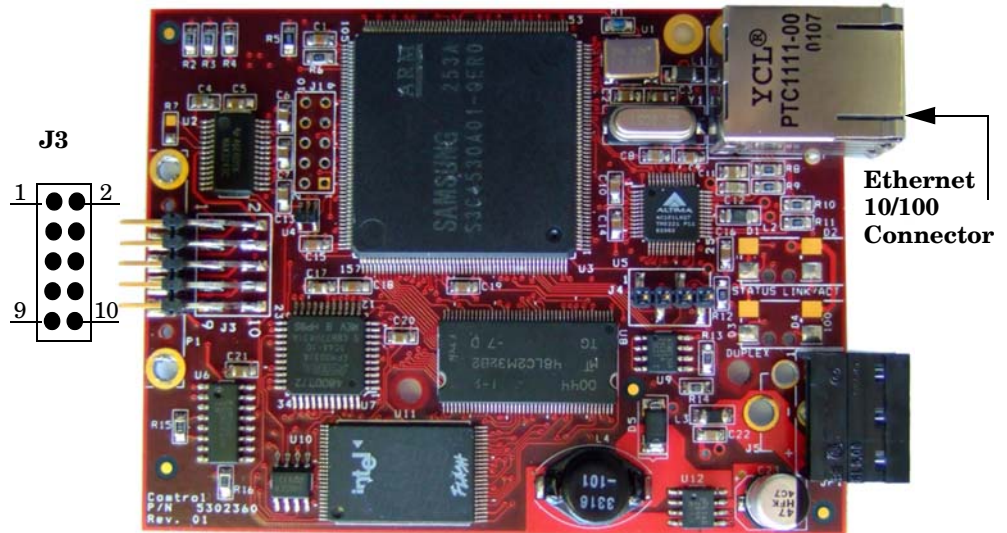
2. Connect a standard Ethernet cable from the RJ45 port on the DeviceMaster 500 to your Ethernet hub.

⚠ **Caution**

The default serial port setting on the DeviceMaster 500 is RS-232. Do not connect the serial device until you have configured the serial port settings. You must configure network settings and upload firmware before configuring the serial port settings.

Use the next subsection to wire the power terminal connector and verify the hardware installation.

Connecting the Power and Verifying Installation

Use the following procedure to wire the power terminal connector and connect the DeviceMaster 500 to a power source.

1. Connect the screw terminal power connector to the wires.

Locally-supplied power supplies must conform to the specifications provided in *Power Supply for the 1-Port* on Page 61.

⚠ **Caution**

Observe proper ESD techniques when connecting and disconnecting the DeviceMaster 500.

2. Use a small flat head screw driver to lock the wires into place.

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3. Plug the screw terminal power connector into **JP1** on the DeviceMaster 500 by aligning the scalloped sides.

4. Apply power to the DeviceMaster 500.

5. Verify the **Status** LED has completed the boot cycle and network connection for the DeviceMaster 500 is functioning properly using the table below.
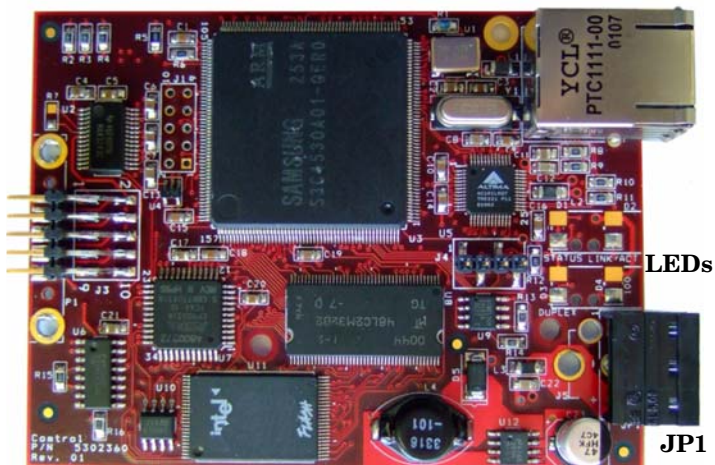
The LEDs are located between the RJ45 connector and the power terminal block.

LED Descriptions	
Status	When lit, the amber **Status** LED (**D1**) on the DeviceMaster 500 indicates the devices is fully powered and has completed the boot cycle.
	Note: *The **Status** LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 30 seconds.*
Link/Act	When lit, the red **Link/Act** LED (**D2**) indicates a working Ethernet connection.
Duplex	When lit, the red **Duplex** (**D3**) LED indicates full-duplex activity.
100	When lit, the red **100** (**D4**) LED indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

6. Go to *Initial Configuration* on Page 19 for default network settings and how to configure the DeviceMaster 500 for use.

4-Port Installation

Use the following procedure to install the DeviceMaster 500 4-port.

1. Record the MAC address, model number, and serial number of the DeviceMaster 500 unit on the customer service label provided.

    You may need the MAC address during driver configuration. The serial number and MAC address (starts with **00 C0 4E**) are located on a label on the DeviceMaster 500.

2. Optionally, attach the mounting brackets using the screws provided in the kit (6-32 1/4" flathead machine) or place the DeviceMaster 500 on a stable surface.

    ⚠ Caution

    Failure to use the correct screws can damage the PCB and void the warranty. Do NOT use screws that exceed the length of the screws provided with the mounting bracket kit.

    Note: *If you ordered the DeviceMaster Rackmount Shelf Kit accessory, use the document that accompanied that kit or download the document to mount the DeviceMaster 500 on the shelf.*

3. Connect the DeviceMaster 500 to the same Ethernet network segment as the host PC using one of the following methods:

    *   **Ethernet hub or switch (10/100Base-T)**: Connect to the port labeled **UP** on the DeviceMaster 500 using a standard Ethernet cable.

    *   **Server NIC (10/100Base-T)**: Connect to the port labeled **DOWN** on the DeviceMaster 500 using a standard Ethernet cable.

    *   **Daisy-chaining DeviceMaster 500 units**: Connect the port labeled **DOWN** on the first DeviceMaster 500 to the port labeled **UP** on the second DeviceMaster 500 or other device using a standard Ethernet cable. Refer to *Daisy-Chaining DeviceMaster 500 4-Port Units* on Page 67 for more detailed information.
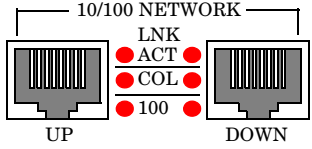
    ⚠ Caution

    If you plan on using the NS-Link device driver, make sure that you do not connect RS-422/485 devices until the appropriate port interface type has been configured in the driver. The NS-Link default port setting is RS-232.

4. Apply power to the DeviceMaster 500 by connecting the AC power adapter to the DeviceMaster 500, the appropriate power cord for your location to the power adapter, and plugging the power cord into a power source. If you want to provide your own power supply, see *Power Supply for the 4-Port* on Page 61.

5. Verify that the **PWR** LED has completed the boot cycle and network connection for the DeviceMaster 500 is functioning properly using the table below.

LED Descriptions	
PWR	LED on the front panel of the DeviceMaster 500 is lit, indicating you have power and it 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. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 30 seconds.*
LNK ACT	The red **LNK ACT** LED is lit, indicating that you have a working Ethernet connection.
COL	If the red **COL LED** is lit, there is a network collision.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

10/100 NETWORK
LNK
ACT
COL
100
UP   DOWN

6. Go to *Initial Configuration* on Page 19 for default network settings and how to configure the DeviceMaster 500 for use.

Adding a Unit to an Existing Installation

Use this procedure to add another DeviceMaster 500 to an existing configuration.

1. Install the DeviceMaster 500 to an Ethernet hub or server NIC using the appropriate subsection found in *Installation Overview* on Page 9.

   Note: Technical support recommends installing one unit at a time and testing that unit when installing multiple units. In the event troubleshooting must be done, a single unit is much easier to resolve than several at once.

2. Power-up the new DeviceMaster 500 and verify that the **PWR** or **Status** LED lights.

3. Program an IP address into the new DeviceMaster 500 using PortVision Plus.

4. Configure serial ports to support the serial devices or upload configuration files from PortVision Plus.

5. Connect the serial devices.

Replacing Hardware

Follow the appropriate procedure to replace DeviceMaster 500 with another DeviceMaster 500 in an existing configuration.

Device Programmed with IP Address

Use this procedure to replace hardware if the existing device is programmed for use with an IP address.

1. Configure the IP address in the new DeviceMaster 500.

2. Remove the old unit and attach a new or spare DeviceMaster 500.

3. Connect the new DeviceMaster 500 to the network hub or server NIC.

4. Apply power to the new DeviceMaster 500 and verify that it passes the power on self-test.

5. If you are using NS-Link, program the IP address of the new DeviceMaster 500 in the NS-Link driver to reflect the new unit.

6. If using socket mode, configure any ports as necessary to match the previous unit or upload configuration files from PortVision Plus.

7. Transfer *all* cabling from the old DeviceMaster 500 to the new DeviceMaster 500.

8. *It is not necessary* to shut down and restart the host PC.

Device Programmed with MAC Address

Use this procedure to replace hardware if the existing device is using a MAC address for communications.

1. Remove the old unit and attach a new or spare DeviceMaster 500.

2. Connect the new DeviceMaster 500 to the network hub or server NIC.

3. Apply power to the new DeviceMaster 500 and verify that it passes the power on self-test.

4. If you are using NS-Link, change the MAC address of the new DeviceMaster 500 in the NS-Link driver to reflect the new unit.

5. If using socket mode, configure any ports as necessary to match the previous unit.

6. Transfer *all* cabling from the old DeviceMaster 500 to the new DeviceMaster 500.

7. Restart the host PC.

Initial Configuration

There are several ways to configure network information. Comtrol Technical Support recommends connecting the DeviceMaster 500 to a PC or laptop running Windows® and installing *PortVision Plus* for initial configuration.

This section shows you how to:

- Install PortVision Plus
- Configure the network address
- Check the SocketServer version on the DeviceMaster 500
- If necessary, download the latest version SocketServer and upload it into the DeviceMaster 500

If you do not want to install PortVision Plus, see *RedBoot Procedures* on Page 49 for alternate methods to configure the network or upload the latest firmware.

PortVision Plus Requirements

Use PortVision Plus to identify, configure, update, and manage the DeviceMaster 500 on the following operating systems:

- Windows 2000
- Windows XP
- Windows Server 2003
- Windows Vista (32-bit only)

PortVision Plus requires that you connect the DeviceMaster 500 to the same network segment as the Windows system during the configuration process.

If you have a previous version of PortVision Plus on your system, use the *Control Panel* to remove PortVision Plus before installing the latest version.

Installing PortVision Plus

During initial configuration, PortVision Plus automatically detects and identifies DeviceMaster 500 units, if they are in the same network segment by using the Scan Network button in PortVision Plus.

Use the *Software and Documentation* CD that came with the DeviceMaster 500 to check for the latest version of PortVision Plus or use the link below to download the latest version.

1. Execute the **pvplus_[*version*].msi** file and follow the installation wizard using one of the following methods:

    - *CD Installation*: Use the CD menu system to check the version on the CD against the latest released version.

    - *Download the latest version*: http://www.comtrol.com/support/download.asp?partnumber=1800294.

2. Click **Launch** and **Finish** in the last installation screen.

3. Click **Scan** so that PortVision Plus locates the DeviceMaster 500.

4. Go to Step 4 in the next section, *Configuring the Network Settings*, to program the DeviceMaster 500 network settings.

If you need additional information about PortVision Plus, refer to the **Help** system.

Configuring the Network Settings

Use the following procedure to change the default network settings on the DeviceMaster 500 for your network.

Default Network Settings

IP address:
  192.168.250.250

Subnet mask:
  255.255.0.0

Gateway address:
  192.168.250.1

Note: Technical Support advises configuring one new DeviceMaster 500 at a time to avoid device driver configuration problems. If you want to configure multiple DeviceMaster 500s using the Assign IP to Multiple Devices option, see Configuring Multiple DeviceMaster 500s Network Addresses on Page 42.

The following procedure shows how to configure a single DeviceMaster 500 connected to the same network segment as the Windows system.

1. If you have not done so, install PortVision Plus (above).

2. Start PortVision Plus using the **PortVision Plus** desktop shortcut or from the **Start** button, click **Programs**, **Comtrol**, **PortVision Plus**.

3. If this is the first time you have opened PortVision Plus, click **Scan** and then **Yes** to locate DeviceMaster 500s on the network.

4. Highlight the DeviceMaster 500 for which you want to program network information and open the **Configure Device** screen using one of these methods.

   • Double-click the DeviceMaster 500 in the *List View* pane.

   • Click **Config**.

   • Right-click the DeviceMaster 500 in the *List View* pane and click **Configure Device**.

   Note: See the PortVision Plus Help system for information about using PortVision Plus.
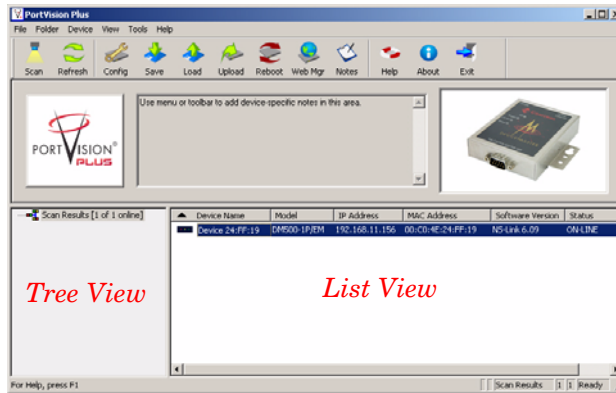
5. *Optionally,* rename the DeviceMaster 500 in the **Device Name** field.

6. Change the DeviceMaster 500 network properties as required for your site.

   - If you want to run the DeviceMaster 500 using the MAC addressing scheme, click **Disable IP**.

   - To use the DeviceMaster 500 with DHCP, click **DHCP IP**, and make sure that you provide the MAC address of the device to the network administrator. Make sure that the administrator reserves the IP address, subnet mask and gateway address of the DeviceMaster in the DHCP server.

   - To program a static IP address, click **Static IP** and enter the appropriate values for your site.

   Note: *For additional information, open the PortVision Plus **Help** system. Access the **Help** system using the **Help** button or go directly to the help for a specific property page by clicking the **Context** menu button (**).*

7. Click **Apply Changes** to update the network information on the DeviceMaster 500.

8. *Optionally,* click **Save Settings to a File** to create a configuration file that you can use to configure other DeviceMaster 500s.

   If you are deploying multiple DeviceMaster 500s that share common values, you can save the configuration file and load that configuration onto other DeviceMaster 500s.

9. Click **Close** to exit the *Configure Device* window.

10. Go to *Checking the SocketServer Version* on Page 22 to see if you need to update SocketServer before installing the device driver or configuring sockets.
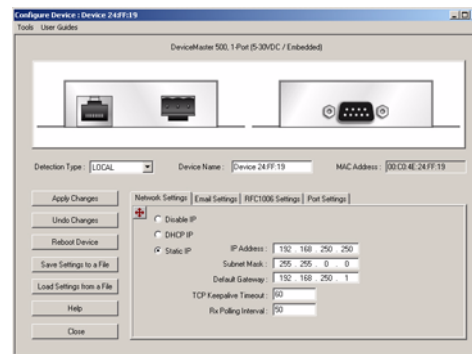
Checking the SocketServer Version

SocketServer is integrated in the firmware that comes pre-installed on your DeviceMaster 500 platform, which provides an interface to TCP/IP socket mode configuration and services.

Comtrol recommends verifying that your DeviceMaster 500 contains the latest SocketServer version before installing the device driver or configuring socket ports to avoid installation problems.

Use the following procedure to check the SocketServer version on the DeviceMaster 500.

1. If necessary, start PortVision Plus and scan the network.

2. Check the SocketServer version number of the *Software Version* for the DeviceMaster 500.
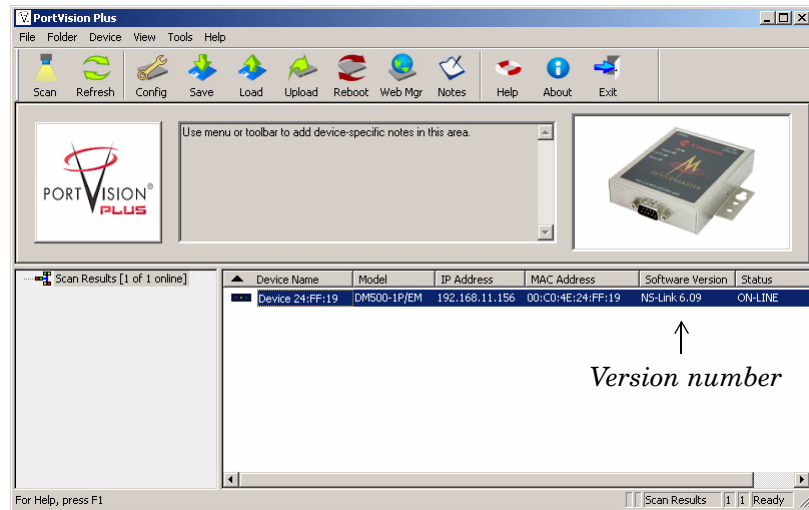
3. Check the Comtrol web site to see if a later version is available.

4. If the version on the web site is later than the version on the DeviceMaster 500, download the file and then go to *Uploading SocketServer* on Page 23.

   If the SocketServer version on the DeviceMaster 500 is current, you are ready to install an NS-Link device driver for tty or COM ports, or you are ready to configure the sockets. Use the appropriate discussion to complete the DeviceMaster 500 configuration process.

   • *Device Driver Installation* on Page 25
   • *Socket Port Configuration* on Page 37

Uploading SocketServer

Use this section to upload a new version of SocketServer on the DeviceMaster 500 using PortVision Plus. Technical Support recommends updating SocketServer before initial device driver installation to avoid configuration problems.

1. Make sure that you have located or downloaded the latest SocketServer version.

2. Right-click the DeviceMaster 500 for which you want to update, click **Upload Firmware**, browse to the SocketServer **.bin** file, and then click **Open**.

3. Click **Yes** to the *Upload Firmware* message that warns you that this is a sensitive process.

   It may take a few moments for the firmware to upload onto the device. The device will reboot itself during the upload process.

4. Click **Ok** to the advisory message about waiting to use the device until the status reads **ON-LINE**. In the next polling cycle, PortVision Plus updates the *List View* pane and displays the new SocketServer version.

You are now ready to complete the DeviceMaster 500 configuration by installing a device driver and/or configuring sockets, depending on your environment.

Go to *Device Driver Installation* on Page 25 to locate information about installing the NS-Link device driver for Windows (COM ports) or Linux (tty ports) with socket support.

If you want to use any of the ports as COM or tty ports, you should install the NS-Link driver first, and then configure the ports that you want to use as TCP/IP sockets.

If you do not plan on using an NS-Link driver, go to *Socket Port Configuration* on Page 37 for information about configuring sockets.

Device Driver Installation

Before installing the NS-Link device driver, the following conditions must be met:

- The DeviceMaster 500 is connected to the network and powered on (*Hardware Installation* on Page 9)

- The network information has been configured in the DeviceMaster 500 (*Configuring the Network Settings* on Page 20)

- If this is the *initial* device driver installation, verify that the DeviceMaster 500 contains the latest version of SocketServer (*Checking the SocketServer Version* on Page 22)

After NS-Link driver installation and configuration, the same ports can be configured as TCP/IP sockets using an NS-Link version of the SocketServer web page (*Socket Port Configuration* on Page 37).

Linux Installation

Refer to the **README** file provided with the Linux® driver for installation and configuration procedures. Locate the latest device driver for Linux:

- ***CD Installation***: Use the CD to check the driver version on the CD against the latest released version. Open the **/html/default.htm** file to use the menu system.

- ***Download the latest device driver***: http://www.comtrol.com/support/download.asp?partnumber=1800026.

Note: Linux supports 500K natively, however this driver remaps 300 baud to 500K baud to mimic our Windows driver functionality.

Windows Installation

This subsection provides a installation overview for Windows 2000, Windows XP, Windows Server 2003, and Window Vista.

1. Locate the latest device driver for Windows and *NS-Link User Guide for Windows*:

    - ***CD Installation***: You can use the CD to check the driver version on the CD against the latest released version.

    - ***Download the latest device driver***: http://www.comtrol.com/support/download.asp?partnumber=1800288.

    - ***Download the latest*** *NS-Link User Guide for Windows*, which contains detailed installation and configuration information or procedures to update an existing installation: http://www.comtrol.com/support/download.asp?partnumber=2000339

2. Unzip the driver assembly.

3. Go to the appropriate procedure to install the driver. The device driver for Windows installation follows these steps for each DeviceMaster 500. If you have multiple DeviceMaster 500s, you must repeat this process for each DeviceMaster 500.

- *Windows Vista: NS-Link Installation* on Page 26
- *Windows XP and Windows Server 2003: NS-Link Installation* on Page 27
- *Windows 2000: NS-Link Installation* on Page 28

Windows Vista: NS-Link Installation

After locating the latest driver (Page 25) and extracting the files, use this procedure to install and configure the NS-Link device driver for your DeviceMaster 500.

1. From the **Start** button, click **Settings**, **Control Panel** and then double-click **Add Hardware**.

2. Click **Next** when the *Add Hardware* wizard starts.

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

4. Highlight **Multi-port serial adapters** and then click **Next**.

5. Click **Have Disk**, **Browse** and locate the unzipped driver files, click **Open** and then click **OK**.

   *Note: Select any **.inf** file and the driver executes the appropriate file for your DeviceMaster 500 installation.*

6. Highlight the DeviceMaster 500 in the **Models** list and click **Next**.

7. Click **Next** to start the driver installation.

8. If necessary, click **Install this driver software anyway** at the prompts to proceed for the DeviceMaster 500 and first port.

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

9. Click **Finish** to complete this part of the installation process.

10. At the *Windows needs to install driver software for your Comtrol NS-Link Port*, click **Locate and install driver software automatically (Recommended)** and **Next**.

11. If necessary, click **Install this driver software anyway** to proceed.

12. Click **Close** when *The software for this device has been successfully installed screen* appears and close the *Control Panel*.

13. Go to *Configuring the NS-Link Driver for Windows* on Page 29 to begin NS-Link driver configuration.

If you are installing multiple DeviceMaster 500, repeat this procedure for each DeviceMaster 500.

Windows XP and Windows Server 2003: NS-Link Installation

After locating the latest driver (Page 25) and extracting the files, use this procedure to install and configure the NS-Link device driver for your DeviceMaster 500.

1. From the **Start** button, click **Control Panel** and then double-click **Add Hardware**.

2. Click **Next** when the *Add Hardware Wizard* starts.

3. Click **Yes, I have already connected the hardware** and then **Next**.

4. Highlight **Add a new hardware device** (at the bottom of the list) and click **Next**.

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

6. Highlight **Multi-port serial adapters** and then click **Next**.

7. Click **Have Disk**, **Browse** and locate the unzipped driver files, click **Open** and then click **OK**.

   Note: *You do not need to select a specific **.inf** file, the driver uses the appropriate file for your DeviceMaster 500 installation.*

8. Highlight the DeviceMaster 500 in the **Models** list and click **Next**.

9. Click **Next** to start the driver installation.

10. If necessary, click **Continue Anyway** to proceed for the DeviceMaster 500 and the first port.

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

11. Click **Finish** to complete this part of the installation process for the DeviceMaster 500.

12. Click **Install the software automatically (Recommended)** and then click **Next**.

13. If necessary, click **Continue Anyway** to proceed.

14. Click **Finish** to complete the driver installation process for this port.

    Note: *You may need to wait a few moments while the operating system creates a port for the DeviceMaster 500.*

15. Repeat Steps 12 through 14 for each remaining port on the DeviceMaster 500.

16. If Windows XP, close the *Control Panel*.

17. Go to *Configuring the NS-Link Driver for Windows* on Page 29 to begin NS-Link driver configuration.

If you are installing multiple DeviceMaster 500, repeat this procedure for each DeviceMaster 500.

Windows 2000: NS-Link Installation

After locating the latest driver (Page 25) and extracting the files, use this procedure to install and configure the NS-Link device driver for your DeviceMaster 500.

1. Click **Start**, **Settings**, and **Control Panel**, and then double-click **Add/Remove Hardware**.

2. Click **Next**.

3. Click **Add/Troubleshoot a device** and then **Next**.

4. Highlight **Add a new device** and click **Next**.

5. Click **No, I want to select the hardware from a list** and then **Next**.

6. Click **Multi-port serial adapters** and select then **Next**.

7. Click **Have Disk**, **Browse** to locate the unzipped installation files or enter the path, and then click **Ok**.

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

   Note: *You do not need to select a specific* **.inf** *file, the driver uses the appropriate file for your DeviceMaster 500 installation.*

8. From the **Models** list, highlight the DeviceMaster 500 and click **Next**.

9. Click **Next** to start the driver installation.

10. Click **Yes** to continue the installation.

    Note: *It may take up to several moments for Windows 2000 to load the driver for each port on the DeviceMaster 500. A* **Found New Hardware** *message will display for each port on the DeviceMaster 500.*

11. Click **Finish** to complete the driver installation process for this port.

12. Close the *Control Panel*.

13. Go to *Configuring the NS-Link Driver for Windows* on Page 29 to begin NS-Link driver configuration.

If you are installing multiple DeviceMaster 500, repeat this procedure for each DeviceMaster 500.

Configuring the NS-Link Driver for Windows

The DeviceMaster 500 must be connected to the local network segment or directly to a NIC on the host system to operate in MAC mode to perform the following procedure.

1. Access the *Properties* page for the DeviceMaster 500.

    a. Right-click **My Computer** or **Computer**, click **Manage**, and then highlight **Device Manager**.

    b. Expand the **Multi-port serial adapters** entry, right-click the DeviceMaster 500 you want to configure, and then click **Properties**.

2. Click the **Network Connections** tab.

3. Enter the address from the MAC address label on the DeviceMaster 500 or select the MAC address from the drop list.

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

4. Click **OK** to program the driver with the MAC address of the DeviceMaster 500.

    The **Properties** page closes automatically.

5. Re-open the *Properties* page for the DeviceMaster 500 and select the **Network Connections** tab.

6. Click **Program Addresses into Device**.

7. Click the appropriate addressing method in the *Program IP Address into Device* dialog for your environment and click **Ok**.

8. To run the driver using an IP address, click **IP Mode** in the *Network Connection Mode* group and **Ok** when you are returned to the **Network Connections** tab.

9. Go to the next subsection to configure the COM port properties.
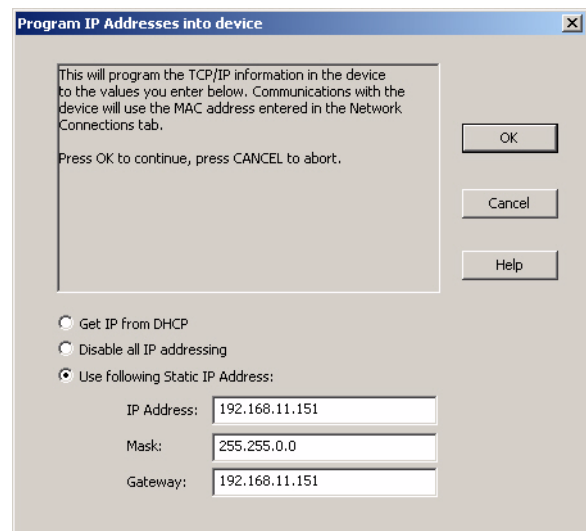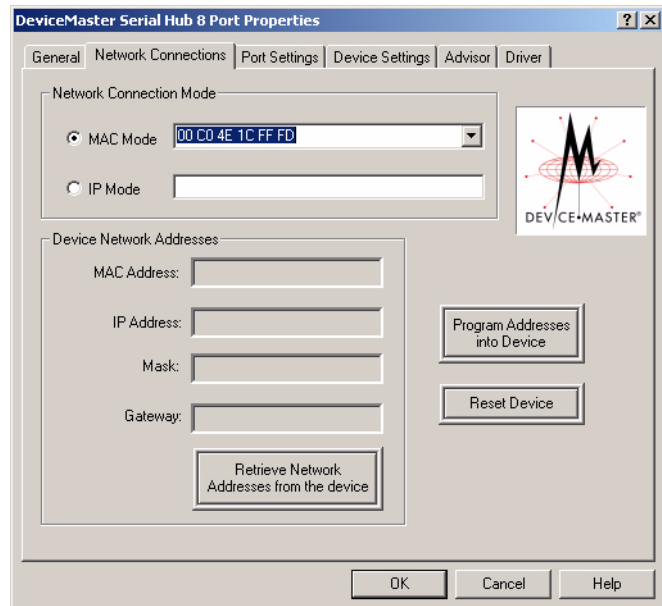
Configuring COM Port Properties for Windows

The following is a COM port properties configuration overview. Use the *NS-Link User Guide for Windows* (also available on the CD) or the NS-Link **Help** system for detailed configuration information.

1. Access the *Properties* page for the DeviceMaster 500.

   a. Right-click **My Computer** or **Computer**, click **Manage**, and then highlight **Device Manager**.

   b. Expand the **Multi-port serial adapters** entry, right-click the DeviceMaster 500 you want to configure, and then click **Properties**.

2. Click the **Port Setting** tab.

3. Highlight the **COM port** that you want to configure and click **Properties**.

4. Complete the screen appropriately for the serial device that you plan on connecting to the port and click **Ok**.

   If connecting a SICK LMS scanner, configure the appropriate COM port on the DeviceMaster 500 to use RS-422 mode.

   Note: If you do not require 500K baud and you are using an RS-232 cable, do not configure the port to use RS-422 mode.

5. Click **Ok** to close the DeviceMaster 500 property page.

6. Close the *Device Manager*.

7. Refer to *Completing the SICK LMS Scanner Installation* on Page 31 or *Connecting Serial Devices* on Page 33 to attach your serial device.
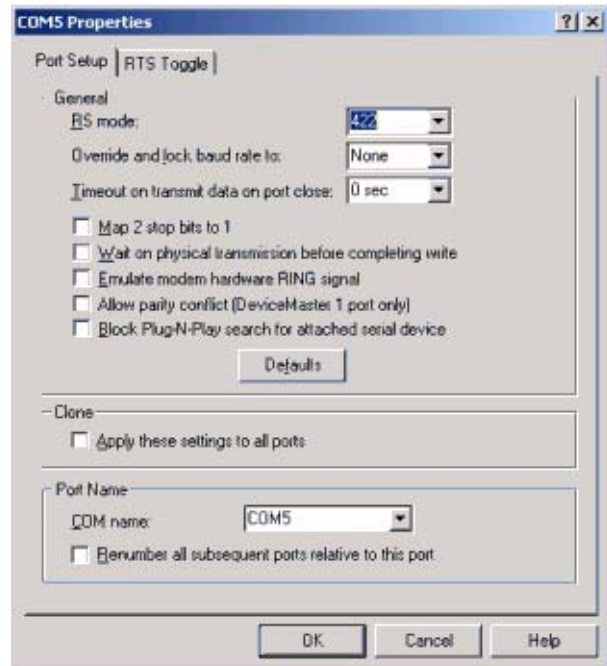
Completing the SICK LMS Scanner Installation

Use the following procedure to complete a SICK LMS Scanner installation.

1. Connect the LMS Scanner to the DeviceMaster 500 port that you configured using the RS-422 cable (or optionally the RS-232 cable if you do not want to use the 500K rate) to the scanner.

   Note: Do not connect the power on the LMS scanner at this time.

2. Open PortVision Plus (**Start/Programs/Comtrol/PortVision Plus/PortVision Plus**).

3. Select **Scan** and verify that the DeviceMaster 500 is connected to the network and is running NS-Link.
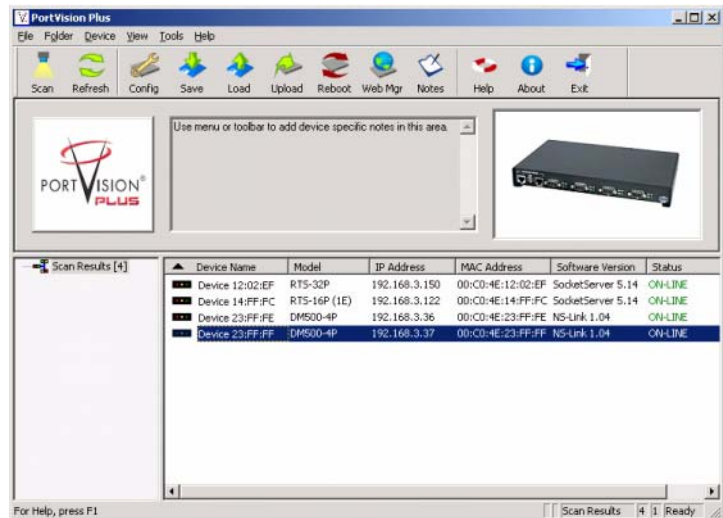
4. Launch *WCOM2 - Test Terminal* from PortVision Plus by selecting **Tools/ Applications/ Test Terminal (WCom2)**.

5. Open the DeviceMaster 500 COM port that you configured for the scanner by selecting the appropriate port from the **File/Open** menu.

6. Set the COM port to 9600 baud by using the **Settings/Port Settings** menu.
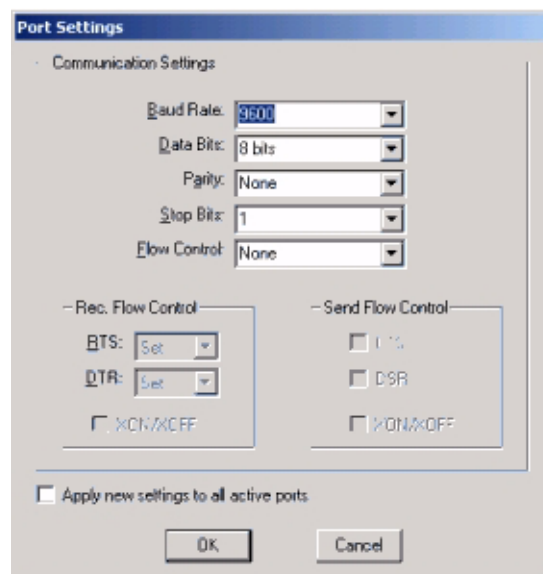
   Note: The default baud rate for the scanner is 9600. Every time you power cycle the scanner you must reset this baud rate to communicate with the scanner.

7. Set WCOM2 to view Hex data by selecting the **View/Hex Display** menu option. **Hex Display** displays a check when selected.

   Note: All the communications with the scanner are in Hex format.

8. Connect the power cord of the scanner to a power source. When the scanner displays a green light, you should see a message on the WCom2 window.
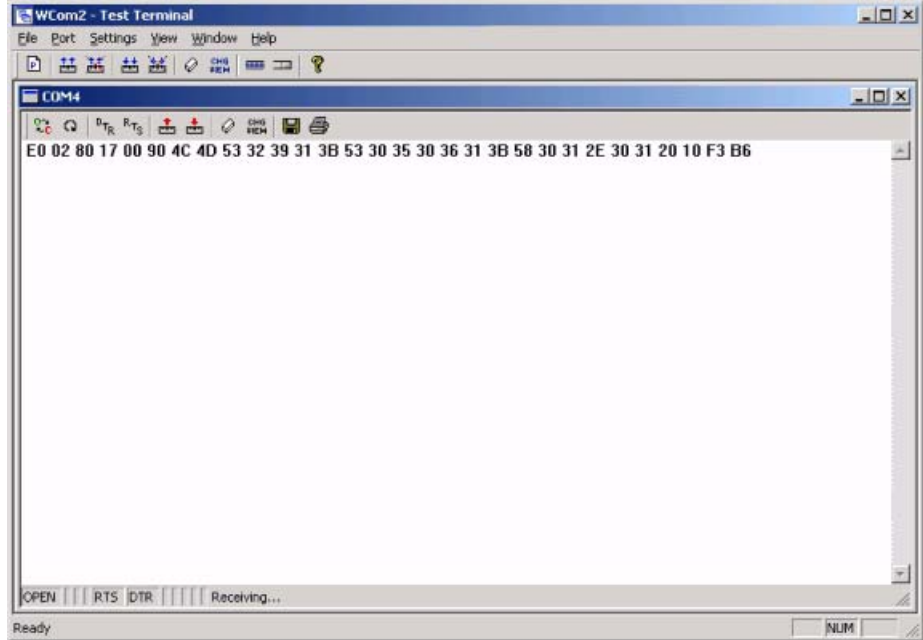
9. Use the **Port/Send ASCII / HEX String** menu to send the appropriate hex commands using LMS scanner manual to perform these steps:

   a. Send a request to the scanner to start measuring.

   b. Send a request to the scanner to stop measuring.

   c. Send a request to the scanner to set the baud rate to 500K.

   d. After you get the confirmation, change the COM port setting in **WCOM2** to 500K by using the **Settings/Port Settings** menu.

   e. Repeat Steps a and b to make sure that the scanner is working at 500K.

   Note: You can use this step for any baud rate.
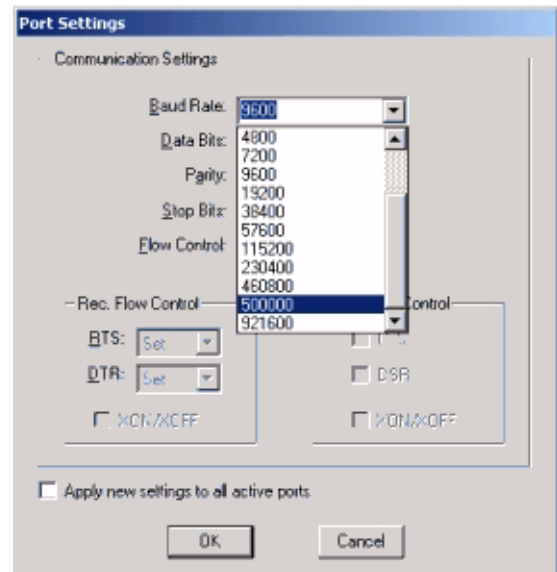
Connecting Serial Devices

This section discusses connecting your serial devices to the DeviceMaster 500. In addition, it provides you with information to build serial cables and loopback connectors to test the serial ports.

Connecting Devices

Use this procedure to connect asynchronous serial devices to the DeviceMaster 500 ports.

![Caution]
Caution

Make sure that you have configured the ports for the correct communications mode before connecting any devices. The default mode in the NS-Link drivers is RS-232. There is a remote possibility that connecting a serial device for the wrong mode could damage the serial device.

1. Connect your serial devices to the appropriate serial port on the DeviceMaster 500 using the appropriate cable. You can build your own DB9 cable using *DB9 Serial Cables and Loopback Plugs* on Page 35

   Note: *Refer to the hardware manufacturer's installation documentation if you need help with connector pinouts or cabling for the serial device.*

2. Verify that the devices are communicating properly. Go to the appropriate table for information about the LEDs, which may provide information about the installation.

   - *1-Port (Standard) LEDs* on Page 33
   - *1-Port Embedded LEDs* on Page 34
   - *4-Port LEDs* on Page 34

1-Port (Standard) LEDs	
Status	The amber **Status** LED on the device is lit, indicating you have power and it 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. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 30 seconds.*
Link Act	If the red **Link Act** LED is lit, it indicates a working Ethernet connection.
Duplex	If the red **Duplex** LED is lit, it indicates full-duplex activity.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

1-Port Embedded LEDs	
Status	When lit, the amber **Status** LED (**D1**) on the DeviceMaster 500 indicates the devices is fully powered and has completed the boot cycle.
	Note: *The Status LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 30 seconds.*
Link/Act	When lit, the red **Link/Act** LED (**D2**) indicates a working Ethernet connection.
Duplex	When lit, the red **Duplex** (**D3**) LED indicates full-duplex activity.
100	When lit, the red **100** (**D4**) LED indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

| 4-Port LEDs		
PWR	LED on the front panel of the DeviceMaster 500 is lit, indicating you have power and it 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. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 30 seconds.*	
LNK ACT	The red **LNK ACT** LED is lit, indicating that you have a working Ethernet connection.	
COL	If the red **COL LED** is lit, there is a network collision.	
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.	
Rx **Tx**	The amber Rx LEDs shows that the port is connected to another RS-232 device or receiving data in RS-422/485 mode. The green Tx LED shows that the data is transmitting.	* Represents port number

DB9 Serial Cables and Loopback Plugs

You can build your own null-modem or straight-through DB9 serial cables using the following subsections.

DB9 Connector Pinouts			
Pin	**RS-232**	**RS-422**	**RS-485**
1	DCD	Not used	Not used
2	RxD	RxD-	Not used
3	TxD	TxD-	TxD/RxD-
4	DTR	Not used	Not used
5	GND	Not used†	Not used†
6	DSR	Not used	Not used
7	RTS	TxD+	TxD/RxD+
8	CTS	RxD+	Not used
9	RI	Not used	Not Used
† Pin 5 is tied to ground on the board, but is not used in the cable.			

This illustrates the DB9 connector signals.

RS-232

GND
DTR   RI
TxD   CTS
RxD   RTS
CD   DSR
                       Pin 6
Pin 1
DB9 Male

RS-422

Not used*
Not used   Not used
TxD-   RxD+
RxD-   TxD+
Not used   Not used
                     Pin 6
Pin 1
DB9 Male

RS-485

Not used*
Not used   Not used
TxD/RxD-   Not used
Not used   TxD/RxD+
Not used   Not used
                     Pin 6
Pin 1
DB9 Male

* Pin 5 is tied to ground on the board, but is not used in the cable.
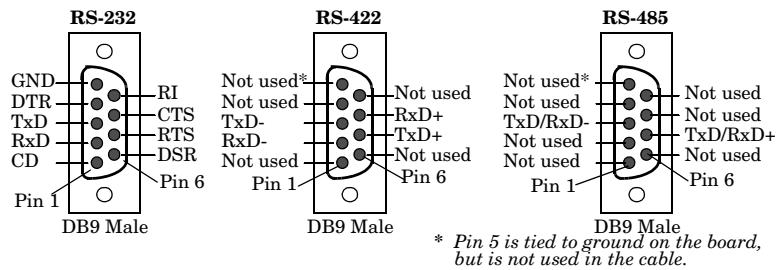
DB9 Loopback Plugs

Loopback connectors are DB9 female serial port plugs, with pins wired together as shown, that are used in conjunction with application software (Test Terminal or Minicom) to test serial ports. The DeviceMaster 500 is shipped with a a single loopback plug (RS-232/422).

Note: *You can use Test Terminal (Windows) or minicom (Linux) to test the serial ports. You can use the Support page on the CD shipped with the DeviceMaster 500 or see Locating Software and Documentation on Page 8 to locate the NS-Link User Guide for Windows or the Linux readme file.*

Wire the following pins together to build additional plugs or replace a missing RS-232 loopback plug:

- Pins 1 to 4 to 6
- Pins 2 to 3
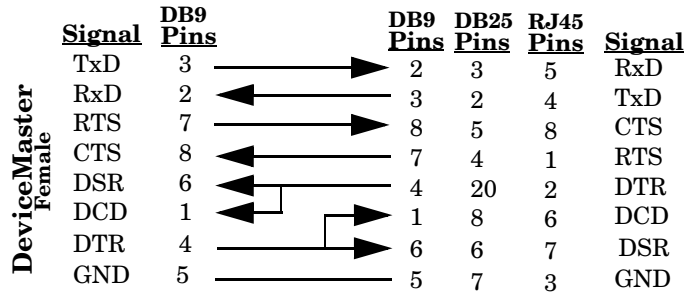- Pins 7 to 8 to 9

Pin 1   Pin 5
Pin 6   Pin 9

RS-232 Only (Back View)   *The RS-232 loopback plug also works for RS-422.*

Wire the following pins together for an RS-422 loopback plug:

- Pins 2 to 3
- Pins 7 to 8

Pin 1   Pin 5
Pin 6   Pin 9

RS-422 Only (Back View)

DB9 Null-Modem Cables (RS-232)

Use the following figure if you need to build an RS-232 null-modem cable. A null-modem cable is required for connecting DTE devices.

DeviceMaster Female	Signal	DB9 Pins		DB9 Pins	DB25 Pins	RJ45 Pins	Signal
	TxD	3	→	2	3	5	RxD
	RxD	2	←	3	2	4	TxD
	RTS	7	→	8	5	8	CTS
	CTS	8	←	7	4	1	RTS
	DSR	6	←	4	20	2	DTR
	DCD	1	←	1	8	6	DCD
	DTR	4	→	6	6	7	DSR
	GND	5	—	5	7	3	GND

Note: *You may want to purchase or build a straight-through cable and purchase a null-modem adapter. For example, a null-modem cable can be used to connect COM2 of one PC to COM2 of another PC.*
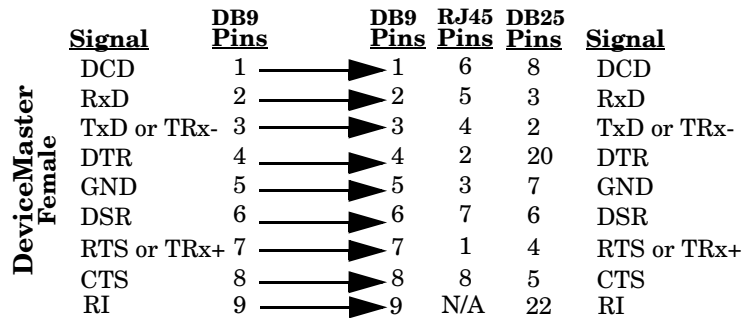
DB9 Null-Modem Cables (RS-422)

Use the following figure if you need to build an RS-422 null-modem cable.

DeviceMaster Female	Signal	DB9 Pins		Signal
	TxD+	7	→	RxD+
	TxD-	3	→	RxD-
	RxD+	8	←	TxD+
	RxD-	2	←	TxD-
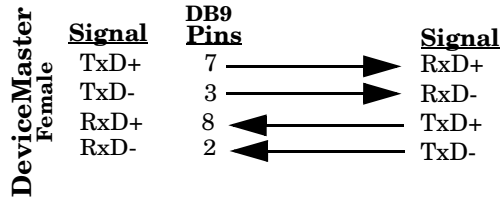
Note: *RS-422 pinouts are not standardized. Each peripheral manufacturer uses different pinouts. Please refer to the documentation for the peripheral to determine the pinouts for the signals above.*

DB9 Straight-Through Cables (RS-232/485)

Use the following figure if you need to build an RS-232 or RS-485 straight-through cable. Straight-through cables are used to connect modems and other DCE devices. For example, a straight-through cable can be used to connect COM2 to a modem.

DeviceMaster Female	Signal	DB9 Pins		DB9 Pins	RJ45 Pins	DB25 Pins	Signal
	DCD	1	→	1	6	8	DCD
	RxD	2	→	2	5	3	RxD
	TxD or TRx-	3	→	3	4	2	TxD or TRx-
	DTR	4	→	4	2	20	DTR
	GND	5	→	5	3	7	GND
	DSR	6	→	6	7	6	DSR
	RTS or TRx+	7	→	7	1	4	RTS or TRx+
	CTS	8	→	8	8	5	CTS
	RI	9	→	9	N/A	22	RI

Socket Port Configuration

This section discusses the following topics:

- *SocketServer Overview*
- *SocketServer Versions* on Page 40
- *Accessing Socket Configuration* on Page 39

SocketServer Overview

SocketServer is the name of the TCP/IP socket web page that is integrated in the firmware that comes pre-installed on your DeviceMaster 500.

If you want to use any of the ports as COM or tty ports, you should first install and configure the NS-Link device driver for your operating system, and then configure the ports that you want to use as TCP/IP sockets. When you install an NS-Link device driver, an NS-Link version of SocketServer loads on the DeviceMaster 500. See *Device Driver Installation* on Page 25 for device driver installation procedures.

The main SocketServer web page provides access to configure:

- Socket port characteristics for:
    - Serial
    - TCP connection
    - UDP connection

    See *SocketServer Architecture* on Page 38 for more information about socket port support.
- Network settings (after initial configuration)
- Email notification services
- RFC1006 (ISO over TCP)

Note: *For socket service configuration procedures, see the web page **Help** system or the PortVision Plus **Help** system.*

SocketServer Architecture

TCP/IP socket mode operation is used to connect serial devices with an application that supports TCP/IP socket communications addressing.

TCP/IP Socket Mode
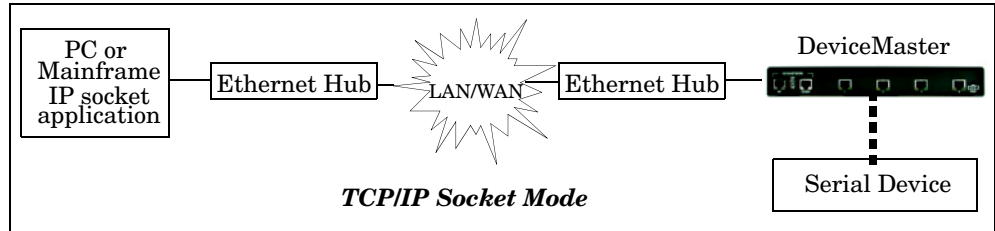
Serial tunneling mode is used to establish a socket connection between two DeviceMaster 500s through an ethernet network.

Serial Tunneling Mode
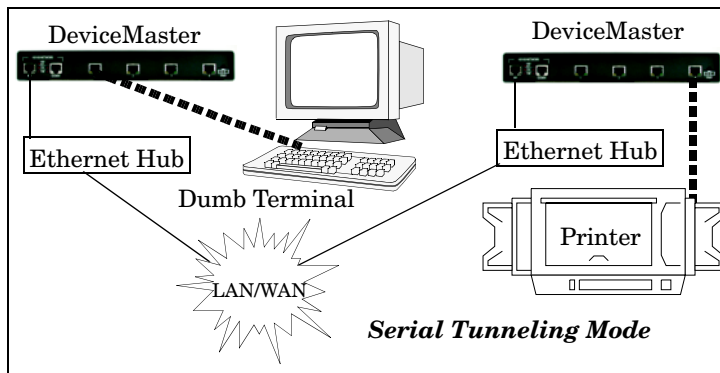
UDP mode is designed for applications that need faster data transmission, or that make use of UDP's broadcast capabilities. UDP differs from TCP in that a UDP transmission does not first require a connection to be opened before sending data and the receiving device does not issue acknowledgements to the sender.

In this example, four PCs receive data simultaneously from one serial device.
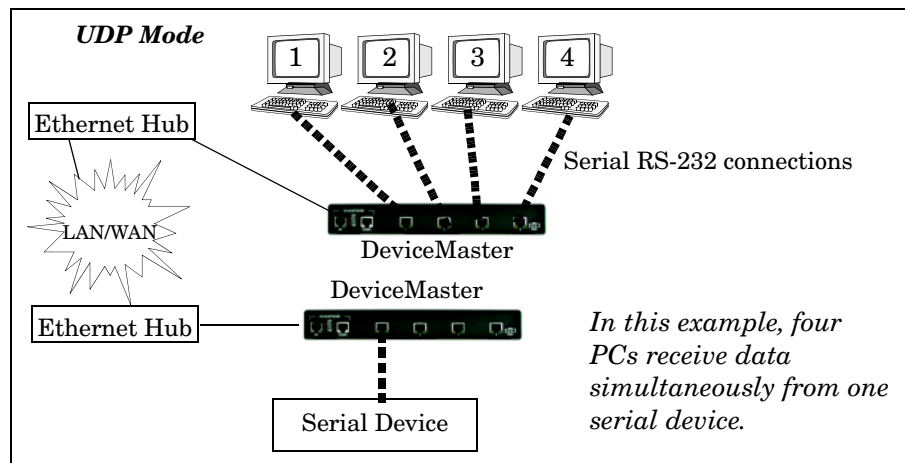
Accessing Socket Configuration

There are several ways to access the socket configuration pages (SocketServer or NS-Link). Use the method that fits your environment best.

- *Web Browser*
- *PortVision Plus*

Web Browser

To access the socket configuration page for the DeviceMaster 500 using a web browser, follow this procedure.

1. Start your web browser.

2. Enter the IP address of the DeviceMaster 500 in the URL field.

    Note: If you do not know the IP address, you can view the IP address in PortVision Plus or retrieve the IP address with the NS-Link driver for Windows.

3. Click the port number that you want to configure as a socket.

*Note: See the web page **Help** system, if you need information about configuring sockets or serial tunneling. The **Help** system provides detailed configuration procedures and descriptions for all fields.*

PortVision Plus

There are several ways to access the socket configuration page for the DeviceMaster 500 using PortVision Plus.

Web Manager Button

1. If necessary, start PortVision Plus, right-click the DeviceMaster 500 that you want to configure, and click **Web Manager**.

2. Click the port for which you want to configure socket port settings (serial, TCP connection configuration, and UDP connection configuration).

    To set the baud rate to 500K, select 300 in the **Baud Rate** drop list.

    *Note: For socket configuration information see the Help system. Click the **?** in a configuration area for field specific information or the **Help** button at the bottom of the page to view page level help. To locate configuration procedures, scroll to the top of the Help file and view the* Table of Contents*.*

3. Click **Save** to return to the main page.

4. Optionally, access the following pages to configure additional settings.

    a. Click the **Network** page to change the network settings.

    b. Click the **Email Settings** page to configure email notification services.

    c. Click the **RFC1006 Settings** page to configure RFC1006 settings.

Configure Device Page

1. If necessary, start PortVision Plus, double-click the DeviceMaster 500 that you want to configure in the *List View* pane.

2. Click the port **Settings tab** to configure socket port settings (serial, TCP connection configuration, and UDP connection configuration).

    *Note: For socket configuration information click the **Help** button at the left.*

3. Optionally, access the following pages to configure additional settings.

    a. Click the **Email Settings** property page to configure email notification services.

    b. Click the **RFC1006 Settings** property page to configure RFC1006 settings.

   c. Click the **Port Settings** property page to configure serial port characteristics for socket services.

    Note: To set the baud rate to 500K, select 300 in the Baud Rate drop list.

SocketServer Versions

The *SocketServer Overview* discusses the that the default SocketServer web page is the same as the NS-Link web page. If the NS-Link driver is not running (not installed or disabled), the default SocketServer loads when you open a web browser session.
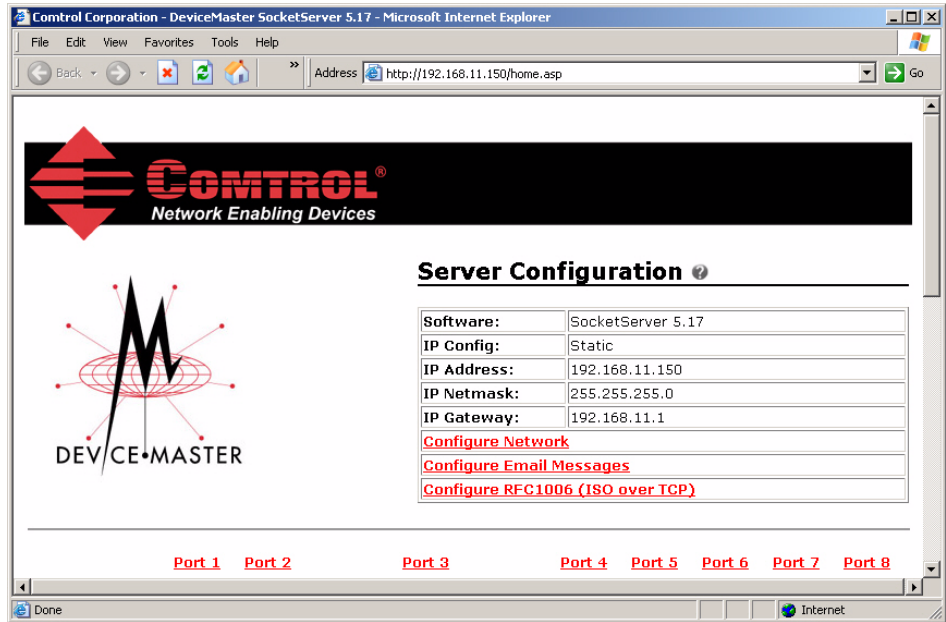
Your SocketServer or NS-Link version may be different than these examples.
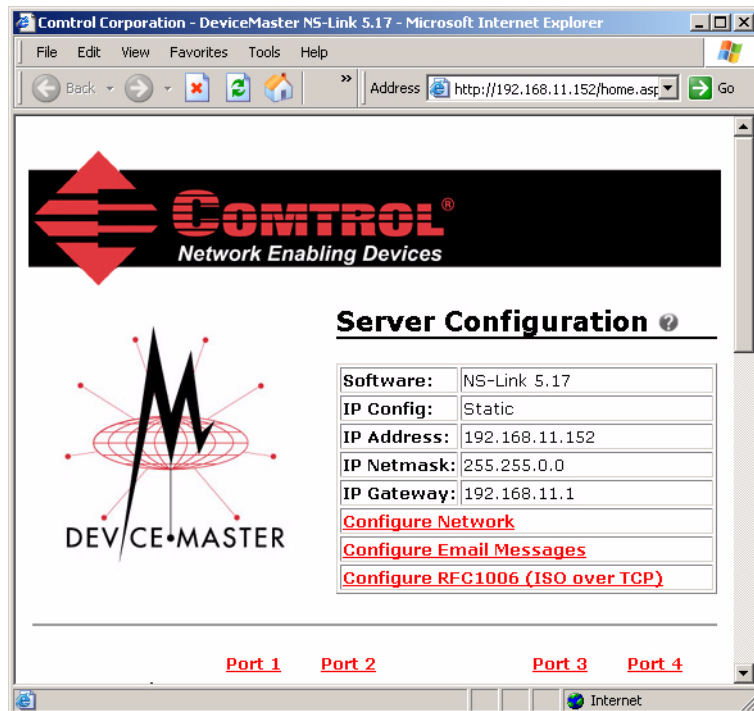
Managing the DeviceMaster 500

This section discusses the following DeviceMaster 500 maintenance procedures:

- *Rebooting the DeviceMaster 500*
- *Uploading SocketServer to Multiple DeviceMaster 500s* on Page 42
- *Configuring Multiple DeviceMaster 500s Network Addresses* on Page 42
- *Using Configuration Files* on Page 43
- *Managing Bootloader* on Page 44, which also discusses checking the Bootloader version and downloading the latest Bootloader
- *Adding a DeviceMaster 500 to an Existing Installation* on Page 46
- *Replacing a DeviceMaster 500* on Page 46
- *Restoring Serial Port Settings* on Page 47

Note: *You can optionally refer to RedBoot Procedures on Page 49 if you want to perform procedures at the RedBoot level.*

Rebooting the DeviceMaster 500

There are many ways to reboot the DeviceMaster 500. Use the method that most fits your situation.

Method	Procedure
PortVision Plus	*Main screen*: Right-click the DeviceMaster 500 or DeviceMaster 500s, click **Reboot Device** and then **Yes**. *Configure Device* screen: Click **Reboot Device** and then **Yes**.
Web page	*Main page*: Scroll to the bottom of the screen, click **Reboot** and then **Yes: Reboot**.
Telnet	Type **reset**.

Optionally, you can power cycle the DeviceMaster 500.

Uploading SocketServer to Multiple DeviceMaster 500s

If the Windows NS-Link driver has been installed, make sure that the driver is disabled through the *Device Manager* before uploading SocketServer.

1. If you have not done so, install PortVision Plus (*Installing PortVision Plus* on Page 19) and **Scan** the network.

2. Shift-click the multiple DeviceMaster 500s on the **Main** screen that you want to update and use one of the following methods:
   - Click the **Upload** button
   - Right-click and then click **Upload Firmware**
   - Click **Upload Firmware** on the **Device** menu

3. Browse, click the firmware (**.bin**) file, **Open** (*Please locate the new firmware*), and then click **Yes** (*Upload Firmware*).

   It may take a few moments for the firmware to upload onto the device. The device will reboot itself during the upload process.

4. Click **Ok** to the advisory message about waiting to use the device until the status reads **ON-LINE**.

In the next polling cycle, PortVision Plus will update the *List View* pane and display the new firmware version.

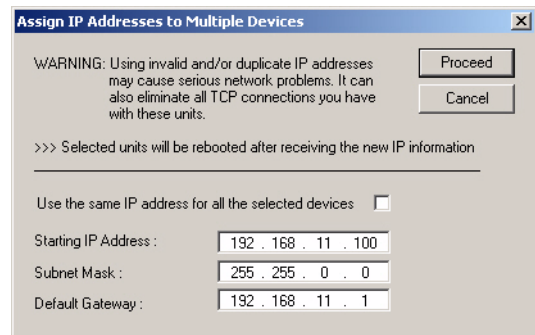## Configuring Multiple DeviceMaster 500s Network Addresses

The DeviceMaster 500s must be on the same network segment for the following procedure to work.

Optionally, you may want to create a configuration file and also configure the Email, RFC1006, and Port Settings. See *Using Configuration Files* on Page 43 for more information.

Use the following steps to configure multiple DeviceMaster 500s.

1. If you have not done so, install PortVision Plus (*Installing PortVision Plus* on Page 19) and **Scan** the network.

2. Shift-click the DeviceMaster 500s for which you want to program network information, right-click, and click **Assign IP to Multiple Devices**.

3. Enter the starting IP address, subnet mask, IP Gateway and click **Proceed**.

   PortVision Plus displays the programmed IP addresses in the *List View* pane after the next refresh cycle.

Using Configuration Files

If you are deploying multiple DeviceMaster 500 units that share common values, you can save the configuration file (.**dmc**) from the *Main* or *Configure Device* screens in PortVision Plus and load that configuration onto other DeviceMaster 500 units.

If you save a configuration file from the *Main* or *Configure Device* screen, you can choose what properties you want saved.

Use this procedure to save a configuration file using the *Main* screen.

1. If you have not done so, install PortVision Plus (*[Installing PortVision Plus](#)* on Page 19) and **Scan** the network.

2. Highlight the device on the *Main* screen that you want to save its configuration and use one of the following methods:

    •   Click the **Save** button

    •   Right-click and then click **Save Configuration to File**

3. Browse to the location you want to save the file, enter a file name and click **Save**.

4. Click the **All** checkbox or click only the properties that you want saved for each property page in the configuration file and click **Done**.

    Note: Selecting the All option with multiple DeviceMaster 500s highlighted will apply the same IP address to all of the selected DeviceMaster 500s.

5. Click **Ok** to close the *Save Configuration Completed* message.

Use the following procedure to load a previously saved a DeviceMaster 500 configuration file. Load a configuration file and apply it to a selected DeviceMaster 500 or DeviceMaster 500s from the *Main* or *Configure Device* screen.

Use this procedure to load a configuration file using the *Main* screen to one or more DeviceMaster 500 units.

1. Highlight the device or devices on the *Main* screen that you want to load and use one of the following methods:

    •   Click the **Load** button

    •   Right-click and then click **Load Configuration to File**

    •   Click **Load Configuration to File** on the *Device* menu

2. Click **Yes** to the warning that it will take 25 seconds per device and it may also reboot the devices.

3. Browse to the location of the configuration file, click the file name and then **Open**.

4. Click the **All** checkbox or click only the properties that you want to load for each property page in the configuration file and then click **Done**.

5. Close the *Load Configuration* popup message.

Managing Bootloader

Bootloader refers to the operating system that runs on the DeviceMaster 500 hardware during the power on phase, which then loads SocketServer.

Note: Typically, you should not update the Bootloader unless advised to do so by Comtrol Technical Support.

There are several methods and tools that you can use to check the Bootloader version or update the Bootloader.

- **PortVision Plus** is the easiest way to check the Bootloader version and uploads the latest version.
- Redboot can be used to check the Bootloader version and update the Bootloader, if necessary. See *RedBoot Procedures* on Page 49 for procedures.

Checking the Bootloader Version

The following procedure uses PortVision Plus to check the Bootloader version. Optionally, you can use Redboot, see *Determining the Bootloader Version* on Page 52.

1. If you have not done so, install PortVision Plus (*Installing PortVision Plus* on Page 19) and **Scan** the network.
2. Right-click the DeviceMaster 500 and click **Reboot Device**.
3. Click **Yes** to the *Confirm Reboot* query.
4. Right-click the DeviceMaster 500, click **Refresh Device** as many times as necessary to catch the reboot cycle in the *List View* pane. The Bootloader version is briefly displayed during the reboot cycle before SocketServer loads.
5. Check the Comtrol web site to see if a later version is available.
6. Go to the next subsection to upload a new version of Bootloader.

Uploading Bootloader

Use the following procedure to upload Bootloader to the DeviceMaster 500. Typically, you should not update the Bootloader unless advised to do so by Comtrol Technical Support.

Note: Technical Support does not recommend updating Bootloader across a WAN. For best results, connect the DeviceMaster 500 directly to a PC or laptop to upload Bootloader.

Make sure that power is not interrupted while uploading Bootloader. Power interruption while uploading Bootloader will require that the DeviceMaster 500 must be sent into Comtrol so that it can be reflashed.

If you are not successful uploading SocketServer into the DeviceMaster 500, do not upload Bootloader.

⚠
Caution

If the NS-Link driver for Windows has been installed, make sure that the driver is disabled through the *Device Manager* before uploading Bootloader.

1. If you have not done so, install PortVision Plus (*Installing PortVision Plus* on Page 19) and **Scan** the network.
2. If necessary, check the Bootloader version and download the latest version.

3. Right-click the DeviceMaster 500 for which you want to update, click **Upload Firmware**, browse to the Bootloader **.bin** file, and then click **Open**.
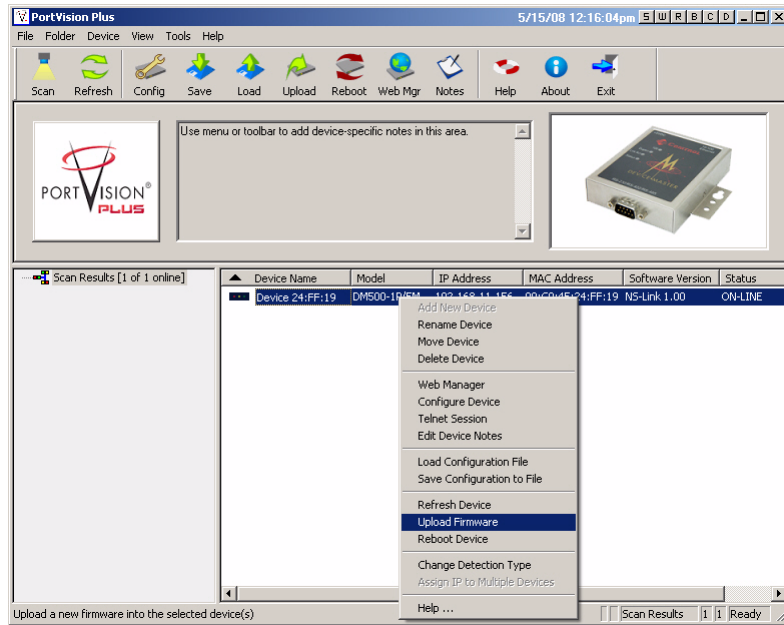
4. Click **Yes** to the *Upload Firmware* message that warns you that this is a sensitive process.

5. Click **Ok** to the second *Upload Firmware* message and then click **Refresh** until the Bootloader version displays in the *List View* pane, which should show the new version.

Adding a DeviceMaster 500 to an Existing Installation

Use this procedure to add another DeviceMaster 500 to an existing configuration.

1. Install the DeviceMaster 500 to an Ethernet hub or server NIC. If necessary, see *Hardware Installation* on Page 9.

   Note: *Technical support recommends installing and testing one DeviceMaster 500 at a time when installing multiple DeviceMaster 500s. In the event troubleshooting must be done, a single DeviceMaster 500 is easier to resolve than several at once.*

2. Power-up the new DeviceMaster 500 and verify that boot cycle completes.

   Note: *he Status LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the boot cycle.*

3. If required, program an IP address into the new DeviceMaster 500.

4. Configure serial ports to support the serial devices.

Replacing a DeviceMaster 500

Follow the appropriate procedure to replace DeviceMaster 500 with another DeviceMaster 500 in an existing configuration.

Device Programmed with IP Address

Use this procedure to replace hardware if the existing device is programmed for use with an IP address.

1. Configure the IP address in the new DeviceMaster 500.

2. Remove the old DeviceMaster 500 and attach a new or spare DeviceMaster 500.

3. Connect the new DeviceMaster 500 to the network hub or server NIC.

4. Power-up the new DeviceMaster 500 and verify that boot cycle completes.

   Note: *he Status LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the boot cycle.*

5. If using socket mode, configure any ports as necessary to match the previous DeviceMaster 500.

6. Transfer *all* cabling from the old DeviceMaster 500 to the new DeviceMaster 500.

7. *It is not necessary* to shut down and restart the host PC.

Device Programmed with MAC Address

Use this procedure to replace hardware if the existing device is using a MAC address for communications.

1. Remove the old DeviceMaster 500 and attach a new or spare DeviceMaster 500.

2. Connect the new DeviceMaster 500 to the network hub or server NIC.

3. Power-up the new DeviceMaster 500 and verify that boot cycle completes.

   Note: *he Status LED flashes while booting and it takes approximately 1530 seconds for the Bootloader to complete the boot cycle.*

4. If you are using NS-Link, change the MAC address of the new DeviceMaster 500 in the NS-Link driver to reflect the new DeviceMaster 500.

5. If using socket mode, configure any ports as necessary to match the previous DeviceMaster 500.

6. Transfer *all* cabling from the old DeviceMaster 500 to the new DeviceMaster 500.

7. Restart the host PC.

Restoring Serial Port Settings

Use the web page and/or the NS-Link device driver for Windows to restore the serial port settings to their default values.

The NS-Link serial port settings are independent of the socket serial port settings on the web page. If you are using COM ports and also have configured the port for socket services, you must restore the default port settings in the driver and web page.

NS-Link COM Port
Click **Defaults** (and if appropriate, **Clone**) and **Ok** in the NS-Link *COM Properties* screen to reset the serial port settings.

If necessary, refer to the *NS-Link User Guide for Windows* (also available on the CD) for additional information about NS-Link.

Socket Port
Use the following procedure to reset the socket port serial settings.

1. Open the DeviceMaster 500 web page (*Accessing Socket Configuration* on Page 39).

2. Scroll to the bottom of the *Server Configuration* page and click **Reboot**.

3. Click **Set configuration for all ports to factory default settings** and the click **Yes, Reboot**.

RedBoot Procedures

Use this section as a reference if you want to perform tasks in Redboot. Typically, most of these procedures can be performed using PortVision Plus.

Overview

You can use a *serial* connection between Port 1 on the DeviceMaster 500 and a COM port on a PC. If you plan on using the serial method, you will need a null modem cable and a terminal program installed and configured on the PC.

Note: Use the serial connection method, if the DeviceMaster 500 is not on the same Ethernet network segment as the PC.

You can use a *telnet* connection, if the DeviceMaster 500 is locally accessible by Ethernet.

If necessary, see *Establishing a Serial Connection* on Page 49 or *Establishing a Telnet Connection* on Page 50 to disable the Bootloader before performing any of these procedures.

Establishing a Serial Connection

Use the following procedure to set up serial connection with a terminal server program (for example, Test Terminal (WCom2), HyperTerminal® or Minicom) and the DeviceMaster 500. Test Terminal (WCom2) is available in PortVision Plus or you can also install the Comtrol Utility package.

1. Connect a null-modem cable from an available COM port on your PC to **Port 1** on the DeviceMaster 500.

   Note: See DB9 Serial Cables and Loopback Plugs on Page 35 to build a null-modem cable.

2. Configure a terminal server program (such as, HyperTerminal or Minicom) to the following values:

   - Bits per second = 57600
   - Data bits = 8
   - Parity = None
   - Stop bits = 1
   - Flow control = None

3. Reset the DeviceMaster 500.

   Note: Disconnect and reconnect the power cable (external power supply.

4. Immediately type **#!DM** and press **Enter** in the terminal program.

5. At the **RedBoot>** prompt, type **dis**, and press **Enter**.

```
#!DM
RedBoot>dis
Loading disabled
```

   Note: If you do not disable the loading feature of the Bootloader within the time-out period (default is fifteen seconds), an application will be loaded from flash and started. If this happens, repeat Steps 3 through 5. The #!DM command is the only case-sensitive command and must be in uppercase.

6. Verify that the system responds with a **Loading disabled** message.

7. Go to the appropriate task:
   - *Determining the Network Settings* on Page 51
   - *Configuring the Network Settings* on Page 51
   - *Determining the Bootloader Version* on Page 52
   - *Resetting the DeviceMaster 500* on Page 52
   - *Uploading Firmware* on Page 53
   - *Configuring Passwords* on Page 56
   - *Redboot Command Overview* on Page 57.

Establishing a Telnet Connection

Use the following procedure to telnet to the DeviceMaster 500.

1. Open a telnet session, enter the DeviceMaster 500 IP address. If using Windows, open a **Command** window and type **telnet** [*ip_address*].

   Note: *Press the* **Enter** *key if you have not programmed a password or use the password previously configured. The DeviceMaster 500 does not come pre-programmed with a password.*

2. Type **reset**, and close the session.

3. Open a new telnet session, enter the DeviceMaster 500 IP address, and the password.

4. Type **dis** to disable the Bootloader.

```
**********************************************
**
**   Comtrol DeviceMaster Bootloader Version 3.05
**   RedBoot(tm) environment - built 08:13:02, Apr   4 2008
**   Platform: Comtrol DeviceMaster (ARM 7TDMI)
**   Portions Copyright (C) 2000. Red Hat, Inc.
**   Portions Copyright (C) 2001-2008 Comtrol Corp.
**********************************************

FLASH:   64 blocks of 65536 bytes each
FLASH:   4194304 bytes (0x05000000 - 0x05400000)
RAM:     8126464 bytes (0x00000000 - 0x007c0000)
RedBoot> dis
Loading disabled
RedBoot> _
```

5. Verify that the system responds with a **Loading disabled** message.

6. Go to the appropriate task:
   - *Determining the Network Settings* on Page 51
   - *Configuring the Network Settings* on Page 51
   - *Determining the Bootloader Version* on Page 52
   - *Resetting the DeviceMaster 500* on Page 52
   - *Uploading Firmware* on Page 53
   - *Configuring Passwords* on Page 56
   - *Redboot Command Overview* on Page 57.

Determining the Network Settings

If you are not sure what the network information is on a DeviceMaster 500, you can perform the following procedure.

1. Establish communications with the DeviceMaster 500 using the serial (Page 49) method.

Default Network Settings

IP address:
    192.168.250.250

Subnet mask:
    255.255.0.0

Gateway address:
    192.168.250.1

2. At the **RedBoot** prompt, type **ip**.

```
RedBoot>dis
Loading disabled
RedBoot> ip
IP Config: IpAddr 192.168.250.250 IpMask 255.255.0.0 IpGate 192.168.250.1
RedBoot>
```

The IP address, subnet mask, and IP gateway values will display.

Note: Optionally, you can install PortVision Plus on a Windows system on the network and see the IP information in the List View pane.

Configuring the Network Settings

The following subsections show you how to establish a communications link with Redboot on the DeviceMaster 500, by using one of these methods:

• *Serial connection* between Port 1 on the DeviceMaster 500 and a COM port on a PC.

  If you do not know the IP address of the DeviceMaster 500 you must use a serial connection to communicate with the DeviceMaster 500.

• *Telnet connection* requires that you know the IP address. In addition, the IP address must also be valid for the network to which it is attached. For example: The network segment must be 192.168.250.x to telnet to the DeviceMaster 500 default IP.

Note: Optionally, you can install PortVision Plus on a Windows system on the network and use the Configure Device window to configure network settings.

Use the following procedure to program the IP address using Redboot.

1. Establish communications with the DeviceMaster 500 using the serial (Page 49) or telnet (Page 50) method.

2. Enter **ip [*addr mask gateway*]** and press the **Enter** key to configure the IP address. *Where*:

   addr = IP address you want to use

   mask = matches you network subnet mask

   gateway = assigned by your network administrator

   Make sure that each value is separated by a space.

```
RedBoot>dis
Loading disabled
RedBoot> ip ###.###.###.### ###.###.###.### ###.###.###.###
RedBoot> ip
IP Config: IpAddr ###.###.###.### IpMask ###.###.###.### IpGate ###.###.###.###
RedBoot> reset
... Resetting
```

3. Verify that Redboot responds with your configured network information or reissue the command.

4. Type **reset** to reset the DeviceMaster 500, if you do not have any other related Redboot tasks.

Determining the Bootloader Version

Use the following procedure to determine what Bootloader version is loaded in the DeviceMaster 500.

1. Establish communications with the DeviceMaster 500 using the serial (Page 49) or telnet (Page 50) method.

2. At the **RedBoot** prompt, type **version**.

```
RedBoot> version
************************************************
**
**  Comtrol DeviceMaster Bootloader Version 3.05
**  RedBoot(tm) environment - built 08:13:02, Apr   4 2008
**  Platform: Comtrol DeviceMaster (ARM 7TDMI)
**  Portions Copyright (C) 2000. Red Hat, Inc.
**  Portions Copyright (C) 2001-2008 Comtrol Corp.
************************************************

FLASH:  64 blocks of 65536 bytes each
FLASH:  4194304 bytes (0x05000000 - 0x05400000)
RAM:    8126464 bytes (0x00000000 - 0x007c0000)
RedBoot>
```

The Bootloader information displays.

3. To update the Bootloader on the DeviceMaster 500, make sure that you download the latest version and see *Managing Bootloader* on Page 44.

4. Type **reset** to reset the DeviceMaster 500, if you do not have any other related Redboot tasks.

Note: *Optionally, you can install PortVision Plus on a Windows system on the network and see the Bootloader version in the List View pane. Reboot the DeviceMaster 500, right-click the DeviceMaster 500 and click Refresh Device until the Bootloader version displays. The Bootloader version is only displayed for a few moments.*

Resetting the DeviceMaster 500

When you have completed your tasks in Redboot, you must enter a **reset** command at the **RedBoot>** prompt for the DeviceMaster 500 to begin operation.

Note: *The LEDs on the DeviceMaster 500 will go through the power up sequence. The DeviceMaster 500 has completed its reset cycle when the Status LED is lit and it stops flashing.*

Uploading Firmware

Use the appropriate procedure for your environment:

- *Serial Method* on Page 53
- *Telnet Method* on Page 55

Note: Optionally, you can install PortVision Plus on a Windows system on the network and upload firmware. PortVision Plus is the recommended method for uploading firmware.

Serial Method

The procedure for updating the Bootloader and SocketServer are the same, but the **.bin** files are unique.

1. Verify that you have the **.bin** file (*Locating Software and Documentation* on Page 8) and cable *Establishing a Serial Connection* on Page 49).

2. Connect a null modem cable from an available COM port on your PC to **Port 1** on the DeviceMaster 500.

3. Start the terminal program and configure your terminal server program (for example, HyperTerminal or minicom) to the following values:

   - Bits per second = 57600
   - Data bits = 8
   - Parity = None
   - Stop bits = 1
   - Flow control = None

4. Reset the DeviceMaster 500 (disconnect and reconnect the power cable).

5. Immediately type **#!DM** and press **Enter** in your terminal program.

```
#!DM
RedBoot>dis
Loading disabled
```

6. At the **RedBoot>** prompt, type **dis**, and press **Enter**.

   *Note: If you are unsuccessful in disabling the Bootloader within ten seconds, type **reset, #!DM,** and **dis** again. The #!DM command is the only case-sensitive command and must be in uppercase.*

7. Verify that the system responds with an **Loading disabled** message.

8. Type **load -r -b 0 -m x** at the **RedBoot>** prompt and press **Enter**.

```
RedBoot> load -r -b 0 -m x
CC
```

9. Upload the file using Xmodem for the protocol. For example, if you are using HyperTerminal:

   a. Click **Transfer**.

   b. Click **Send File**.

   c. Browse to the location where you stored the file from *Locating Software and Documentation* on Page 8.

   d. Click **Xmodem** as the protocol.
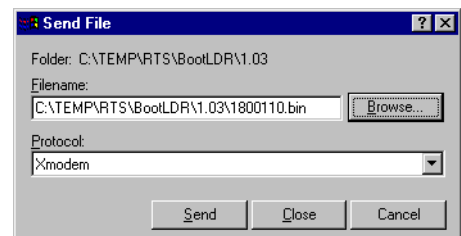
The file name in this screen shows the Bootloader.

e. Click **Send**.
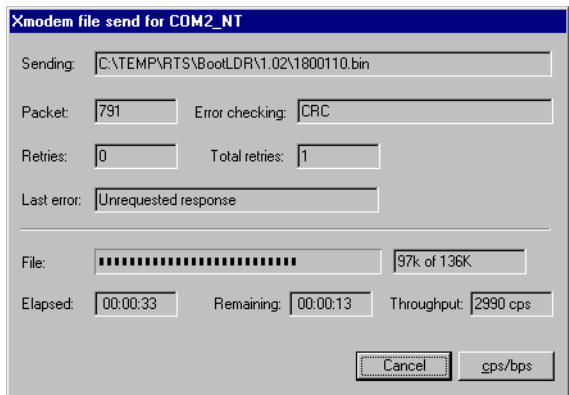
The file name in this screen shows the Bootloader.

10. When the **RedBoot>** prompt appears (after approximately one minute for the Bootloader and approximately three minutes for SocketServer), type **go**.

```
CCCCCCRaw load done: 542721 bytes read
Address range:  00000000-00084800, Entry point:  00000000,
xyzModem - CRC mode, 4241(SOH)/0(STX)/0(CAN) packets, 8 tries
RedBoot> go
... Erase from 0x05030000-0x050c0000: .........
... Program from 0x00000000-0x00084801 at 0x05060000: ...
... Erase from 0x050f0000-0x05400000:  .
... Program from 0x007a0000-0x007b0000 at 0x053f0000: .
```

Note: In a few seconds, the ethernet and PWR LEDs cycle through a light sequence once and then upgrade is complete.

11. *If you updated SocketServer:* type, **fis list** and press **Enter** at the RedBoot> prompt.

```
RedBoot> fis list
Name              FLASH addr    Mem addr     Length      Entry point
FIS_directory   0x053F0000   0x053F0000   0x00010000   0x00000000
default         0x05030000   0x00000000   0x00090000   0x00000000
RedBoot>
```

*Note: You should see file information for a file called **default**. If you do not see this file, repeat the process starting with [Step 6](#).*

12. Reset the DeviceMaster 500 by typing **reset** at the RedBoot> prompt.

```
RedBoot> reset
. . .Resetting
```

Note: In a few seconds the ethernet and PWR LEDs cycle through a light sequence once and the update is complete.

13. Start your internet browser and enter the IP address of the DeviceMaster 500 to verify that the new version of SocketServer loads.

Telnet Method Use the following procedure to update the Bootloader or SocketServer with telnet to the DeviceMaster 500.

Note: A TFTP server is required to perform firmware updates using Redboot.

1. Verify that you have the **.bin** file (<u>Locating Software and Documentation</u> on Page 6).

2. Open a telnet session, type **reset**, and close the session.

3. Open a new telnet session and enter the DeviceMaster 500 IP address.

```
$ telnet 192.168.250.250 ◄───────────── Default IP Address
Trying 192.168.250.250...
Connected to 192.168.250.250.
Escape character is '^]'.
```

4. Enter the webserver password.

    Note: Press the **Enter** *key if you have not programmed a password.*

```
Password:
*********************************************
**
**   Comtrol DeviceMaster Bootloader Version 3.05
**   RedBoot(tm) environment - built 08:13:02, Apr   4 2008
**   Platform: Comtrol DeviceMaster (ARM 7TDMI)
**   Portions Copyright (C) 2000. Red Hat, Inc.
**   Portions Copyright (C) 2001-2008 Comtrol Corp.
*********************************************

FLASH:   64 blocks of 65536 bytes each
FLASH:   4194304 bytes (0x05000000 - 0x05400000)
RAM:     8126464 bytes (0x00000000 - 0x007c0000)
RedBoot>
```

5. At the Redboot prompt: type **dis** and press **Enter** to disable the Bootloader.

```
RedBoot>dis
Loading disabled
```

6. Verify that the system responds with an **Loading disabled** message.

7. Load the file from a TFTP server using the following command and press the **Enter** key:

    load -r -b 0 -h <TFTP-Server_IP_Addr> <Downloaded_File_Name>

    Note: The default IP address is: **192.168.250.250**.

```
RedBoot> load -r -b 0 -h 192.168.250.1 1800110.bin
CCCCRaw load done: 139521 bytes read
Address range: 00000000-00022100, Entry point: 00000000.
xyzModem - Cksum mode, 1091(SOH)/0(STX)/0(CAN) packets, 6 retries
RedBoot>
```

8. When the RedBoot> prompt appears (after approximately one minute if you are uploading the Bootloader and approximately three minutes if you ware uploading SocketServer), type **go**.

```
RedBoot>go
```

If uploading Bootloader: In a few seconds the ethernet and PWR LEDs cycle through a light sequence once and the update is complete.

> ### *If uploading SocketServer*:
>
> a. At the RedBoot> prompt, type: **fis list** and press **Enter**.

```
RedBoot> fis list
Name              FLASH addr   Mem addr    Length      Entry point
FIS_directory   0x053F0000   0x053F0000  0x00010000  0x00000000
default         0x05030000   0x00000000  0x00090000  0x00000000
RedBoot>
```

> *Note:* *You should see file information for a file called **default**. If you do not see this file, repeat the process starting with* <u>Step 7</u>.
>
> b. Reset the DeviceMaster 500 by typing **reset** at the RedBoot> prompt.
>
> *Note:* *In a few seconds the ethernet and PWR LEDs cycle through a light sequence once.*
>
> c. Start your internet browser and enter the IP address of the DeviceMaster 500 to verify that the new version of SocketServer loads.

Configuring Passwords

This section discusses how to configure a password for the web and telnet server.

Note: *See the PortVision Plus or socket Help system for information about email notification.*

Use the following procedure to establish the DeviceMaster 500 password for the Web and telnet server. Establishing a password prevents unauthorized changes to the DeviceMaster 500 configuration.

1. Establish communications with the DeviceMaster 500 using the serial (Page 53) or telnet method (Page 50).

2. Type **password** [*your_password*] and press **Enter**.

Note: *If you forget your password, you can reprogram the password using the serial method which bypasses the password.*

```
Password:
**********************************************
**
** Comtrol DeviceMaster Bootloader Version 3.05
** RedBoot(tm) environment - built 08:13:02, Apr  4 2008
** Platform: Comtrol DeviceMaster (ARM 7TDMI)
** Portions Copyright (C) 2000. Red Hat, Inc.
** Portions Copyright (C) 2001-2008 Comtrol Corp.
**********************************************

FLASH:  64 blocks of 65536 bytes each
FLASH:  4194304 bytes (0x05000000 - 0x05400000)
RAM:    8126464 bytes (0x00000000 - 0x007c0000)
RedBoot> dis
Loading disabled
RedBoot> password dev1357
Password 'dev1357'
RedBoot>
```

Note: *The Bootloader version on your DeviceMaster 500 may be different than the version displayed in this graphic.*

See the **auth** command in the <u>*Redboot Command Overview*</u> on Page 57 if you want to set up Web browser authentication.

Redboot Command Overview

The following table is an overview of Redboot commands available. You can access the list of commands online by entering **help** and pressing the **Enter** key. For more detailed information, see the *Redboot User's Guide* that is located on the Comtrol product CD or <u>download</u> it from the web.

RedBoot Commands	
auth **{noaccess, none, basic, md5, invalid}**	Sets or displays web authentication. The default is set to **none**, which means that there is no authentication required to access the web server. To deny access to the web server, click **noaccess** or **invalid**. If access is attempted, a message appears to notify the user that access is denied. To configure the web server to request an un-encrypted password, click **basic**. To configure the web server to request an encrypted password, click **md5**. (Some browsers do not support the **md5** command.)
boardrev†	Displays board revision.
cache [ON | OFF]	Manages machine caches.
chassis	Displays chassis information.
disable	Disables automatic load of the default application.
dump -b <location> -l <length>	Displays (hex dump) of a range of memory.
fis {cmds}	Manages flash images. See Chapter 2 of the *eCos Reference Manual* (located at this address on the CD or ftp site: **dev_mstr\500\software\redboot\user_guide**) for **{cmds}** information.
go [-w <timeout>] [entry]	Executes code at a location.
help <topic>	Displays available Redboot commands.
ip {addr mask gateway}	Displays or sets the IP address configuration.
load {-r} {-v} {-h <host>} {-m {TFTP | xyzmodem}} {-b <base_addr>} <file_name>	Loads a file from TFTP server or XModem.
loop 232|422|int port-number	Runs loopback test on port.
mac†	Displays ethernet MAC address.
model†	Shows model number.
password {password}	Sets the password.
reset	Resets the DeviceMaster 500. You must reset after changing an IP address.
telnet [disable | enable}	Sets or displays telnet server enable. Disables telnet.
teltimeout [seconds]	Shows or sets telnet time-out.
terse	Terse command response mode.
timeout {seconds}	Displays or sets Bootloader time-out value.
t485 port #1 port #2	Runs port-to-port RS-485 test.
version	Displays RedBoot version information.
† *Do not use these commands to change the values. Doing so may cause the DeviceMaster 500 to stop functioning.*	

Hardware Specifications

The following subsections contain specifications and safety notices for the DeviceMaster 500 family.

- *Locating DeviceMaster 500 Specifications*
- *Serial Communications* on Page 60
- *External Power Supply Specifications* on Page 61
    - *Power Supply for the 1-Port* on Page 61
      Note: *Use the specifications to provide a power supply for the embedded version.*
    - *Power Supply for the 4-Port* on Page 61
- *Notices* on Page 62

RoHS compliant products conform to EU Directive 2002/95/EC. These products do not contain any restricted substances (lead, cadmium, hexavalent chromium, mercury, PBB, and PBDE) except as specifically provided in the Directive.

Locating DeviceMaster 500 Specifications

Use the following table to locate the specification for your product.

DeviceMaster 500	Connector	Part Number
1-Port	DM9M	99439-8
Embedded 1-Port	IDC10	99474-9
4-Port	DB9M/RJ45	99444-2

Serial Communications

This table provides DeviceMaster 500 serial communications specifications.

Serial Communications	
Interface	RS-232, RS-422, and RS-485

Serial connector types:
    1-Port standard
    1-Port embedded
    4-Port
	
	DB9 Male
	Header, IDC10
	DB9

Baud rate/port
    Receive buffer
    Transmit buffer
	9600, 57.5K, and 500K bps
	1024 bytes
	256 bytes

NS-Link control:
    Data bits
    Parity
    Stop bits
    Flow control
	
	7 or 8
	Odd, even, none
	1 or 2
	Hardware or software

Network default values:
    IP address
    Subnet mask
    Gateway
	
	192.168.250.250
	255.255.0.0
	192.168.250.1

Network protocols	TCP/IP and UDP Socket services, BOOTP, TFTP, ICMP, ARP, SNMP (MIB-II), Telnet, HTTP, DHCP/RARP/Ping, RFC 1006
Event notification	SocketServer
SNMP support	Monitoring only

External Power Supply Specifications

This subsection discusses information that you may need if you wish to use your own external power supplies

Power Supply for the 1-Port

This table provides specifications for the power supply shipped with the DeviceMaster 500 1-port.

Comtrol Power Supply: 5-30VDC	
Input line frequency	43-63 Hz
Input line voltage	90-260 VAC
Output voltage	24VDC
Output current	500 mA @ 24VDC

Note: *The embedded model is not shipped with a power supply.*

This table provides the specifications, if you intend on using your own power supply.

External Power Supply: 5-30VDC	
Output voltage†	5-30VDC
Current†	100 mA (Min) @ 24VDC
Power	2.5 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

Note: *The embedded model is not shipped with a power supply.*

Screw Terminal Connector (included with the 1-port enclosed model)

Earth Gnd   5-30VDC   Return   Positive

Wire gauge:
AWG 12-22
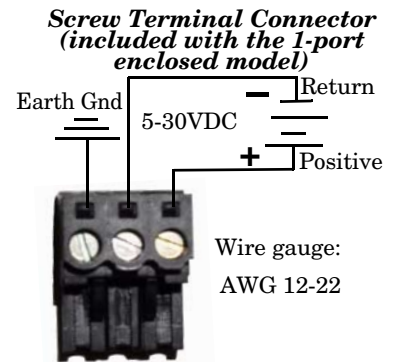
Power Supply for the 4-Port

This table provides the specifications for the power supply shipped with the DeviceMaster 500 4-port.

Comtrol Power Supply	
Input line frequency	47 - 63 Hz
Input line voltage	90 - 260 VAC
Output voltage	24VDC
Output current	500 mA @ 24VDC

This table provides the specifications, if you intend on using your own power supply.

External Power Supply	
Output voltage†	9-30VDC
Current†	200 mA (Min) @ 24VDC
Power	4.8 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

+VDC
V Return - GND
Shield GND
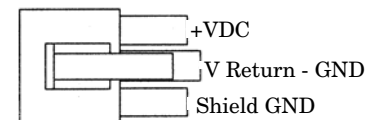
Housing Molex P/N:
39-01-4030
Pins Molex P/N:
44485-1211

Notices

Radio Frequency Interference (RFI) (FCC 15.105)

This equipment has been tested and found to comply with the limits for Class A digital devices pursuant to Part 15 of the FCC Rules.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements (FCC 15.19)

This equipment complies with part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by Comtrol Corporation may void the user's authority to operate this equipment.

Serial Cables (FCC 15.27)

This equipment is certified for Class A operation when used with unshielded cables on models with the RJ45 connectors and with shielded cables on all models with DB9 connectors.

Underwriters Laboratory

This equipment is Underwriters Laboratory "UL" listed.

Important Safety Information

Warning

To avoid contact with electrical current:

- Never install electrical wiring during an electrical storm.
- Never install the power plug in wet locations.
- Use a screwdriver and other tools with insulated handles.

Troubleshooting and Technical Support

This section contains troubleshooting information for your DeviceMaster 500. 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* on Page 63
- *General Troubleshooting* on Page 64
- *Daisy-Chaining DeviceMaster 500 4-Port Units* on Page 67

If you cannot diagnose the problem, you can contact *Technical Support* on Page 68.

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.

    Note: Most customer problems reported to Comtrol Technical Support are eventually traced to cabling or network problems.

- Isolate the DeviceMaster 500 from the network by connecting the device directly to a NIC in a host system.

Model	Connected to	Ethernet Cable	Connector Name
1-Port	Ethernet hub or NIC	Standard	10/100 ETHERNET
1-Port Embedded	Ethernet hub or NIC	Standard	RJ45 port (not labeled)
4-Port	NIC	Standard	DOWN
	Ethernet hub	Standard	UP

- Verify that the Ethernet hub and any other network devices between the system and the DeviceMaster 500 are powered up and operating.
- Reset the power on the DeviceMaster 500 and watch the **PWR** or **Status** light activity.

PWR or Status LED	Description
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.

- If the device has a power switch, turn the device's power switch off and on, while watching the LED diagnostics.
- If the DeviceMaster 500 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 DeviceMaster 500.

- Verify that the network IP address, subnet mask, and gateway is correct and appropriate for the network. If IP addressing is being used, the system should be able to ping the DeviceMaster 500.

- Verify that the IP address programmed into the DeviceMaster 500 matches the unique reserved IP configured address assigned by the system administrator.

- If using DHCP, the host system needs to provide the subnet mask and gateway.

- If using a driver for Windows, 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 a driver for Windows, you can use one of the Comtrol tools, which are discussed in the *NS-Link User Guide*.

  - *Device Advisor*, which helps identify problems is a tab in the **Advisor** window of the Windows driver.
  - *Test Terminal* program, which can be used to troubleshoot communications on a port-by-port basis.
  - *Port Monitor* program, which checks for errors, modem control, and status signals. In addition, it provides you with raw byte input and output counts.

- If using a driver for Windows hosts, enable the **Verbose Event Log** feature under the **Options** tab and then reboot the system.

- Reboot the system and the DeviceMaster 500.

- Remove and reinstall NS-Link.

- If you have a spare DeviceMaster 500, try replacing the device.

General Troubleshooting

This table illustrates some general troubleshooting tips.

Note: *Make sure that you have reviewed the* <u>Troubleshooting Checklist</u> *on Page 63.*

General Condition	Explanation/Action
PWR or **Status** LED flashing	Indicates that boot program has not downloaded to the DeviceMaster 500. 1. Make sure that you have downloaded the most current driver from: <u>http://www.comtrol.com/support/download.asp?partnumber=1800288</u>. 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 DeviceMaster 500, you can use the procedure outlined in the *NS-Link User Guide* (Page 8). 4. Remove the NS-Link driver.
PWR or **Status** LED not lit	Indicates that power has not been applied or there is a hardware failure. Contact Technical Support.

General Condition	Explanation/Action
Can ping the Comtrol device, but cannot open the ports from a remote location. (You must have previously programmed the IP address, subnet mask, and IP gateway.)	The NS-Link driver uses Port 4606 (**11FE** h) to communicate with the DeviceMaster 500. When using a "sniffer" to track NS-Link packets, filtering for Port 4606 will easily track the packet. The packet should also contain the MAC address of the device and the originating PC so that it can be determined if the packet is able to travel the full distance one way or not. If the 4606 packet is found on one side of a firewall or router, using sniffer, and not on the other side, then that port needs to be opened up to allow the 4606 to pass. This will most often be seen with firewalls, but is also seen in some routers.
Cannot ping the device through Ethernet hub	Isolate the DeviceMaster 500 from the network. Connect the device directly to the NIC in the host system (see Page 63).
Cannot ping or connect to the DeviceMaster 500	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 *RedBoot Procedures* on Page 49 for the Redboot method of programming an IP address.

General Condition	Explanation/Action
DeviceMaster 500 continuously reboots when connected to some Ethernet switches	The problem is caused by a L2 bridging feature called Spanning Tree Algorithm (STA) in the Switch. This feature is enabled by default in some switches. This features causes time-out problems on certain L2 protocols, such as our MAC mode. *Resolution*: There will be no firmware fix for this problem. Only ***one*** of the following fixes is required for resolution. 1. Disable STA in the switch. 2. Enable STA fast forwarding on the port. 3. Change the STA Forward Delay and Message Age to minimum time values. 4. On the device, set the time-out value to 0 (to disable loading of SocketServer) or 120. The command from the redboot prompt is "Timeout 120" without the quotes. *Problem Details*: STA by default blocks packets for 30 seconds after an ethernet port auto negotiates. Blocking of these packets causes the NS-Link driver load process to fail. The normal NS-Link load process is: 1. If NS-Link determines that it needs to load a device, it resets the device. It does this to get the device into Redboot mode. Only Redboot accepts "load binary" commands, which are needed to load the NS-Link binary into the device. 2. After a 6 second delay, NS-Link sends an ID query to the device. This query is to verify that the device is in Redboot and can accept "load binary" commands. 3. The device sends an ID query response. 4. NS-Link loads the device. If the device is not loaded after "timeout" seconds (default 15), it loads SocketServer. The above process fails when STA is running because the switch blocks packets for 30 seconds after the RTS is rebooted. Therefore, the ID query is not received by the RTS and after 15 seconds the device loads SocketServer. After 30 seconds, NS-Link finally can do an ID query, which reveals that the device is not in Redboot. NS-Link therefore reboots the device, and the process repeats.
DeviceMaster 500 continuously reboots when connected to some Ethernet switches or routers	Invalid IP information may also cause the switch or router to check for a gateway address. Lack of a gateway address is a common cause.

Daisy-Chaining DeviceMaster 500 4-Port Units

The DeviceMaster 500 4-port models with external power supplies follow the IEEE specifications for standard Ethernet topologies.

When using the **UP** and **DOWN** ports, the DeviceMaster 500 4 is classified as a switch. When using the **UP** port only, it is a simple end node device.

The maximum number of daisy-chained DeviceMaster 500 4 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 500 4 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 are using an NS-Link driver for a Windows system, you should review the troubleshooting section in the *NS-Link User Guide for Windows* (Page 8) before contacting Technical Support.

It contains troubleshooting procedures that you should perform before contacting Technical Support since they will request that you perform, some or all of the procedures before they will be able to help you diagnose your problem. If you need technical support, contact one of the support facilities below.

SICK AG Hotline

Auto Ident

Schiessstr. 56

D-40549 Duesseldorf

Phone: +49 (0) 211 5301 270

Email: info@sick.de

Web: http://www.sick.com

SICK, Inc. US

6900 W. 110th Street

Bloomington, MN 55438

Phone: 952.829.4823

Email: don.alexander@sick.com

Index