

PowerPC[®] 750FX Evaluation Kit Quick Setup for Windows

Introduction

The complete instructions for setting up the PowerPC 750FX Evaluation Kit are provided in the *PowerPC 750FX Evaluation Board User's Manual* which can be found on the 750FX Evaluation Kit CD. This document provides a summary of those instructions as well as directions for configuring and starting the RISCWatch debugger with the PIBS Debug Monitor on a Windows host system.

Note that these instructions assume that you will use a dedicated and private point-to-point Ethernet connection between the evaluation board and a PC.

Setup Instructions

To ensure a successful setup, please follow these instructions in the order given.

1. Configure a TCP/IP Ethernet network interface port on your PC host

Set the IP address to: 192.168.0.1
Set the subnet mask to: 255.255.255.0

The network interface configuration property screens can be accessed by double clicking the network icon in the Windows Control Panel.

If your PC uses socks to access the Internet through your firewall, add the following direct line to the socks.cnf file:

```
direct 192.168.0.0 255.255.255.0
```

The socks.cnf is usually in a Windows system directory and can be found using the windows search or find utility.

2. Install the Evaluation Kit Software

Insert the Evaluation Kit CD in your computer's CD drive. If the installation program does not automatically start, run the installation program **D:\kitinst.exe** where **D** is the drive letter of your CD drive. There are three installation applications that can be run from **kitinst.exe**.

- Click on the button labeled "Install PowerPC 750FX Evaluation Kit". Read the License agreement and accept all of the default options to the installation. If you are going to install the tools as well, click on NO to reboot later if you are prompted by the install program.
- Click on the button labeled "Install IBM GNU Tools For PowerPC" or "Install High C C++ Compiler". Accept all of the defaults to complete the installation of the tools. Read the License agreement and accept all of the default options to the installation. If you are going to install RISCWatch as well, click on NO to reboot later if you are prompted by the install program.
- Click on the button "Install RISCWatch" once again accepting the defaults to complete installation of the debugger software. Read the RISCWatch **README** file that is displayed after the installation is complete to familiarize yourself with 750FX operational information.

Close the installation application and reboot your computer so that the new PATH variables can be registered. Note that if you have other tools installed on your Windows computer, you may need to adjust the PATH environment variable such that the 750FX Evaluation Kit binaries are ahead of other binaries with the same name. The following instructions assume that you have accepted the default path names. If you changed the path names during installation you will need to adjust your paths in the Quick Start accordingly.

3. Configure the RISCWatch Debugger Software

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Change to the C:\Program Files\RISCWatch directory. Copy the C:\IBM\ppc750fx-kit\bsp_750fx\rw* files to the current directory. Invoke the **rwpcfc.exe** executable to compile the pcf file into a prd file.

```
rwpcfc.exe ppc750fxevb.pcf
```

The prd file is used by RISCWatch to access registers on the companion chip.

Edit the **rwppc.env** file by selecting from the host:

```
Start->Programs->RISCWatch->Edit Environment File
```

In the **rwppc.env** file uncomment the Processor Name statement and set it to **750FX+ppc750fxevb**.

```
PROC = 750FX+ppc750fxevb
```

Uncomment and set the Revision number to 2

```
REV = 2
```

Set the target type to **sim**.

```
TARGET_TYPE = sim
```

Set the Target name to the IP address of the evaluation board which will be 192.168.0.2.

```
TARGET_NAME = 192.168.0.2
```

Set the search path to the sample directory

```
SEARCH_PATH = c:\IBM\ppc750fx-kit\bsp_750fx\sample
```

Uncomment and set the PRD filename to the file that was compiled at the beginning of this step

```
PRD_FILE = ppc750fxevb.prd
```

Save the **rwppc.env** file and exit the editor program.

4. Connect the 750FX evaluation board to the PC

There are two serial ports and two ethernet ports on the 750FX evaluation board. The serial ports are the upper pair of connectors and the ethernet ports are the lower pair. The upper part of the board is the edge near the row of LED's, and the lower part of the board is the edge with the PCI finger connectors. Connect the lower serial port (i.e. the one closest to the ethernet connectors) to the evaluation board chassis to the PC serial port using the supplied Null Modem serial cable.

Connect the higher Ethernet port (i.e. the one closest to the serial ports) directly to the PC Ethernet port using the supplied crossover Ethernet cable.

Connect the power cable from the wall socket to the power supply. Plug the power connector from the power supply into the matching connector at the top of the 750FX evaluation board. Turn the power supply switch on. You will not notice any movement of the power supply fan until the board is also turned on.

5. Start and configure a serial port console session on the PC

Start a terminal emulator program such as HyperTerminal. HyperTerminal is distributed with Windows and can usually be started by selecting:

```
Start->Programs->Accessories->Communications->HyperTerminal
```

Set the HyperTerminal connection properties to connect using the COM port associated with the PC serial port. This will be a numbered COM port such as COM1, COM2, etc. If there are multiple COM port choices and you don't know which is the correct one, try them all systematically until you determine the correct one.

Configure the selected COM port connection properties to use 115000 bits per second, 8 data bits, no parity, 1 stop bit and "Xon / Xoff" flow control. Hardware flow control is not supported.

Make sure the HyperTerminal status bar indicates that you are connected. You may have to select the "Disconnect" function and then the "Call" or "Connect" function for the updated connection properties to take effect.

6. Power on the 750FX evaluation board

Power on the 750FX evaluation board by pressing the small button at the bottom of the 750FX evaluation board. Note that the button on the top of the board is the reset switch. You should see some board information scroll in the serial port console window and the PIBS prompt. If you don't see the board information in the serial console window, check your connections and serial port configuration.

7. Configure PIBS

PIBS is an initialization and boot program that allows you to interactively configure the evaluation board. It has a help feature that describes commands that you can use to configure the board. The commands are documented in detail in the *PowerPC 750FX Evaluation Board User's Manual*.

Configure the ethernet port with an IP address by using the PIBS *ifconfig* command. In this case we are using port 0:

```
PIBS $ set ifconfigcmd0=ent0 up 192.168.0.2 <ENTER>
```

Press the reset button and the 750FX evaluation board will reboot and automatically configure the ethernet port.

You can now review your port configuration with the *ifconfig* command:

```
PIBS $ ifconfig ent0 <ENTER>

ent0: flags=63<UP,BROADCAST,NOTRAILERS,RUNNING> metric 0

inet 192.168.0.2 netmask ffffffff broadcast 192.168.0.255

PIBS $
```

Note that a subnet mask of 255.255.255.0 (0xFFFFFFFF) was implied in the initial *ifconfig* command. Your output may vary slightly depending on prior configuration.

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8. Perform the Ping Test

You should be able to “*ping*” your host now from the PIBS shell:

```
PIBS $ ping 192.168.0.1 <ENTER>

ping 192.168.0.1: 56 data bytes

64 bytes from 192.168.0.1: icmp_seq=0. time=0. ms

64 bytes from 192.168.0.1: icmp_seq=1. time=0. ms

64 bytes from 192.168.0.1: icmp_seq=2. time=0. ms

----192.168.0.1 PING Statistics----

3 packets transmitted, 3 packets received, 0% packet loss

round-trip (ms)  min/avg/max = 0/0/0

PIBS $
```

Your output may vary slightly depending on prior configuration.

Note that a software firewall program that is installed on your PC may prevent your PC from responding to a ping from the evaluation board. In this case, please consult your software firewall’s documentation to determine how to configure the software as needed.

9. Configure the TFTP server

In order to use PIBS for downloading applications via Ethernet, the host workstation must be configured to support a TFTP server. A TFTP server is included in the 750FX evaluation kit binaries.

Edit the `c:\IBM\ppc750FX-kit\bin\tftpaccess.ctl` file. Make sure that it contains a line to allow access to the directory where you want to compile your application. In this case we will use the sample directory, so the line in `tftpaccess.ctl` will look like:

```
allow:c:\ibm\ppc750fx-kit\bsp_750fx\sample
```

The TFTP server must be started on the host so that binary images that are built on the host can be transferred to the target. Start the server by clicking

```
Start->Programs->IBM PowerPC 750FX Evaluation Kit-> Start TFTP server
```

Make sure to restart the server if the PC is rebooted.

For more information on installing and running the TFTP server see the *PowerPC 750FX Evaluation Board User's Manual*.

10. Compile and load the sample code.

Note for MetaWare HighC compiler users:

To use the HighC compiler the file you should first complete the following steps:

Activate the compiler by executing the command 'ibmdemo hcppc1.exe' from the C:\IBM\hcppc\bin directory.

Copy the file C:\IBM\ppc750fx-kit\bsp_750fx\make\make.opt.met to C:\IBM\ppc750fx-kit\bsp_750fx\make\make.opt. Recompile all the BSP libraries by going to the C:\IBM\ppc750fx-kit\bsp_750fx\lib directory and typing 'gnumake clobber' and then 'gnumake all'.

Copy the file C:\IBM\ppc750fx-kit\kernel_7xx\make\make.opt_7xx.met to C:\IBM\ppc750fx-kit\kernel_7xx\make\make.opt. Recompile the kernel by going to the C:\IBM\ppc750fx-kit\kernel_7xx\lib directory and typing 'gnumake clobber' 'gnumake all'.

Create an MSDOS window and change directories to c:\IBM\ppc750fx-kit\bsp_750fx\sample. Compile the samples by typing:

```
gnumake all <ENTER>
```

Several binary images will be made, each of which has a different purpose. First, we will load the finaloram image and execute it. PIBS variables are used on the target to determine the file to load, and the host to load from using TFTP. The TFTP server should already be running on the host as described in the previous step. Go to the serial console to set the PIBS variable bootfilename and host:

```
PIBS $ set bootfilename = C:\IBM\ppc750fx-kit\bsp_750fx\sample\finaloram <ENTER>
```

```
PIBS $ set ipdstaddr0 = 192.168.0.1 <ENTER>
```

You can use the "set" command with no arguments if you want to see a list of the variables and their current values. Type the command to fetch the image and execute it on the processor:

```
PIBS $ bootfile eth <ENTER>
```

The result is output on the serial console in the EPOS information banner. Note that the prompt is now from the EPOS shell. For more information on EPOS see the *PowerPC 750FX Evaluation Board User's Manual* and the *Embedded PowerPC Operating System User's Manual* which are both located on the 750FX Kit CD.

The EPOS shell is part of the sample code image that was compiled into finaloram. You can modify the sample code and replace it with your own code, but first lets attach the debugger to the sample.

11. Start the RISCWatch Debugger

We examine two methods of using RISCWatch with the Debug Monitor here. The first way is to attach to the image we started running from PIBS in the previous step and the second way is to load an image directly from RISCWatch.

1. Attach to already running code

RISCWatch can attach to user code that has been loaded and run by PIBS. In the previous step we loaded and executed the finaloram image using the bootfile command. Start the RISCWatch application on the host by clicking:

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Start->Programs->RISCWatch->RWPPC

RISCWatch attaches to the EPOS Debug Monitor over the ethernet connection and allows us to debug without the use of a JTAG probe. Status messages indicating the connection to the Debug Monitor should appear in the serial console. When RISCWatch comes up the processor status window will say “Stopped” but in fact only the `debug_thread()` is stopped. The `debug_thread()` is the EPOS code (see file `debug_thread.c` in sample directory) that provides a hook into the Debug Monitor. The entry point to a user application should be called within the `debug_thread()` routine if this method of debugging is used. On the RISCWatch command line type:

```
load host finaloram <ENTER>
```

On the RISCWatch GUI select Source->Source and a window pops up to display the source code at the beginning of `debug_thread()`. In the RISCWatch command line type:

```
bp set in routine5 <ENTER>
```

```
run <ENTER>
```

In the source window you will see that the debugger stopped execution at the breakpoint in the sample routine called `routine5()`. Press the “Line Step” button on the RISCWatch Source window and the instruction pointer is advanced to the next line each time the button is pressed.

2. Use RISCWatch to load file

A second method of debugging an image is by using RISCWatch to load and run the file. In this case we use a standalone image that we compiled earlier called `finalodebug`. This image is loaded and relocated by RISCWatch instead of PIBS, so it must be carefully linked such that it does not interfere with PIBS. Press the reset switch at the top of the 750FX evaluation board and wait for the PIBS prompt. You will need to restart RISCWatch since the connection to the Debug Monitor has been broken. In the new RISCWatch command line type:

```
load file finalodebug <ENTER>
```

In the source window we see that the image has again been loaded and the instruction pointer placed at the beginning of the `debug_thread()` entry point. As before, you can set a breakpoint and perform source level debugging from this point.

For more information on debugging the sample code and the `debug_thread()` see Chapter 16 of *PowerPC 750FX Evaluation Board User's Manual*.

12. Complete the RISCWatch Quick Start Tutorial

To learn more about source level debugging capabilities of RISCWatch continue with the RISCWatch Quick Start tutorial from chapter 2 of the *RISCWatch Debugger User's Manual* provided with the RISCWatch software and also on the *PowerPC Embedded Processors, Cores, and Tools CD*.

13. Optional JTAG installation

If you are going to use the JTAG interface instead of the Debug Monitor, you will need to complete the following procedure before invoking RISCWatch.

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Edit the **ppc750fxevb.mps** file to specify the IP address of your RISCWatch probe. The line should read:

```
BOARD ppc750fxevb 192.168.0.2 jtag_eth
```

and the chip name should reflect that which was given in step 3:

```
CHIP 750FX+ppc750fxevb.2 "CPU0" 8
```

```
CHIP 750FX+ppc750fxevb.2 "CPU1" 8
```

Edit the **rwppc.env** file to specify the MPS file by adding the line:

```
MPS_FILE = ppc750fxevb.mps
```

and commenting out the PROC line using the '#' symbols as follows:

```
#PROC = 750FX+ppc750fxevb
```

Revision Log

Revision Date	Contents of Modification
June 3, 2003	Initial release (00).
September 9, 2003	Added HighC compiler activation instruction (01).



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