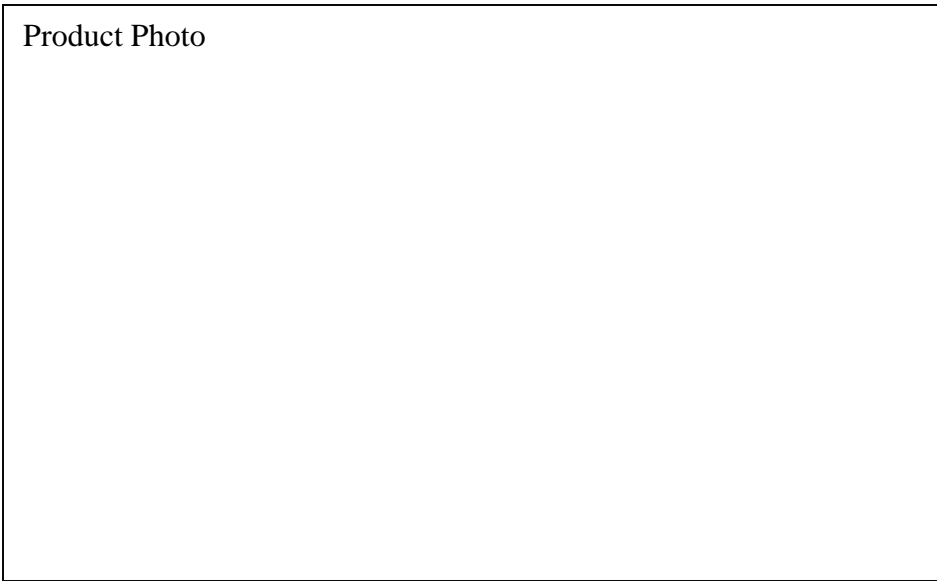




Serial Server

Ethernet and Wireless Serial Servers

Product Photo

A large, empty rectangular box with a black border, intended for a product photograph.

Installation and User's Guide

Part Number 40179-120
Revision X5

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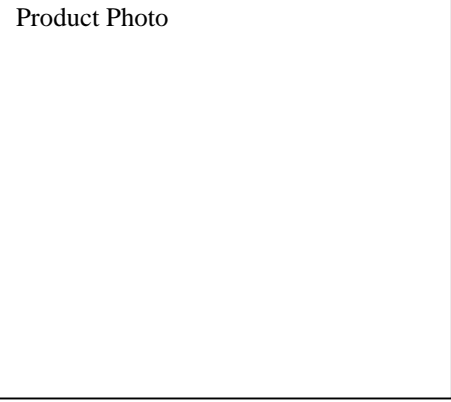
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Section 1: Product Overview

Introduction

The TROY Serial Server is a high-performance, standalone device designed to connect a wide range of serial devices (i.e., security devices, telecommunications equipment, modems, data display devices, industrial instrumentation, etc.) to an Ethernet network. The TROY Serial Server supports RS232, RS422, or RS485 serial interfaces at a variety of baud rates (data transmission speeds), automatically senses both 100baseTX Fast Ethernet and 10baseT Ethernet network connections, and the wireless version allows connections to 802.11b wireless networks as well. The TROY Serial Server also supports the ModBus protocol (a popular industrial device communications protocol), which is used to communicate with many types of industrial devices (e.g., instruments, meters, controllers, switches, etc.) over a serial-to-Ethernet connection.

Product Photo



The installation can be performed by the least-experienced users, while providing networking professionals with advanced features for configuration. TROY is confident that you will enjoy the many features of the Serial Server. For more information on this product or for downloading firmware upgrades, visit the TROY web site at <http://www.troypgroup.com/>.

Package Contents

- TROY Serial Server
- Power supply adapter
- TROY Serial Server Installation CD
- Hardware Installation Guide

IMPORTANT

- ▶ Use Adobe Acrobat Reader 5.0 or higher to view or print the PDF files contained on the CD.
- ▶ Print out, fill in, and mail back the warranty registration card provided on the *TROY Serial Server Installation CD*, or register online at <http://www.troypgroup.com>.

About This User's Guide

This User's Guide contains information on system requirements, basic troubleshooting, and instructions on the following:

- Installing the Serial Server hardware
- Configuring the Serial Server for use with a serial device
- Configuring the Serial Server for use on your network
- Configuring the Serial Server using the TROY ExtendView Utility

NOTE: The TROY Serial Server can be used with a variety of network operating systems and protocols. Refer to Section 3: Management Methods for detailed information.

Windows™ System Requirements

To configure the settings of the TROY Serial Server (wired and wireless versions) using the provided ExtendView Utility in Windows, your Windows-based system should include the following components:

- A PC with a 133 MHz or higher processor
- Microsoft Windows 98SE, ME, 2000, XP, or 2003 server operating system
- At least 64 MB of RAM (memory)
- At least 10 MB of free hard disk space (to install the software)
- A CD-ROM drive (to load the software)
- An Internet connection through a cable or DSL modem, or an external dial-up or ISDN modem (for online product registration)

Wireless Serial Server Requirements (for wireless models only)

To use the wireless TROY Serial Server, you need an 802.11b wireless network consisting of either of the following:

- An 802.11b wireless-enabled PC connected directly to the serial server (Ad-Hoc or Peer-to-Peer Mode).
- An 802.11b wireless access point that allows wireless and wired Ethernet-enabled computers to connect to the serial sever.

To configure the wireless TROY Serial Server, you will need the following information from your wireless network administrator:

- Wireless Mode used (Infrastructure or Ad-Hoc)
- The SSID (service set identifier) for your wireless network.
- The Radio Frequency Channel of the wireless network.
- If you are using TCP/IP (recommended for Windows Networks) and are not connected to a DHCP server (for obtaining an IP Address automatically), you will need a unique IP Address for the wireless Serial Server (for example: 192.168.1.14). If the Serial Server is not on the same IP subnet as the computers you are printing from, you will also need a subnet mask and a router (default gateway) address.
- Wireless Security Settings (WEP keys, 802.1x settings, etc.)


NOTE: If you require assistance for installing or configuring your serial server, ask your system administrator for assistance, or contact TROY Technical Support at (800) 332-6427, between 8 AM and 8 PM, Monday through Friday, Eastern Standard Time. Customers located outside the United States, call (304) 232-0899. European customers, please call +49 (0) 7032-9454-21.

Component Descriptions

The Serial Server includes the following components as described below:

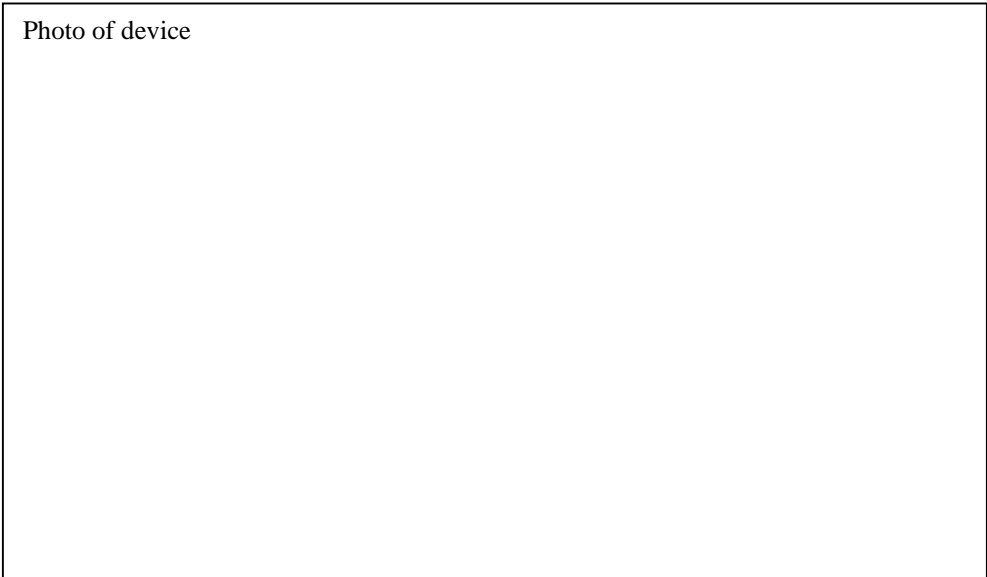
- **Power connector** – The power supply cable plugs into this connector.
- **Test button** – Pressing this button for less than five seconds will print a test page (if the device is connected to a serial printer). Pressing and holding this button for more than five seconds will reset the serial server to factory default settings.
- **LED status indicators** – used to indicate the operational states of the Serial Server. Refer to the next page for detailed LED status light descriptions.
- **Ethernet port** – This port (8-pin RJ45 jack) is used for connecting the Serial Server to an Ethernet card, hub, router, or other wired access point for network access.

Photo of device



- **Serial port** – This port (PC-compatible 9-pin male DB-9 connector) can be configured to connect the Serial Server to a serial device that uses the RS232, RS422, or RS485 serial interface.

Photo of device



LED Indicators

The TROY Serial Server provides three multifunction LED (Light Emitting Diode) indicators (yellow, green, and orange) for easy monitoring. The following table defines the function of each LED.

FUNCTION	STATE	STATUS
POWER (ORANGE)	ON	The device is receiving power
	OFF	The device is not receiving power
	Blinking	The device's power supply is malfunctioning
NETWORK STATUS (YELLOW / GREEN)	Yellow OFF Green OFF	No network activity
	Yellow ON Green OFF	10baseT network active
	Yellow Blinking Green OFF	10baseT network data received
	Yellow OFF Green ON	100baseTX network active
	Yellow OFF Green Blinking	100baseTX network data received
	Yellow ON Green ON	Wireless network active (wireless models only)
	Yellow Blinking Green Blinking	Wireless network data received (wireless models only)

Pushbutton Functions

Action	Result
Depress for less than 5 seconds	Generates configuration data that can be viewed using a terminal emulator (e.g., Windows Hyper Terminal) or other serial device that can display ASCII characters, or it will initiate a test page if the serial server is connected to a serial printer.
Depress for more than 5 seconds	Resets the serial server's configuration to factory defaults (cold reset). The unit will automatically re-initialize after updating the configuration memory.
Depress for 3 seconds during power up	Places the device into console configuration mode, which can be used to configure the device via the Serial Server's serial port.

Factory Default Settings

The TROY Serial Server is shipped with a default configuration that will work with the most common serial-to-Ethernet and wireless connections. The default settings can be changed to suit specific installation requirements via the ExtendView Utility, the embedded Web server, or via a Telnet connection to the serial server's internal console. The factory default settings can be easily restored at any time by performing a cold reset (press and hold the pushbutton on the device for more than five seconds).

Port Parameters and Modbus Settings

Parameter	Description	Settings
CHARACTER	bits per character	7, 8 (default)
FLOW	flow control	NO (default), XO, CT
PARITY	parity	NONE (default), EVEN, ODD, MARK, or SPACE
SPEED	baud rate (bits per second)	300, 600, 1200, 2400, 3600, 4800, 7200, 9600 (default), 14400, 19200, 38400, 57600, 76800, 115200 (console port default), 230400, 460800
STOP	stop bits per character	1 (default), 2
MODE	line mode (serial port protocol)	232 (default), 422, 485, 485HD, Disabled
ECABLE	E-Cable mode (for TCP connections)	Enable, Disable (default)
ECADDR	E-Cable destination IP address	(set by user)
ECONN	E-Cable connection attempt time	20 seconds
ECPORT	E-Cable destination IP port number	9100 (default), or set by user
MULTI	multidrop protocol	Host (default), Modbus
MBTYPE	Modbus attached device type	RTU slave (default) ² , ASCII slave
MBINIT	Modbus initialization delay interval	100 – 3276 ms (default = 100 ms)
MBAUTOID	Modbus auto slave ID	Enable (default) ¹ , Disable
MBCHARTMO	Modbus character timeout interval	10 – 3000 ms (default = 100 ms)
MBMSGTMO	Modbus message timeout interval	10 – 3000 ms (default = 1000 ms)
(N/A)	Modbus/TCP Exception handling	Enable, Disable (default)

Configuration Notes

1. The Modbus/TCP protocol contains a "Unit ID" field to identify multiple Modbus slave devices that are accessible at a single IP address. When the Modbus/TCP command contains a Unit ID, the Modbus Gateway can pass the Unit ID to Modbus serial devices, which allows multiple serial devices to be linked with a Modbus Gateway. When Auto Slave ID is enabled, a unit ID will be assigned automatically. If the Auto Slave ID is disabled, a unit ID (any number between 1 and 247) must be manually assigned in the Slave ID field.
2. When the Modbus serial protocol is set to Modbus/RTU, the Serial Server is ready to receive connection requests from Modbus/TCP master devices. Each message packet is determined by a character timeout. An incorrect character timeout may cause a CRC (Cyclic Redundancy Check) checksum error. Modbus ASCII slave mode functions the same as Modbus/RTU slave mode, except that the data format is Modbus/ASCII.
3. The Modbus/TCP Exception is in effect when the Modbus Gateway connects a Modbus/TCP Master with Modbus serial slave devices. When the Modbus Gateway cannot get a response from Modbus serial devices, the Modbus serial protocol will not respond to the master device. However, the TCP protocol has a longer waiting time, which could cause a network traffic problem for Modbus/TCP. For this reason, the Modbus Gateway can automatically send a Modbus exception code 16 to the Modbus/TCP master device when there is not response from the Modbus serial slave devices, thereby making overall network communication much more efficient.

Section 2: Hardware Installation

Install the TROY Serial Server (for wired and wireless models)

Follow the steps below to install the TROY Serial Server. In most cases, the Serial Server's factory default settings should be sufficient for most serial connections; however, some of the configuration settings may have to be changed for your particular installation. The TROY Serial Server can be wall mounted, set on the desktop, or mounted using the optional DIN rail kit (available from TROY).

1. Before attempting to install the TROY Serial Server, make sure you have installed and set up your serial device as described in the documentation that came with the device.
2. Write down the 12-digit MAC (Media Access Code) address printed on the label located on the bottom of the Serial Server (for example: 004017023F96). You may need this number in order to configure the Serial Server.
3. Connect the Serial Server to your serial device using a standard PC-compatible 9-pin (DB-9) serial cable for RS-232 type devices (refer to Appendix A for pinout descriptions). A custom cable may be required for RS-422 and RS-485-type serial devices. For RS-422/RS-485-type devices, a 120-ohm terminating resistor may be required at the receiving end of a differential pair if the device is at the end of the cable (refer to Appendix C for detailed information).
4. Plug the Serial Server power supply adapter into a suitable AC receptacle, and then plug the power supply cable into the Serial Server. The Serial Server will run through a sequence of power-up diagnostics for a few seconds.
 - If the Serial Server is operating properly, the LEDs will blink momentarily and then go out, the yellow and green LEDs will illuminate if the wireless network is active, and the orange LED will illuminate, indicating the device is receiving power (refer to page 1-4 for detailed LED status descriptions).
 - The unit powers up in the Normal mode, which provides for connection from the network to device(s) connected to the serial port of the Serial Server.
 - If the orange LED blinks continuously in a regular pattern, a problem exists. If this is the case, try powering the unit OFF and then ON again. If the problem persists, refer to the *Troubleshooting* section in this User's Guide.
5. Connect the Serial Server to your network through a switch or hub using a category 5 (CAT5) Ethernet cable. The Serial Server's IP address must be configured before a network connection is available. If your network offers DHCP (Dynamic Host Configuration Protocol), the Serial Server will automatically search for a DHCP server upon power up and obtain an IP address. If your network does not offer DHCP, a static (fixed) IP address must be assigned (see your system administrator for assistance). In most cases, a fixed IP address is preferred because a DHCP server may not always assign the same IP address to the Serial Server when the Serial Server is powered ON.

The Serial Server also supports the following protocols. See your system administrator for help.

- arp
- rarp
- BootP

NOTE: The IP address must be within a valid range, unique to your network, and in the same subnet as your PC (refer to page A-1 for a list of TCP port connections).

NOTE: For wireless Serial Servers, if a wired connection is established to the unit, the wireless link will be disabled.

Section 3: Configuration and Management

Configuration Options

After the hardware installation has been successfully completed, the Serial Server can be configured and managed via an Ethernet and/or wireless connection using the TROY ExtendView Utility (recommended), the embedded web (HTTP) server pages, or the Serial Server's internal configuration console, which can be accessed via a Telnet connection or directly through the Serial Server's serial port. Additional options for configuration and management of the Serial Server are available as third-party utilities that can be downloaded from their respective web sites as noted below. If you are using a wireless Serial Server, you can still configure it via an Ethernet connection or optionally configure it via a wireless connection as described on Page 3-5.

ExtendView Utility

- a Windows TCP/IP utility used for configuring the Serial Server's port, network, and wireless settings.
- uses a 32-bit graphical user interface.
- works with Windows PCs running the TCP/IP protocol.
- included on the TROY serial server installation CD.
- can be downloaded from the TROY web sites:
USA: <http://www.troygroup.com>
Europe: <http://www.troygroup.de>
- after installation, this utility can be run from the START menu.

INSTALLING THE EXTENDVIEW UTILITY (WINDOWS OPERATING SYSTEMS):

1. Ensure your PC is connected and has access to your network.
2. Connect an available Ethernet cable from your network hub to the Serial Server. Ensure the Serial Server is powered ON.
3. Insert the CD supplied with your Serial Server into the CD-ROM drive of your computer. The CD should automatically start and display a menu screen. Click on **Install Software**.
4. Select **TCP/IP Management Utilities**, and then click on **Next**.
5. Select **ExtendView**, and then click on **Install**. After the installation is complete, you can start the ExtendView utility by clicking on **Start, Programs, TROY GROUP**, and then **ExtendView**.

Web Browser Interface

- allows you to configure the print server with a standard web browser (e.g., Netscape Navigator or Microsoft Internet Explorer).
- no additional software is needed on the system.
- can be used on any system that supports web browser capabilities.
- type the IP address into your web browser address bar to connect.
- the default password is ACCESS (not case sensitive).

HP Web JetAdmin Utility

- a web browser-based utility (works with browsers like Internet Explorer or Netscape Navigator).
- can be downloaded from the HP web site <http://www.hp.com>.

Command Console

- a command-line-oriented console.
- contains some advanced features not available through ExtendView or the Web Browser Interface.
- the default password is ACCESS.
- can be accessed via TELNET or via a direct connection to the Serial Server's serial port.
- type **HELP** for a list of console commands.

Configuring the Serial Server via an Ethernet Connection

For Microsoft Windows operating systems, the TROY ExtendView Utility is the recommended method of configuring one or more Serial Servers on your network. Once the Serial Server obtains an IP address (occurs automatically when the unit is powered ON and connected to a DHCP network), the ExtendView Utility's auto-discovery feature will search for and locate all Serial Servers on the network and then display the IP address for each discovered Serial Server.

USING THE EXTENDVIEW UTILITY TO CONFIGURE THE SERIAL SERVER (WINDOWS OPERATING SYSTEMS):

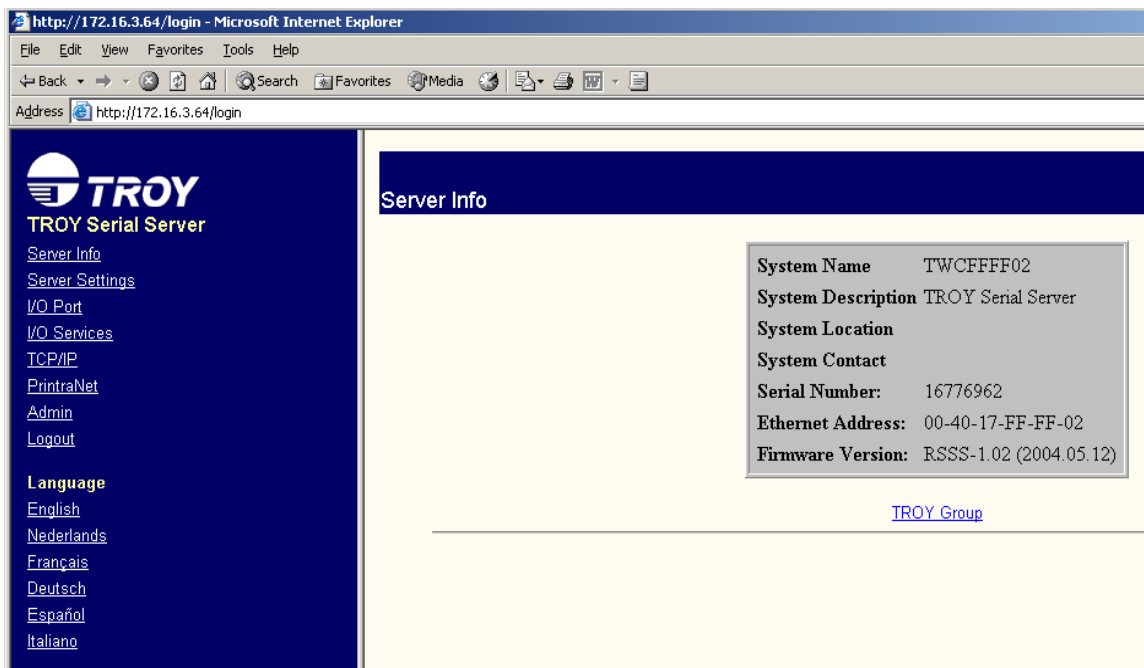
1. Start the ExtendView Utility by clicking on **Start, Programs, TROY GROUP**, and then **ExtendView**.
2. When the Welcome screen appears, click on **Next**, choose any name for your **View Name**, select **Automatically create a view with default settings** (or configure the view to your preferences), and then click on **Finish**.
3. Right-click on the Serial Server that you want to configure from the displayed list, and then left-click on **Configuration**. The default Serial Server name is TWC_XXXXXX (where XXXXXX is the last six digits of the MAC address from the label located on the back of the Serial Server).
4. If you are using TCP/IP (recommended for Windows) and you do not have a DHCP server (see note below), you will need to manually assign a valid IP Address (if you are not sure what IP address is valid, ask your network administrator), and then click on **OK**.
5. Configure the 802.11b wireless settings (for wireless models only). To operate on an 802.11b network, the Serial Server configuration must be set to the same configuration as your wireless network to allow the Serial Server to communicate over your wireless network. All nodes of a wireless network need to have the same settings to allow communication between the devices.
 - wireless mode (ad-hoc or infrastructure)
 - SSID channel
 - data rate
 - wireless security settings (WEP keys, 802.1x settings, etc.)

NOTE: If you are using DHCP on your network, the Serial Server should have acquired valid IP settings at this point and no further configuration is necessary. However, for most installations, a static IP address is preferred. If your DHCP server does not allow the Serial Server to keep its assigned IP address permanently, then you must manually assign an IP address. In this case, use a static IP address outside the range reserved for DHCP (see your DHCP server documentation for details). To assign a static IP address, right-click on the Serial Server in the menu, and then select **Configuration**. On the TCP/IP tab, under **IP Address Resolution**, select **Set Permanent**, and assign a valid static IP address for your network. Click on **OK** to save the new settings.

USING THE WEB BROWSER INTERFACE TO CONFIGURE THE SERIAL SERVER (NON-WINDOWS SYSTEMS):

To configure the Serial Server using non-Windows operating systems (e.g., Unix systems), a standard web browser (e.g., Internet Explorer or Netscape Navigator) can be used to access the Serial Server's embedded Web (HTTP) server pages, which contain the Serial Server's configuration options. No additional software is required.

1. Ensure your PC is connected and has access to your network.
2. Connect an available Ethernet cable from your network hub to the Serial Server. Ensure the Serial Server is powered ON.
3. Connect the Serial Server to the desired serial device, and ensure that the device is powered on and ready. If the Serial Server is connected to a serial device that cannot display or print ASCII characters, then it is recommended that another serial device capable of displaying or printing ASCII characters be temporarily connected to the Serial Server in order to view the IP address assigned by the DHCP server to the Serial Server.
4. With the serial device and Serial Server switched on and ready, press the **Test** button on the Serial Server to send the Serial Server's configuration data to the connected serial device. The serial device should display or print the current IP address assigned to the Serial Server by your network DHCP service. If your network does not use DHCP, then the Serial Server will have the default IP address of 192.0.0.192. In any case, your computer must use an IP address other than the one used by the Serial Server in order to establish a connection between the two devices.
5. Configure the 802.11b wireless settings (wireless Serial Servers only). To operate on an 802.11b network, you must set the Serial Server's wireless mode (ad-hoc or infrastructure), SSID channel, data rate, and security settings (WEP keys, 802.1x settings, etc.) to the same configuration as the wireless network you want the Serial Server to communicate on. All nodes of a wireless network need to have the same settings in order to communicate with each other.
6. From the host computer, open a standard web browser (e.g., Internet Explorer, Netscape Navigator), enter the IP address of the Serial Server into the address bar of the web browser, and then press **Enter**. The Web Browser Utility screen will be displayed. Click on the **Login** menu selection, enter the password (default is ACCESS), and then click on **Submit**. The main screen will be displayed, allowing you to configure the settings of the Serial Server. The menu selections are displayed on the left side of the screen, and the individual settings are located at the top of the screen.



USING THE INTERNAL CONFIGURATION CONSOLE TO CONFIGURE THE SERIAL SERVER:

1. Ensure the serial sever is connected via an Ethernet cable to the host computer.
2. From the Windows **Start** menu, click on **Run**, and then type the following command (where x.x.x.x. is the IP address of the Serial Server). The system will use the default port 23.

telnet X.X.X.X

3. After a connection is established, press RETURN or ENTER to get the "#" prompt, enter the password ACCESS (it will not 'echo' on your screen), and type anything in response to the **Enter Username>** prompt. When the **Local>** prompt appears, you are ready to enter commands.

Configuring the Serial Server via a Serial Connection

The Serial Server's command console can be accessed via a direct connection to the Serial Server's serial port using a COM port emulator and a null modem serial cable.

USING THE INTERNAL CONFIGURATION CONSOLE TO CONFIGURE THE SERIAL SERVER:

1. Attach one end of a null modem serial cable to the DB9 serial port of the Serial Server, and the other end of the cable to the COM port on your computer.
2. Press and hold the Serial Server's test button for at least three seconds while powering up the device. When the Serial Server has finished initializing, the internal configuration console will be ready to accept commands.
3. Start a terminal emulation program (e.g., Windows Hyper Terminal), making sure you are connecting with the relevant COM port.
4. Use the following settings for the connection:
 - BITS PER SECOND: 115200
 - DATA BITS: 8
 - PARITY: NONE
 - STOP BITS: 1
 - FLOW CONTROL: NONE
5. Once connected, press ENTER to continue. The **Local>** prompt will appear, indicating that the system is ready to accept commands. For a list of commands, type **help** at the command prompt.

First-Time Configuration of the Wireless Serial Server Using 802.11b (wireless models only)

Although the Serial Server can be configured using a wireless connection, it is recommended that the Serial Server be initially configured using a wired connection as described on the previous pages. The Serial Server's wireless network interface supports all modes of 802.11b at 1, 2, 5.5, and 11 Mbps. The wireless network is only active if the Serial Server is not connected to a wired network. If a wired link is established to the Serial Server, the wireless link is automatically disabled. To configure the wireless Serial Server for the first time from a computer via an 802.11b wireless connection, you will need to temporarily change your computer's settings to match the default settings of the Serial Server as follows:

- Wireless Mode: **Ad-Hoc** (sometimes referred to as Peer-to-Peer)
- Channel: **11**
- SSID (or wireless network name): **serserv**

You should now be able to configure your Serial Server using either the ExtendView Utility or the Web Browser Interface as described in the previous sections.

In addition to the standard 802.11 WEP (Wired Equivalency Privacy), TROY provides additional wireless security options (refer to the security addendum for detailed information).

NOTE: It is not necessary to change your computer's settings if you are configuring the print server's settings via an Ethernet connection.

NOTE: Be sure to set your PC back to its original wireless settings after you finish configuring the wireless Serial Server.

Verifying the Serial Server's Connection to a Serial Device

1. Verify that both the Serial Server and the connected serial device are powered on and ready, and that a serial cable is properly connected between the Serial Server and serial device (i.e., transmit signal output from the Serial Server going to the receive signal input on the serial device, ground leads connected together, etc.).

NOTE: Before attempting to use the Serial Server, you must verify the connection between the Serial Server and the connected serial device. If this connection is not working, you will not be able to send and/or receive data from the connected serial device.

2. Verify that the Serial Server's port settings (i.e., baud rate, flow control, character bit size, parity, etc.) exactly match the settings of the connected serial device's port.
3. If the serial device connected to the Serial Server is able to display or print ASCII characters (such as terminal emulator or serial printer), then communication between the devices can be verified by pressing the **Test** button on the Serial Server for about one second (but less than five seconds), which will initiate the output of configuration data from the Serial Server to the connected serial device.
 - If communication has been successfully established between the two devices, the serial device should be able to display or print the Serial Server's configuration data.
 - If no data is displayed or printed, verify that both devices are powered ON, are properly connected using a suitable serial cable, and are using compatible serial port parameters. The two most common serial communication problems are due to the either the cabling and/or mismatched serial port parameters.

NOTE: If the Serial Server is connected to a serial device that cannot display or print ASCII characters, then it is recommended that another serial device capable of displaying or printing ASCII characters be temporarily connected to the Serial Server in order to verify the serial connection. After successful communication is verified using the temporary serial device, reconnect the original serial device, making sure that the original serial device is configured with serial port parameters that match the tested connection.

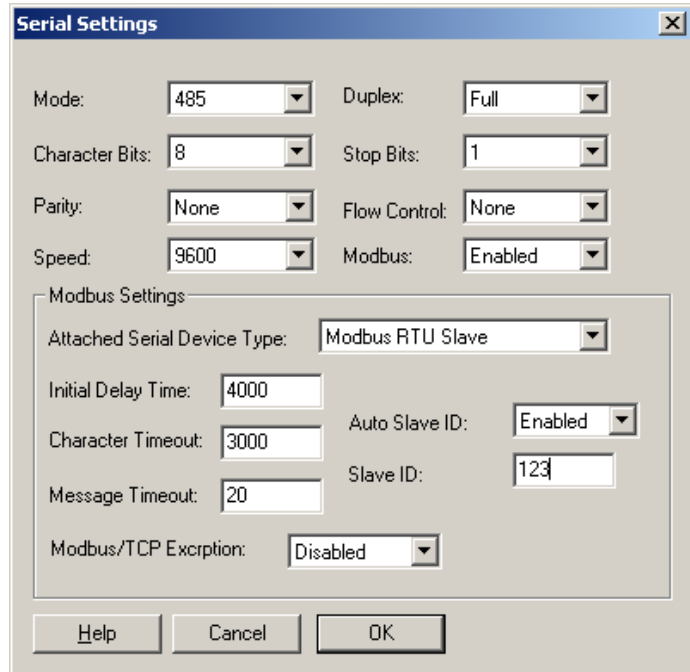
If you are unable to establish a working serial connection between the Serial Server the connected serial device, refer to the troubleshooting section in this User's Guide. For additional troubleshooting information, refer to the troubleshooting section in this user's guide, or contact TROY Technical Support at (800) 332-6427, or visit the TROY web site at <http://www.troymgroup.com>, or send an e-mail to technicalsupport@troymgroup.com. Customers outside the United States, please call (304) 232-0899. European customers, please call +49 (0) 7032-9454-21, or send an e-mail to support@troymgroup.de for assistance.

Changing the Serial Settings

In order to establish communication between the Serial Server and a serial device, the serial settings for both devices must match. The serial settings can be changed using ExtendView (recommended), the web browser interface, or the Serial Server's internal configuration console (refer to the previous sections for the installation and use of these utilities). Refer to page 1-5 for a list of factory default settings.

USING THE EXTENDVIEW UTILITY TO CHANGE THE SERIAL SETTINGS:

1. Start the ExtendView Utility by clicking on **Start, Programs, TROY GROUP,** and then **ExtendView.**
2. From the main menu, click on **Options,** and then click on **Configuration.**
3. Click on the **Output Port** tab, and then click on the **Serial Settings** button.
4. After configuring the serial settings, click on **OK** to continue.



Changing the Baud Rate

In some cases it may be necessary to change the baud rate of the serial sever in order to match the baud rate of a particular serial device where the baud rate is fixed. Baud is a measurement of transmission speed in asynchronous communication and represents the number of bits that are actually being sent over the media, not the amount of data that is actually moved from one device to the other. The TROY Serial Server supports baud rates from 300 to 460800 bps (refer to page 1-5 for the specific baud rates supported). To ensure communication between connected serial devices, all other serial port parameters (mode, character bits, parity, etc.) must be identical for each serial device.

Changing the Serial Port Protocol

The Serial Server's serial port protocol (data transmission mode) can be changed to match the particular characteristics of the connected serial device's UART (Universal Asynchronous Receiver/Transmitter). The TROY Serial Server supports the following serial port protocols. Each of these protocols is capable of handling data transfer speeds of 1 Mbps or better.

Protocol	Description
RS-232	an interface between data terminal equipment and data communications equipment employing serial binary data interchange over a wired connection with a maximum range of 50 feet (16.5 meters).
RS-422	a data transmission system using balanced differential signals (voltages) to send serial binary data over a wired connection with a maximum range of 4,000 feet (1.2 km).
RS-485 / RS-485HD	a data transmission system using balanced differential signals (voltages) to send serial binary data over a wired connection with a maximum range of 4,000 feet (1.2 km). As many as 32 driver/receiver pairs can share a multidrop network (4-wire at full duplex or 2-wire at half duplex). Many characteristics of the drivers and receivers are the same as RS-422.

Using the Modbus Protocol

Modbus is a widely used industrial device communications protocol that provides "client/server" communications between devices connected on different types of buses or networks. The TROY Serial Server supports the Modbus serial line version of the protocol used for communicating with many types of industrial devices (e.g., instruments, meters, controllers, switches, etc.) over a serial-to-Ethernet connection. In general, the TROY Serial Server operates as a transparent device between the host (master device) and the connected serial devices (slaves), sending and receiving data to and from one or more slave units (up to a maximum of 32 slave serial devices). The Serial Server uses the RS-232 and RS-485 serial port protocol (using a 9-pin connector) for Modbus communication.

Serial Transmission Modes

Two connection protocol options are available between the TROY Serial Server and the serial device:

- **RTU (Remote Terminal Unit) Mode** – allows for greater character density, which allows for better data throughput than ASCII mode. However, each message must be transmitted in a continuous stream of characters.
- **ASCII (American Standard Code for Information Interchange) Mode** – is used when the physical communication link or the capabilities of the serial device do not allow conformance with RTU mode requirements.

Typical Modbus Applications

Many traditional Modbus devices can talk over an RS-485-type serial port provided that the transmission distance between the serial device and the TROY Serial Server does not exceed 4,000 feet (1.2 km). When using the RS-232-type serial port, the connection between the TROY Serial Server and the serial device cannot exceed 50 feet (16.5 meters), which is sufficient for short point-to-point communications. Using the TROY Serial Server configured as a Modbus master device, up to 32 Modbus slave devices can be placed on the same Modbus network using the RS-485-type serial port.

In a master/slave configuration, the master serial device will always initiate communication with the slave devices, and the slave devices will never talk to each other. In unicast mode, the TROY Serial Server can only address an individual slave at one time with each slave having a unique network address. In this mode, when addressed by the master, each slave returns a reply to the master device. In broadcast mode, the TROY Serial Server can address all the slave units simultaneously; however, in this case, the slave devices do not send a reply to the master device.

Changing the Modbus Settings

In order to establish communication between the Serial Server and a serial device using the Modbus protocol, the Modbus settings for both devices must be compatible. The Serial Server's Modbus settings can be changed using the TROY ExtendView Utility (recommended), the web browser interface, or the Serial Server's internal configuration console (refer to page 3-1 for detailed application use).

Section 4: Troubleshooting

Introduction

This section describes procedures for troubleshooting problems you may encounter with the TROY serial server, and is divided into the following sections:

- Installation Problems
- Intermittent Problems
- Protocol-Specific Problems

Troubleshooting Installation Problems

If you cannot access the connected serial device via the Serial Server, first check the network connection and cabling.

- Check the physical cabling to ensure all cables are plugged in (Ethernet and DB-9 serial cable).
- If the appropriate LEDs are not illuminated, then there is probably a bad 10baseT or 100baseTX cable, or the hub port is bad. If possible, try a different cable and hub port, or try connecting a different device to the cable.
- Verify that you are using the correct values for both IP Address and Port Number. A common mistake is to assume the TCP port number is the "device number" on the server.
- If you are using a hub, verify that the hub port is operating correctly by trying the Serial Server on a different port.

Troubleshooting Network Configuration Problems

- If you are using TCP/IP, make sure that your computer and the serial server are on the same IP segment or can reach each other with a PING command from the host. The IP address you assign to the serial server must be on the same logical network as your host computers (e.g., if your computer has an IP address of 192.189.207.3, the Serial Server should have an IP address of 192.189.207.x, where x is an integer between 1 and 254), or you must properly configure your router address to work with the serial server.
- If your serial server is set to Auto or DHCP for obtaining an IP Address, it is possible that the serial server's IP address can change. Either configure your DHCP server to give the serial server a permanent lease, or configure the print server to be on a STATIC IP address outside the scope of the DHCP addresses.
- The problem may be the result of mismatched or duplicate IP addresses. Verify that the IP address is correctly loaded into the TROY serial server (via the displayed or printed configuration information or through the remote console), and make sure that no other nodes on the network have this address (duplicate addresses are the biggest cause of TCP/IP connectivity problems). If the IP address is not correct, then check whether the loading procedure was properly executed.
- Also verify that the host computer and the serial server are either on the same subnet (for example, if the serial server has a subnet mask of 255.255.255.0, the host must have the same subnet mask) or that the router is properly configured to pass data between the two devices.
- If the wrong IP address is loaded, check your network for file servers that have DHCP, BOOTP, or rarp enabled, and make sure that these file servers are not set up to load IP addresses into the serial server.

Troubleshooting Windows Problems

- If you are having trouble accessing the connected serial device through Windows, ensure you can ping the TROY Serial Server using the DOS command `PING ipaddress`, where *ipaddress* is the IP address of the TROY Serial Server. If you cannot ping the serial server, you will not be able to access the serial device.
- If you are running COM port emulation software and the software reports an error, verify that the correct serial/IP COM port is being used when the application runs. Verify that your application's COM port settings have been changed to use the Serial/IP COM ports.

Troubleshooting Wireless Configuration Problems

- Verify that your PC's wireless adapter and/or access point is configured properly – note the settings, paying special attention to the wireless mode, SSID or network name, WEP or security, and IP address settings so you can configure your serial server to the same wireless settings.
- Make sure you have a good wireless signal from your PC and from the serial server, that the serial server is within range (90 meters or 300 feet), and that it is away from metal objects and other devices that generate radio signals (like Bluetooth devices, cordless phones, and microwave ovens).
- Make sure your computer is set to infrastructure mode if you are connecting through an access point, or ad-hoc (802.11) if you are connecting to the serial server without an access point. See the documentation for your wireless adapter for details.
- If you want to use WEP encryption or password protection for your wireless network, and your wireless adapter or access point normally uses a password or passphrase instead of WEP, it should allow you to enter 0x followed by a 10-digit key (for 40-bit or 64-bit WEP) or 26-digit key (for 128-bit WEP) in hexadecimal format (0-9 or A-F).
- If you are experiencing slow performance or are having intermittent problems connecting, try changing the RF channel of your wireless network. The RF channel can be changed via the ExtendView Utility or the web browser configuration utility for the serial server. See your wireless adapter and/or access point documentation for more information. When changing the RF channel, it is recommended that you select a channel that is at least three channels lower or higher than any other wireless networks within range.

Section 5: Where to Get Help

Obtaining Technical Assistance

TROY technical support is available to assist you with any questions concerning the setup, operation, or maintenance of your TROY200 Series Print Server.

Worldwide Web Support

Located at <http://www.troygroup.com/wireless>, the TROY web site provides answers to many common technical questions and also includes copies of product manuals and literature, as well as utilities and firmware load images.

Technical Support

North and South America

If you need to talk to one of our Technical Support Specialists, our support line is open Monday through Friday, 8 AM to 8 PM, Eastern Standard Time.

U.S. 48 contiguous States: (800) 332-6427

Canada, Alaska, Hawaii, and South America: +1-304-232-0899

E-Mail : technicalsupport@troygroup.com

Europe

Technical support is available in either German or English from Monday through Thursday, 9 AM to 12 PM and 1 PM to 5 PM, and on Friday from 9 AM to 12 PM and 1 PM to 4 PM.

Phone: +49-7032-9454-21

E-Mail : support@troygroup.de

Web: <http://www.troygroup.de>

Returning Products

If you need to return a TROY product for any reason (failures, incorrect shipments, etc.), follow the steps below:

1. Contact the TROY Technical Support group at (304) 232-0899 to request a Return Goods Authorization (RGA) number (for North and South American customers), or call +49-7032-9454-21 (for European customers) and request a Return Material Authorization (RMA) number.
2. Be prepared with the serial number of the unit you are returning. You will be asked for the serial number to verify warranty coverage.

Please record these serial numbers in the space provided below for future reference.

Print Server Model #: _____

Print Server S/N: _____

Make sure that you write the RMA or RGA number on the outside of the shipping container you use to return the product. Please ship the defective product(s) to the appropriate address below:

North and South America:

TROY Group, Inc.
RGA# _____
3 Bryan Drive
Wheeling, WV 26003

Europe:

TROY GmbH
RMA# _____
Schwarzwaldstr. 99
D-71083 Herrenberg,
Germany

Contacts

Corporate Headquarters

TROY Group, Inc.
2331 South Pullman Street
Santa Ana, CA 92705 USA
(949) 250-3280

Technical Support

North and South America

U.S. 48 contiguous States: (800) 332-6427
Canada, Alaska, Hawaii, and South America: +1-304-232-0899
E-Mail: technicalsupport@troygroup.com

Europe

Phone: +49-7032-9454-21
E-Mail: support@troygroup.de
Web: <http://www.troygroup.de>

Appendix A: Safety and Regulatory Notices

Information for United States Users

This equipment has been tested and found to comply within the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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 and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and 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.

The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The radiated output power of the Serial Server is far below the FCC radio frequency exposure limits. Nevertheless, the Serial Server shall be used in such a manner that the potential for human contact during normal operation is minimized.

To satisfy RF exposure requirements, this device and its antenna(s) must operate with a separation distance of at least 20 centimeters from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users must be provided with specific operating instructions for satisfying RF exposure compliance.

Declaration of Conformity (FCC)

According to 47CFR, Part 2 and 15 for Class B Personal Computers and Peripherals; and/or CPU Boards and Power Supplies used with Class B Personal Computers:

We: TROY GROUP, INC.
Located at: 2331 South Pullman Street
Santa Ana, CA USA

Declare under sole responsibility that the product identified herein, complies with 47CFR Part 2 and 15 of the FCC rules as a Class B digital device FOR HOME OR OFFICE USE. Each product marketed, is identical to the representative unit tested and found to be compliant with the standards. Records maintained continue to reflect the equipment being produced can be expected to be within the variation accepted, due to quantity production and testing on a statistical basis as required by 47CFR §2.909. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Trade Name: TROY
Type of Product: Wireless 802.11b Serial Server
Model: TROY 500-103x, TROY 500-303x

TROY Group, Inc. hereby declares that the equipment specified above conforms to the above requirements.

Standards used and met in the assessment:

- EN55022: 1998 Class B; CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247.
- ANSI C63.4: 2001

Information for Canadian Users (IC notice)

The term "IC" before the radio certification number only signifies that Industry of Canada technical specifications were met. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouiller du Canada.

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment that is installed outdoors is subject to licensing.

Pour empêcher un brouillage radioélectrique au service faisant l'objet d'une licence, cet appareil doit être utilisé à l'intérieur et loin des fenêtres afin de fournir un écran de blindage maximal. Au cas où une installation en plein air, le matériel doit faire l'objet d'une licence.

Information for European Users

The Serial Server and its built-in 802.11b wireless technology is in compliance with the Class B Information Technology Equipment requirements and other relevant provisions of European Directive 1999/5/EC. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communications devices. The internal function is a radio device using the 2.4 GHz frequency band (2.400GHz – 2.4835GHz). It is intended for wireless communication with other 802.11b-enabled devices in an indoor environment.

The use of 802.11b wireless technology in certain countries may be restricted. Before using 802.11b products, please confirm with the frequency management authority in the country where you plan to use it. Many countries allow indoor use only. In Italy, general authorization is required if used outside. In France, the use of certain channels is restricted outdoors. In some situations or environments, the use of 802.11b wireless technology might be restricted by the proprietor of the building or responsible representatives of the organization, for example, in airplanes, in hospitals or in any other environment where the risk of interference with other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies to the use in a specific organization or environment, you are encouraged to ask for authorization to use 802.11b wireless technology prior to switching it on. Consult your physician or the manufacturer of personal medical devices (pacemakers, hearing aids, etc.) regarding any restrictions on the use of 802.11b wireless technology.

TROY Group cannot be responsible for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product.

Declaration of Conformity (CE)

Manufacturer: TROY Group, Inc
2331 South Pullman Street
Santa Ana, California 92705 USA
Telephone: (949) 250-3280

Product: Wireless 802.11b Serial Server
Model No.: TROY 500-103x, TROY 500-303x

TROY Group, Inc. hereby declares that the above-referenced product, to which this declaration relates, in is conformity with the provisions of:

Council Directives 1999/5/EC (March 9, 1999), Radio Equipment and Telecommunications Terminal Equipment, 89/336/EEC Electromagnetic Compatibility and 73/23/EEC Low Voltage Equipment.

Standards used and met in the assessment:

- ETSI EN 300-328-2 V1.3.1 (2001-12)
- ETSI EN 300-328-2 V1.2.1 (2001-12)
- ETSI EN 301-489-1 V1.4.1 (2002-08)
- ETSI EN 301-489-17 V1.2.1 (2002-08)
- EN 55024

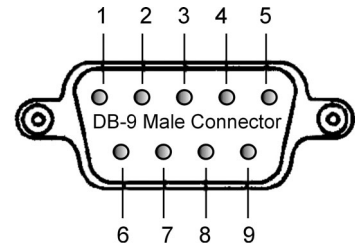
The documents required by this Directive is maintained at the corporate headquarters of TROY Group, Inc., 2331 South Pullman Street, Santa Ana, California, 92705, USA.

Appendix B: Product Specifications

COMPONENT	SPECIFICATION
Model	TROY Serial Server
Processor	Motorola Coldfire MC5272
Flash Memory	2 Mbytes
RAM Memory	8 Mbytes (SDRAM)
Processor Speed	66 MHz
Interfaces Supported	Serial: RS-232, RS-422, RS-485 (via 9-pin jack) (ModBus support for RS-232 / RS-485 networks) Ethernet: 10/100Base-T (via RJ-45 8-wire jack)
Baud Rates Supported (Kbps)	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800
Network Protocols Supported	FTP, TFTP, Telnet, BootP, DHCP, RARP, ARP, UDP, ICMP, SMTP, SNMP
Power Requirements	500 mA (max) at +5 VDC (non-wireless); 800 mA (max) at +5 VDC (wireless)
Power Module	(wireless) Input: 120 / 220 VAC, Output: 1 A at +5 VDC (non-wireless) Input: 120 / 220 VAC, Output: 500 mA at +5 VDC
RADIO PERFORMANCE	SPECIFICATION
Description	2.4 GHz Direct Sequence Spread Spectrum (DSSS) 802.11b wireless CF card
Interoperability	Interoperable with Wi-Fi (WECA) certified products (AP, card, etc.)
Host Interface	16-bit CompactFlash V1.4 I/O interface, type II
Chipset	Prism 3.0 chipset
Data Rate	11, 5.5, 2, and 1 Mbps per channel
Power Consumption	TX power consumption: 262 mA (typical) RX power consumption: 260 mA (typical) Sleep Mode power consumption: 65 mA (typical)
Voltage	3.3 VDC + /- 5%
LED	Link status
Network Architecture Types	Supports ad-hoc, infrastructure, roaming (standard IEEE 802.11b compliant)
Receiver Sensitivity	-84 dBm @ 1 Mbps -84 dBm @ 2 Mbps -83 dBm @ 5.5 Mbps -79 dBm @ 11 Mbps
RF Output Power	14 dBm
Antenna	Omni-directional, 1.5 dBi gain
Operating Channels	11 for North America, 13 for Europe (ETSI)
Operating Frequency	2.412 – 2.462 GHz (North America) 2.412 – 2.472 GHz (Europe ETSI)
Modulation	CCK (11 Mbps, 5.5 Mbps), DQPSK (2 Mbps), DBPSK (1 Mbps)

Appendix C: Serial Port Pinouts

PIN	RS-232 (DTE)
1	DCD (Data Carrier Detect) Input
2	RxD (Receive Data) Input
3	TxD (Transmit Data) Output
4	DTR (Data Terminal Ready) Output
5	GND (Signal Ground)
6	DSR (Data Set Ready) Input
7	RTS (Request To Send) Output
8	CTS (Clear To Send) Input
9	RI (Ring) or +5 VDC power input (selectable via 3-pin jumper)



PIN	RS-422 and RS-485 (4-wire, full duplex)
2	RD+ (Receive Data +) Differential Input
3	TD+ (Transmit Data +) Differential Output
4	TD – (Transmit Data –) Differential Output
5	GND (Signal Ground)
6	RD – (Receive Data –) Differential Input
9	Optional +5 VDC power input (selectable via a 3-pin jumper)

PIN	RS-485 (2-wire, half duplex)
3	TD+/RD+ (Transmit / Receive Data +) Differential Bi-directional
4	TD –/RD – (Transmit / Receive Data –) Differential Bi-directional
5	GND (Signal Ground)
9	Optional +5 VDC power input (selectable via a 3-pin jumper)

TCP Port Connections

The TROY Serial Server supports port connections over TCP/IP using raw TCP ports only. The TCP ports are allocated as follows:

PORT	DESTINATION DEVICE
502	Used for MODBUS communications
3001	RS-232, RS-422, or first RS-485 device in mulitdrop configuration
3002	Second device in RS-485 multidrop configuration
3032	32nd device in RS-485 multidrop configuration
9100	RS-232, RS-422, or first RS-485 device in mulitdrop configuration
9101	Second device in RS-485 multidrop configuration
9131	RS-232, RS-422, or first RS-485 device in mulitdrop configuration

Appendix D: Alternate Power Source Configuration

The TROY Serial Server can be configured to use a +5 VDC input via Pin 9 on the DB-9 connector to power the unit instead of using the supplied power supply module. To configure the serial server to accept power via Pin 9, the serial server case must be opened, and the shunt at JP3 must be moved from Pins 2 and 3 to Pins 1 and 2 (towards the +5 indicator). The voltage measured at Pins 9 and 5 must be at least +4.8 VDC and not greater than +5.2 VDC. Minimum supply current is 800 mA and 500 mA for the TROY wireless and non-wireless serial server, respectively. If Pin 9 is utilized for power, it is recommended that shielded cable be used to minimize EMI (Electro-Magnetic Interference).

RS-232 Port

In RS-232 mode, the DB-9 male connector is configured as a Data Terminal Equipment (DTE) port. Figure 1 below shows a null-modem cable connection to another DTE device.

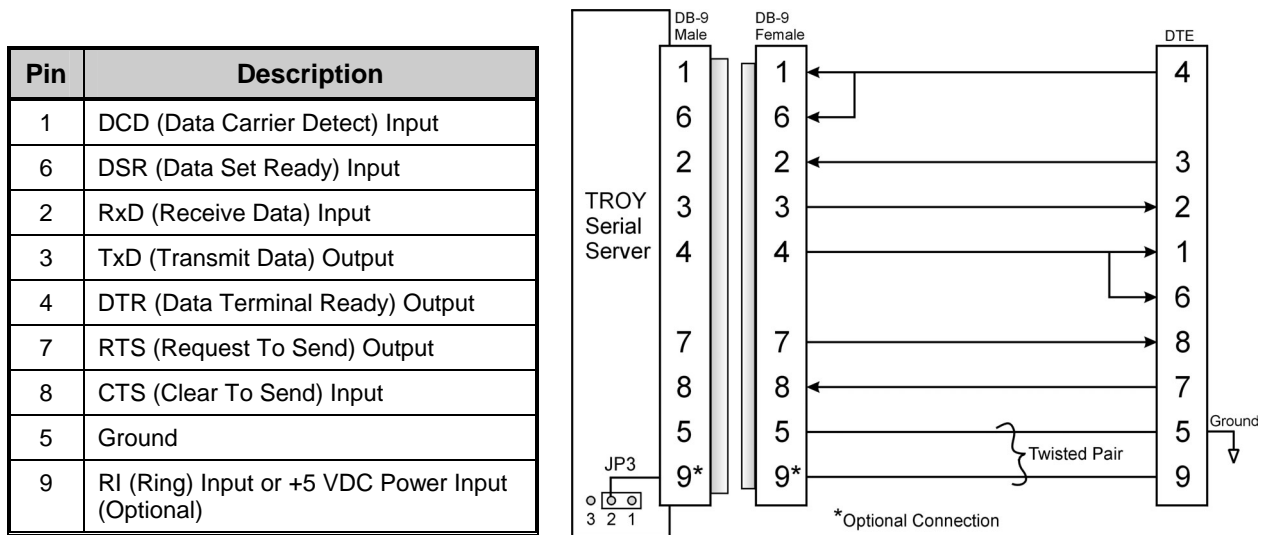


Figure 1

RS-422 / 485 Full Duplex Port

In RS-422 / 485 full duplex mode, the DB-9 male connector is configured as follows. It is important to construct the cable so that an unshielded twisted pair (UTP) wire is used for the transmit pair and another UTP wire is used for the receive pair to minimize EMI emissions and maximize immunity to outside sources (see Figure 2). If the TROY Serial Server is the last device in a chain, then a 120-ohm terminating resistor should be placed across Pins 2 and 6. The Pin 9 connection is optional.

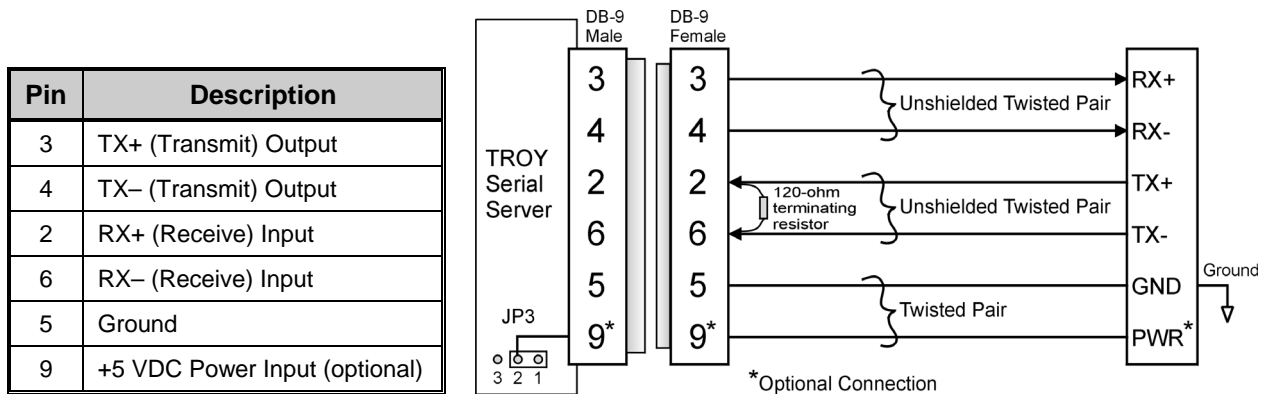


Figure 2

RS-485 Half-Duplex Port

In RS-485 half-duplex mode, the DB-9 male connector is configured as shown below. It is important to construct the cable so that an unshielded twisted pair (UTP) wire is used for the transmit/receive pair to minimize EMI emissions and maximize immunity to outside sources (see Figure 3). If the TROY Serial Server is the last device in a chain, then a 120-ohm terminating resistor should be placed across Pins 3 and 4. The Pin 9 connection is optional.

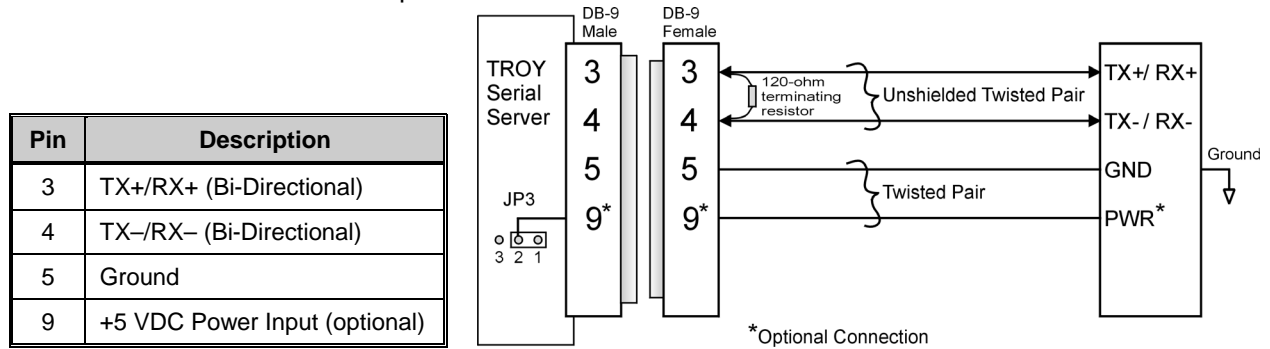
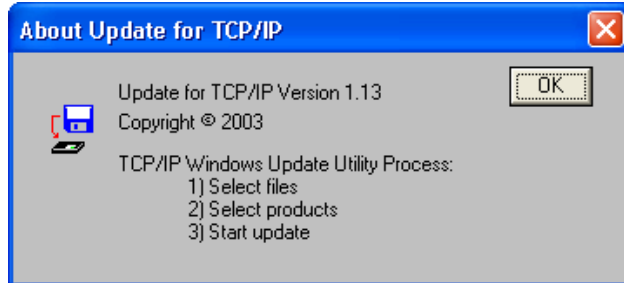


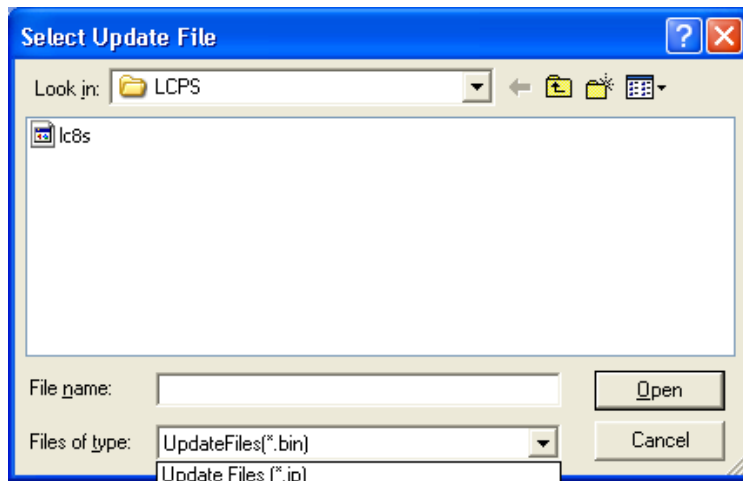
Figure 3

Appendix E: Loading New Firmware

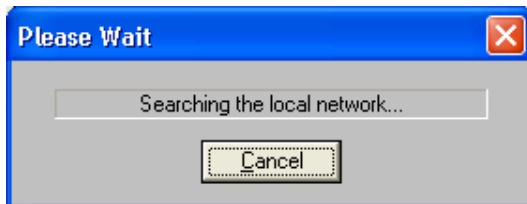
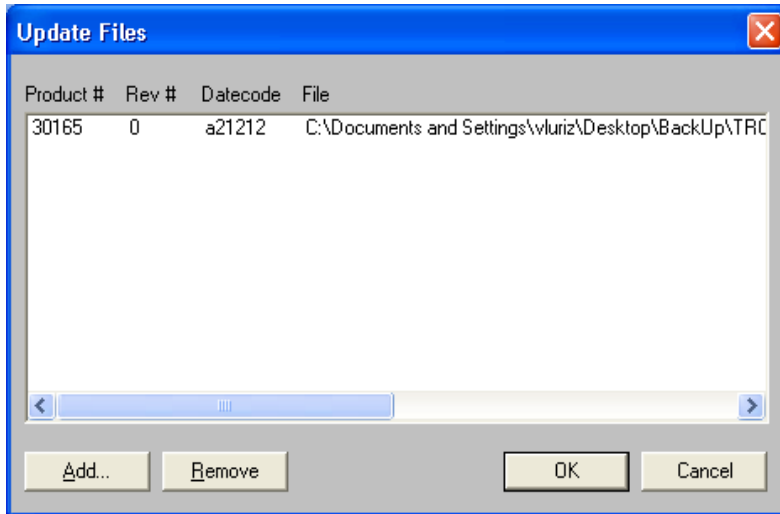
1. Run the TROY Wireless Update utility for TCP/IP. The **About Update for TCP/IP** window will be displayed. Click on **OK** to continue. The **Select Update File** window will be displayed.



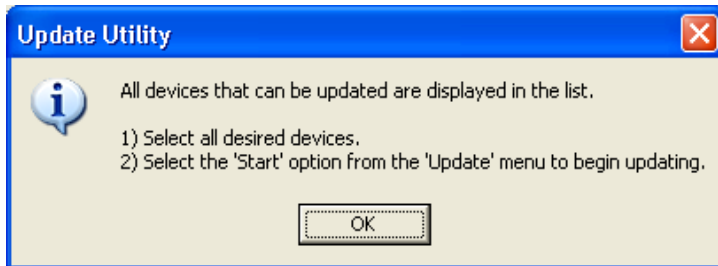
2. Select **UpdateFiles (*.bin)** file type, locate the Serial Server bin file, and then click on **Open**. A window will be displayed (see next page) showing the file(s) you have selected including the revision level and date code for each file.



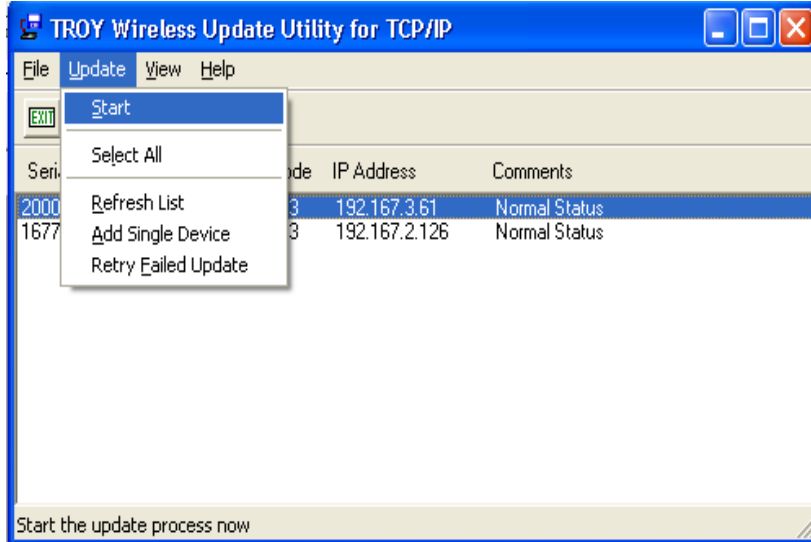
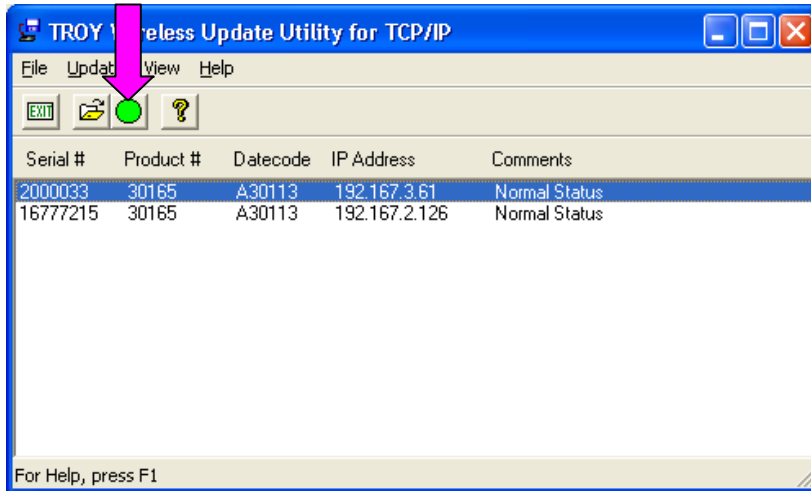
3. Verify that the file(s) are correct, and click on **OK**. The utility will begin searching for qualified serial servers present on the network.



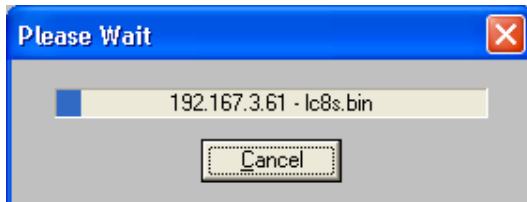
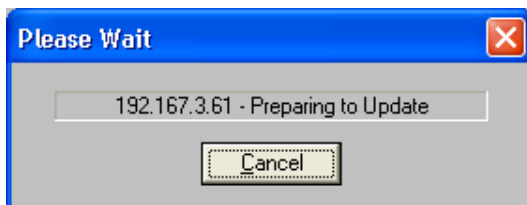
4. When the search process is complete, click on **OK** to continue. A list of found devices will be displayed.



5. Select the desired Serial Server to be upgraded, click on the green icon, or click on **UPDATE** → **START**. The firmware update process will begin automatically as soon as the Serial Server is ready.



6. When the Serial Server is ready, the firmware upgrade will begin. The IP address of the serial server as well as the file you are loading will be displayed.



7. The update log will be displayed when the update process is finished. Click on **Close** to continue.

