

# TW100-W2 NWay Web Cruiser User's Guide

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RECYCLABLE

## Wichtige Sicherheitshinweise

1. Bitte lesen Sie sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den spätern Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Vervenden Sie keine Flüssig- oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Um eine Beschädigung des Gerätes zu vermeiden sollten Sie nur Zubehörteile verwenden, die vom Hersteller zugelassen sind.
5. Das Gerät is vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sichern Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen. Verwenden Sie nur sichere Standorte und beachten Sie die Aufstellhinweise des Herstellers.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, daß diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim Anschluß an das Stromnetz die Anschlußwerte.
9. Die Netzanschlußsteckdose muß aus Gründen der elektrischen Sicherheit einen Schutzleiterkontakt haben.
10. Verlegen Sie die Netzanschlußleitung so, daß niemand darüber fallen kann. Es sollete auch nichts auf der Leitung abgestellt werden.
11. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
12. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
13. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. Elektrischen Schlag auslösen.
14. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von autorisiertem Servicepersonal geöffnet werden.
15. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
  - a- Netzkabel oder Netzstecker sint beschädigt.
  - b- Flüssigkeit ist in das Gerät eingedrungen.
  - c- Das Gerät war Feuchtigkeit ausgesetzt.
  - d- Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
  - e- Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
  - f- Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
16. Bei Reparaturen dürfen nur Originalersatzteile bzw. den Originalteilen entsprechende Teile verwendet werden. Der Einsatz von ungeeigneten Ersatzteilen kann eine weitere Beschädigung hervorrufen.
17. Wenden Sie sich mit allen Fragen die Service und Repartur betreffen an Ihren Servicepartner. Somit stellen Sie die Betriebssicherheit des Gerätes sicher.

# Quick Installation

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This section takes you through a step-by-step minimum installation and setup procedure for the internet server. Please refer to the main text of this manual for detailed information about the setup and operation of this device.

## Getting Started

**Step 1:** Unpack the device. Make certain no components have been lost or damaged. A packing list is provided on page 5.

**Step 2:** Choose an installation site on a flat, level surface or wall near the modem or ISDN/TA you plan to use for internet connections or near the network line you plan to use for a LAN connection. Note that the internet server can be hung on a wall using the wall mounting equipment included with the product.

## Making Connections

**Step 3:** Connect the internet server to your LAN using a Category 3, 4 or 5, twisted-pair cable and the device's single RJ-45 LAN port. This connection should be made to an Ethernet or Fast Ethernet switch or hub. (The RJ-45 port looks like a phone jack.)

**Step 4:** Connect the internet server to a modem or ISDN/TA, using one or both of the device's serial ports (COM1 and COM2). (Note that your modem or ISDN/TA should already be connected and setup according to the instructions included with it.)

**Step 5:** Plug the power adapter into the device and into an outlet.

## Configuring

**Step 6:** Before you can use your internet server, IP addresses on your LAN's PCs must be set so that they are compatible with the internet server's settings. The internet server comes with the default local IP address: **192.168.100.1** and the default subnet mask setting: **255.255.255.0**. Computer stations on your LAN that will use the internet server for internet access must modify their IP settings to 192.168.100.xxx (where xxx is a number between 2 and 255). All stations must also modify their subnet mask settings to match the internet server subnet mask setting, and set their default gateway to the local IP address (in this case the default address listed above) used by the internet server. If you want to use a different IP address range, see "Setting IP Addresses" on page 12.

**Step 7:** The internet server can be configured and operated via Telnet or a web browser once PC IP addresses have been properly set. (Note that some device settings can be manipulated using the IS Admin program included with the device.) Start your Telnet or browser software and enter the IP address of the internet server (either the default IP listed above or the new address you assigned using IS Admin). This should bring up the internet server start menu. See the next series of steps for information about variables that must be set for the device to work properly.

## Key Variables

**Step 8:** **ISP Account -> Phone Number**, when you signed-up for an account with your ISP (internet service provider), you should have been given an access phone number that your modem will dial. Look under the "WAN Port Variables" menu for this variable and enter the phone number provided by your ISP.

**Step 9: ISP Account -> User ID**, your ISP should also have assigned a User ID (aka, a username) that you will use for logging-in. Also under “WAN Port Variables,” enter this user ID exactly as it was provided to you.

**Step 10: ISP Account -> Password**, finally, to complete the ISP login process, the internet server must provide the password associated with the user ID assigned by your ISP. Enter it.

You have now completed the basic steps necessary to install, configure, and begin using the internet server. Note that, with respect to steps 8–10, it may be necessary for you to use a “Login Script” instead. If you enter the information required in those three variables correctly and still have trouble logging-in, see the “Login Script” section on page 19 to create a login script.

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## **CE Mark Warning**

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# ***ABOUT THIS GUIDE***

This guide explains how to install and use the internet server.

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## **Audience**

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This manual assumes basic familiarity with LANs, the internet, and ISPs. It has, however, been designed for basic-level users.

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## **Overview of the User's Guide**

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- ◆ Chapter 1, *Introduction*. Provides information on the internet server and internet server technology.
- ◆ Chapter 2, *Installation*. Helps you unpack, understand and install the internet server.
- ◆ Chapter 3, *System Setup*. Explains how to set necessary options on the internet server.
- ◆ Chapter 4 *Configuration Variables*. Explains all available variables on the internet server and what options exist for configuration and use.
- ◆ Appendix A, *Troubleshooting*. Provides direction and assistance for locating the source of problems and solving them.
- ◆ Appendix B, *Specifications*. Lists the device's specifications.

- ◆ Appendix C, *AT Commands*. Lists the basic and extended AT command sets.
- ◆ Appendix D, *Port Pinouts*. Provides pinout data for the device's ports.
- ◆ Appendix E, *Glossary*. Provides the meaning for some networking terms used in this manual.

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# ***INTRODUCTION***

This chapter introduces the internet server, as well as some of the technology that underlies it.

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## **Product Description**

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The internet server is designed to provide a single-point access to the internet for multiple, networked PCs. One of the primary features of the internet server is that it provides multi-user access to the internet through a single user account and one connection. More simply put, an internet server takes a single internet connection that without it could only be used by one person and allows it to be used by multiple stations on the same network simultaneously.

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## **Product Features**

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The list below highlights the features and specifications of the internet server.

- ◆ Compatible with the IEEE 802.3 10BASE-T Ethernet and 802.3u 100BASE-TX Fast Ethernet industry standards for

interoperability with other Ethernet/Fast Ethernet network devices.

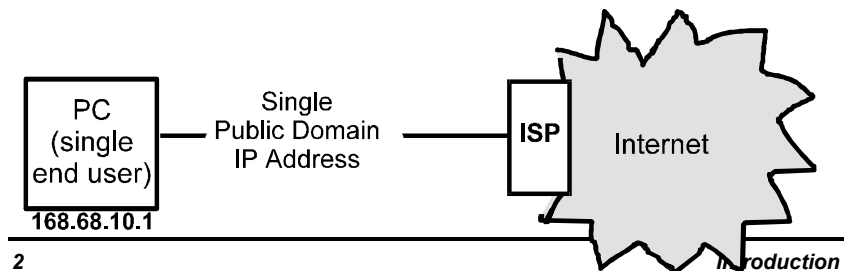
- ◆ Internet protocol support for: PPP, PAP/CHAP, NAT, TCP/IP, DHCP, ARP, ICMP, SMTP, POP3, FTP, Telnet, and HTTP.
- ◆ Support for device configuration via Telnet, web browser, and IS Admin program (included).
- ◆ NWay TP port for LAN connection.
- ◆ Ethernet connections support Category 3 or better twisted-pair cables.
- ◆ Fast Ethernet connections support both shielded twisted pair and Category 5 unshielded twisted-pair cables.
- ◆ 56K (maximum) modem speed support
- ◆ 128K (maximum) ISDN/TA speed support
- ◆ Internet Features include: Dial-On-Demand, NAT internet access, DHCP server, and virtual server.
- ◆ Flash memory for easy firmware upgrades.

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## Internet Server Technology

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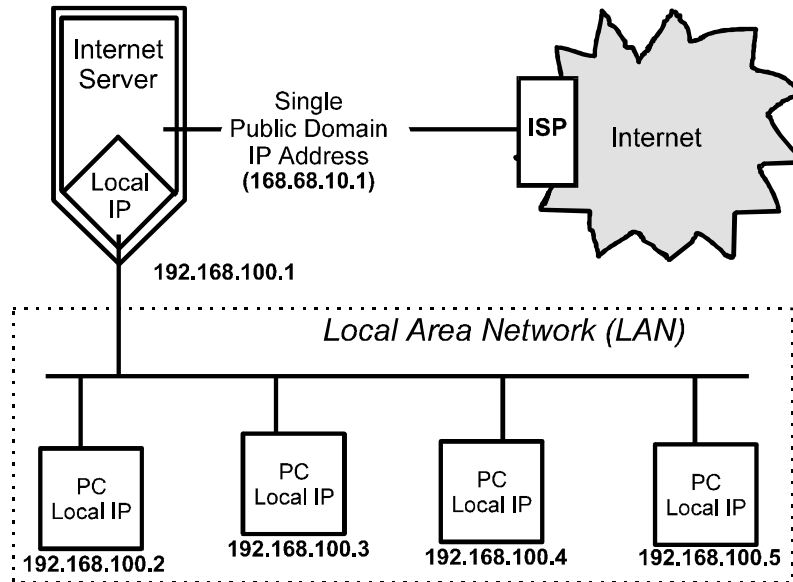
The concept behind internet servers is to provide a single, shared access point for multiple users. Without an internet server, each end point (i.e., PC or workstation) on a LAN must have it's own



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public domain IP address.

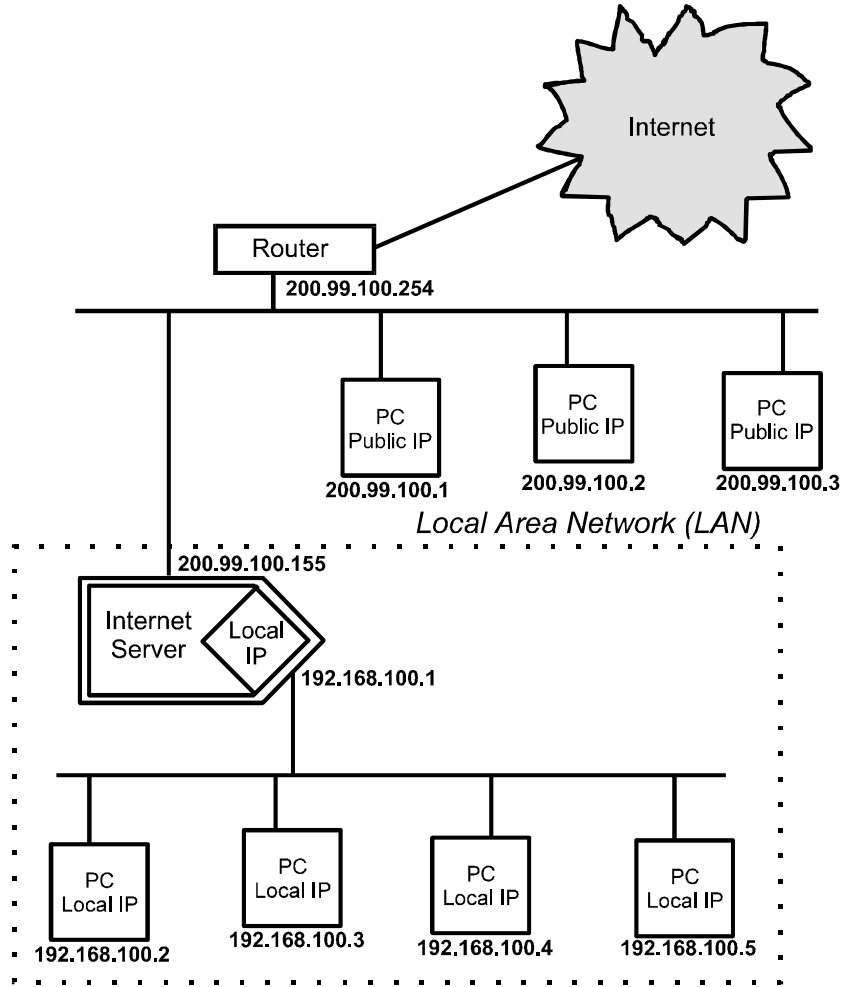
Using an internet server allows a single public IP address to be shared by multiple local end points simultaneously.



Since the same range of local IP addresses can be used at as many multiple locations as necessary, available IP addresses can increase. Also, it is only necessary for a company to pay for a single internet access account even though many people will be able to use it.

An internet server can also be used to expand a LAN by providing a means to create localized “sub-groups” in a LAN-to-LAN configuration. The internet server acts as a single public IP address access point for the sub-group LAN. The sub-group LAN can then use local IP addresses from the available ranges. The effect of this

is to expand the number of stations that can use IP addresses assigned to the LAN.





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# 2

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## ***INSTALLATION***

This chapter provides information on the unpacking and initial installation of your internet server.

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### **Unpacking**

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Open the shipping carton of your internet server and carefully unpack the contents. The carton should contain the following items:

- ◆ One internet server device
- ◆ One AC power adapter, suitable for your area's electrical power connections
- ◆ One 3.5" diskette with IS Admin software
- ◆ IS Admin *User's Guide*
- ◆ Wall mount hardware
- ◆ This *User's Guide*

Inspect the device and all accompanying items. If any item is damaged or missing, report the problem immediately to your dealer.

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## Desktop / Shelf Installation

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The unit has rubber feet attached to the bottom to cushion it. Allow enough ventilation space between the device and the objects around it. Choose a sturdy, level surface in a ventilated area that is dust free and away from heat vents, warm air exhaust from other devices and direct sunlight. Avoid proximity to large electric motors or other electromagnetic equipment.

Observe the following guidelines when choosing an installation location:

- Air temperature should range from 32° to 122° F (0° to 50° C).
- Humidity should be less than 90%, non-condensing.
- Site should not exceed the electromagnetic field (RFC) standards for IEC 801-3, Level 2 (3V/M) field strength.

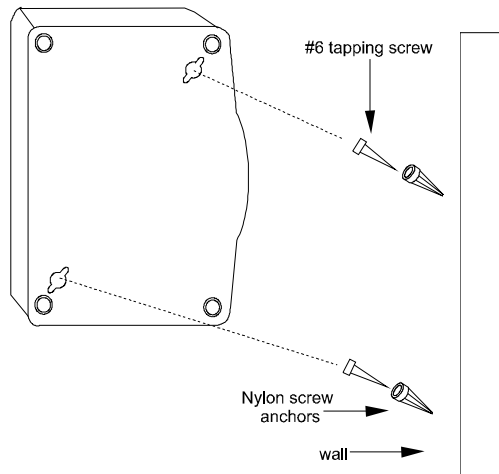
For a detailed list of the product's technical specifications, refer to Appendix B, *Specifications*.

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## Wall Installation

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The product can be installed on a wall. When installing, you need to attach two tapping screws and two screw anchors to the bottom of the device. Wall mount supplies are included with the device.



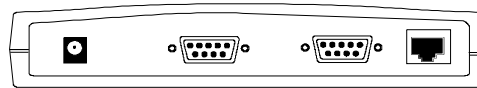
**Installing the Internet Server on a Wall**

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## Port Description

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The internet server has two WAN ports.



**Internet Server Rear Panel**

### ***Serial – WAN***

Serial ports are used for WAN connections either to a modem or an ISDN terminal adapter. Both serial ports are standard male 9-pin RS-232 connectors.

## **RJ-45 – LAN**

The internet server has a single, NWay RJ-45 LAN port. This port is 10Mbps and 100Mbps capable (auto-detect, auto-configure) and designed for use in an Ethernet or Fast Ethernet LAN via a network hub. The port has standard RJ-45 pinouts.

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## **LED Description**

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The internet server has a small LED array for indicating current port and transmission status. The power/transmit (Pw/Tx) and connect/receive (Link/Rx) LEDs only relate to activity on the LAN ports. All other LED indicators display information about their related ports as labeled.

### ***Pw/Tx***

The Pw/Tx (power/transmit) LED lights when power is supplied to the device and flashes when a LAN port transmits data.

### ***Link/Rx***

The Link/Rx (link/receive) indicator will light up when a good connection is made at either LAN port with an operating and compatible Ethernet or Fast Ethernet device. This indicator flashes when either LAN port receives data from the network.

### ***COM1 / COM2***

Each COM port LED provides an indication of the operating status of one WAN port. When a WAN port is transmitting data, the re-

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lated COM port will light. If no data is being transmitted, the COM LEDs will be off.

## ***Normal LED Flash Pattern***

Immediately after power-up, all four of the LEDs should display steady green for several seconds. Then both COM LEDs should flash simultaneously three times. This sequence of flashes should be followed by first COM1 flashing once and then COM2 flashing once, repeated three times in succession. If a problem with the device is detected during this time, the LED flashes will display an error pattern (see Appendix A: *Troubleshooting* for more information on POST error indications). If no errors are detected, the internet server will begin operating normally.

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## **Connecting to the Local Network**

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The internet server includes one RJ-45 NWay LAN port. To connect the device to your LAN, use a standard Category 3, 4, 5 UTP, or STP twisted-pair cable to link the device to an Ethernet or Fast Ethernet hub or switch.

Cable length limits must conform to Ethernet and Fast Ethernet wiring rules. Ethernet cable segments can be a maximum of 100 meters. Fast Ethernet wiring rules also limit the maximum length of cabling segments to 100 meters.

Once the internet server is physically connected to a local network and you have used the IS Admin software included to assign an IP address to the device (or simply reconfigured your PC's IP address, subnet mask and gateway to match the default settings of the internet server), you may configure other parameter variables from your network station using Telnet or a web browser.

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## **Connecting to the Internet**

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The internet server must be connected to the internet (this is also known as a "Wide Area Network or 'WAN'" connection) using a COM serial port. A COM port can either be connected to the serial port of a modem (or fax/modem), or to an ISDN terminal adapter.

This internet server model has two COM ports and can therefore have two WAN connections. Any combination of different types of WAN connections will work. The faster the WAN connections are, the faster access will be and the more users will be able to get on the internet simultaneously.

Connect the COM port of the internet server to a modem or ISDN terminal adapter using a standard serial cable.

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## **Connecting Power**

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Power is supplied to the internet server through an AC power adapter. Check the technical specifications section for information about the AC power input voltage.

Since the internet server does not include a power switch, plugging its power adapter into a power outlet will immediately power it on.

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# 3

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## SYSTEM SETUP

Before it can be used, the internet server has some variables that need to be properly set. This chapter describes how to change default IP settings and then how to use Telnet or a web browser to manipulate the internet server. A description of the minimum setup required to operate is also provided. A full listing of all variables on the internet server is provided in Chapter 4. Note that the variables and their options are the same regardless of whether you are using Telnet or a web browser although they are displayed in different formats.

*Usage Note: Throughout this user's guide, we refer to "your ISP." An ISP is a company that provides internet services, normally for a fee, and usually via modems connected over telephone lines. From the ISP's point of view, the internet server is a single user (with a single username and password). The purpose of the server is to allow you to get access as a single user for multiple actual users.*

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## **Setting IP Addresses**

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The internet server comes with a default IP address and subnet mask assigned. If you would prefer not to use the internet server's default IP address, it will be necessary for you to change that address using the IS Admin program included with the device. Regardless, it will be necessary for you to configure one PC with an IP address and subnet mask that are compatible with the settings of the internet server. (Note that your PC's IP address, subnet mask, and IP gateway must be hand set; The IS Admin program does not include this function.)

Once the server and a management PC have compatible IP address and subnet mask settings, and are connected through the LAN, either an in-band Telnet session or a web browser can be used to set the device's configurable variables and view its current operating status.

### ***Default Addressing***

The internet server comes with a preset default IP address setting of 192.168.100.1. In order to configure the internet server, you must set at least one computer on your LAN to an IP address in the same subnet (192.168.xxx.xxx).

### ***Configuring LAN IP Addresses***

Before you can use Telnet or a browser to configure the internet server, it is necessary for you to change your PC's IP address to the same subnet as the LAN IP used by the server. Each operating system and network software suite will have a different procedure/application for setting the system IP.



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Under TCP/IP (many Windows 3.1 and 3.11 users), the system IP and subnet mask are configured under “Setup” in the TCP manager. In Windows 95, users must go to the Control Panel and Network settings; Under Network settings, you must modify the TCP/IP properties for the IP address, subnet mask, and default gateway. The IP address should be on the same subnet as the local address assigned to the internet server, the subnet mask setting should be the same as the internet server, and the default gateway setting should be the local IP address assigned to the internet server.

Since the principle behind internet server technology is the use of local IP addresses that are never seen or used on public systems, you must use IP addresses from the ranges below. The following three IP address blocks have been set aside by internet regulatory authorities specifically for local-only use:

10.0.0.0 – 10.255.255.255

172.16.0.0 – 172.31.255.255

192.168.0.0 – 192.168.255.255

All local stations using the server to access the internet must have an IP address within these three ranges, as well as an IP address on the same subnet as the internet server.

*Important: If the server's IP address is 10.10.1.150, all local stations must have an IP address as: 10.10.1.xxx, the subnet mask setting must be the same, and the default gateway of each station needs to be set to the local IP address assigned to the internet server.*

We recommend that you make a note of each device's IP address for reference during troubleshooting or when adding new stations or devices.

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## Using In-Band Telnet to Configure the Server

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Once your PC is configured with an IP address on the same subnet as the server, start your Telnet program and enter the IP address assigned to the server when you are prompted for a host address.

You should immediately see the internet server Telnet Interface console greeting screen.

Enter the password to access the device parameters. There is no default password. Once you have access, use the menu item numbers to set the variables which are described later in this chapter.

*Note: When using Telnet to modify device parameters, saving those parameters immediately ends the Telnet session.*

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## Using a Browser to Configure the Server

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Once your PC is configured with an IP address on the same subnet as the server, start your browser program and enter the "http://" prefix, followed by the IP address assigned to the server, in the address window.

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You should immediately see the internet server web browser interface menu. Note that the internet server IP can be bookmarked for future access so that it doesn't need to be entered each time.

The browser interface uses frames, so it is best if you use a frames-capable browser program. Also, we advise you to temporarily suspend the use of proxies – if you are using them – while accessing the internet server as proxy settings may interfere with browser access to local devices.

If you use a non-frames browser, when you receive the initial internet server screen, you should see the main navigation menu rather than the navigation menu and the system status screen. The functions are the same, only the appearance will be different.

After you have access to the browser interface, use the menu options in the left-hand frame to choose the variables you want to view, set or modify. Some variables have limited options that must be selected from a pull-down list.

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## **Minimum Configuration**

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Regardless of how you intend to use the internet server, you will need to consider and set some basic system variables. This section is concerned with describing only those variables that are critical to proper functioning of the internet server.

The following variables need to be configured for the internet server to operate correctly (the first is a System variable, the others are WAN port variables):

## **DNS IP Address**

Domain Name Service (DNS) servers are used on the internet to maintain information about which Uniform Resource Locator (URL) name relates to which internet IP address. For example, the URL: WWW.CNN.COM, is a pseudonym for the IP address: 207.25.71.25. DNS entries allow users to access resources using URLs instead of IPs.

**Options:** Any internet DNS server IP address available through the WAN connection. This address should be provided by your ISP. (Note that without a DNS server IP, internet sites will only be available using IP addresses and will not be available using URLs.)

**Default Value:** 0.0.0.0

**Must Be User Modified?** Yes.

**Description:** A Domain Name Service (DNS) server address is used to translate URLs into their corresponding IP addresses.

## **ISP Account -> Phone Number**

In order for the internet server to control the modem to dial the phone, you must enter the dial-up phone number for your ISP. If you need to dial an area code in order to call the number, it must be included in this variable. If you must dial "#", 0, 9 or some other number in order to get an outside phone connection, that information must be included in how this variable is configured.

**Options:** For dial-up connections, the local ISP phone number, complete without spaces, hyphens or other punctuation (commas may be used to indicate a pause). The maximum length is 20 characters.

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**Example:** Your ISP phone number is a local call to 916-5555 and you must dial 0 in order to get an outside line from the office where you want to use the internet server. You would enter 0,,9165555 in the “ISP Account -> Phone Number” variable. The two commas instruct the modem to pause between dialing the 0 and dialing the rest of the number. This pause is necessary if there is normally a moment or two between dialing 0 and getting an outside dial tone.

**Default Value:** (none)

**Must Be User Modified?** Yes.

**Description:** The phone number entered in this variable is the number the internet server will dial to establish its internet (WAN) connection.

*Note: If the ISP phone line is busy, the internet server will automatically redial. Three successive redial attempts will be made.*

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## **ISP Account -> User ID**

Just as the internet server needs to know what phone number to dial to access your ISP, it also needs to know what username to login under. This variable is the username the ISP has assigned to you or your company.

**Options:** Needed for dial-up connections. The ISP assigned user ID name exactly as provided (i.e., all letters capitalized where necessary, underscores and other punctuation included). The maximum length is 16 characters.

**Default Value:** (none)

**Must Be User Modified?** Yes.

**Description:** This variable is the user ID that will be provided to the ISP once the modem connection is established.

**Notes:** It may not be possible with some ISPs to use this variable to allow the internet server to automatically login. In that case, it will be necessary to use the Login Script as described below.

## ***ISP Account -> Password***

The password is the final step in the ISP dial-up login process. As with the username, this password should have been assigned to you by your ISP when you registered for the service.

**Options:** For dial-up connections, the ISP user access password exactly as provided (i.e., all letters capitalized where necessary, underscores and other punctuation included). The maximum length is 16 characters.

**Default Value:** (none)

**Must Be User Modified?** Yes.

**Description:** This variable is the user password that will be provided to the ISP once the modem connection is established and the username has been accepted.

**Notes:** It may not be possible with some ISPs to use this variable to allow the internet server to automatically login. In that case, it will be necessary to use the Login Script as described below.

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## Login Script

The login script allows you to list prompts generated by the ISP each time a user dials-up and then provide the right responses so that the internet server can login. The login script should be used when the Username and Password variables above don't work with your ISP or if your ISP's login procedure includes additional prompts (for example, a transmission protocol choice).

**Options:** For each line item, a prompt string and a keyin string must be provided. The prompt string is the text displayed by the ISP requesting that something be entered. The keyin string is what should be entered. Prompt strings can be up to 25 characters long including punctuation. Keyin strings can be up to 20 characters long including punctuation (a maximum of 8 separate line entries).

**Example:** If your ISP asks you to input a user ID, password, and to choose from a list of available communications protocols each time you dial-up, your login script would look like something like this:

<u>No.</u>	<u>Prompt</u>	<u>Keyin</u>
1	Username	Andy
2	Password	abcd
3	Choice -->	2

With each prompt being the text of the prompt provided by the ISP, and each keyin being the exact data you would enter.

**Default Value:** (none)

**Must Be User Modified?** No (unless your ISP login procedure requires you to use a login script).

**Description:** A login script is used to provide login prompt responses when required by the ISP login procedures. Each line item in the script table should correspond with a prompt that the ISP makes once the modem connection is established. The prompt string information entered in the table should include an indication of what data is being asked for at each step in the login process. Reply string data should be provided exactly as it would be if it were hand entered.

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## Operation

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To access the internet, do the following at each station that will use the internet server for internet access:

1. Make sure that TCP/IP settings are configured properly. IP parameters that must be set:
  - **IP Address** – must be a unique IP address chosen from the three reserved IP ranges set aside for local network only use. See “Setting IP Addresses” earlier in this chapter.
  - **Default Gateway** – should be set to the IP address assigned to the internet server’s LAN interface.
  - **DNS (Domain Name Service)** – an IP address provided by your ISP.
2. Activate your browser and use normally.



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# 4

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## CONFIGURATION VARIABLES

This chapter provides information about all of the configuration settings available on the internet server. Information about the range of values, default setting, and purpose for each variable is given. Sections and variable order correspond with the menu listings presented by the internet server Telnet console program. Note that those variables which must be user configured are further detailed in Chapter 3.

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### System Variables

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#### *Server Name*

**Options:** An fifteen-character string of letters and numbers.

**Default Value:** IS-xxxxxx (where “xxxxxx” is the last six digits of the device’s MAC address).

**Description:** The server name is used to identify the internet server on network management lists of active devices.

## **Local LAN -> IP Address**

The Local LAN IP Address variable defines the unique IP address that your network will use to identify the internet server.

**Options:** Any IP address from within the local-only ranges (10.0.0.0– 10.255.255.255 ; 172.16.0.0 – 172.31.255.255 ; 192.168.0.0 – 192.168.255.255).

**Default Value:** 192.168.100.1

**Must Be User Modified?** No.

**Description:** The IP address assigned to the internet server must be consistent with the addresses to be used by other devices on the network. That is, if the internet server address is 192.168.100.1, all other addresses assigned to local network devices must start with 192.168.100 and have a final number between 2 and 255.

## **Local LAN -> Subnet Mask**

This variable defines the subnet level the internet server will share with other devices on the network.

**Options:** Any subnet address which identifies a subnet level.

**Default Value:** 255.255.255.0

**Must Be User Modified?** No.

**Description:** The subnet mask is used to identify subgroups on a LAN. A subgroup is a set of network nodes that can receive broadcast messages (i.e., messages not requiring a specific IP).

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## ***DNS IP Address***

Domain Name Service (DNS) servers are used on the internet to maintain information about which Uniform Resource Locator (URL) name relates to which internet IP address. For example, the URL: WWW.CNN.COM, is a pseudonym for the IP address: 207.25.71.25. DNS entries allow users to access resources using URLs instead of IPs.

**Options:** Any internet DNS server IP address available through the WAN connection. This address should be provided by your ISP. (Note that without a DNS server IP, internet sites will only be available using IP addresses and will not be available using URLs.)

**Default Value:** 0.0.0.0

**Must Be User Modified?** Yes.

**Description:** A Domain Name Service (DNS) server address is used to translate URLs into their corresponding IP addresses.

## ***Maximum Idle Time***

This variable allows you to set an idle time after which the internet server will automatically disconnect the WAN connection. Setting an idle time lets you keep from staying logged-in to your ISP when no one is using the internet.

**Options:** A time duration from 3 to 65535 minutes.

**Default Value:** 30 minutes

**Must Be User Modified?** No.

**Description:** The system will automatically disconnect the WAN link if the port is inactive for the time set.

## Operation Mode

### Options (sub-menus):

- ◆ **Mode:** LAN-to-WAN / LAN-to-LAN; Default is LAN-to-WAN operation.
- ◆ **LAN-to-LAN Internet server -> Global IP Address:** Internet server's address for the router segment when used in LAN-to-LAN mode only.
- ◆ **LAN-to-LAN Internet server -> Subnet Mask:** (as subnet mask above)
- ◆ **LAN-to-LAN Internet server -> Default Gateway:** Router's IP Address.

**Default Value:** Mode = LAN-to-WAN

**Description:** This option only needs to be changed if the internet server isn't going to be used to connect directly to an ISP. Enabling LAN-to-LAN mode automatically disables the LAN-to-WAN Internet server and Server Address Mapping functions.

LAN-to-LAN mode should be used when you need to expand your LAN but have limited IP addresses available and internet access is provided via a router.

*Note: In LAN-to-LAN mode, you cannot let users outside of the LAN have access to services (e.g., Telnet, FTP, or web servers).*

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## ***Change Password***

**Options:** An eight-character string of letters and numbers. Case sensitive.

**Default Value:** (none – no password)

**Must Be User Modified?** No (but it is highly recommend to protect your internet server's settings).

**Description:** Prevents unauthorized access to the device.

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## **WAN Port (1 & 2) Variables**

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### ***Maximum User Connection***

Set this variable to limit the number of users who must access the internet through the server before new user accesses are directed to the secondary WAN port.

**Options:** A number of users between 1 and 255

**Default Value:** 6

**Must Be User Modified?** No.

**Description:** The internet server uses the limitation created by this variable to allocate resources in the most efficient way possible. If the maximum allowed on COM1 by this variable is reached, the next user who attempts to use the server will be given access through the secondary WAN port. If both WAN ports reach the allowed maximum, new user requests are evenly distributed between the two ports one-at-a-time. There is no ultimate maximum.

## **Line Type**

**Options:** Disable, Dialup, Lease Line.

**Default Value:** Dialup

**Description:** The WAN port must be configured for use as either a dial-up connection or a leased-line connection.

## **Baud Rate**

**Options:** 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800 bps.

**Default Value:** 115200 bps

**Description:** The setting of this variable sets the maximum bits per second data transmission rate on the line. Generally, the rate should be set equal to or greater than the maximum possible transmission rate of the device (e.g., the modem) connected to the WAN port.

## **ISP Account -> Phone Number**

**Options:** For dial-up connections, the local ISP phone number, complete without spaces, hyphens or other punctuation (commas may be used to indicate a pause). The maximum length is 20 characters.

**Default Value:** (none)

**Description:** The phone number entered in this variable is the number the internet server will dial to establish its internet (WAN) connection.

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*Note: If the ISP phone line is busy, the internet server will automatically redial. Three successive redial attempts will be made.*

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## ***ISP Account -> User ID***

**Options:** For dial-up connections, the ISP assigned user ID name exactly as provided (i.e., all letters capitalized where necessary, underscores and other punctuation included). The maximum length is 16 characters.

**Default Value:** (none)

**Description:** This variable is the user ID that will be provided to the ISP once the modem connection is established.

## ***ISP Account -> Password***

**Options:** For dial-up connections, the ISP user access password exactly as provided (i.e., all letters capitalized where necessary, underscores and other punctuation included). The maximum length is 16 characters.

**Default Value:** (none)

**Description:** This variable is the user password that will be provided to the ISP once the modem connection is established and the username has been accepted.

## ***ISP Account -> IP Address***

**Options:** The IP address the ISP has assigned to this account.

**Default Value:** 0.0.0.0

**Description:** Dial-up connections should use address 0.0.0.0 if the IP will be dynamically assigned at each connection. Otherwise, enter the IP address assigned by your ISP.

## **Modem AT Command**

**Options (sub-variables):**

- ◆ **Initial String:** <AT &F> (default)
- ◆ **Dial Prefix String:** <ATDT> (default)
- ◆ **Hangup String:** <~~~~+++~~~ATH0> (default)

**Description:** Modem AT commands are used to configure and operate the modem when it is necessary to control settings such as the speaker volume, line modulation, or handshaking protocol.

**Note:** *See your modem user's guide for information about initial string settings and other modem commands.*

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Note that the initial string modem command must set the following:

1. Fixed baud rate (i.e., serial data rate adjustment disabled).
2. Data Carrier Detect (DCD) to follow carrier signal status.
3. Data Set Ready (DSR) to on while the modem is on.



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4. Data Terminal Ready (DTR) to off to hang-up.

5. Enable RTS/CTS flow control.

## ***Login Script***

**Options:** For each line item, a prompt string and a keyin string must be provided. The prompt string is the text displayed by the ISP requesting that something be entered. The keyin string is what should be entered. Prompt strings can be up to 25 characters long including punctuation. Keyin strings can be up to 20 characters long including punctuation (a maximum of 8 separate line entries).

**Example:** If your ISP asks you to input a user ID, password, and to choose from a list of available communications protocols each time you dial-up, your login script would look like something like this:

<u>No.</u>	<u>Prompt</u>	<u>Keyin</u>
1	Username	Andy
2	Password	abcd
3	Choice -->	2

With each prompt being the text of the prompt provided by the ISP, and each keyin being the exact data you would enter.

**Default Value:** (none)

**Description:** A login script is used to provide login prompt responses when required by the ISP login procedures. Each line item in the script table should correspond with a prompt that the ISP makes once the modem connection is established. The prompt string information entered in the table

should include an indication of what data is being asked for at each step in the login process. Reply string data should be provided exactly as it would be if it were hand entered.

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## DHCP Server Variables

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The Dynamic Host Configuration Protocol (DHCP) allows servers and devices like the internet server to dynamically assign IP addresses to network devices. Dynamic IP assignment alleviates the need for the network administrator to maintain and monitor IP address assignments and simplifies IP use because IP address are automatically and dynamically assigned when a station powers-on. DHCP is factory defaulted to OFF.

*Important Note:*        *If you use DHCP to set your local IP addresses, the software IP settings of all stations on the network will need to be manually configured to 0.0.0.0., or, as in the case of Windows 95 users, the "Obtain an IP address automatically" option under TCP/IP will have to be selected.*

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### **Enable**

**Options:** Yes/No

**Default Value:** No

**Description:** This variable is the "on/off" switch for using a DHCP server. DHCP (Dynamic Host Configuration Protocol) allows IP addresses to be dynamically assigned. Rather than assigning a specific local IP address to each station, the

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internet server will assign IPs to each station dynamically if the DHCP server function is enabled.

## ***IP Address Range -> Start***

The range of IP addresses available to the internet server for DHCP allocation is set using two variables. This is the first.

**Options:** Any IP address within the three reserved IP ranges. The IP chosen must correlate with the End of the range.

**Default Value:** 192.168.100.101

**Must Be User Modified?** No.

**Description:** This variable indicates the beginning of the range of IP addresses available for DHCP use in assigning IPs. It is paired with the next variable to create an address range.

## ***IP Address Range -> End***

This is the second of the DHCP IP address range variables.

**Options:** Any IP address within the three reserved IP ranges. The IP address used must correlate with the IP set in the Beginning range variable.

**Default Value:** 192.168.100.150

**Description:** This variable indicates the end of the range of IP addresses available for DHCP use in assigning IPs. It is paired with the previous variable to create an address range.

## ***IP Lease Time***

**Options:** An amount of time, measured in minutes, from 5 to 65535.

**Default Value:** 1440 (24 hours)

**Description:** Dynamically assigned addresses can be periodically “refreshed” by a DHCP server. The IP Lease Time variable allows you to set that time limit. If a time is entered in this variable, each dynamically assigned address will be recycled at the end of the lease time.

## ***IP Reserve Table***

**Options:** Local IP Address, MAC Address (a maximum of 16 separate line entries).

**Default Value:** (none)

**Description:** The IP reserve table specifies ownership of particular IP addresses by particular stations or servers (identified by MAC address) so that those IP addresses will not be used by other devices on the LAN under any circumstances. (Note that devices listed in the Server Address Variables table should have their IP addresses listed here if DHCP is going to be used so that their IP addresses don't get assigned to other network stations.)

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## **Server Address Variables**

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The Server Address Configuration table allows you to setup local servers, for example an FTP or web site, and provide non-local access to them through the internet server. Entries in the table

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associate a port number with the local IP of a particular LAN server so that users not on the LAN can access that server.

The internet server supports virtual internet servers so that your single-point ISP internet access can be used to provide externally-accessible servers for FTP and HTTP. “Virtual Servers” in this context are “virtual” because they don’t have their own public domain IP addresses in the typical internet fashion. Rather, their local IP address, with an access port number, is listed in a table inside the internet server. The port number provides the internet server with the reference to correctly route data requests.

Note that in LAN-to-LAN mode, this function is disabled and no LAN devices can be accessed from the internet.

◆ **No.**

Item number used for entry editing. Maximum of 16 entries.

◆ **Local IP Address**

The LAN IP address for the server entered. Any resource which will be shared to the internet through the server should have a dedicated IP address.

◆ **Protocol**

The type of server protocol being used: TCP or UDP

◆ **Port Number**

The server port number assigned to provide outside connections (from 1 to 65535).

A Server Address Variable table example:

<u>No</u>	<u>Local IP Address</u>	<u>Protocol</u>	<u>Port Number</u>
-----------	-------------------------	-----------------	--------------------

1	192.168.100.11	TCP	23
2	192.168.100.50	TCP	21
3	192.168.100.101	TCP	80

*Note:*        *The port numbers in the above example are those commonly used for Telnet, FTP, and web servers respectively, but the port number should correspond to that assigned when the server is setup.*

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## System Monitoring

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The internet server provides a display function which shows the current setting and operational status of all of its functions. In display mode, it is only possible to view the status of variables and functions, it is not possible to modify or control them.

### ***Displaying Information***

#### **◆ Monitor WAN Port Link**

Provides a display of the current WAN port link status (i.e., whether or not the WAN port is connected).

#### **◆ Display Configuration**

Displays all configuration data for the device (addresses, ports, links, etcetera). Configuration data is a readout of the variables that are user-set as described in this chapter.

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### ◆ **DHCP Server Status**

Displays a table of DHCP servers with the following information: IP Address, MAC Address, and Lease Time.

### ◆ **User Connection Status**

Displays a table of current user connections with the following data: Source IP, Destination IP, Protocol, Path, and Idle. Each user connected to the internet through the server will be listed.

## ***Tools***

Each of the management items listed below allows you to ‘force’ some action. Each of them prompt for confirmation before executing.

- ◆ **Dial Up** – Dial the ISP phone access for one or the other WAN port using the configuration stored under the WAN port control.
- ◆ **Hang Up** – Send the phone disconnect command string to the modem immediately to end the current session.
- ◆ **Reset** – Return the internet server’s settings to their state prior to changes made this session and restart the device.
- ◆ **Factory Reset** – Return the internet server’s settings to their original factory values and restart the device. Note that this will wipe out all information about how the variables are currently set.

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## Navigation Controls

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Each of the functions below may be available in various locations and each is either a configuration control or a navigation control.

- ◆ **Save Configuration** – Stores the current settings into the system firmware. Activation is followed by a prompt for confirmation.

*Note:*            *When using Telnet to modify device parameters, saving the configuration immediately ends the Telnet session.*

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- 
- ◆ **Quit** – Quits the current function or the entire management system. Activation is followed by a prompt for confirmation.
  - ◆ **Return to Main Menu** – Returns the management console to the first menu screen.
  - ◆ **Return to <Previous> Menu** – Takes you up one menu level (generally to the menu immediately preceding the current menu).





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# TROUBLESHOOTING

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## System POST

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When the unit is powered on, the system first runs a Power-On Self Test (POST) as a check of system components. Errors encountered during the POST are indicated by different flashing front panel LED combinations.

*Note: The LEDs flash as a normal part of the system initialization. The error flash codes listed in the table below will be constant and thus unlike the brief LED indications at initial power-on.*

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**Internet Server LED POST Error Indication Table**

	COM1 STATE	COM2 STATE	ERROR INDICATED
0	slow flashing	slow flashing	Need to reload firmware
1	on	On	DRAM Error
2	1 long 2 short	Off	Timer INT Error

3	1 long 3 short	Off	Flash Protected
4	1 long 4 short	Off	Flash ID Error
5	1 long 5 short	Off	Flash Erase / Program Error
6	1 long 6 short	Off	LAN Controller Error
7	1 long 7 short	Off	LAN Memory Error
8	1 long 8 short	Off	IO Controller Error
9	fast flashing	On	EEPROM Error
10	1 long 11 short	Off	LAN IO Base Error

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## Device Installation Problems

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### WAN

**IP ADDRESSES:** If you have trouble connecting with or contacting your ISP, double-check the IP address setting of the internet server. Particularly if your ISP is not using DHCP to dynamically assign IP addresses, make certain that you are using the right IP for the login you have set.

**ACCESS PASSWORD:** It is possible that you mis-entered your ISP login password. Use the Telnet or browser configuration program to re-enter the login password.

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## **LAN**

**IP ADDRESSES:** If stations on your network have trouble connecting with the internet, double check their IP address settings. Particularly if you are not using the internet server's DHCP server function, make certain that you are using only IP addresses from the three reserved ranges and that each PC's IP address is within the same subnet as the internet server LAN IP.

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## **Station Configuration Problems**

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**SUSPEND BROWSER PROXIES:** When using a browser to configure the internet server, we recommend that you suspend use of proxies until after you have completed the configuration. If you are using a proxy server on a different subnet, your browser will have difficulty contacting the internet server.

**IP ADDRESSES:** The PC you are using must have an IP address on the same subnet as the internet server in order to contact it.

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## **Operating Problems**

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**ISP LOGIN PROCEDURES – LOGIN SCRIPT:** It may be necessary for you to create login script entries in order to complete your login procedure. Some ISPs prompt for a communications protocol choice or other data after a successful modem connection. Refer to Chapter 4 for more information.

**MODEM COMMANDS:** It may be necessary for you to reconfigure the initial modem commands due to operational differences in your modem. Refer to Appendix C of this *User's Guide* and the documentation provided with your modem for more information. In particular, check the setting of the initial string for discrepancies with your modem's operational features.

**ISP DETAILS:** Double check all ISP login information (i.e., username, password, phone number) for accuracy.

**OUTSIDE LINE ACCESS DIALING:** If it is necessary for you to dial a special number in order to dial a phone number outside of your office, that dialing information will need to be included in the phone number information provided to the internet server. See Chapters 3 and 4 for more information.

**NUMBER OF USERS:** While the internet server can handle any number of users, it is recommended that no more than 50 attempt to access the internet through the device simultaneously. Note that the more people who access the internet through the internet server the slower response times will be for all.



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# **SPECIFICATIONS**

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## **General**

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**Standards:** IEEE 802.3 10BASE-T Ethernet repeater, IEEE 802.3u 100BASE-TX Fast Ethernet repeater (Class II); ANSI X3T9.5 Twisted-Pair Transceiver

**Protocol:** CSMA/CD

**Network Data Transfer Rate:** NWay – Fast Ethernet, 100Mbps; Or Ethernet, 10Mbps

**Ports:** One RJ-45 NWay LAN port; Two RS-232 serial WAN ports

**Network Media:** Ethernet: Category 3 or better UTP cable, 100m maximum; Fast Ethernet: UTP Cat 5 or STP, 100-ohm twisted-pair 100m maximum.

**Status LEDs:** Pw/Tx (power on/transmit); Link/Rx (connect o.k./receive); COM1 and COM2.

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## Environmental and Physical

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<b>Power Supply:</b>	12VDC/500mA (external)
<b>Dimensions:</b>	164 x 118.2 x 30 mm (W x L x H)
<b>Weight:</b>	240 grams (approximately 8.5 ounces)
<b>Operating Temp.:</b>	0° to 50°C
<b>Storage Temp.:</b>	-25° to 55°C
<b>Humidity:</b>	5% to 95% non-condensing
<b>Emissions:</b>	FCC Class A, CE, VCCI Class A, C-Tick
<b>Safety:</b>	UL, CSA, CE Mark, TÜV/GS



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# AT COMMANDS

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The commands provided in the table below are used to control modems and are provided as a supplemental reference to documentation that should have been included with your modem or fax/modem.

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## Basic AT Command Set

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Each command, except for “+++” and “A”, must be preceded by “AT” and executed when you press the <Enter> key.

Command	Var	Description
+++	-	Escape to command mode
A/	-	Repeat last command
A	-	Answer command
Bn		Protocol for 1200 bps connection
	0	V.22 mode
	1	Bell 212A mode (Default)
Dstring		Dial Command
	P	Pulse dial, must precede number string
	T	Tone dial, must precede number string

	<b>W</b>	Inserted between digit. Wait for dial tone for the period defined by S7 before dialing.
	,	Inserted between digit. Pause for the period defined by S8.
	!	Flash. Inserted between digit. Cause modem to go on-hook for 0.5 seconds and return to off-hook.
	;	Command append. Return to command mode after dialing to allow additional dialing command.
	<b>S=n</b>	Dial a stored number where n is equal to 0, 1 or 2 corresponding to the slot number.
<b>F<sub>n</sub></b>		Select Line Modulation
	<b>0</b>	Auto-detect mode
	<b>1</b>	V.21 or Bell 103
	<b>2</b>	Reserved
	<b>3</b>	V.23
	<b>4</b>	V.22 or Bell 212A 1200 bps line speed
	<b>5</b>	V.22
	<b>6</b>	V.32bis or V.32 4800
	<b>7</b>	V.32 7200
	<b>8</b>	V.32bis or V.32 9600
	<b>9</b>	V.32bis 12000
	<b>10</b>	V.32bis 14400
	<b>13</b>	V.FC 14400
	<b>14</b>	V.FC 16800
	<b>15</b>	V.FC 19200
	<b>16</b>	V.FC 21600
	<b>17</b>	V.FC 24400
	<b>18</b>	V.FC 24600
	<b>19</b>	V.FC 28800
<b>H<sub>n</sub></b>		Hook Switch



	<b>0</b>	Go on-hook (hang-up)
	<b>1</b>	Go off-hook
<b>In</b>		Identification Command
	<b>0</b>	Display the product identification code.
	<b>1</b>	Report pre-computed checksum.
	<b>2</b>	Report O.K.
	<b>3</b>	Report firmware revision, model and interface type.
	<b>4</b>	Report response programmed by an OEM.
	<b>5</b>	Report the country code parameter.
	<b>6</b>	Report modem data pump model and code version.
<b>Ln</b>		Speaker Volume
	<b>0</b>	Off
	<b>1</b>	Low (Default)
	<b>2</b>	Medium high
	<b>3</b>	High
<b>Mn</b>		Speaker Control
	<b>0</b>	Speaker always off
	<b>1</b>	Speaker on during handshaking and off while receiving carrier. (Default)
	<b>2</b>	Speaker on during handshaking and while receiving carrier.
	<b>3</b>	Speaker off during dialing and receiving carrier and turn speaker on during answering.
<b>Nn</b>		Automode Detection – This command interacts with the <b>F</b> command and should be thus used.
	<b>0</b>	Disabled
	<b>1</b>	Enabled (Default)
<b>On</b>		Return to Data Mode – after using <b>+++</b> command to switch to command mode.

	<b>0</b>	Return to data mode.
	<b>1</b>	Perform equalizer retrain sequence, then return to data mode. A retrain causes the modem to optimize for the best data transmission. This command works at speeds of 2400 bps or higher.
<b>P</b>		Force Pulse Dialing
<b>Qn</b>		Modem Responses – Determines whether the modem returns responses after typing a command.
	<b>0</b>	Send responses to local computer (Default)
	<b>1</b>	Do not send response
<b>Sn</b>		Select S-Register as default
<b>Sn?</b>		Display the value of S-Register n
<b>Sn=v</b>		Change the value of Register n to v
<b>=v</b>		Set default S-Register to value v
<b>?</b>		Display the value of the default S-Register
<b>T</b>		Force DTMF dialing
<b>Vn</b>		Response Format – Used with <b>Q</b> command.
	<b>0</b>	Numeric response format
	<b>1</b>	Word response format (Default)
<b>Wn</b>		Extended Response Code
	<b>0</b>	Report DTE speed in EC mode. (Default)
	<b>1</b>	Report line speed, EC protocol and DTE speed.
	<b>2</b>	Report DCE speed in EC mode.
<b>Yn</b>		Long Space Disconnect
	<b>0</b>	Modem does not send or respond to break signals. (Default)
	<b>1</b>	Modem sends break signals for 4 seconds before disconnecting.

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## Extended AT& Command Set

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Command	Var	Description
<b>&amp;Bn</b>		Data rate, terminal-to-modem
	<b>1</b>	DTE/DCE rate fixed at DTE setting
<b>&amp;Cn</b>		Carrier Detect signal status
	<b>0</b>	Forced to On continuously (Default)
	<b>1</b>	Follows the status of remote carrier signal
<b>&amp;Dn</b>		Date Terminal Ready (DTR) operations
	<b>2</b>	DTR off causes modem to hang up
<b>&amp;F</b>		Load the default factory settings
<b>&amp;Hn</b>		Data flow control, DTE/DCE
	<b>0</b>	Flow control disabled
	<b>3</b>	Hardware (RTS/CTS) flow control
	<b>4</b>	Software (Xon/Xoff) flow control
<b>&amp;Sn</b>		Data Set Ready (DSR)
	<b>0</b>	DSR overridden, DSR always on





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# PORT PINOUTS

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This appendix provides pinout data for the internet server's ports.

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## Serial Ports

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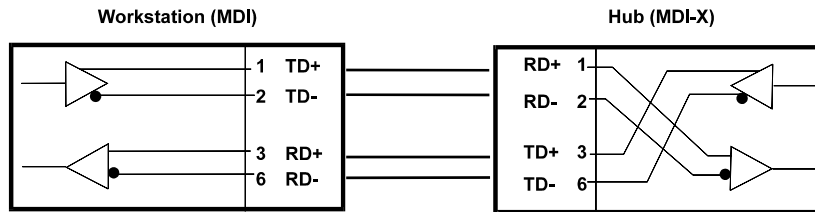
The table below shows the pinouts of the internet server's 9-pin RS-232 serial port. Consult your modem's documentation for detailed information on how to physically connect the internet server to it.

Pin	Signal	Function
1	DCD	Data Carrier Detected
2	RxD	Received Data
3	TxD	Transmitted Data
4	DTR	Data Terminal Ready
5	Gnd	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

## RJ-45 Port

The RJ-45 port of the device is a LAN port designed to use standard, straight twisted-pair cabling (with different ratings at different lengths for Ethernet and Fast Ethernet).

Straight Twisted 1-Pair Cable Pinouts		
Contact	MDI-X Signal	MDI Signal
1	RD+ (receive)	TD+ (transmit)
2	RD- (receive)	TD- (transmit)
3	TD+ (transmit)	RD+ (receive)
4	Not used	Not used
5	Not used	Not used
6	TD- (transmit)	RD- (receive)
7	Not used	Not used
8	Not used	Not used



**RJ-45 Twisted-Pair Cabling Active Pinout Configuration**



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# GLOSSARY

Please note that the terms in this glossary are defined according to their usage in this document and as part of the field of computer networking. Any meaning or usage outside of these specific areas may not be included and is not necessarily implied.

## #

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<b>100BASE-TX</b>	100Mbps Ethernet LAN communications standard set by the IEEE (in standard 802.3u); also called “Fast Ethernet.”
<b>100Mbps</b>	100 million bits per second; an expression of transmission speed in a network.
<b>10BASE-T</b>	The original Ethernet LAN communications standard set by the IEEE (in standard 802.3); a 10Mbps standard.
<b>10Mbps</b>	10 million bits per second; an expression of transmission speed in a network.

## A

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<b>Address</b>	A number, set of numbers, or name which uniquely identifies a computer, network device, or network resource.
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## B

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**Bandwidth** The range of frequencies available across a communications channel; in one sense, the “size” of the communications channel.

## C

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**Category 3, 4, 5** Communication cabling standards referring to the quality of the transmission medium and whether or not the cable includes transmission shielding.

**Collision** Simultaneous data transmission on a network medium, resulting in a garbled (and unreadable) transmission. See “CSMA/CD.”

**Collision Domain** A section of a network isolated from other sections by a switch, bridge, or hub that detects and resolves collisions locally so that there is less impact on the entire network.

**CSMA/CD** **C**arrier **S**ense **M**ultiple **A**ccess with **C**ollision **D**etection; a network communications protocol in which each transmission source (i.e., station, server, switch, etc.) monitors the main data channel for traffic before and during transmission, postponing transmission when the data channel is in use.

## D

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**DHCP**                      **D**ynamic **H**ost **C**onfiguration **P**rotocol. DHCP is a protocol that allows IP addresses to be dynamically assigned.

**DNS**                        **D**omain **N**ame **S**ervice. DNS entries on internet DNS servers map site names (also called, “URLs”) to their actual IP addresses.

## **E**

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**Ethernet**                 A particular type of LAN described in a standard (802.3) established by the IEEE, with 10Mbps data transmission.

## **F**

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**Fast Ethernet**         An extension of Ethernet LAN (defined in standard 802.3u) to allow 100Mbps transmissions.

## **H**

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**Hub**                        The central device in a star-topology LAN used to connect each station to the network.

## **I**

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**IEEE**                      Institute of **E**lectrical and **E**lectronics **E**ngineers, an accredited professional group of scientists and engineers who help set standards for LAN communications technology.

**In-band**                 Communications with a network device using the network medium itself. Contrast with out-of-band.

**Internet server** A device designed to provide internet access to multiple users at multiple stations but through a single access point (both a single ISP and only one public domain IP).

**ISP** **Internet Service Provider.** ISPs are companies that provide internet access, often through a modem-to-modem phone line connection.

## **L**

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**LAN** **Local Area Network,** an interconnected set of computers and other devices.

**Leased-Line** A phone line, usually “rented” from a phone company, which is dedicated to the sole use of the “renter.” Internet access speeds are faster using a leased-line, because there is no bandwidth sharing.

**LED** **Light Emitting Diode** – an electronic device that lights up when electricity is passed through it. LEDs are commonly used for status indicators on electronic devices.

## **M**

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**Mbps** Megabits per second; millions of bits per second.

## **T**

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**TCP/IP** **Transmission Control Protocol/Internet Protocol;** a suite of transport and network layer communications protocols.

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**Telnet** Terminal emulation for the TCP/IP protocol suite, used for interacting with remote computers and devices.

**Twisted-pair** Wire such as is commonly used with telephones consisting of pairs of copper wire usually terminating in an RJ-45 or RJ-11 connector.

## U

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**UTP/STP** UTP – unshielded twisted-pair, twisted pair wire without shielding. STP – shielded twisted-pair, twisted-pair wire with shielding.

## W

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**WAN** **Wide Area Network**, an interconnected set of computers and other devices spread over a large geographic area. (Often used synonymously with “internet.”) Compare, “LAN.”

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