i.LON™ 1000 Internet Server Starter Kit

Version 1

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i.LON 1000 Internet Server Starter Kit
Welcome to the *i.LON 1000 Internet Server Starter Kit*. This kit builds upon the Model 37400 *LONWORKS® System Starter Kit* by supplying you with everything you need to add web access to your control system.
Introduction

The i.LON 1000 Internet Server (Echelon Model 72001 or 72002) adds web-based monitoring and control to the LonPoint™ applications described in the Getting Started with the LONWORKS System Starter Kit document. Once the examples described below are completed and you understand the basic principles of web-based monitoring and control, you can use the i.LON 1000 Internet Server to add a web interface to any LONWORKS network!

Important: You must complete the Getting Started with the LONWORKS System Starter Kit examples prior to executing the instructions below. This manual assumes that you have successfully completed those examples and have a working knowledge of both LonPoint modules and the LonMaker™ for Windows Integration Tool.

Important: The examples described in this document require a PC running Microsoft Windows 95/98/NT 4.0 with TCP/IP networking installed. This document does not cover how to install TCP/IP networking. Contact your TCP/IP system administrator if you need help installing TCP/IP networking.

Contents of the i.LON™ 1000 Internet Server Starter Kit

The i.LON™ 1000 Internet Server System Starter Kit is distributed as a Zip archive named iLON Starter Kit.Zip from Echelon’s web site. You can find a link to the archive file at http://www.echelon.com/ilon. The archive contains the following files:

LonPoint PID.zip
LonMaker backup file containing the solution network documented in Chapter 3 of Getting Started with the LONWORKS System Starter Kit. This network will be expanded to include an i.LON™ 1000 Internet Server.

Web Solution.zip
LonMaker backup file containing the solution network with the i.LON™ 1000 Internet Server.

demolpage1.htm
demolpage2.htm
demolpage3.htm

User interface information can be displayed in a variety of ways. These pages show various implementations of an HMI application that are equivalent to the HMI application constructed in the LNS DDE Server and Excel Example documented in Chapter 3 of the Getting Started with the LonWorks System Starter Kit User's Guide.
page3getvalues.htm, page3main.htm

HTML support files used by demo1page3.htm

ash_bottom.jpg, ash_left.jpg, ash_right.jpg, ash_top.jpg, hvac_anim.gif, hvac_bg.gif, hvac_off.gif, pid_bg.gif, pid_slider.gif, slider_bg.gif, slider_knob.gif, temp_bg.gif, temp_slider.gif

Graphic support files used by demo1page3.htm

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**PC Requirements**

The PC requirements for this starter kit are identical to the requirements for the Model 37400 LONWORKS System Starter Kit. The same PC should be used to execute both kits.

**Software Installation**

Download the iLON Starter Kit.zip archive from [www.echelon.com/ilon](http://www.echelon.com/ilon). Extract the contents of this archive to a local directory on your PC. The directory path is not important. Place the files in a convenient location.

**Getting More Information and Technical Support**

This document provides information on using the i.LON 1000 Internet Server to add web pages to the examples described in the Getting Started with the LONWORKS System Starter Kit User's Guide.

See the documentation that shipped with your i.LON 1000 Internet Server and with the LONWORKS System Starter Kit for more information on the individual components mentioned below.

Visit the i.LON 1000 Internet Server web site at [http://www.echelon.com/ilon](http://www.echelon.com/ilon) for the latest technical support alerts, upgrades, white papers, and other information.

If you have technical support questions that are not answered by the documentation, online help, or i.LON 1000 Internet Server web site, technical support is available from Echelon. To receive this support, purchase one of Echelon’s incident-based support services. Detailed information about these services is found on Echelon’s Services home page at [http://www.echelon.com/services](http://www.echelon.com/services). There is no charge for software installation related questions during the first 30 days after you receive your i.LON 1000 Internet Server.
**Notice:** The support programs and the information in the following table are subject to change. See the Echelon Services home page at www.echelon.com/Services for a description of the current offerings and support contacts.

<table>
<thead>
<tr>
<th>Language</th>
<th>London</th>
<th>Palo Alto</th>
<th>Tokyo</th>
</tr>
</thead>
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<td>English</td>
<td>Japanese</td>
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<td>German/Italian</td>
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<td></td>
</tr>
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<td>8:30am-4:30pm Pacific Time</td>
<td>0900-1700 Tokyo Time</td>
</tr>
<tr>
<td><strong>Telephone</strong></td>
<td>+44-(0)-1923-430-200</td>
<td>+1-650-855-7400</td>
<td>+81-3-3440-7781</td>
</tr>
<tr>
<td></td>
<td>1-800-258-4566 (US and Canada only)</td>
<td></td>
<td></td>
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<tr>
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<td>+44-(0)-1923-430-300</td>
<td>+1-650-856-6153</td>
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<td><a href="mailto:lonsupport@echelon.co.jp">lonsupport@echelon.co.jp</a></td>
</tr>
</tbody>
</table>

*Excluding holidays at center location

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**Introduction to the i.LON 1000 Internet Server**

The i.LON 1000 Internet Server is a breakthrough product that provides reliable, secure Internet access to the everyday devices in your world – lights, appliances, switches, thermostats, motors, meters, and valves. The i.LON 1000 puts you in control – letting you monitor, adjust, and reconfigure devices as needed, from wherever you might be.

LONWORKS control networks are the worldwide standard for networking controls and machines in building, industrial, home, transportation, and utility automation applications. Internet Protocol (IP) based data networking is the worldwide standard for moving data over the Internet, local area networks (LANs), and wide area networks (WANs). The i.LON 1000 Internet Server seamlessly links together these control and data networking standards.

While IP-based data networks are poorly suited to the tasks performed by a control network, they complement LONWORKS control networks by offering high speed, wide area networking over which LONWORKS data can be sent and received. By providing a robust, high performance interface between LONWORKS and IP-based networks, the i.LON 1000 allows users to leverage the unique strengths of both control and data networks.
The i.LON 1000 offers unparalleled performance and reliability. Certified under the Cisco NetWorks™ program, the i.LON 1000 integrates Echelon’s control networking and routing expertise together with Cisco’s Network Foundation Technologies. The result is a layer 3 LONWORKS router that offers very high packet throughput for demanding process control, building automation, utility, transportation, and telecommunications applications. Cisco certification is your assurance that the i.LON 1000 has been both rigorously tested and will meet the needs and standards of information technology (IT) managers worldwide. Adherence to the EIA-proposed standard for tunneling ANSI/EIA 709.1 packets over IP ensures that communications through the i.LON 1000 are both open and interoperable.
The i.LON 1000’s built-in Web server allows control information (such as network variables representing temperature, occupancy, speed, etcetera) to be accessed easily through a web browser. This feature provides access to LONWORKS monitoring and control data from anywhere without the need for special software tools, over LANs, WANs, or the Internet. Whether for remote diagnostics, equipment calibration, alarm monitoring, or maintenance, the integral Web server makes it simple to access any part of the control system.

The i.LON 1000 can be installed using standard LONWORKS installation tools. For example, the i.LON 1000 is fully supported by tools using Echelon’s LNS™ network operating system, which provides quick setup, configuration, and application-level interoperability. From the perspective of the IT network, the i.LON 1000 is viewed as a typical IP host. Like other IP hosts, the i.LON 1000 supports standard internetworking protocols: TCP/IP, UDP, DHCP, SNMP (MIB II), ICMP, SNTP, TOS, MD5, HTTP, and FTP. In addition, packet aggregation parameters, addressing, IP bandwidth utilization, and security can all be adjusted via the IP network.
Hardware and Software Installation

This chapter provides information for installing the i.LON 1000 Internet Server hardware and software with the LONWORKS System Starter Kit.
Hardware Installation

Recall the LonPoint hardware installation described on pages 2-15 and 2-16 of *Getting Started with the LONWORKS System Starter Kit*. You will expand the hardware installation to include the i.LON 1000 Internet Server. The final topology is shown in figure 2.1. A picture of the actual components is shown in figure 2.2.

**Figure 2.1** Final Installation Topology

**Figure 2.2** Photograph of the Working Configuration
**Hardware Step-by-Step Installation**

1. Verify that the PC is connected to the LONWORKS network and that you can run LonMaker for Windows and the HMI examples as documented in Chapter 3 of *Getting Started with the LONWORKS System Starter Kit*.

2. Verify that TCP/IP networking is installed and running on the PC. (See your network administrator or the Windows TCP/IP networking documentation for information on setting up Windows TCP/IP networking.)

3. Connect both the PC and the *i.LON 1000* to the 10BaseT hub using standard 10BaseT cables. (One such cable is provided with the *i.LON 1000*.) Figure 2.2, above, shows just the PC and *i.LON 1000* connected to the hub. For the examples described in this document, an isolated TCP/IP network is recommended. This avoids conflicts with the existing TCP/IP infrastructure at your location. See your TCP/IP network administrator for more information.

4. Connect the *i.LON 1000* to the LONWORKS network using a short length of twisted pair cable. The cable should be either cat 5 wire or Level 4 wire as described in the *Junction Box and Wiring Guidelines for Twisted Pair LONWORKS Networks*. ([http://www.echelon.com/Products/technical/pdfs/media_wiring/jboxwire.pdf](http://www.echelon.com/Products/technical/pdfs/media_wiring/jboxwire.pdf))

5. Strip approximately 4mm of insulation away from the ends of the wire; attach one end of the twisted pair to the orange Weidmuller connector included with the *i.LON 1000* and the other end to terminal 3 & 4 of the right-most LonPoint module on your DIN rail, as pictured in figure 2.2.

6. Power ON all devices.

Your network should now look similar to the network pictured in figure 2.2.
Software Step-by-Step Installation

Follow these steps to install your software.

1. Connect to the i.LON 1000 console application using Hyperterminal.
   a) Using the null-modem cable (not pictured in the above diagrams) that shipped with the i.LON 1000, connect an available COM port on your PC to the i.LON 1000 console port. Be sure that a modem driver, palm organizer driver, or other serial device is not already using the COM port you choose on your PC.
   b) Run Hyperterminal on your PC. (Hyperterminal ships with Windows and can usually be found under START | PROGRAMS | ACCESSORIES | COMMUNICATION | HYPERTERMINAL. See Microsoft Windows help or your system administrator for complete information on using the Hyperterminal program.)
   c) When Hyperterminal starts, it will prompt you for a Connection Description. Type a descriptive name such as “ilon” for the connection description and click OK.
   d) After you have provided the connection description name from step c, Hyperterminal’s Connect To dialog box will appear. This dialog allows you to choose the COM port you will use. Select the COM port that you connected the null-modem cable to.
e) Next, Hyperterminal will prompt you for the RS-232 (COM1 or COM2) communication parameters. The \textit{i.LON} 1000 communicates at 9600bps, using 8 bit data, 1 stop bit, and no parity. No flow control is necessary. Set the parameters in the hyperterminal communication property dialog accordingly.

![Hyperterminal Communication Property Dialog]

2. Initialize the \textit{i.LON} 1000’s IP address, subnet mask, and default gateway.
   a) Press the PC’s Enter key twice. The \textit{i.LON} 1000 console application should respond with the \texttt{ILON}> prompt.
   b) Type \texttt{show} at the \texttt{ILON}> prompt and press the PC’s Enter key. The \textit{i.LON} 1000 should respond with a display of its current settings.

\texttt{iLON} > \texttt{show}

\begin{verbatim}
Software Version:  1.00.00
IP Address:        0.0.0.0
Subnet Mask:       0.0.0.0
Host Name:         iLON
Gateway:           0.0.0.0
DHCP:              off
MAC ID:            00-D0-71-00-00-26
LonTalk Unique IDs: 80:00:00:00:12:60 through 80:00:00:00:12:6F
LonTalk Xcvr ID:   TP/FT-10
LonTalk IP Port:   1628
Config Server:     0.0.0.0 (1628)
Authentication:    off
SNTP Servers:      0.0.0.0 (123); 0.0.0.0 (123)
SNTP Synchronized: no
\end{verbatim}
c) Get a static IP address, subnetmask, and default gateway address from your TCP/IP system administrator.

**Important:** It is critical that you select an IP addressing scheme that is compatible with your local TCP/IP network. Check with your system administrator; do not use an IP address until you have confirmation that it will not adversely affect your local network.

The example addresses provided below are probably incorrect for your local network. We provide them so that you may understand the syntax of each command only.

Issue the following console commands at the command prompt to set the IP properties of the i.LON 1000.

The syntax for console commands is: **command argument**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ipaddress address</code></td>
<td>Modifies the IP address, e.g., ipaddress 10.1.0.170</td>
</tr>
<tr>
<td><code>subnetmask address</code></td>
<td>Modifies the subnet mask, e.g., subnetmask 255.255.255.0</td>
</tr>
<tr>
<td><code>hostname name</code></td>
<td>Modifies the host name of the i.LON 1000, e.g., hostname myilon (this name then becomes the console application prompt)</td>
</tr>
<tr>
<td><code>gateway address</code></td>
<td>Modifies the gateway address, e.g., gateway 10.1.0.1</td>
</tr>
<tr>
<td><code>ftpuser name</code></td>
<td>Sets the FTP user name to <code>name</code> for security in using FTP, e.g., ftpuser user1. Anonymous FTP is not supported.</td>
</tr>
<tr>
<td><code>ftppassword password</code></td>
<td>Sets the FTP password to <code>password</code>, e.g., ftppassword gh5bug</td>
</tr>
</tbody>
</table>

See your network administrator if you need help deciding on proper values for the fields listed above. The hostname property can be a single name without domain information, such as ilon1. It does not need to be a fully qualified host name like ilon1.echelon.com.

d) Several of the commands entered above will not take effect until the i.LON 1000 is rebooted. Reboot the i.LON 1000 by typing **reboot** at the i.LON 1000 command prompt.

e) Once the i.LON 1000 reboots, type **show** at the i.LON 1000 command prompt to verify that the changes were accepted and that there are no typographical errors.

Type **help** at the i.LON 1000’s command prompt at any time for a list of available commands.
**Note:** This is a good time to test TCP/IP communication between the PC and the i.LON 1000 by pinging the i.LON 1000 from the PC, and by pinging the PC from the i.LON 1000.

Open the Windows Start menu, point to Programs, and choose the MS-DOS Prompt to open a DOS box. Type: `ping 10.1.0.170` From the i.LON 1000 console application type: `ping <PC’s IP address>`. See your TCP/IP network administrator for information on how to use the ping command.

3 Recall the examples described in Chapter 3 of the *Getting Started with the LONWORKS System Starter Kit*. The following steps show how to add an i.LON 1000 to the network that was created in that chapter.

a) Start the LonMaker tool and restore the final solution file from the *Getting Started with the LONWORKS System Starter Kit*. The file name is LonPoint PID.zip. Although the LonMaker tool will prompt you to re-commission all the devices in the drawing, it is not necessary to do so at this time.

b) Once the network and drawing are restored, open them by clicking the Open Network button. **When prompted, be sure to select “OnNet” for the LonMaker management mode.**

The LonMaker tool again will prompt you to recommission all the devices in the drawing, it is not necessary to do so at this time.

The LonMaker drawing should look like figure 2.3

---

**Figure 2.3** Sample LonMaker Drawing
c) Select the device shape (titled Device) from the LonMaker Basic Shapes stencil and drag it to the LonMaker drawing. Place the new device just to the right of the DIO shape. The LonMaker tool will ask for a device name to associate with the device shape you just dropped. Set the device name to “iLON1” and select the Commission Device checkbox. Click Next.

![New Device Wizard](image)

d) The next window asks you where the LonMaker tool should find information about the i.LON 1000 device. Because the i.LON 1000 adheres to the LONMARK guidelines, it is not necessary to maintain a separate external interface file (XIF) describing it. The LonMaker tool is able to upload the external interface definition directly from the i.LON 1000. Select Upload From Device. Click Next.

![New Device Wizard](image)
e) The LonMaker tool allows you to select which channel the i.LON 1000 will be connected to. Our example network has only a single channel, the TP/FT-10 channel (named Channel 1), which the LonMaker tool automatically selects for the i.LON 1000. Click Next to accept the selection.

f) LONWORKS devices can be assigned properties that may be useful in larger networks. For example, embedded network management devices such as Echelon’s DM-20 and DM-21 use location information to uniquely identify discovered devices. For the network in this example, it is not necessary to assign any properties to i.LON 1000. Click Next to move to the next window.
g) Click Next to use the service pin method of device identification. This is the easiest way to get an i.LON 1000 Neuron ID into the LonMaker tool if the LonMaker PC is actually attached to the LONWORKS network, like it is in this example.

h) It is not necessary to load the i.LON 1000’s application image because the i.LON 1000 comes preloaded from the factory. Leave the Load Application Image checkbox cleared, and click Next.
i) Specify Online as the initial state of the i.LON 1000, click Next.

![Image of the LON 1000 Internet Server Starter Kit]

j) The LonMaker prompts you to press the service pin on the i.LON 1000. Using a ballpoint pen or similar object, press the recessed button marked “Service” on the back of the i.LON 1000. This causes the i.LON 1000 to send a service pin message on the LONWORKS network. The LonMaker tool captures this message and commissions the i.LON 1000.

![Image of LonMaker for Windows]

Your LonMaker drawing should now look like figure 2.4

![Image of LonMaker Network Drawing]

**Figure 2.4** Sample LonMaker Network Drawing
The next step is to connect input and output network variables representing the points to display in your web page to the i.LON 1000. Recall the HMI application example in Chapter 3 of *Getting Started with the LONWORKS System Starter Kit*. In that example, an HMI application was created that monitored 4 points. These points were represented by the following:

- **SP** input network variable of the A0-1 PID controller;
- **CV** output network variable of the A0-1 PID controller;
- **Data_Out** from the A0-1 Switch to Mode translator (representing the building mode); and
- The temperature sensor's *Analog* output.

In order for the i.LON 1000 to monitor these values, you must connect the existing network variables in the drawing to the i.LON 1000. Do this by adding an i.LON 1000 functional block to the drawing. Once complete, your drawing will look similar to figure 2.5. Steps 4a – 4k provide exact instructions for placing the functional block.

![Figure 2.5 LonMaker Drawing Example with Functional Block](image-url)
a) Drag a Functional Block shape from the LonMaker Basic stencil to the LonMaker drawing. The LonMaker tool will prompt you with a dialog asking you to select a functional block from a particular device. Select the ilon device from the Device list. Select Virtual Functional Block from the Functional Block list. Click Next.

b) The LonMaker tool will now prompt you to name this functional block. Choose a descriptive name such as iLON WebNode. Click Finish.
Your LonMaker drawing now displays the functional block, but it has no network variables, and is not connected to anything. You must now add the network variables for the functional block. A powerful feature of using the LonMaker tools and *i.LON 1000* together is the ability to define the network variables dynamically. In this way, you can optimize the use of network variables on the *i.LON 1000* and select the exact network variable type for each of your connections.

c) Drag an Input Network Variable shape from the LonMaker Basic stencil and place it on the *i.LON 1000* functional block. The LonMaker tool will prompt you to select which network variable you want to place on the functional block; however, since no network variables have been defined, the selection list will be empty.
d) Click the Create NV button. This brings up a dialog that allows you to define the network variable you want to create. Enter \texttt{nviTempSensor} as the name, and click Browse. Be careful when typing the network variable name. This name must be exactly the same as the name referenced in the \textit{i.LON 1000} web page to be created later. Names are case sensitive.

![Create Network Variable dialog](image1.png)


e) The Select Object dialog allows you to navigate the LNS object hierarchy to the point you want to monitor. Navigate to A | AI-1 | Temperature Sensor | Analog and click OK.

![Select Object dialog](image2.png)
f) The string A/AI- 1/Temperature Sensor/Analog string will now be displayed in the Source Network Variable section of the Create Network Variable window.

![Create Network Variable dialog box](image)

![Network Variable selection dialog box](image)

g) Click **OK**. This instructs the LonMaker tool to create a network variable on the *i.LON 1000* that is a complement to the A/AI- 1/Temperature Sensor/Analog network variable. See the *LonMaker for Windows Integration Tool User's Guide* for more information on dynamic network variable creation and complement network variables.

h) Now that a network variable has been created, it is possible to select it as described in step 4c, above. Click **OK** to select the newly created network variable.
i) The LonMaker tool places that network variable on the functional block, providing a connection point.

![Diagram of LonMaker tool placing network variable](image)

```
lon1.LON1 iLon WebNode
```

j) Repeat the process outlined in steps 4c through 4i. Create two more input network variables and an output network variable on the functional block.

<table>
<thead>
<tr>
<th>Network Variable Name</th>
<th>Created as a compliment to</th>
</tr>
</thead>
<tbody>
<tr>
<td>nviBuildingMode</td>
<td>A</td>
</tr>
<tr>
<td>nviControlValue</td>
<td>A</td>
</tr>
<tr>
<td>nvoSetPoint</td>
<td>A</td>
</tr>
</tbody>
</table>

When finished, your functional block should look like this:

![Diagram of completed functional block](image)
k) Drag the Connector shape from the LonMaker Basic Shapes stencil onto the LonMaker drawing. Use this tool to connect the newly created network variables to other points in the system, as shown in figure 2.5

l) Right click the DIO hardware device shape. Select commission from the shortcut menu.

m) Right click the AI-1 hardware device shape. Select commission from the shortcut menu.

n) Right click the AO-1 hardware device shape. Select commission from the shortcut menu.

Save the LonMaker drawing and exit the LonMaker program.
Working with Web Pages

This chapter provides information on web pages. It includes information for creating, transferring, and viewing these pages.
Transferring Web Pages to the \textit{i.LON} 1000 using FTP

Following the steps in Chapters 1 and 2, you created a fully functional LONWORKS network. As network variables change, the \textit{i.LON} 1000 receives updates for each connection defined in step 4k above.

The next step is to create a web page that allows those network variable values to be viewed in a standard web browser.

a) The following three sample web pages display the network variables defined on the virtual functional block created in step 4: demo1page1.htm, demo1page2.htm and demo1page3.htm.

The pages are located in the iLON Starter Kit.Zip archive.

demo1Page1.htm is the simplest page. It is intended to display the values of the network variables using the minimum HTML possible.

demo1Page2.htm displays identical information, but places the network variables in an HTML table.

Finally, demo1Page3.htm uses JavaScript to reload the HTML page every second and presents an animated user interface with a slide bar to control the setpoint.

b) Recall the FTP user name and password you defined in step 2c. Using a standard FTP program such as CuteFTP (\url{http://www.cuteftp.com}), AbsoluteFTP (\url{http://www.vandyke.com}), or even the command line FTP client that ships with Windows, transfer demo1page1.htm and demo1page2.htm to the \textit{i.LON} 1000. Place the files in the /Web/forms directory. Note that \textit{i.LON} 1000 file and directory names are case sensitive.

\textit{See your TCP/IP system administrator for help using FTP if you are not familiar with transferring files in a TCP/IP network.}

Assuming that demo1Page1.htm and demo1Page2.htm are located at the root of C:\ your ftp log should look something like this:

```
C:\>ftp 10.1.0.170
Connected to 10.1.0.170.
220 VxWorks FTP server (VxWorks 5.3.1) ready.
User (10.1.0.170:(none)): user1
331 Password required
Password:
230 User logged in
ftp> cd Web
250 Changed directory to "/root/Web"
ftp> cd forms
250 Changed directory to "/root/Web/forms"
ftp> put demo1page1.htm
200 Port set okay
```
150 Opening BINARY mode data connection
226 Transfer complete
ftp: nnn bytes sent in 0.00Seconds nnn.00Kbytes/sec.
ftp> put demo1page2.htm
200 Port set okay
150 Opening BINARY mode data connection
226 Transfer complete
ftp: nnn bytes sent in 0.00Seconds nnn.00Kbytes/sec.
ftp> quit
221 Bye...see you later
C:\>

The i.LON 1000’s console application allows you to browse the i.LON 1000’s flash disk using the DIR and CD commands. Using the console application, verify that the files ended up where you expected.

**Viewing the Web Pages in a Browser**

To retrieve the pages with a web browser use http://10.1.0.170/forms/demo1page1.htm. Be sure to substitute your i.LON 1000’s IP address and to use the proper case; i.LON 1000 file names are case sensitive. Note that you do not need to include the “Web” directory in the URL. “Web” is implied because the browser makes an HTTP request.

The i.LON 1000’s directory structure is as follows:

```
  root
  + demo
  + lonworks
  + liconfig
  + snmp
  + Web
  + forms
```

All web pages must be in the Web directory named or in a Web subfolder. Any page that accesses network variables must be placed in the Web/forms directory. You may create other directories under Web to store graphics and other content. The i.LON 1000 has about 1MB of disk space available for your content.

The three web pages are illustrated below. See the i.LON 1000 Internet Server User’s Guide for specific information about the HTML syntax supported by the i.LON 1000.

*These pages have been tested with Microsoft’s Internet Explorer version 5.0 (US version) only. There are many subtle differences between Netscape and Microsoft web browsers that may prevent the pages (especially demo1page3.htm) from being properly displayed using the Netscape browser.*
This page shows how to create an HTML page that reads input network variable values, and allows you to set an output network variable value.

The idea here is to show the raw HTML necessary to transfer information, not create an attractive web page.

**Of Interest:** Select SOURCE from the VIEW menu. Compare the source displayed by the browser to demo1page1.htm. Notice the server side substitution that occurred when the page was served.

Although this page is not particularly complex, it is designed to present a user interface that looks similar to the interface you designed in chapter three of the *Getting Started with the LONWORKS System Starter Kit* document.

You will notice that the HTML code required to generate this page is substantially more complex than the code for the previous page, but the network variable access mechanism is essentially the same.
This page is designed to show a sample user interface that can be built using JavaScript. The four “controls” on this page are in reality not controls at all; they are graphic images that are manipulated in the browser using JavaScript. The same effect can be accomplished using Java applets or ActiveX controls. The advantage of using JavaScript is that the computing demand on the client is much lower and the download time for the page also is much lower, since only a small amount of text needs to be downloaded instead of an entire application.

To test this page, you will have to load 3 HTML files and several image files to the i.LON 1000. Use the same file transfer procedure described above to load demo1page3.htm, page3getvalues.htm, and page3main.htm to the Web/forms directory.

Create a new directory on the i.LON 1000 under the Web directory named images. Transfer ash_bottom.jpg, ash_left.jpg, ash_right.jpg, ash_top.jpg, hvac_anim.gif, hvac_bg.gif, hvac_off.gif, pid_bg.gif, pid_slider.gif, slider_bg.gif, slider_knob.gif, temp_bg.gif, and temp_slider.gif to the Web/images directory. Use the i.LON 1000's DIR command and console application to verify that the transferred files ended up where you wanted them.

In addition to the files that shipped with your i.LON 1000, the i.LON 1000 directory structure should contain the following files.

Web
   Echelonlogo.gif, index.htm

Web/forms
   demo1page1.htm, demo1page2.htm, demo1page3.htm,
   localConfig.htm, page3getvalues.htm, page3main.htm

Web/images
   ash_bottom.jpg, ash_left.jpg, ash_right.jpg, ash_top.jpg,
   hvac_anim.gif, hvac_bg.gif, hvac_off.gif, pid_bg.gif,
   pid_slider.gif, slider_bg.gif, slider_knob.gif, temp_bg.gif,
   temp_slider.gif
(Substitute your IP address)

This page resembles the type of user interface that is often created with an expensive HMI tool. The entire page was created using JavaScript, HTML, and graphics; however, the illusion of actual controls exists.

**Using JavaScript**

Visit your local bookstore for a text with more information on creative usage of JavaScript or visit the following web sites.

- http://www.wdvl.com/Authoring/JavaScript/
- http://www.atl.ualberta.ca/downes/java/move_object.htm
- http://www.dansteinman.com/dynduo/
- http://msdn.microsoft.com/scripting/
This chapter provides suggestions for resolving problems you may have encountered in the previous chapters.
Resolving Problems

To the newcomer, the LONWORKS system may appear to be just a device network. However, beyond the complete implementation of the ISO/OSI 7 layer networking model lies a very broad technology.

The LONWORKS system includes device networking, network management, development tools, a variation of the ANSI C programming language, power line communication, innovative twisted pair transceivers, a network operating system, a data model tailored for control, IP connectivity, a host of applications that translate, present, and provide access to the base information carried by the network, and much more.

The breadth of the technology requires that tools such as LonMaker for Windows and the i.LON 1000 Internet Server provide multiple options for getting things done. If you followed the steps in Chapters 2 and 3, but did not end up with the results you expected, you may have inadvertently mistyped. Follow the tips below:

1. Reset the i.LON 1000.

   a) This is accomplished using Hyperterminal by typing *factory* at the i.LON 1000’s command prompt.

   b) Reboot the i.LON by typing *reboot* at the i.LON 1000’s command prompt.

   c) When the reboot completes you will see that the i.LON 1000’s IP address, subnet mask, and other parameters, have been reset. The FTP user name has been reset to the factory default of “ilon” and the FTP password has been reset to the factory default of “ilon”. Any files that you may have transferred to the i.LON 1000 are still intact. Verify that the i.LON 1000 has been reset to factory defaults by typing *show* at the i.LON 1000’s command prompt.

   iLON> show

   Software Version: 1.00.00
   IP Address: 0.0.0.0
   Subnet Mask: 0.0.0.0
   Host Name: iLON
   Gateway: 0.0.0.0
   DHCP: off
   MAC ID: 00-D0-71-00-00-26
   LonTalk Unique IDs: 80:00:00:00:12:60 through 80:00:00:00:12:6F
   LonTalk Xcvr ID: TP/FT-10
   LonTalk IP Port: 1628
   Config Server: 0.0.0.0 (1628)
   Authentication: off
   SNTP Servers: 0.0.0.0 (123); 0.0.0.0 (123)
   SNTP Synchronized: no

   This is the first potential trouble spot. If the i.LON 1000’s TCP/IP parameters are not set properly, it will not be possible for your
browser to connect to the i.LON 1000 to display web pages. Get help from your TCP/IP system administrator. The administrator is an expert on TCP/IP and knows how your TCP/IP network performs. The administrator also will know which values to use for IP address, subnet mask, etcetera. It is a common mistake to supply the wrong values. Remember that the values shown in Chapter 2 are to illustrate syntax only. Your network will require different values.

d) Reset the i.LON 1000’s IP address, subnet mask, FTP user name and password, and the default gateway by typing the following commands at the i.LON 1000’s console prompt. Your TCP/IP network administrator will know the proper values to use with each command.

   ipaddress n.n.n.n
   subnetmask n.n.n.n
   gateway n.n.n.n
   ftpuser user1
   ftppassword gh5bug

e) Verify that you can ping the i.LON 1000 from your PC, and that you can ping the PC from the i.LON 1000’s console prompt. Again, your TCP/IP network administrator can help you do this.

2 Work from the solution network. This network represents the state of your project through step 4k in Chapter 2. The devices, functional blocks, network variables, and connections are all properly defined in this network.

a) Start the LonMaker tool and restore the backup file named Web solution.zip. Although the LonMaker tool will prompt you to re-commission all the devices in the drawing, it is not necessary to do so at this time.
b) Open the network you just restored by clicking the Open Network button. Click through the LonMaker startup wizard. When prompted, be sure to select your network interface (PCC1 or PCLTA1) and set the network management mode to OnNet. Once open, the drawing should look like figure 4.1.

![Figure 4.1 Restored LonMaker Drawing](image)

Note that the i.LON 1000, the i.LON 1000's functional block, and all connections are already made. You will notice red diagonal lines across each of your devices. The network interface should appear green. The red diagonal lines indicate that the devices exist logically in the drawing, but the LonMaker tool was not able to communicate with the specific Neuron IDs associated with each device. Because the network was not resynchronized, this is normal.

c) Replace each of the devices with red diagonal lines by right-clicking on each device and choosing Replace from the shortcut menu. Choose the service pin method of replacement. When prompted, be sure that you place each device Online.

The replace process causes the LonMaker tool to associate a new Neuron ID (the one supplied by the device when you pressed the service pin) with each device shape on the drawing. Each of the devices is re-commissioned during the replace process, and the LonMaker tool is now able to communicate with the devices. This is indicated on the drawing by the red diagonal lines being replaced with a green fill.
d) Exit the LonMaker tool. When prompted, select Yes to save your changes.

3 Ask your TCP/IP system administrator to help you verify that the files you transferred via FTP to the i.LON 1000 were transferred, and are now located in the correct directories. Remember that resetting the i.LON 1000 back-to-factory defaults did not delete any files that you may have already transferred to the i.LON 1000.

It is helpful to use the Web Solution.zip solution network and to work with your TCP/IP system administrator to avoid possible TCP/IP errors.