A Simple Local Area Network Setup
for Connecting Multiple VersaTenn V's
Using a Low Cost Cable/DSL Router
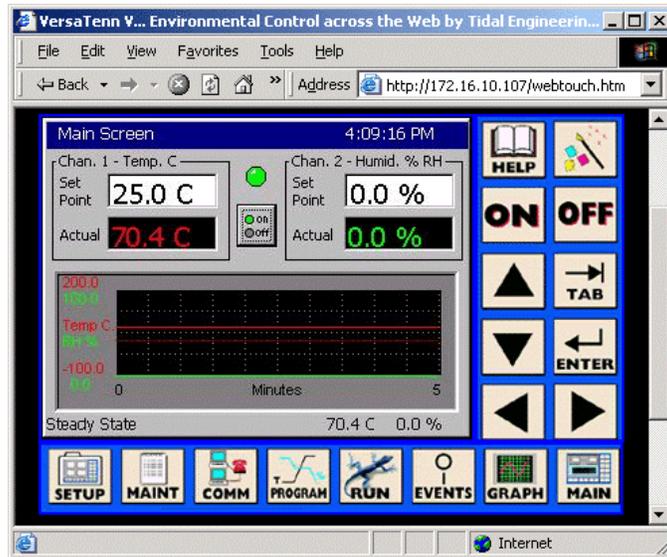
Figure 1 VersaTennV Web Touch Remote

One of the powerful features of the VersaTenn V (Five) is it's built-in Ethernet port and the Web and TCP/IP servers that provide Ethernet (TCP/IP) communications. Using these VersaTenn V (VTV) features and a low cost cable/DSL router, this application note will show you how to remotely monitor and control your environmental chamber from anywhere in your factory or over the Internet using Ethernet cable connections. Once connected you can use your Web Browser, our LinkTenn32 or SimpleComm software or your own LabVIEW, Visual Basic or Visual C++ program to monitor and control your networked environmental chambers. This application note will guide you through the setup of the Belkin Cable/DSL router and your PC.

Figure 2 Belkin 4 Port Cable/DSL Gateway Router

The diagram below illustrates the hypothetical system described in this AppNote: four VTV controllers connected to a PC via the Belkin Cable/DSL router.
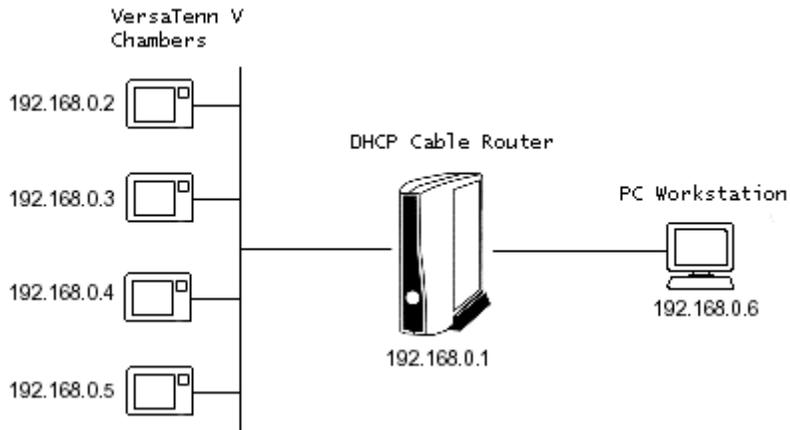
Figure 3 Connection Diagram; Four VersaTenn V's

Setting up the Hardware Connections

Required Equipment

1. PC
   - Ethernet card
   - Windows 9x, NT, 2000 or XP

2. Belkin 4 Port Cable/DSL Gateway Router, Model F5D5230-4
   - DC power supply

3. One or more VersaTenn V Chamber Controllers.

4. CAT 5 Ethernet patch cables, one for the PC and one for each VTV. (Do not use crossover cables)

Hardware Setup
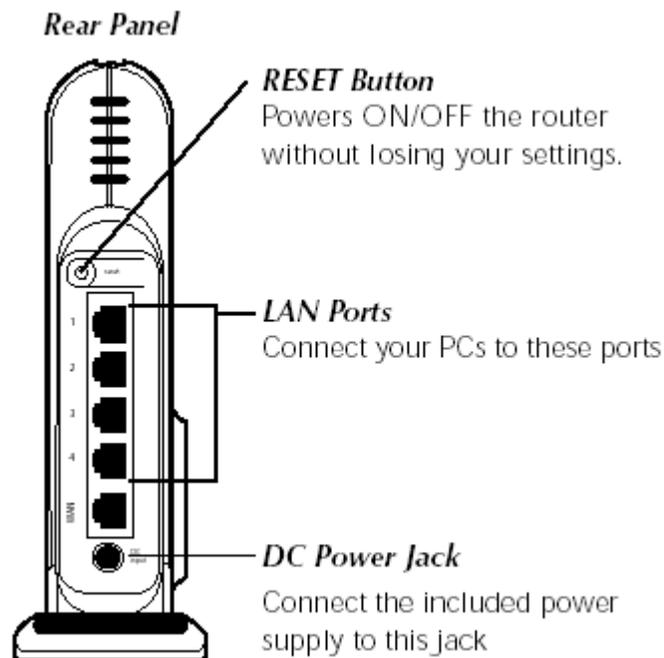
Figure 4 Rear Panel of the Belkin Router

1. Connect an Ethernet cable from each VersaTenn V's Ethernet port to a LAN port on the router.

2. Connect another cable from a LAN port on the router to your PC's Ethernet port.

3. Plug the connector of the 16 V AC power adapter into the DC adapter socket on the router and then plug the adapter into a wall outlet.

Setting up the Software

Belkin Cable/DSL Router Software Setup

The Belkin router is set to run in DHCP mode as shipped from the factory and does not need to be changed. Refer to Appendix A or Belkin's documentation to configure the settings or to reset them to their factory configuration.

PC Software Setup

The PC's network settings can be configured to "Obtain an IP address automatically" from the router for the simplest setup. The following steps show you how to modify your network settings to do this for each operating system.

1. Open your Network Settings or Local Area Connection folder.

    Windows 95 98 ME
    > Go to the Start button and navigate to Settings, Control Panel and click on Network.

    Windows NT & 2000
    > Go to the Start button and navigate to your Network and Dial-up Connections folder. Start, Programs, Accessories, Communications, Settings, Network and Dial-up Connections.

    Windows XP
    > Go to the Start button and navigate to the Control Panel. Click on Network Connections folder and click "Local Area Connection".

    The screen below is for Windows 2000. We will walk through the rest of the steps associated with Window NT & 2000 network settings modifications. Window 95, 98 and XP procedures are similar to these steps.

Figure 5 Opening Network Connection Setup Windows

2. After clicking on Network and Dial-up Connections, you will see the screen below. Right click on Local Area Connection and select Properties.

Figure 6 Network And Dial-up Connections

3. Select Internet Protocol (TCP/IP) and press the Properties button.
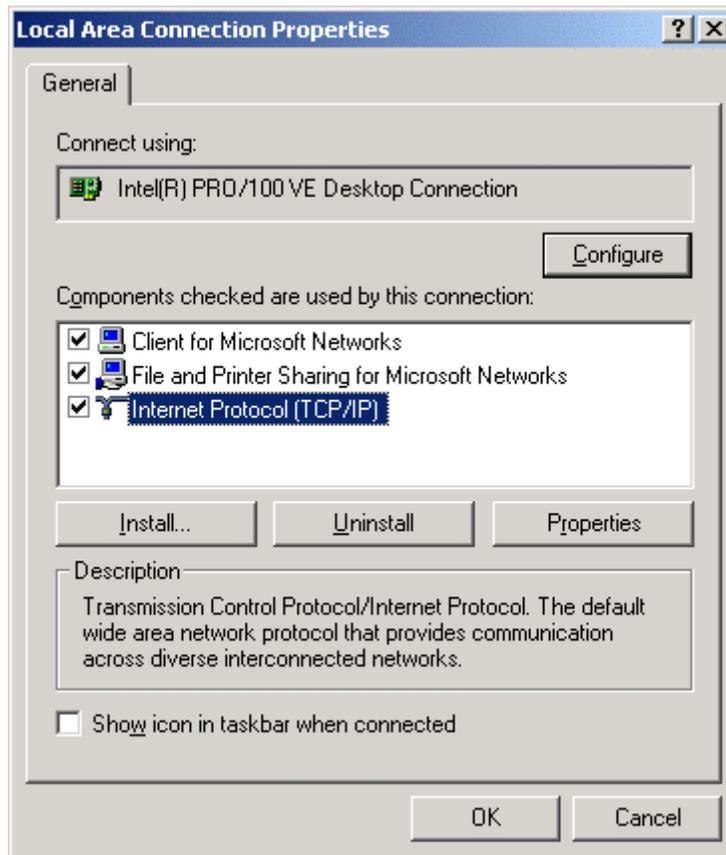
Figure 7 Local Area Connection Properties

4. To enable your PC to accept IP addresses assigned by the router, select the option buttons labeled "Obtain an IP address automatically" and "Obtain DNS server address automatically".
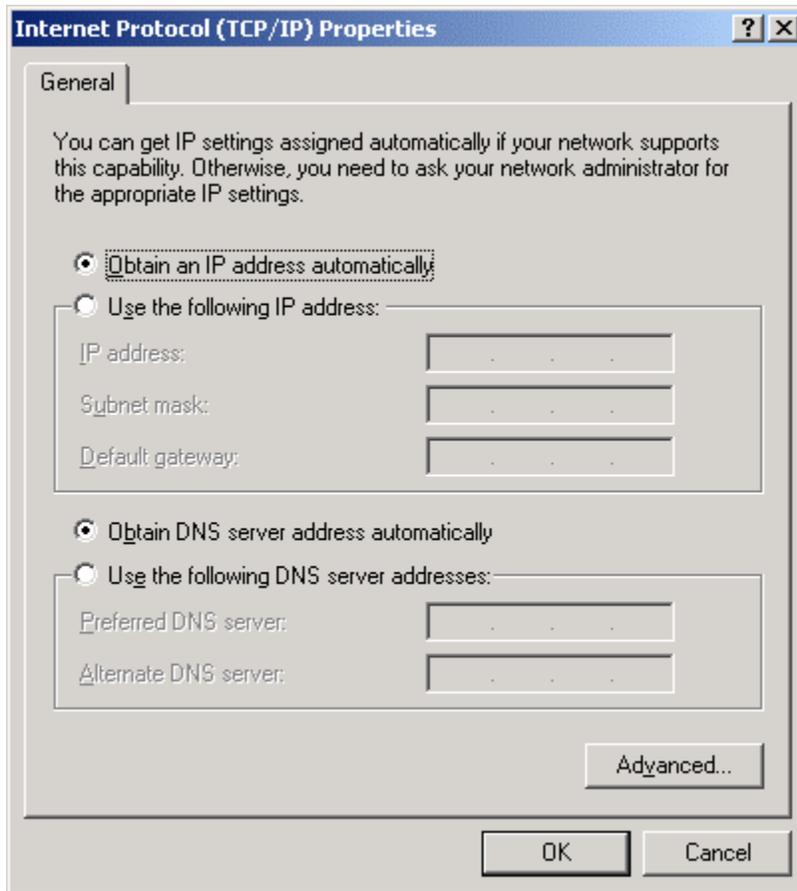
Figure 8 Internet Protocol Properties – DHCP Setup

5. Your PC is now configured for DHCP. Press OK to accept the changes.

Note: You may need to reboot your PC to actually be assigned an IP address.

VersaTenn V Software Setup

Verify DHCP IP Addressing

1. Make sure your PC and the VTV's are connected to the router.

2. In the following order:
   a. Cycle the power on the router. (Allow it to boot completely).
   b. Cycle the power on each VTV.
   c. Reboot your PC.

   When the PC and the VTV's reboot, they broadcast a request for IP addresses from a DHCP server. The DHCP server in the cable router will provide unique IP addresses for the PC and each VTV at this time.

3. To confirm that each VersaTenn V was assigned an address, press the COMM button on the VTV touch screen and press the Ethernet folder icon. You should see a screen similar to the one below. Verify that each field contains non-zero numbers.
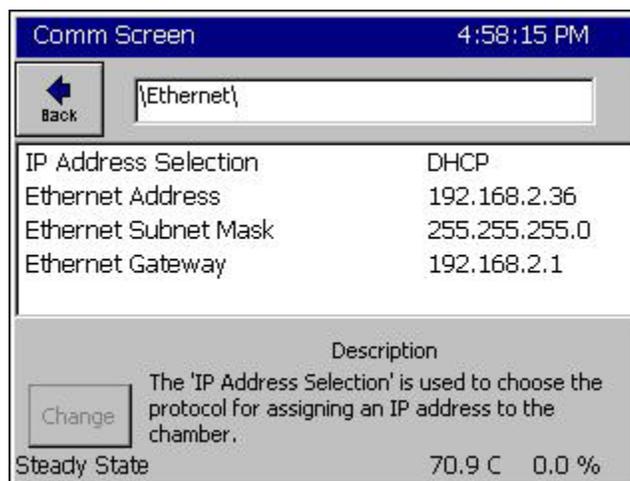
Figure 9 VTV Ethernet Settings

The address in the Ethernet Address field is the IP Address of the VTV controller. Use this address when connecting to the VTV over Ethernet.

If the addresses are blank or 0.0.0.0 then the VTV did not obtain an IP address from the DHCP router. If this is the case, review the previous sections to make sure you have set up the PC and each VTV correctly. If that doesn't solve the problem, review Belkin's user manual.

VersaTenn V TCP/IP Server Setup
To set up the VersaTenn V for ASCII commands over TCP/IP, press the COMM button at the bottom of the VersaTenn V's touch screen. The Comm Screen window will appear.
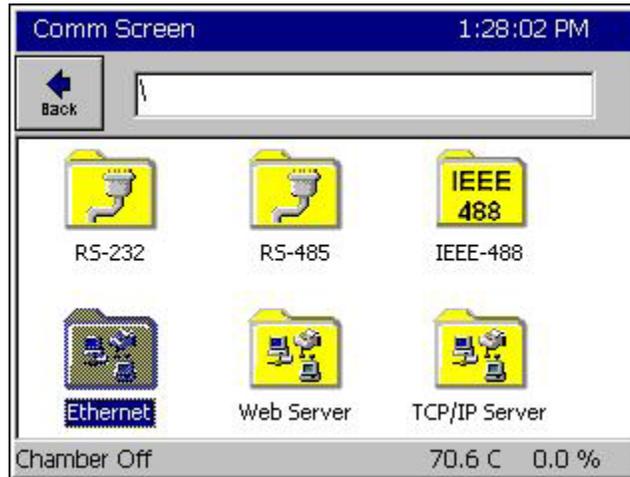
Figure 10 VTV COMM Screen

Press the "TCP/IP Server" folder icon.
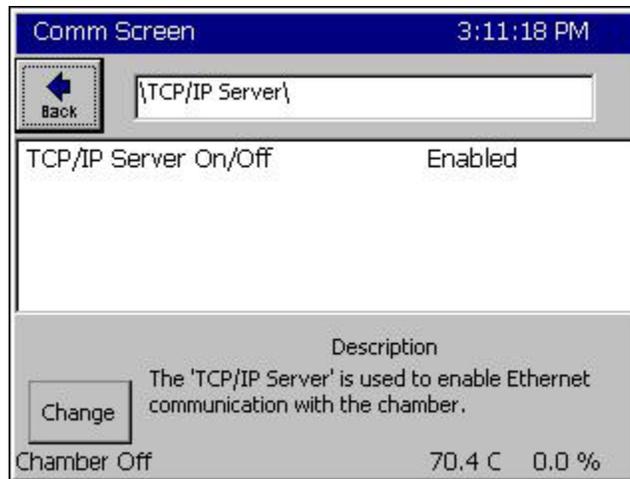
Figure 11 VTV TCP/IP Server Settings

Confirm that the TCP/IP Server On/Off field is set to Enabled. If it is not enabled, press the Change button and enable it. Your VersaTenn V is now configured to accept ASCII commands over TCP/IP.

Note: The Web Server is enabled separately from the TCP/IP Server.

Communicating ASCII commands over TCP/IP

To connect over TCP/IP you can use a Web Browser, a communications program such as Tidal Engineering's LinkTenn 32 or VTV SimpleComm or a third party telnet program.

SimpleComm Setup

SimpleComm is a free communications application from Tidal Engineering that can communicate with VersaTenn V controllers over RS-485, RS-232, IEEE 488 and TCP/IP protocols. This Visual Basic 6.0 application is available from our web site in both executable and source code form with documentation. Go to:

> http://www.tidaleng.com/vtvmain.htm to download:

- VersaTenn V AppNote 8 - VTV Simple Comm
- VTV SimpleComm Application
- VTV SimpleComm Source Code

To set up the VTV SimpleComm program for TCP/IP, enter the VTV's IP Address, set the port to 5000 and press Connect. In other telnet programs you may need to set the protocol to telnet and the emulation to VT100.
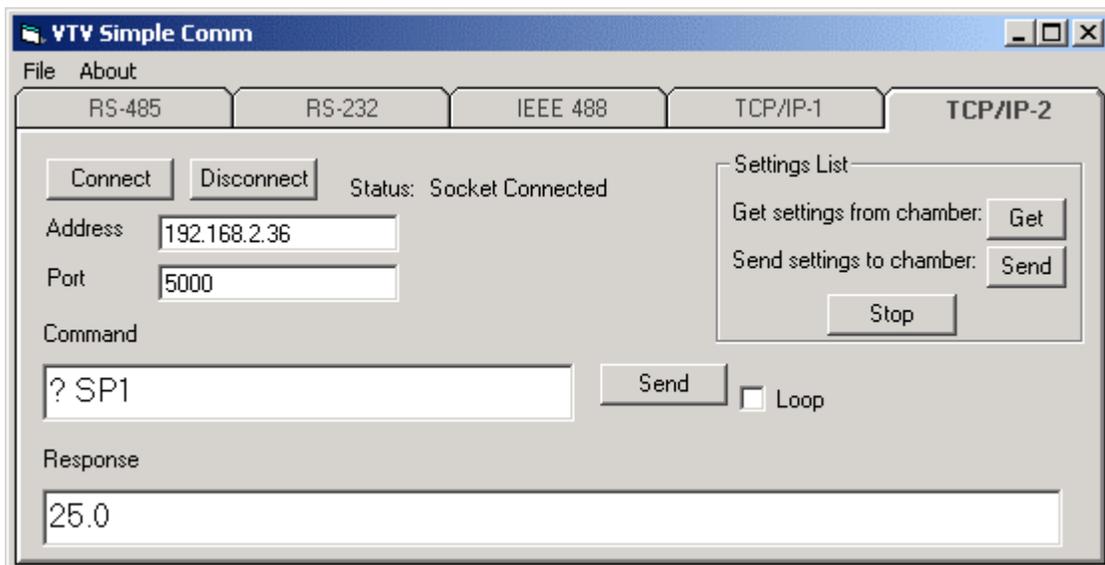
Figure 12 SimpleComm TCP/IP Telnet Connection

Note: Microsoft HyperTerminal cannot be used communicate with the VTV over TCP/IP.

When communicating with the VTV using either SimpleComm or another Telnet program you will want a list of communication commands. This list is available from Tidal Engineering at: www.TidalEng.com/vtvmain.htm. Scroll down to the General Information section and download either VTV 1.2.19 Communication Commands or VTV 1.3.8 Communication Commands, depending on the VTV version on your chamber.

Web Touch Remote

You can operate and monitor your VersaTenn V (VT V) controller over a network with a web browser. Each controller has a built-in web server that uses Tidal Engineering's Web Touch™ Remote technology (Pat. Pending). This technology provides a web browser user interface that is identical to the local touch screen interface on the environmental chamber (see Figure below). You can use this feature to remotely monitor chamber settings and readings. Technicians can use this feature for remote troubleshooting.
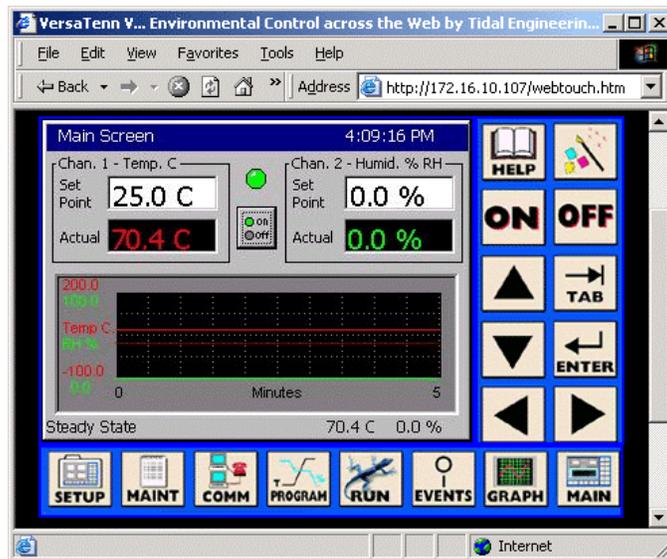
Figure 13 Web Touch Remote Browser Interface

VersaTenn V Web Server Setup

Detailed instructions for setting up the VTV Web server and your Web Browser can be found at www.TidalEng.com/vtvmain.htm in the application note titled: "VersaTenn V AppNote 7 - Using Web Server Rev 3.doc". A brief description of this process follows on the next several pages. The VTV Web server registration key is available from Tenney Environmental. Contact them at www.Tenney.com.

Press the COMM button on the bottom tool bar to navigate to the Communications screen and then press the Web Server folder.
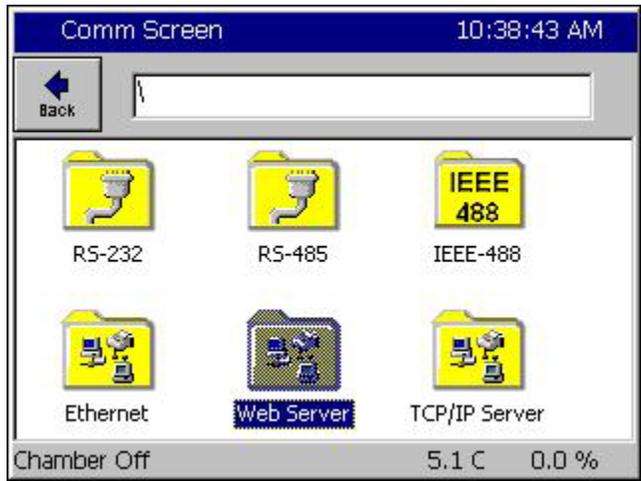
Figure 14 COMM Screen

Figure 15 Web Server Registration Window

Click on the Registration Key text box to display the keypad. Input the registration key you received from Tenney Environmental using the keypad.
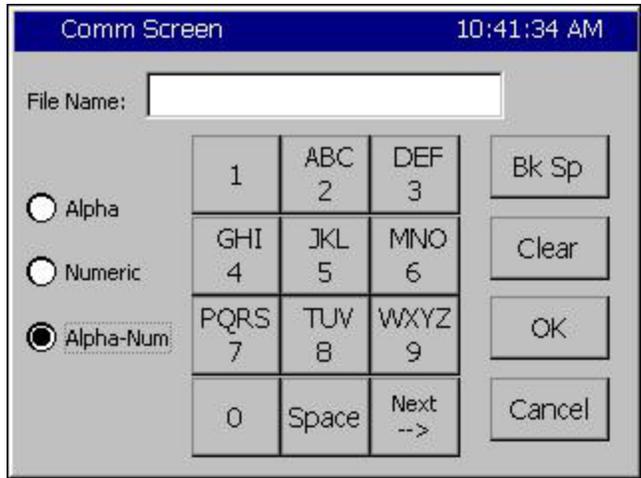
Figure 16 Keypad

Press Register to continue.

Figure 17 Successful Registration

The VersaTenn V will display a message box indicating that the web server key was successfully registered.

Hit OK to proceed to the Web Server Settings page (Figure 17).

Figure 18 Web Server Settings

Assuming you have successfully registered the web server, you can now set a Login Name and Password and enable the web server. Once enabled, you can connect to the VersaTenn V using your web browser.

To change the Web Server On/Off value to Enabled, first press the line in the Web Server screen to highlight it and then press the Change button. From the Web Server On/Off screen, highlight Enabled and press Accept (Figure 18).
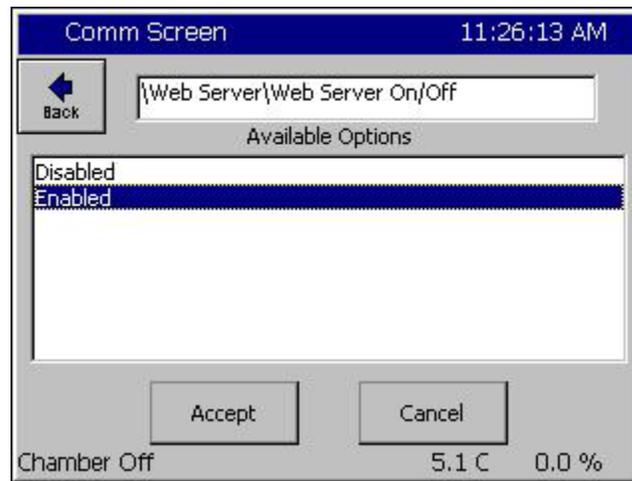
Figure 19 Web Server On/Off Screen

Press the Back button to return to the settings page. Now that the webserver is enabled you can open a browser window and type in the IP address of the VTV to view the control panel. Refer to Application Note 7 for the browser settings required.

LinkTenn32

The LinkTenn32 PC based application, developed by Tidal Engineering for use with Tenney Environmental test chambers, can monitor and control multiple chambers from a single PC. It offers advanced logging, profile management and graphing capabilities not only for the VersaTenn V, but also for Tenney's VT IV, VT III and Watlow F4 and 942 controllers.

For more information on the LinkTenn32 go to www.tidaleng.com/linktenn.htm. Contact Tenney at www.Tenney.com to purchase LinkTenn32.
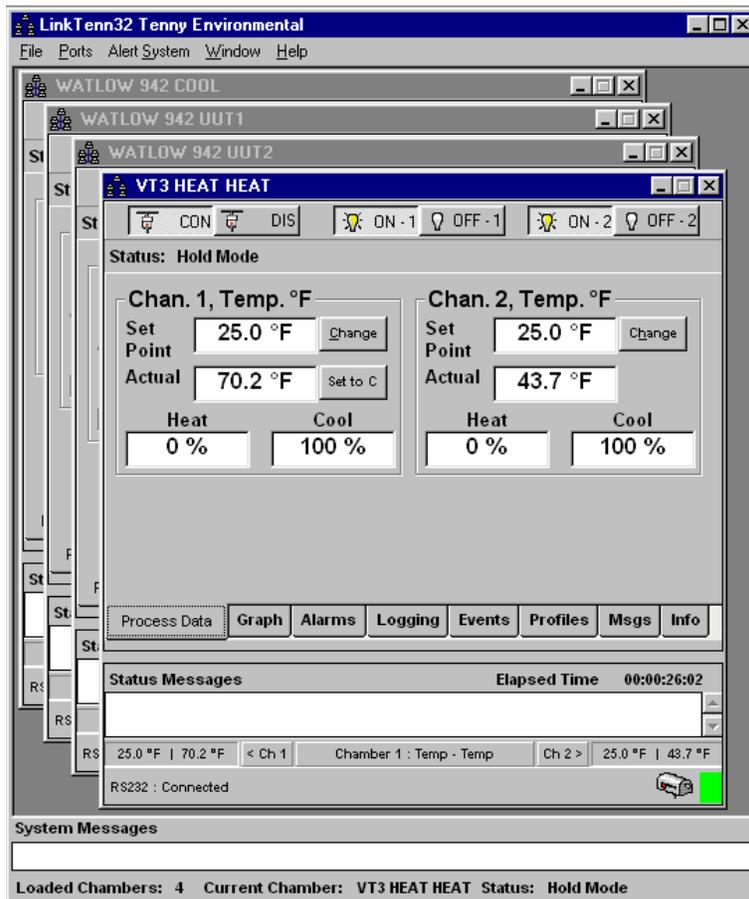
Figure 20 LinkTenn 32 Application

Appendix A

Belkin Cable/DSL Router Software Configuration

The default factory settings are correct for this application note. The steps below can be used to modify or confirm these settings. If you need more detailed information on the any of the cable router features discussed here, refer to Belkin's Cable/DSL Gateway Router manual.

1. Make sure your router is on and is connected to the PC via an Ethernet cable.

2. Cycle the power to your PC. This action forces the PC to accept the new DHCP assigned IP address. Wait for the PC to finish rebooting.

3. The routers setup program is accessed using Microsoft's Internet Explorer. Open Internet Explorer and type the routers default IP address "192.168.2.1" in the address bar.

Figure 21 Internet Explorer with Router's Default IP Address

4. Type the routers default User Name "Admin", leave the Password field empty and press OK.

Figure 22 Router User Name

5. Confirm that the values match the screen below, in particular: IP Address, Subnet Mask and DHCP Server. The section that says "Cable/DSL : Disconnected" indicates that our router is not hooked up to an outside cable or DSL line. We are using it simply as a DHCP router.
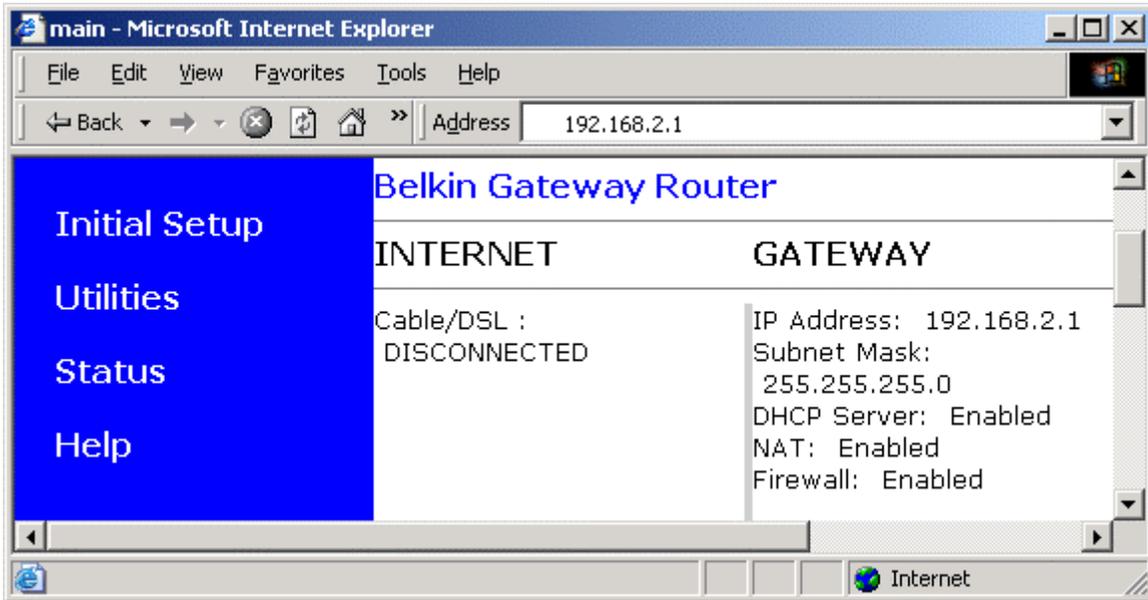
Figure 23 Router Configuration Welcome Screen

6. Select Initial Setup from the navigation menu on the left. Confirm that the option button labeled Dynamic IP Address is selected.

Figure 24 Router Initial Setup Screen

7. Select LAN Services from the navigation menu on the left. Confirm the settings below match the settings on your router.

Figure 25 Router LAN DHCP Settings Screen

Appendix B

Troubleshooting

If you cannot communicate with the VersaTenn V using telnet or Internet Explorer through the router please review the instructions in this manual, namely:
- confirm the PC settings.
- confirm the Belkin Cable/DSL Router settings.
- confirm the VTV settings.

The problem may be that either the PC or the VTV did not get assigned an address by the DHCP router. Cycle the power first on the router. After it reboots, cycle the power on the VTV and on your PC. Return to the "VersaTenn V Software Setup" section and confirm that the Ethernet Address field of the VTV is displaying an IP Address. If it is, then the VTV and the Router are communicating properly.

To check the communications between the PC and the router, press the Start button on your PC desktop, select Run, type "cmd" and press enter. From the DOS window type "ipconfig" and hit [Enter].

The information displayed under the Local Area Connection applies to this application. If this information isn't displayed correctly, then the communication between the PC and the router incorrect. Review the PC setup instruction section and refer to the Belkin Cable/DSL Gateway Router User Manual. The IP Address refers to the IP Address of your PC. The DHCP Server address refers to the address of the Belkin router.
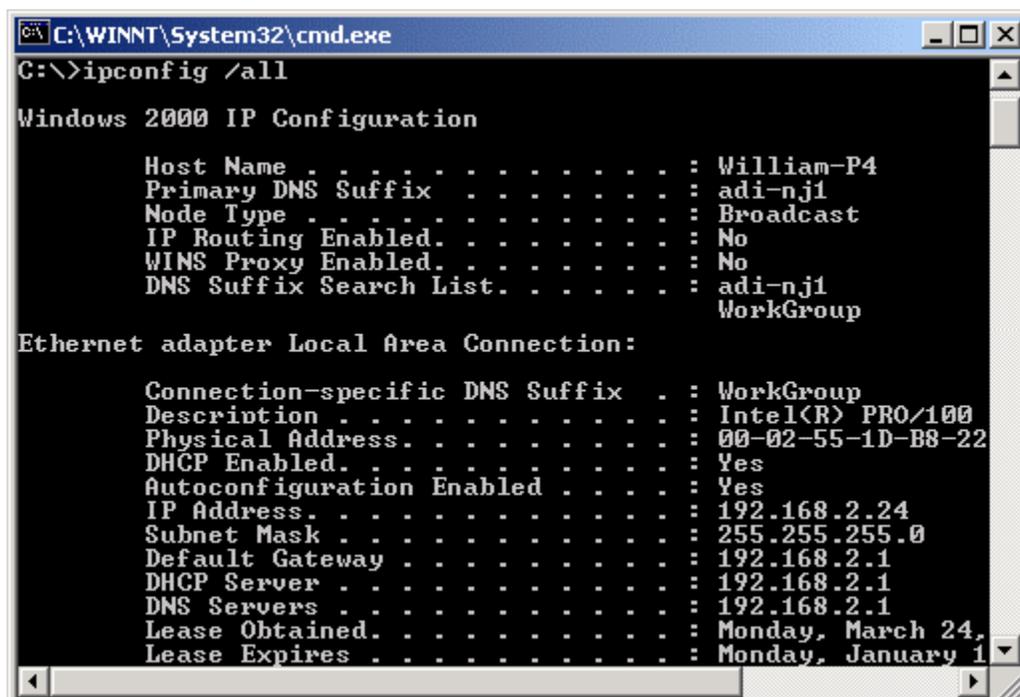

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C:\WINNT\System32\cmd.exe                                    _ □ ×
C:\>ipconfig /all

Windows 2000 IP Configuration

        Host Name . . . . . . . . . . . . . : William-P4
        Primary DNS Suffix  . . . . . . . . : adi-nj1
        Node Type . . . . . . . . . . . . . : Broadcast
        IP Routing Enabled. . . . . . . . . : No
        WINS Proxy Enabled. . . . . . . . . : No
        DNS Suffix Search List. . . . . . . : adi-nj1
                                              WorkGroup

Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . : WorkGroup
        Description . . . . . . . . . . . : Intel(R) PRO/100
        Physical Address. . . . . . . . . : 00-02-55-1D-B8-22
        DHCP Enabled. . . . . . . . . . . : Yes
        Autoconfiguration Enabled . . . . : Yes
        IP Address. . . . . . . . . . . . : 192.168.2.24
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.2.1
        DHCP Server . . . . . . . . . . . : 192.168.2.1
        DNS Servers . . . . . . . . . . . : 192.168.2.1
        Lease Obtained. . . . . . . . . . : Monday, March 24,
        Lease Expires . . . . . . . . . . : Monday, January 1
```

Figure 26 Command Prompt Troubleshooting with Ipconfig

Figure 27 Command Prompt Troubleshooting with Ping

If the ipconfig response is OK then try pinging your PC, the router and the VTV from the command widow.

To test the PC connection, type "ping" and the IP address of your PC (ex. ping 192.168.2.24). You can find the IP address of your PC in the previous section.

To test the router connection, type "ping" then the IP Address of the router (ex. ping 192.168.2.1). If the ping is successful then the communications between the PC and the router are OK.

To test the VTV connection, type "ping" and then the IP Address of the VTV (ex. ping 192.168.2.36). You can find the IP Address of the VTV by reviewing the VersaTenn V Software Setup section. If the ping is successful then the PC is successfully communicating with the VTV.

If this doesn't fix the problem, consult your network administrator, one or more addresses may be conflicting with computers already on the network.

About Tidal Engineering

Headquartered in Randolph, NJ, Tidal Engineering Corporation has been designing and building award-winning embedded hardware and software for test and measurement and data acquisition applications since 1992. The company further provides product development services together with engineering support, and is recognized for technical expertise in such areas as Embedded IEEE 488, and turnkey SCADA (Supervisory Control and Data Acquisition) systems. Tidal's products are available exclusively through ADI American Distributors Inc., an ISO-9002 certified distributor of electronic and electromechanical components and assemblies.

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Tidal Engineering Corporation
2 Emery Avenue
Randolph, NJ 07869
Tel: 973/328-1181
Fax: 973/328-2302
www.TidalEng.com
info@tidaleng.com

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