i^3 Intelligent Control Station

Ethernet – FTP and HTTP Tutorial

IMO
The World's Finest

Think inside the box

PREFACE

This tutorial explains how to use the Ethernet, FTP and HTTP functions of the i^3C and i^3H Controllers.

WARRANTY AND LIMITATION OF LIABILITY

IMO Precision Controls Ltd. warrants to the original purchaser that the i^3 module is free from defects in material and workmanship under normal use and service. The obligation of IMO under this warranty shall be limited to the repair or exchange of any part or parts which may prove defective under normal use and service within three (3) years from the date of purchase, such defect to be disclosed to the satisfaction of IMO after examination by IMO of the allegedly defective part or parts. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES AND IMO NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IMO, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS i^3 module. THIS WARRANTY SHALL NOT APPLY TO THIS i^3 module OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. IMO MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY IMO. THE TERM "ORIGINAL PURCHASER", AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON FOR WHOM THE i^3 module IS ORIGINALLY INSTALLED. In no event, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, shall or its suppliers be liable of any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, down time costs, or claims of original purchaser's customers for such damages.

To obtain warranty service, return the product to your distributor with a description of the problem, proof of purchase, post paid, insured and in a suitable package.

ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, IMO Precision Controls Ltd. cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilizing the i^3 module to appropriately design the end system, to appropriately integrate the i^3 module and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

Note: All programming examples shown in this manual or in tutorials are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

CHAPTER 1: SAFETY / COMPLIANCE

1.1 Safety Warnings and Guidelines

When found on the product, the following symbols specify:

a. All applicable codes and standards need to be followed in the installation of this product.
b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

Adhere to the following safety precautions whenever any type of connection is made to the module.

a. Connect the green safety (earth) ground first before making any other connections.
b. When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
c. Make connections to the module first; then connect to the circuit to be monitored.
d. Route power wires in a safe manner in accordance with good practice and local codes.
e. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
f. Ensure hands, shoes, and floor is dry before making any connection to a power line.
g. Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
h. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

1.2 Grounding

Grounding is covered in various chapters within this manual.

1.3 CE Compliance

To check for compliance and updates, visit our website at: www.imopc.com

⚠	**Warning:** Consult user documentation.	⚡	**Warning:** Electrical Shock Hazard.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

NOTES

CHAPTER 2: INTRODUCTION

The training module will introduce the FTP and Web hosting capabilities of the i^3 product family. The user will be instructed in setting up the FTP server and Web server sections of the i^3 firmware.

The tutorial applies to the i^3C controller with embedded Ethernet (models with '**SEHF**' in the last four letters of the part name) and all models of the i^3**H**. It does not apply to i^3 models with an additional Ethernet card (the **i3-E**), unfortunately this unit does not support web server functionality.

The training does not aim to give instruction in web page creation.

CHAPTER 3: ETHERNET – FTP SERVER

3.1 FTP Technicalities

File Transfer Protocol (FTP) is a standard Client/Server Internet protocol, based on RFC959, which supports efficient and reliable file transfers over a TCP/IP network. In this context, the Ethernet Module acts as an FTP Server, that will respond to file transfer requests from one or more FTP Clients.

To enable and configure the FTP support for an i^3 select the Ethernet Module Configuration and then tick the FTP (File Server) box. With the box still selected click the 'Configure Selected Protocol' button to configure FTP access.
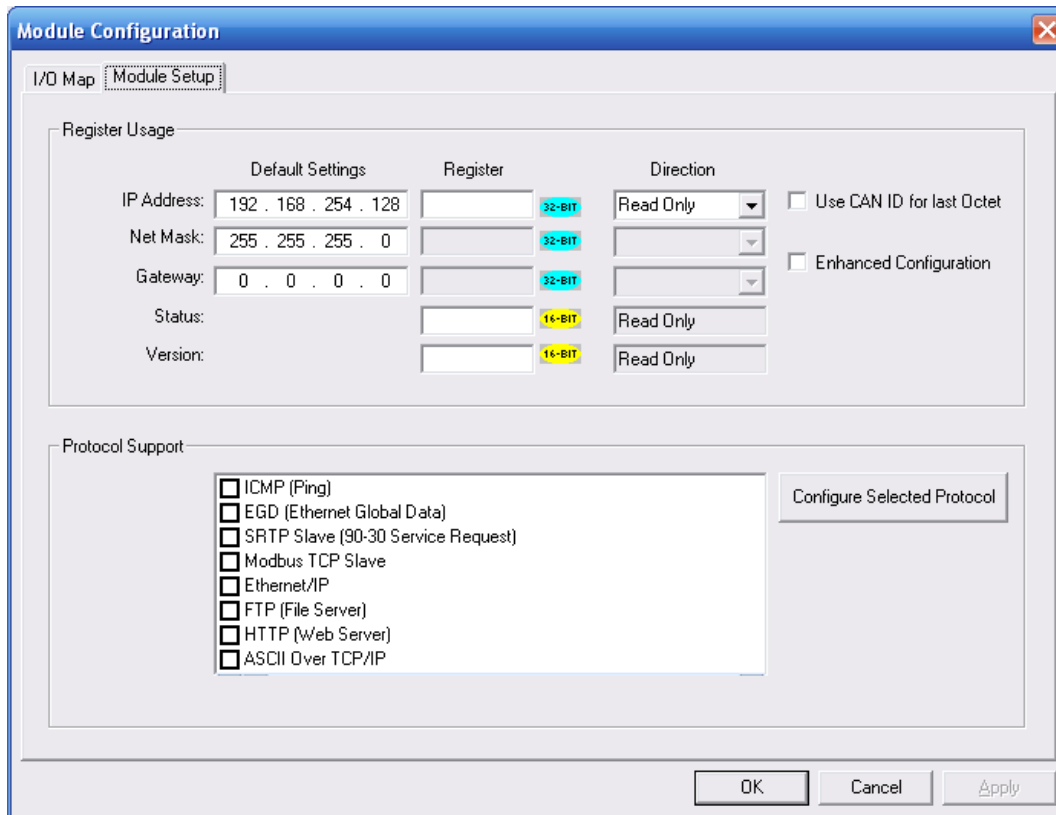
3.2 Configuring FTP Access

The Ethernet Module's FTP Server supports both anonymous and authenticated file transfers between an FTP Client and the i^3 file system. Authenticated file transfers require that the FTP Client provide one of two possible User Name and Password pairs, before the i^3 file system can be accessed.

Properly authenticated, an FTP Client can access i^3 file system functions, which include file read, file create, file delete, file rename, file write, directory read, directory create and directory delete.

- During FTP configuration the user can optionally set up two supported FTP Accounts as **User 1** and/or **User 2** as follows:

    – **User Name:** Enter an alphanumeric string (up to 40 characters) for the FTP Client's User Name.

    – **Password:** Enter an alphanumeric string (up to 40 characters) for the FTP Client's Password.

    – **Read Only:** Select this option to give the FTP Client read-only access to the i^3 file system.

    – **Read / Write:** Select this option to give the FTP Client read-write access to the i^3 file system.

- User Names and Passwords are case-sensitive and, by default, are empty for both User 1 and User 2. In this case, *anonymous* FTP Clients can access i^3 files, but file access will be read-only. In a typical application, both User 1 and User 2 will be configured - one with read-only access and the other with read-write access.

- When using FTP to exchange files with an i^3, the user should know that the i^3 file system implements an "8.3" filename format, which means file and directory names consist of up to 8 characters, followed by an optional dot, and an optional extension with up to 3 characters.
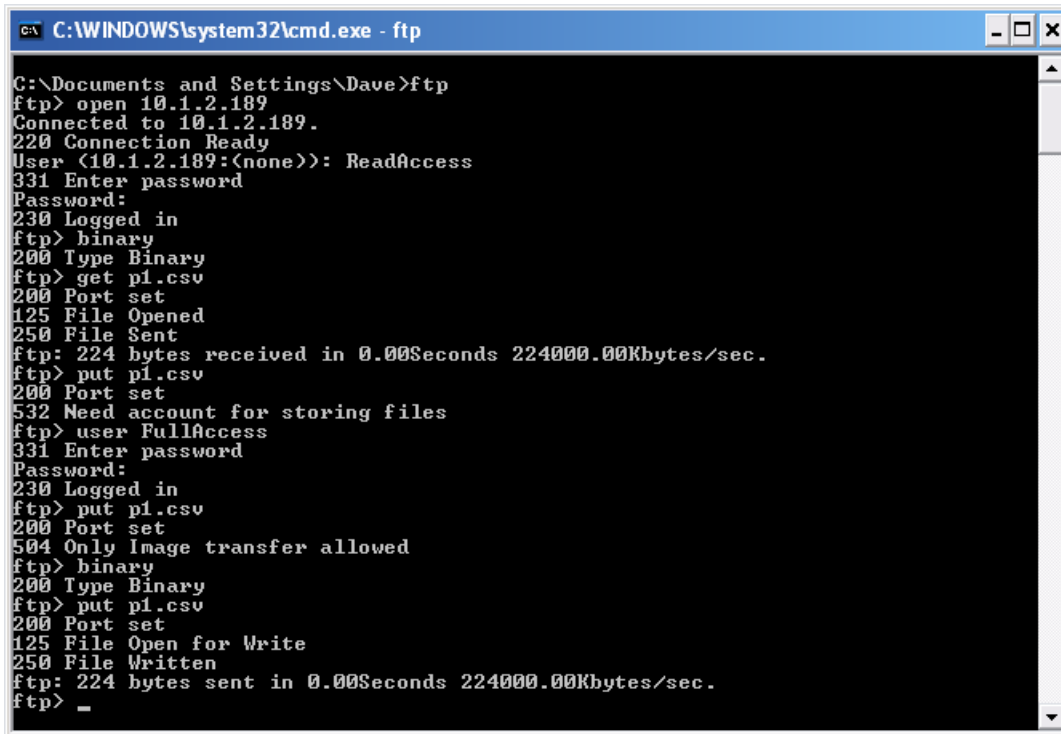
Try setting the following FTP configuration:

3.3 Sample FTP Session

With the above configuration loaded to the *i³* and removable media fitted to the unit, run the standard FTP package supplied with windows from a command prompt.

```
C:\Documents and Settings\Dave>ftp
ftp> open 10.1.2.189
Connected to 10.1.2.189.
220 Connection Ready
User (10.1.2.189:(none)): ReadAccess
331 Enter password
Password:
230 Logged in
ftp> binary
200 Type Binary
ftp> get p1.csv
200 Port set
125 File Opened
250 File Sent
ftp: 224 bytes received in 0.00Seconds 224000.00Kbytes/sec.
ftp> put p1.csv
200 Port set
532 Need account for storing files
ftp> user FullAccess
331 Enter password
Password:
230 Logged in
ftp> put p1.csv
200 Port set
504 Only Image transfer allowed
ftp> binary
200 Type Binary
ftp> put p1.csv
200 Port set
125 File Open for Write
250 File Written
ftp: 224 bytes sent in 0.00Seconds 224000.00Kbytes/sec.
ftp> _
```

3.4 Using Microsoft Explorer as FTP client.
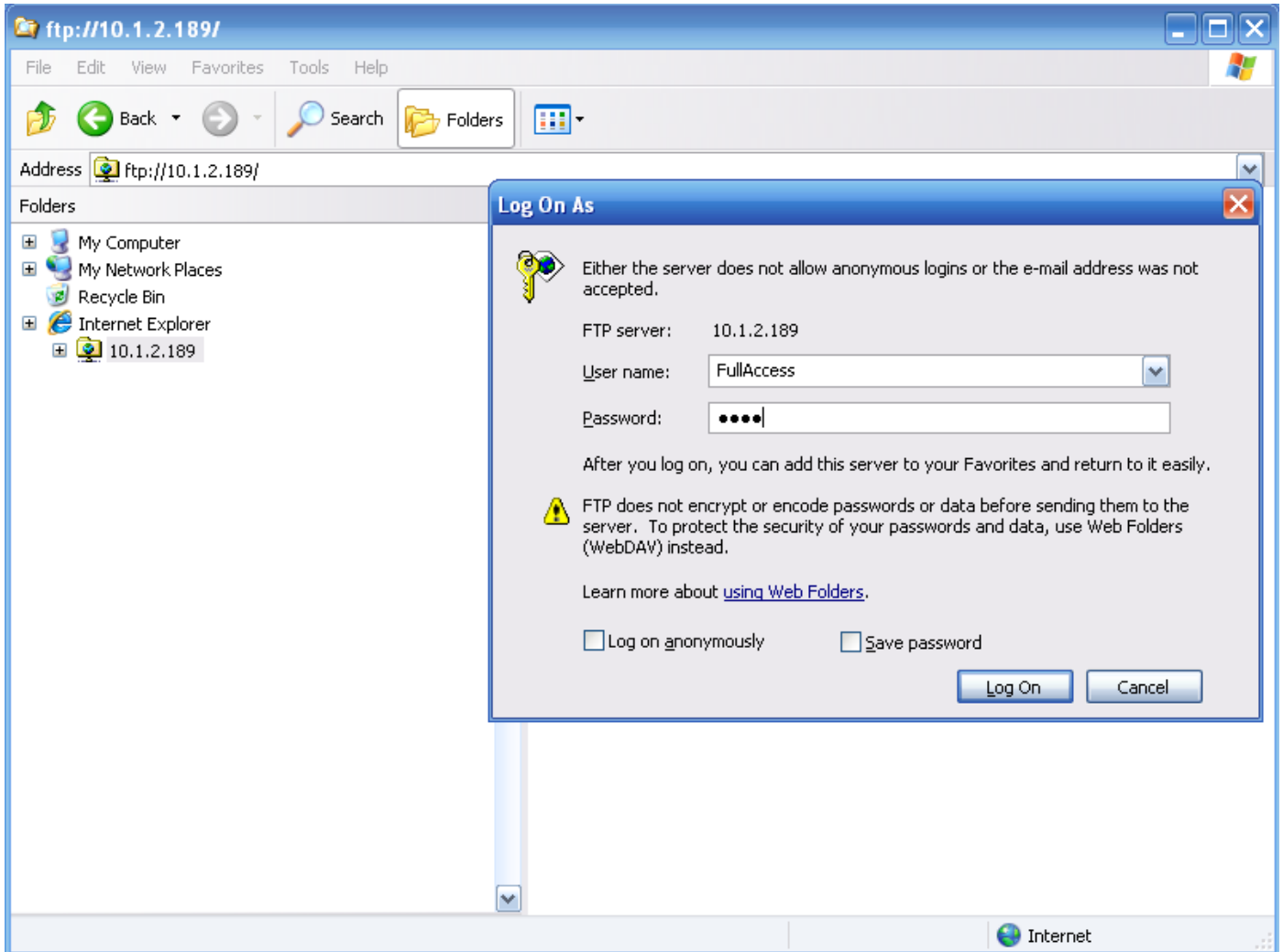
Microsoft Explorer can also be used as an FTP client as above – but beware! Previous versions of Explorer have not always adhered strictly to the FTP and standard and not all functions worked.

3.5 File Conflicts

The i^3 file system allows multiple concurrent file accessing. For example, an FTP Client can read a file at the same time as the i^3 ladder program is logging data to it. If there is a file access conflict, such as an FTP Client attempting to delete a file that is currently being read or written by ladder, the file delete request is denied and an error response is sent to the FTP Client.

CHAPTER 4: ETHERNET – WEB SERVER

4.1 A Simple Web Page

- Simply select the HTTP tick box to enable the web server functionality.

- The Web server can be password protected to avoid unauthorised access (user name and password can be up to 40 characters long)
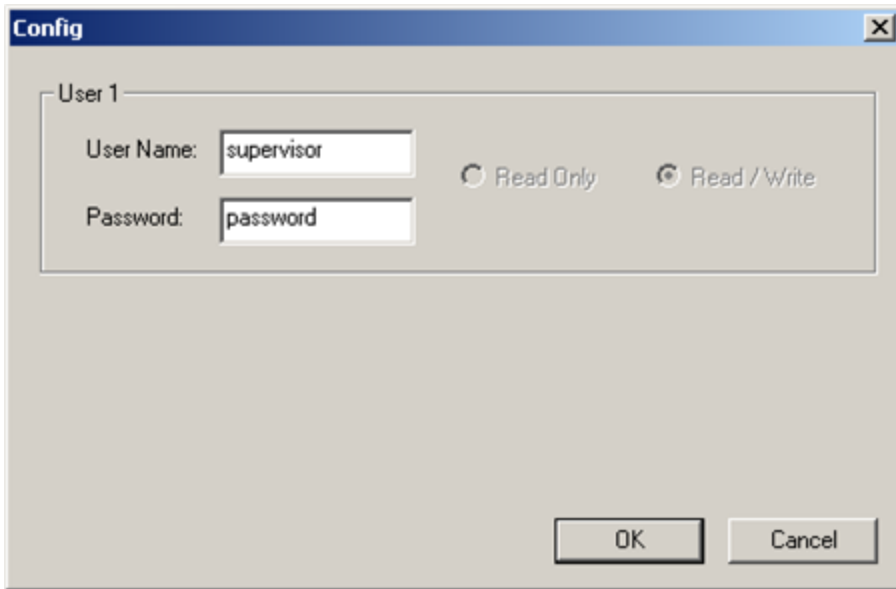
- The web server retrieves files stored on removable media and sends them to the client.
- The user has the possibility of displaying register values from html pages as well as sending values to the i^3.
- Files are stored on the removable media in 8.3 file format.
- There is no default page access. The client has to specify a full url (e.g. 192.168.254.128/index.htm)
- Custom HTML files are created to suit the application. These files can be created with a simple text editor or with a 3rd party HTML Editor.
- Within the static HTML file, <iframe> and <form> tags respectively read and write i^3 Register data, by referencing two specially named dynamic HTML files (**readreg.htm** and **writereg.htm**).

4.2 A Simple Web Page

Create a file 'Index.Html' with the following contents:
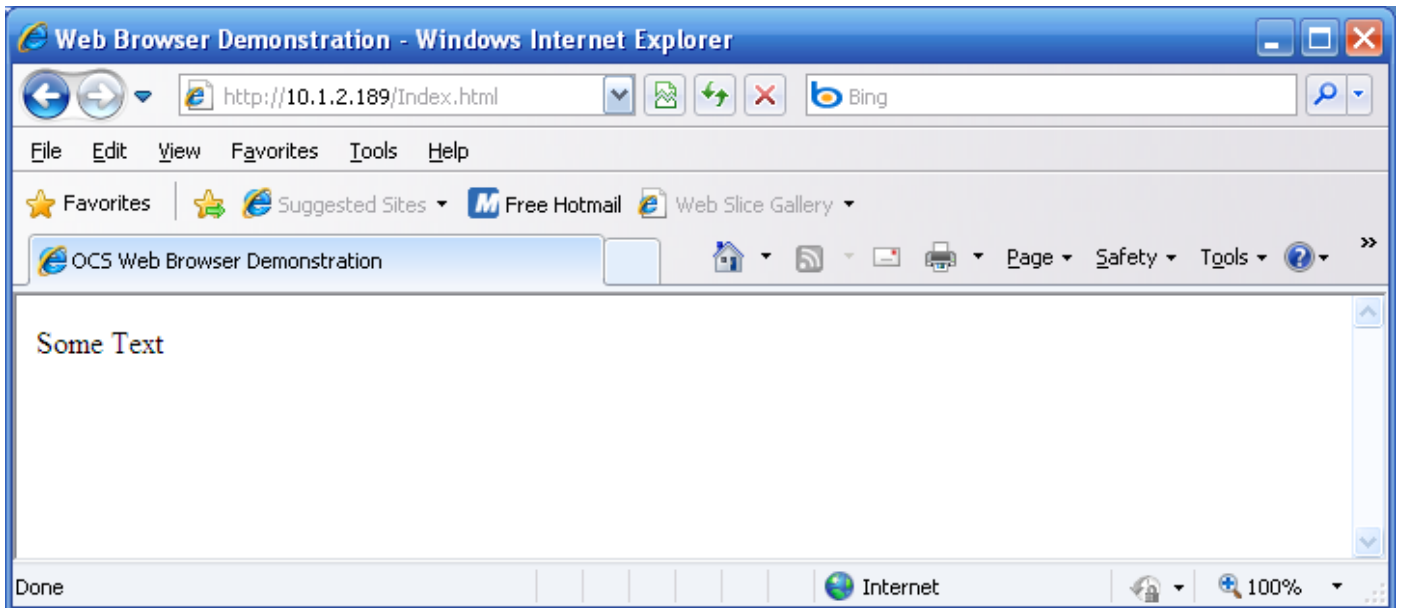
```
<HTML>
<HEAD>
<TITLE> Web Browser Demonstration</TITLE>
</HEAD>
<BODY>
<COMMENT> Test File </COMMENT>

Some Text

</BODY>
</HTML>
```

And transfer this to the root directory of the Removable media card on the target i^3. (Perhaps using FTP)

Once the file is there use start Internet explorer and select URL 'http://10.1.2.189/Index.html' to view the page.

4.3 Embedding Live *i³* Data within an HTML Page

• The read register operation is performed within an IFRAME tag.

```
<iframe src="readreg.htm;reg-R11;fmt-UINT;rfs-2">
</iframe>
```

– Reads R11 in UINT format and refreshes the value every 2 seconds.

• The formats available are:

– BOOL, BOOL-<on text>-<off text>, BIN, HEX, INT, UINT, DINT, UDINT, REAL, REAL-E, ASCII-<num characters> and IPADR

Modify the Index.Html to contain the following

```
<HTML>
<HEAD>
<TITLE> Web Browser Demonstration</TITLE>
</HEAD>
<BODY>
<COMMENT> Test File </COMMENT>
<p>Some Text</p>
<p> R1 = <iframe src="readreg.htm;reg-R1;fmt-UINT;rfs-2" height="30" width="50"
        marginwidth="0" marginheight="0" align="middle"></iframe> </p>
<p> R11 = <iframe src="readreg.htm;reg-R11;fmt-UINT;rfs-2" height="30" width="50"
        marginwidth="0" marginheight="0" align="middle"></iframe></p>
</BODY>
</HTML>
```

Transfer the updated file to the removable media.

Refresh your internet browser to see the live values on screen.

• The refresh rate may be from 0 to the limits set by the browser. If this parameter is omitted the page has to be refreshed manually.

• When using an **Internet Explorer** browser to view *i³* web pages that employ the rfs parameter, the browser plays the currently configured **Start Navigation** sound (a short "tick" by default) for each refresh. To disable the "ticking", (1) open the **Windows Control Panel**, (2) click the **Sounds** or **Sound and Audio Devices** icon or link and (3) turn off the **Start Navigation** sound by selecting **(None)** for it in the drop-down list.

4.4 Updating i^3 Register Data from an HTML Page

The write register operation is performed within a FORM tag.

-     `<form action="writereg.htm;reg-R6;fmt-UINT" method="post">`
  `<input type="text" name="value" value="0" />`
  `<input type="submit" value="Send" />`
  `</form>`

-     This will write a value into %R6 when the Send button is pressed.

Important: The i^3 HTTP Server requires the name="value" attributes to appear exactly as shown.

Modify the Index.Html to contain the following

```
<HTML>
<HEAD>
<TITLE> Web Browser Demonstration</TITLE>
</HEAD>
<BODY>
<COMMENT> Test File </COMMENT>
<p>Some Text</p>
<p>R1 = <iframe src="readreg.htm;reg-R1;fmt-UINT;rfs-2" height="30" width="50"
        marginwidth="0" marginheight="0" align="middle"></iframe> </p>
<p>R11 = <iframe src="readreg.htm;reg-R11;fmt-UINT;rfs-2" height="30" width="50"
        marginwidth="0" marginheight="0" align="middle"></iframe></p>
<p><form action="writereg.htm;reg-R6;fmt-UINT" method="post">
<input type="text" name="value" value="0" />
<input type="submit" value="Send" />
</form></p>

</BODY>
</HTML>
```

4.5 Other Data Formats.

As well as UINT the following data types are supported in Fmt field:

```
fmt–BOOL
fmt–BOOL–ON–OFF
fmt–BOOL–YES–NO
fmt–BIN
fmt–HEX
fmt–INT
fmt–UINT
fmt–DINT
fmt–UDINT
fmt–REAL
fmt–REAL–E
fmt–ASCII–10
fmt–IPADR
```

Investigate use of some of these formats with the Embedded Data Read and Write items.

Remember previously we loaded the Unit's IP Address in to a Register pair in the i^3 as part of the Ethernet configuration – try displaying this as part of the Web page using the fmt-IPADR format.

4.6 Java Applets

Java Applets may be embedded on an i^3 page to give a more integrated feel to the embedded web pages.

Collect the Java applets together and store them in the same directory of the removable media card as the HTML page which 'ties them all together'

Note that the filing system on the i^3 only supports 12 character file names – typically java applets will be renamed in 6.5 form where the file extension is ".class"