

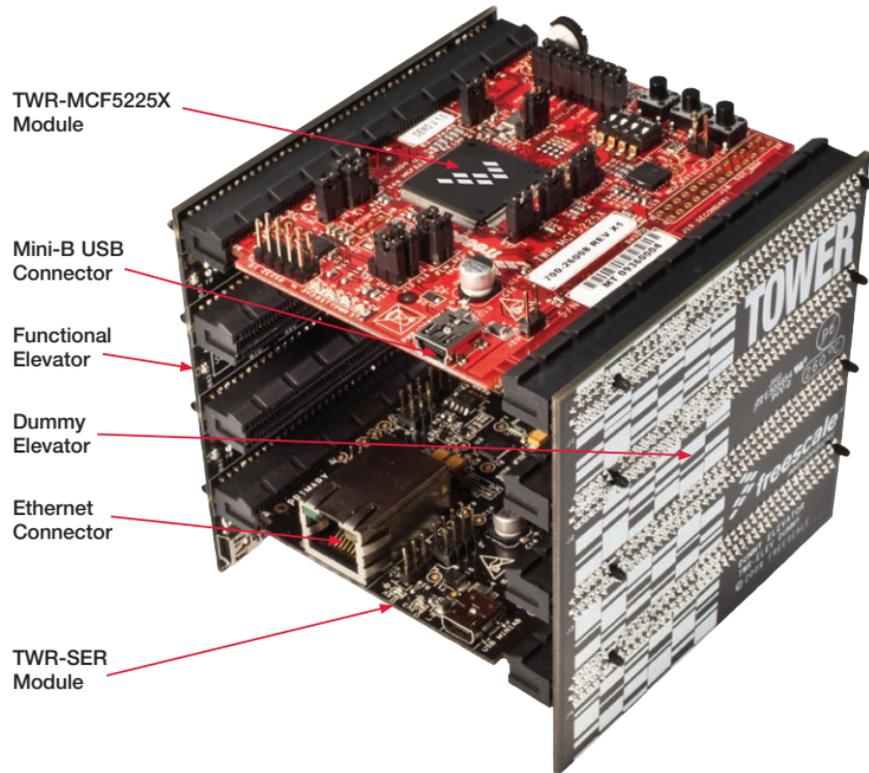


**MCF5225X**

Connectivity Labs 2, 3 and 4



## About the Tower System



TWR-MCF5225X Module

Mini-B USB Connector

Functional Elevator

Dummy Elevator

Ethernet Connector

TWR-SER Module

## Get to know the TWR-MCF5225X



Primary Connector

RS232 Port

MCF5225X

OSBDM Mini-B USB Connector

Secondary Connector

Potentiometer

LED1-LED4

SW1

SW3

SW4/Reset

Accelerometer



### TWR-MCF5225X-KIT Freescale Tower System

The TWR-MCF5225X module is part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Take your design to the next level and begin constructing your Tower System today.

Figure 1: Tower System

# MCF5225X—Lab Tutorials 2, 3 and 4 (sheet 2 of 3)

**LAB 2**

## USB Functionality, Freescale MQX USB and MFS

This lab will guide you through the use of the USB stack, the MFS file system and the logging of data to the memory stick.

### Demonstrates

- USB host functionality with mass storage class support
- USB drive read and write access by using the MFS file system component

Note: The USB labs in this document require a USB memory stick and USB A to Mini-B converter, which are not included.

### Step by Step Instructions

1. Stop the application in CodeWarrior™ if it is currently running (**Debug>Kill**)
2. Open **hvac.h** in CodeWarrior

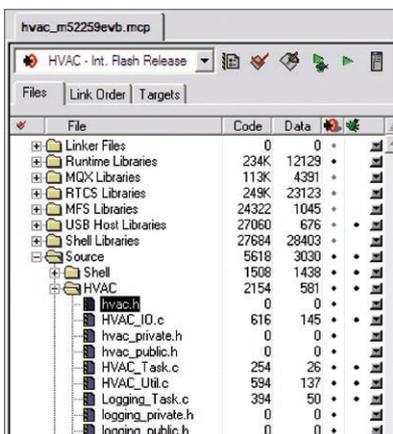


Figure 1: MQX Source Tree

3. Enable the USB support by changing:
 

```
#define DEMOCFG_ENABLE_USB_FILESYSTEM 0
```

 to:
 

```
#define DEMOCFG_ENABLE_USB_FILESYSTEM 1
```
4. Recompile the code, download, and run the application as was done in steps 8 to 15 of Lab 1.
5. Load the files located in **C:\Program Files\Freescale\MQX3.4\demo\web\_hvac\usb\_webpages** on to a USB memory stick.

Then insert the USB memory stick into the USB connector on the **TWR-SER** board. You will need the mini USB-B adaptor plug. See Figure 2 on the next page.

6. On the hyperterminal console you should see text that indicates that the USB memory stick was found, the type of memory stick that was found, the USB mass storage device was opened, the partition manager was installed, and that the file system was installed and opened. It may take several seconds to fully install the memory stick. It will look like Figure 3.

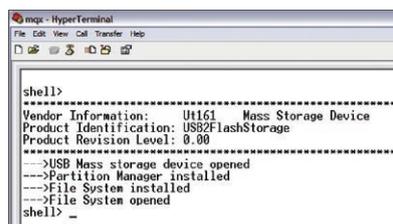


Figure 3: Inserting a USB mass storage device

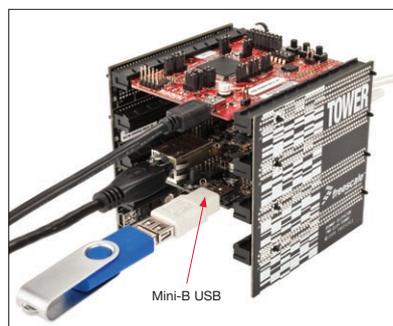


Figure 2: Plugging in the USB stick

7. Press return on the PC to get the **shell>** prompt.
8. Type **help** to see the list of commands. You should see additional commands available as seen in Figure 4. You can use the commands to exercise the memory stick attached.
9. Type **dir** to see the memory stick directory listing.
10. The logging information is now being sent to the memory stick in file **hvac\_log.txt** instead of being printed to the serial port. You should see this file in the directory listing. Note the file size of **hvac\_log.txt**.
11. Press SW1 and SW3 a few times each to change the desired temperature.
12. Type **dir** again in the shell and note the file size of **hvac\_log.txt**. It should be bigger than

before indicating that the changed parameters are being logged to the memory stick.

13. Use the **type** command to display the contents of the log file located on the memory stick (**type hvac\_log.txt**). It will look like Figure 5.

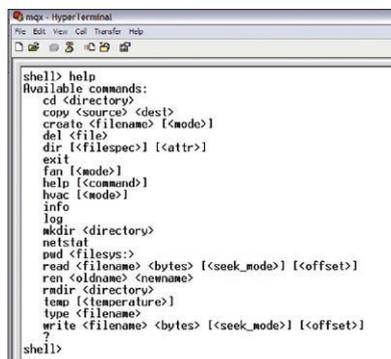


Figure 4: Shell commands with USB functionality enabled

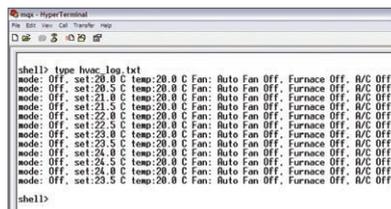


Figure 5: HVAC log file contents

14. Delete the log file using the **del** command (**del hvac\_log.txt**). Once again view the directory listing to verify that the file has been removed.
15. Within 15 seconds (or after SW1/SW3 key press) you should see that the log file has been recreated. Use the **type** command on the log file (**type hvac\_log.txt**) to see the latest entry.

**LAB 3**

## Telnet and FTP Operation, Freescale MQX RTCS

This lab will introduce you to the use of Telnet and FTP to access a product remotely via Ethernet and TCP/IP protocols.

### Demonstrates

- MQX RTCS TCP/IP network stack
- Telnet server functionality
- FTP server functionality

### Step by Step Instructions

1. Stop the application if it is currently running (**Debug>Kill**).
2. Connect an Ethernet cable between the TWR-SER board and an Ethernet port on your computer.
3. The default IP address of the board is 169.254.3.3. Typically, when you connect your computer directly to the board, the computer will default to an auto IP address on the same subnet as the board (169.254.x.x), therefore requiring no setup. Note: The PC may take a few minutes to default to the auto IP address and make the connection.

However, if you have trouble connecting, you may configure the IP address of the computer manually. Select **Start > Settings > Network Connections > Local Area Connection**. Note your original TCP/IP settings, and then set your IP address to 169.254.3.4 and your subnet mask to 255.255.0.0.

4. Open the **HVAC.h** file in the CodeWarrior window. Double-click the file item located in the "Source/HVAC" group in the CodeWarrior project tree.
5. Locate the line of code starting with **#define ENET\_IPADDR** and specify your target IP address by using the **IPADDR** macro. Use the IP address 169.254.3.3 if it has not already been set:

```
#define ENET_IPADDR IPADDR(169,254,3,3)
```

6. Do the same with the IP address mask value **ENET\_IPMASK**:

```
#define ENET_IPMASK IPADDR(255,255,0,0)
```

7. In the same **HVAC.h** file, enable RTCS and Telnet servers by changing this:

```
#define DEMOCFG_ENABLE_RTCS 0
```

```
#define DEMOCFG_ENABLE_FTP_SERVER 0
```

```
#define DEMOCFG_ENABLE_TELNET_SERVER 0
```

to this:

```
#define DEMOCFG_ENABLE_RTCS 1
```

```
#define DEMOCFG_ENABLE_FTP_SERVER 0
```

```
#define DEMOCFG_ENABLE_TELNET_SERVER 1
```

8. Recompile the code, download and run the application as was done in steps 8 to 15 of Lab 1. Then plug in the USB stick as done in Lab 2.

9. Open a command prompt on the PC (**Start > Programs > Accessories > Command Prompt**)

10. At the prompt invoke a telnet session to the board by typing **telnet 169.254.3.3** you will be connected to the MQX shell via telnet.



Figure 1: Connect to telnet

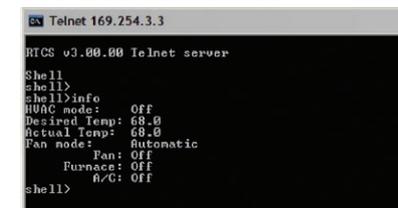


Figure 2: Using shell commands over telnet

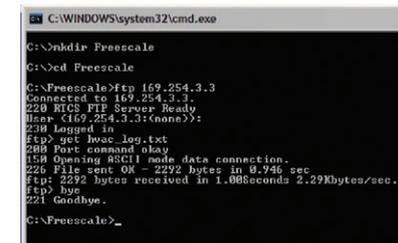


Figure 3: Communicating with FTP

11. The telnet shell has its own command set, which is similar to the terminal shell commands as in the previous labs. Try the **help** and **info** commands.

12. Try the **log** command to print content of the **hvac\_log.txt** file to the telnet console.

13. In the same **HVAC.h** file, disable Telnet and enable the FTP server by changing this:

```
#define DEMOCFG_ENABLE_RTCS 1
```

```
#define DEMOCFG_ENABLE_FTP_SERVER 0
```

```
#define DEMOCFG_ENABLE_TELNET_SERVER 1
```

to this:

```
#define DEMOCFG_ENABLE_RTCS 1
```

```
#define DEMOCFG_ENABLE_FTP_SERVER 1
```

```
#define DEMOCFG_ENABLE_TELNET_SERVER 0
```

14. Recompile the code, download, and run the application as was done in steps 8 to 15 of Lab 1.

15. Open a second command prompt (**Start > All Programs > Accessories > Command Prompt**) and change the working directory for the prompt to the **c:\Freescale** folder (type "**cd .**", "**cd \**", "**mkdir Freescale**" and

"**cd Freescale**" commands). See Figure 3 below for an example.

16. Start the ftp session by typing the following in the Windows command prompt:
 

```
>ftp 169.254.3.3
```

For the user name, press Enter to leave it blank.

User (169.254.3.3(none)):

17. Get the USB memory stick directory listing in the ftp session by the **ls** command.

18. Use **get hvac\_log.txt** command in the ftp session to retrieve the log file. The file will be copied to the local working directory **c:\Freescale**. Open the local file with notepad to verify that the file was copied properly.

**LAB 4**

## Web-Enabled HVAC System, Freescale MQX RTCS

This lab extends the HVAC application described in Labs 1–3 and adds Web server functionality. The dynamic Web pages serve as a graphical user's interface to the HVAC application.

### Demonstrates

- MQX RTCS TCP/IP network stack
- HTTP server functionality

### Step by Step Instructions

1. Make the following connections from the Tower System to the computer.
  - a. USB debugger connection (J17 on the TWR-MCF5225X module) to a USB port on PC
  - b. Serial port on the **TWR-SER** module to a serial port on PC (serial cable not included)
  - c. An Ethernet cable between the **TWR-SER** module and Ethernet port on your computer
2. The first time you connect the USB debugger cable to your PC, Windows will install a driver for the debugger. Follow the prompts to automatically detect and install the driver.
3. Open the lab project by selecting the **File > Open** menu item: **C:\Program Files\Freescale\MQX3.4\demo\web\_hvac\codewarrior\web\_hvac\_twrvcf52259.mcp**

continued from reverse side...

- The default IP address of the board is 169.254.3.3. Typically, when you connect your computer directly to the board, the computer will default to an auto IP address on the same subnet as the board (169.254.x.x), therefore requiring no setup. Note: The PC may take a few minutes to default to the auto IP address and make the connection.

However, if you have trouble connecting, you may configure the IP address of the computer manually. Select Start > Settings > Network Connections > Local Area Connection. Note your original TCP/IP settings, and then set your IP address to 169.254.3.4 and your subnet mask to 255.255.0.0.

- Open the HVAC.h file in the CodeWarrior window. Double-click the file item located in the "Source/HVAC" group in the CodeWarrior project tree.
- Locate the line of code starting with `#define ENET_IPADDR` and specify your target IP address by using the IPADDR macro. Set the target address to 169.254.3.3, and the line will be:

```
#define ENET_IPADDR IPADDR(169,254,3,3)
```

- Do the same with the IP address mask value ENET\_IPMASK:

```
#define ENET_IPMASK IPADDR(255,255,0,0)
```

- Compile, download and run the application and open a hyperterminal window as was done in steps 8 to 15 of Lab 1.
- Start your Internet browser and navigate to the target device address. In this case, 169.254.3.3.
- You should see the Web server welcome page in the browser window.

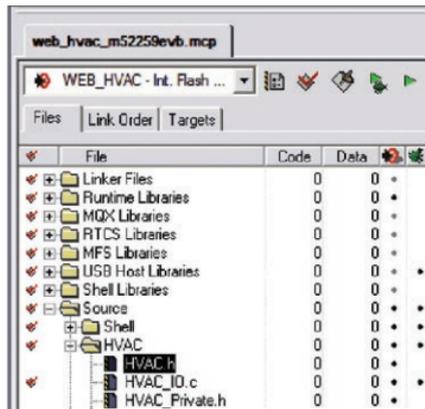


Figure 1: MQX source tree

- Navigate to the HVAC control page by moving your mouse over the HVAC demo link on the left hand side, and selecting the "Change Settings" link. You can change the

HVAC settings via that Web page. Figure 3 demonstrates how that page will look.

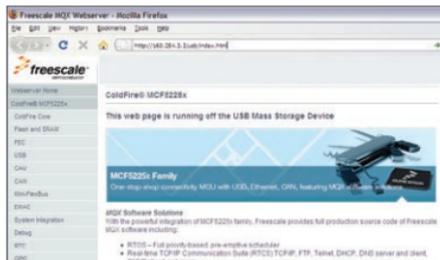


Figure 2: Web demo pages running from the USB memory stick

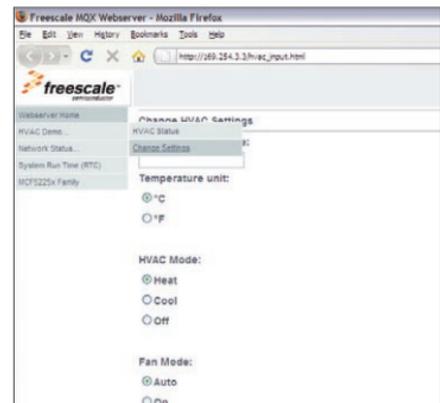


Figure 3: Change HVAC setting via Web site

- Similarly as in Labs 1–3, you can control the HVAC application by SW1 and SW3 push buttons. You should see the desired temperature changed on HVAC status Web page.
- Return to the Web server's home page, by clicking the "Web server Home" link.
- Load the files located in `C:\Program Files\FreescaleMQX3.4\demo\web_hvac\usb_webpages` on to a USB memory stick. Insert the USB Memory Stick into the USB connector on the TWR-SER module. You will need a mini USB-B adaptor plug.
- Reload the Web server home page by pressing F5 in the browser window. You should now see the "Browse USB Mass Storage Device" link on the left hand side as shown here.
- Click the "Browse USB Mass Storage Device" link. You should see the Web pages shown in Figure 2, that are located on the USB memory stick.

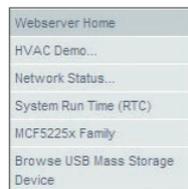


Figure 4.

**Learn More:** For more information about MQX and Freescale solutions, please visit [www.freescale.com/mqx](http://www.freescale.com/mqx) and [www.freescale.com/tower](http://www.freescale.com/tower).

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