

phyCORE-MCF548x

QuickStart Instructions

Using Metrowerks CodeWarrior for ColdFire
Development Tool Chain

Preliminary

Note: The PHYTEC Tool-CD includes the electronic version of the
phyCORE-MCF548x English Hardware Manual

Edition: May 2005

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phyCORE-MCF548x QuickStart Instructions

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1 Introduction to the phyCORE-MCF548x Rapid Development Kit

This QuickStart provides:

- general information on the PHYTEC phyCORE-MCF548x Single Board Computer
- an overview of Metrowerks' CodeWarrior software development tool chain, and
- instructions on how to run example programs on the phyCORE-MCF548x, mounted on the PHYTEC Development Board, in conjunction with Metrowerks' CodeWarrior tools.

Please refer to the [phyCORE-MCF548x Hardware Manual](#) for specific information on such board-level features as [jumper configuration](#), [memory mapping](#) and [pin layout](#). Selecting the links on the electronic version of this document links to the applicable section of the phyCORE-MCF548x Hardware Manual.

1.1 Rapid Development Kit Documentation

This "Rapid Development Kit" includes the following electronic documentation on the enclosed "PHYTEC Tool-CD-ROM":

- PHYTEC [phyCORE-MCF548x Hardware Manual](#)
- PHYTEC phyCORE-MCF548x QuickStart Instructions
- MCF548X controller [User's Manuals](#) and [Data Sheets](#)

1.2 Overview of this QuickStart Instruction

This QuickStart Instruction provides a general "Rapid Development Kit" description, as well as software installation hints and example programs enabling quick out-of-the box start-up of the phyCORE-MCF548x in conjunction with Metrowerks' CodeWarrior tools. It is structured as follows:

- 1) The "*Getting Started*" section uses the example programs "*Hello_Fl*" and "*flash_MCF548x*" to demonstrate the download of user code to the phyCORE-MCF548x external RAM and Flash memory using Metrowerks' CodeWarrior Debugger.
- 2) The "*Getting More Involved*" section proves step-by-step instructions on how to modify the example, create and build new projects and generate and download output files to the phyCORE-MCF548x.

1.3 System Requirements

Use of this "QuickStart" requires:

- the [PHYTEC phyCORE-MCF548x](#)
- the [PHYTEC Development Board](#) with the included DB-9 serial cable, DB-25 printer port cable and AC adapter supplying 5 VDC/min. 1000 mA
- the [P & E Microcomputer Systems ColdFire Interface Adapter](#). This is the hardware interface between a standard PC parallel port (DB-25 female connector) and a standard (2.54 mm) 26-pin BDM header connector
- the PHYTEC phyCORE-MCF548x Tool CD
- the Metrowerks CodeWarrior for ColdFire architectures CD-ROM
- computer with 800 MHz Pentium compatible microprocessor, 512 MB RAM, CD-ROM drive, parallel, serial, and Ethernet ports, running Windows XP/2000, 350 MB free hard disk space plus project space

For more information and example updates, please refer to the following sources:

PHYTEC

<http://www.phytec.com> - or - <http://www.phytec.de>
support@phytec.com - or - support@phytec.de



<http://www.metrowerks.com>
sales@metrowerks.com



<http://www.freescale.com>

1.4 The PHYTEC phyCORE-MCF548x

The phyCORE-MCF548x module integrates the 32-bit Freescale MCF548x ColdFire microcontroller on an advanced PCB layout. All applicable controller signals extend to two 160-pin, high-density Molex connectors. In addition to the on-chip memory (32 kByte SRAM, 32 kByte Instruction Cache and 32 kByte Data Cache), the phyCORE-MCF548x can be populated with 32 MByte to 64 MByte Intel Strata Flash memory and 64 MByte to 128 MByte of DDR SDRAM. The external Flash supports direct on-board programming without additional programming voltages. A serial EEPROM, 4 Kbyte (up to 32 KByte), is available for storing operating parameters. I²C Real-Time Clock with a calendar and alarm function serves as a real-time reference.

The phyCORE-MCF548x is especially suited for applications requiring processing of calculation-intensive algorithms. The MCF548X's integrated 64-bit Floating Point Unit (FPU) enables hardware-level execution of elementary operations with single or double precision floating point numbers. Other controller features supported by the SBC module include two on-chip CAN 2.0B controllers, four UARTs; SPI Interfaces, I²C Master/Slave controller, PCI 2.2 Bus, and two fast Ethernet controllers.

phyCORE-MCF548x Technical Highlights

- Single Board Computer in subminiature form factor (70 x 57 mm) according to phyCORE specifications
- all applicable controller and other logic signals extend to two high-density 160-pin Molex connectors
- processor: Freescale embedded ColdFire MCF548X (200 MHz clock)

- **Internal Features of the MCF548X:**

- 32-bit ColdFire V4e core, 200 MHz CPU speed
- 32kByte instruction cache
- 32kByte data cache
- MMU with 32 entries
- 64-bit FPU double precision IEEE-754
- EMAC unit
- DMA unit
- Encryption unit
- 32 kByte SRAM
- Watchdog
- two system timers
- four 32-bit general purpose timers
- four UARTs
- SPI interfaces
- two CAN 2.0B interfaces
- I²C Master/Slave controller
- two fast Ethernet controllers
- USB2.0
- PCI bus
- BDM test/debug port

- **Memory Configuration¹:**

- DDR SDRAM: 64 MByte to 128 MByte
- Flash: 32 MByte to 64 MByte Intel Strata Flash memory, 32-bit memory width, synchronous (K3) or asynchronous (J3) devices are supported
- I²C Memory: 4 kByte EEPROM (up to 32 kByte, alternatively I²C FRAM, I²C SRAM)

¹: Please contact PHYTEC for more information about additional module configurations.

- **Other Board-Level Features:**

- four UART ports
RS-232 interfaces (RXD/TXD/RTS/CTS) and two TTL interfaces
- two CAN ports
on-board CAN transceivers; also configurable as TTL
- two 10/100 Mbps Ethernet ports
- Logic Device Lattice ispXPLD 5000 family
256/512/768 Macrocells and 128/256/384 kBit SRAM, in-system-programmable
for applications like:
single-, dual-port RAM or FIFO
Timer, PWM, CapComp etc.
Decoder, Encoder
IP core
application-specific logic
special bus interfaces
multi-purpose I/O signals etc.
- PCI 2.2 bus
- SPI bus
Synchronous Serial Interface with two Chip-Selects
- I²C bus
- I²C Real-Time Clock with calendar and alarm function
- 12-bit ADC
8 channels, connected to I²C bus
- 12-bit DAC
1 channel, connected to I²C bus
- JTAG/BDM test/debug port
- industrial temperature range (-40...+85°C)

The phyCORE-MCF548x Development Board is fully equipped with all mechanical and electrical components necessary for the speedy and secure insertion and subsequent programming of the phyCORE-MCF548x module with high-density (0.635 mm pitch) pin header connectors. RS-232 and CAN interface signals extend from the module to dual-stacked DB-9 connectors on the Development Board, while the USB and Ethernet signals extend to dual USB-Host sockets and dual RJ-45 connectors. A 26-pin BDM connector provides a debugging interface.

Development Board Technical Highlights

- Development Board (160.06 x 125 mm)
- high-density (0.635 pitch) Molex connector for speedy and secure insertion, and subsequent programming, of the phyCORE-MCF548x Single Board Computer module
- socket for +5VDC power supply connectivity
- socket for +12V/-12V power supply to the PCI slot
- 2x RS-232 at DB-9 sockets
- 2x CAN interfaces at DB-9 plugs
- 2x RJ-45 Ethernet interfaces
- 10-pin JTAG header PCI slot
- 10-pin JTAG interface
- 26-pin BDM interface (populated)
- 2x dual USB host sockets
- CF card socket
- MMC/SD card socket
- various power and status LEDs for monitoring all available supply voltages and specific controller signals
- reset and boot push buttons
- expansion bus: address, data, interface and all applicable I/O signals route from implemented phyCORE module to 2 x 160-pin Molex connectors, enabling connectivity to PHYTEC **Add-On hardware**

1.5 The Metrowerks CodeWarrior Development Tool Chain

Metrowerks CodeWarrior is a cost-effective and highly functional Integrated Development Environment (IDE) containing a complete suite of development tools to create, compile, link, debug, and assemble fast, optimized embedded systems code for the Coldfire, PowerPC, and other architectures.

The Metrowerks CodeWarrior Integrated Development Environment (IDE) is intuitive, easy to use and designed to provide a variety of tools that work in a cohesive manner regardless of the host, language, or target architecture. This means you can reach more markets and solve more problems without having to learn new tools. Metrowerks CodeWarrior IDE's graphical interface includes an editor, project manager, class browser, compiler, source-level and assembly-level debugger, stand-alone assembler, and linker.

In addition to keeping all your development tools a keystroke away, the IDE stores compiler settings and tracks all the dependencies for your project, simplifying even the most complex development build. The editing and software debugging tools in CodeWarrior are state-of-the-art and feature syntax highlighting, the power to evaluate structures and complex expressions in the debugger, and the ability to correct source code in the error message window.

Metrowerks CodeWarrior consists of the IDE and Debugger core tools, which are structured as follows:

IDE:

Windows-based Integrated Development Environment housing the following tools:

- **Project Manager:** shows the collection of files used to build an output file
- **Editor:** double-clicking on a file in the Project Manager window invokes the Editor
- **Build System:** IDE plug-in “tools” to create and then convert source code to output code
- **C compiler:** IDE plug-in
- **Linker:** IDE plug-in
- **Make:** IDE plug-in
- **Debugger:** Fully active source-level and assembly-level Windows-based debugger

Upon installation of CodeWarrior, the IDE and Debugger executables are located in the *C:\Program Files\Metrowerks\Bin* folder. All tool commands are easily accessible via intuitive pull-down menus with prompted selections.

As depicted below, CodeWarrior’s editor, C/C++ compiler, linker and debugger comprise the basic tool chain. The remaining plug-in tool components assist in code navigation and build control.

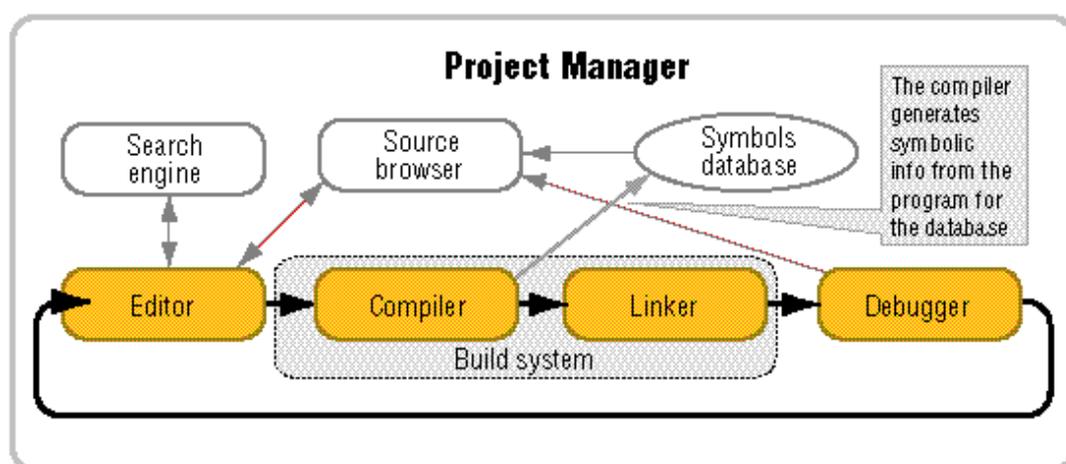


Figure 1: Metrowerks CodeWarrior IDE Architecture

All IDE commands and functions are accessible via pull-down menus or short cuts. An extensive Help utility is included.

The **Project Manager** gathers all necessary source files, library and project information - such as various output files (called targets) with different memory maps for RAM-download or ROM-imaging - and stores it in a project file assigned the suffix **.mcp*. From the project manager window, all other tool components are easily accessible via mouse control.

The **Editor** is a powerful tool to compose source code. It includes a context-sensitive coloring of keywords for easy navigation and recognition. All colors and custom keyword sets can be user-defined. Pop-up menus provide an overview of all available functions and a navigation to the start of a desired function or its corresponding header file. A graphic difference engine displays the differences between two source code files. The search engine enables location of a specified text string and implements find-and-replace operations.

The **Build System** contains the C/C++ compiler, assembler, linker and code converter. The CodeWarrior compiler produces fast, optimized embedded systems code. The C compiler is NIST Certified ANSI C, and the C++ compiler closely tracks the emerging ANSI/ISO C++ standard. To increase the compilation speed the compiler can generate precompiled headers. For syntax check, the compiler provides pre-processing of single source files or for the complete project. For code exploration, a disassembly command displays the corresponding assembler code that the C code compiles to.

The compiler and linker support **.elf* and Freescale S-record output file formats. A map file is also generated, providing detailed memory map and module information.

The **CodeWarrior Debugger** provides C/C++ source-level, assembly-level and mixed mode debugging. For code exploration, absolute or conditional breakpoints can be accessed or single-step operation can be performed. Step-over, step-into and step-out of code function capabilities are provided. The contents of variables, arrays and structures can be monitored and manually modified.

The Metrowerks CodeWarrior Debugger supports the following debug options of the phyCORE-MCF548x target.

- A hardware-level debugging option is provided via a PC-to-target connection using the MCF548X BDM port (Background Debug Mode), a hardware debugger module integrated on the processor. The parallel printer port of the host-PC communicates to the phyCORE via a BDM interface, such as the P& E Microcomputer Systems ColdFire Interface Adapter. Furthermore for extensive software development, more sophisticated BDM interfaces are available for increase download speed.

2 Getting Started

What you will learn with this Getting Started example:

- installing Metrowerks CodeWarrior for ColdFire Version 5.1
- installing the Rapid Development Kit software
- interfacing the phyCORE-MCF548x, mounted on the Development Board, to a host-PC
- downloading example user code to the phyCORE-MPC548x external memory

2.1 Installing the Metrowerks CodeWarrior Tool Chain

When you insert the Metrowerks CodeWarrior CD into the CD-ROM drive of your host-PC, the Metrowerks CodeWarrior CD should automatically launch a setup program that installs the required software. Otherwise the setup program *setup.exe* can be manually executed from the root folder of the Metrowerks CodeWarrior CD.

The applicable CodeWarrior tool chain must be installed to ensure successful completion of this QuickStart Instruction. Failure to install the proper software could lead to possible version conflicts, resulting in functional problems.

- Install the Metrowerks CodeWarrior Development Studio for ColdFire from the enclosed Metrowerks CD, following the steps indicated in the install procedure.

The default destination location is

C:\Program Files\Metrowerks\CodeWarrior for ColdFire Version 5.1.

All path and file statements within this QuickStart Instruction are based on the assumption that you accept the default install paths and drives. If you choose different paths and/or drives you must consider this for all further file and path statements. We recommend that you accept the default destination location.

2.2 Installing Rapid Development Kit Software

- Insert the PHYTEC phyCORE-MCF548x Tool-CD into the CD-ROM drive of your host-PC. The CD should automatically launch a setup program that installs the required demos, documentation and other support documents. Otherwise the setup program *setup.exe* can be manually executed from the root folder of the PHYTEC Tool-CD.

The default destination location is *C:\PHYBasic*. All path and file statements within this QuickStart Instruction are based on the assumption that you choose the default install paths and drives. If you decide to choose different paths and/or drives you must consider this for all further file and path statements. We recommend that you accept the default destination location.

- Follow the instructions in the setup window.

2.3 Interfacing the phyCORE-MCF548x to a Host-PC

Connecting the phyCORE-MCF548x (part # PCM-024-xxxx, mounted on the PHYTEC Development Board (part # PCM-982), to your computer is simple:

- If the phyCORE module is not already pre-installed, mount it pins-down onto the Development Board's receptacle footprint (X1) as shown in the *Figure 2* below. Ensure that pin 1 of module matches pin 1 of the receptacle on the Development Board.

Ensure that there is a solid connection between the module's pins and the Development Board receptacle. If the phyCORE module is removed from the Development Board, take precautions to properly mount the module when it is reattached to the Development Board. Pin 1 on the phyCORE module (denoted by the hash stencil mark on the PCB) should be matched to the footprint receptacle on the Development Board marked by "X1" on the PCB. Also take precautions not to damage the connectors when the phyCORE is removed from and inserted onto the Development Board.

- Configure the jumpers on the phyCORE Development Board as indicated in *Figure 2*. This correctly routes the CAN interface signals. *Please see the phyCORE-MCF548x Hardware Manual for further information on jumper settings.*

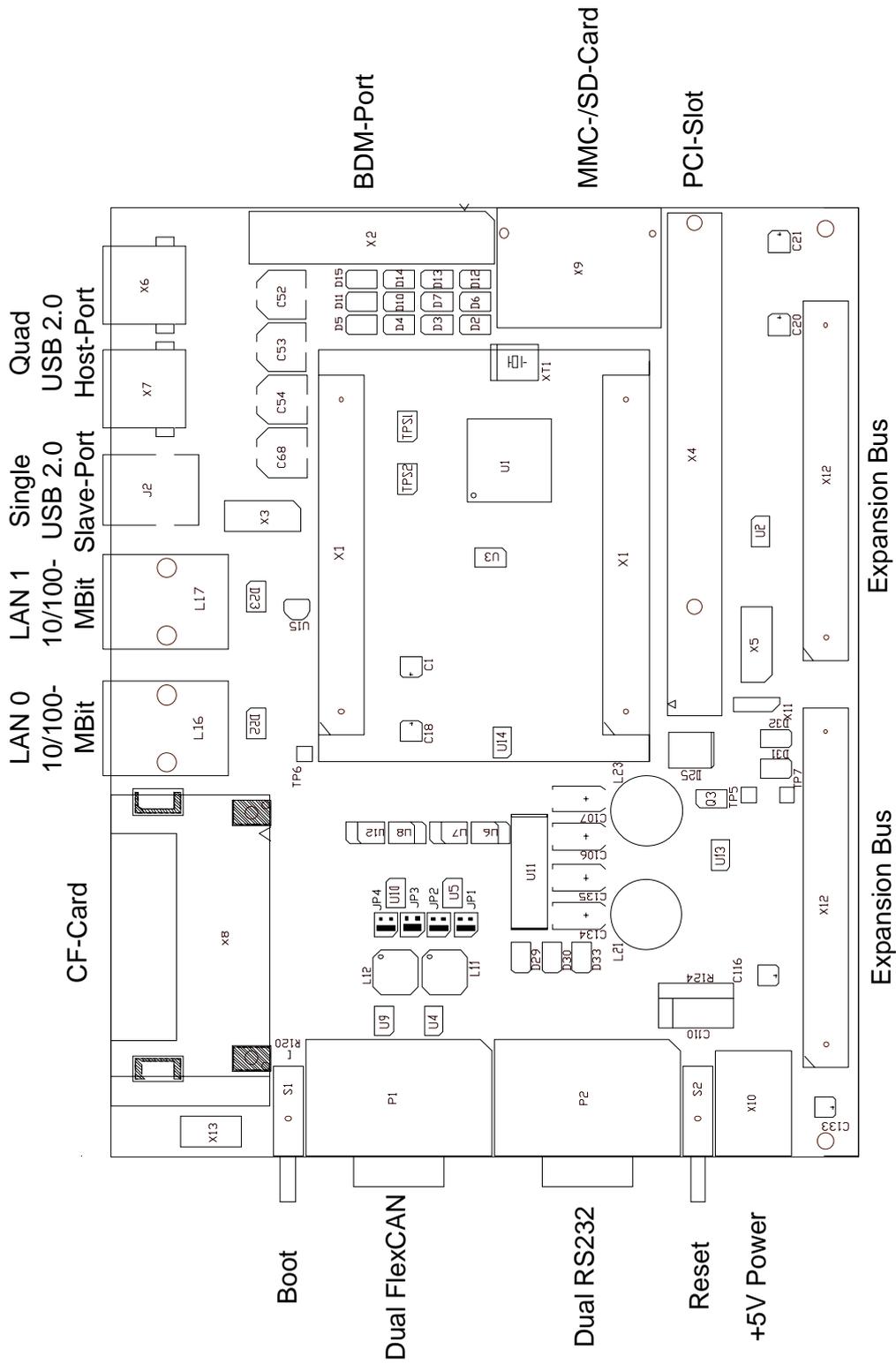


Figure 2: View of Development Board and Suitable Jumper Settings

- Connect the included DB-25 to the LPT1 port of your host-PC.
- Connect the P&E Microcomputer DB-25 BDM interface to the female end of the included DB-25 cable.
- Connect the P&E Microcomputer BDM interface to the 26-pin BDM header on the Development Board at X2. This connection is used for the communication between the Metrowerks CodeWarrior development suite and the phyCORE-MCF548x target hardware.
- Connect the included serial cable to the lower socket (P2A) of the double DB-9 connector on the Development Board and to a free serial port of your host-PC. This will enable you to monitor board-host communication via a terminal emulation program, such as Windows HyperTerminal.
- Using the included 5VDC power adapter, connect the power socket on the board (X10) to a power supply (*refer to Figure 3 for the correct polarity*). The phyCORE module/Development Board combination requires a 5 VDC@1A $\pm 3\%$ regulated supply.

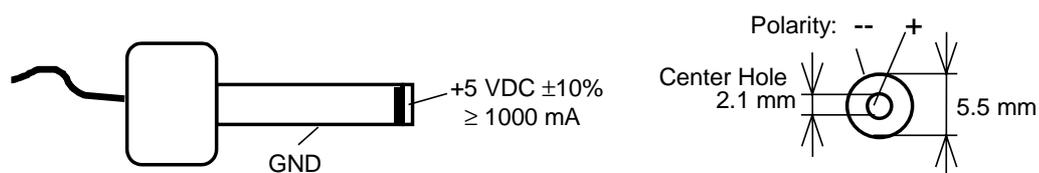


Figure 3: Connecting the Supply Voltage at X10

The LEDs D31 and D32 (two green LEDs) should light, indicating that all voltages are supplied to the phyCORE module.

The phyCORE-MCF548x should now be properly connected via the Development Board to a host-PC and power supply and you are now ready to use the Metrowerks CodeWarrior tool chain to establish communication. This phyCORE module/Development Board combination shall also be referred to as "target hardware".

2.4 Downloading Example Code with CodeWarrior IDE

The *Hello_Fl* example sends a program to the target hardware that, when executed, sends a character string from the RDK back to the host-PC. The character string can be viewed with a Terminal Emulation program. The program also flashes the user LED D29 with equal on and off ratio.

^a

- Launch the Metrowerks *CodeWarrior IDE* by double-clicking on the *CodeWarrior* icon or by selecting *CodeWarrior IDE* from within the *Programs/Metrowerks CodeWarrior\ CodeWarrior for ColdFire Version 5.1* program group.

2.4.1 Setting up HyperTerminal

Monitoring the execution of the *Hello_Fl* demo requires use of a terminal program, such as the HyperTerminal program included within Windows.

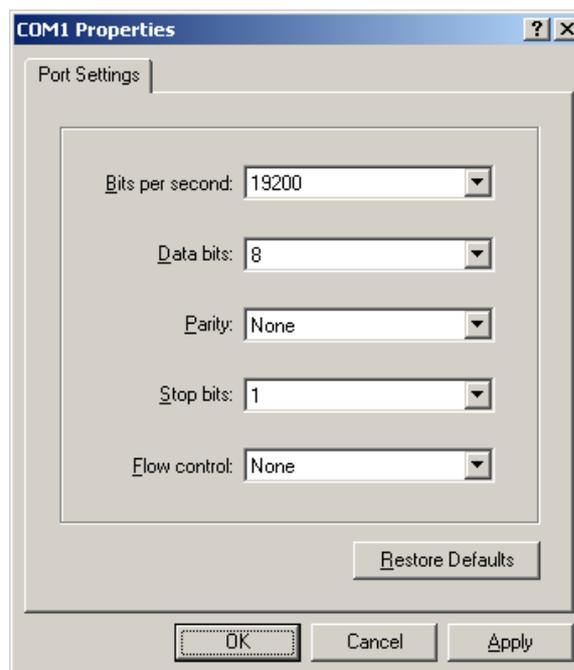
- Start the HyperTerminal program within the *Programs / Accessories* bar.
- The HyperTerminal main window will now appear.
- Double-click on the HyperTerminal icon *Hypertrm* to create a new HyperTerminal session.
- Enter a name such as "*Connect to Com1*" (be sure to use an available COM port for your system) and select an icon of your choice to establish a new connection using HyperTerminal.



- Click *OK* to advance to the connection window.

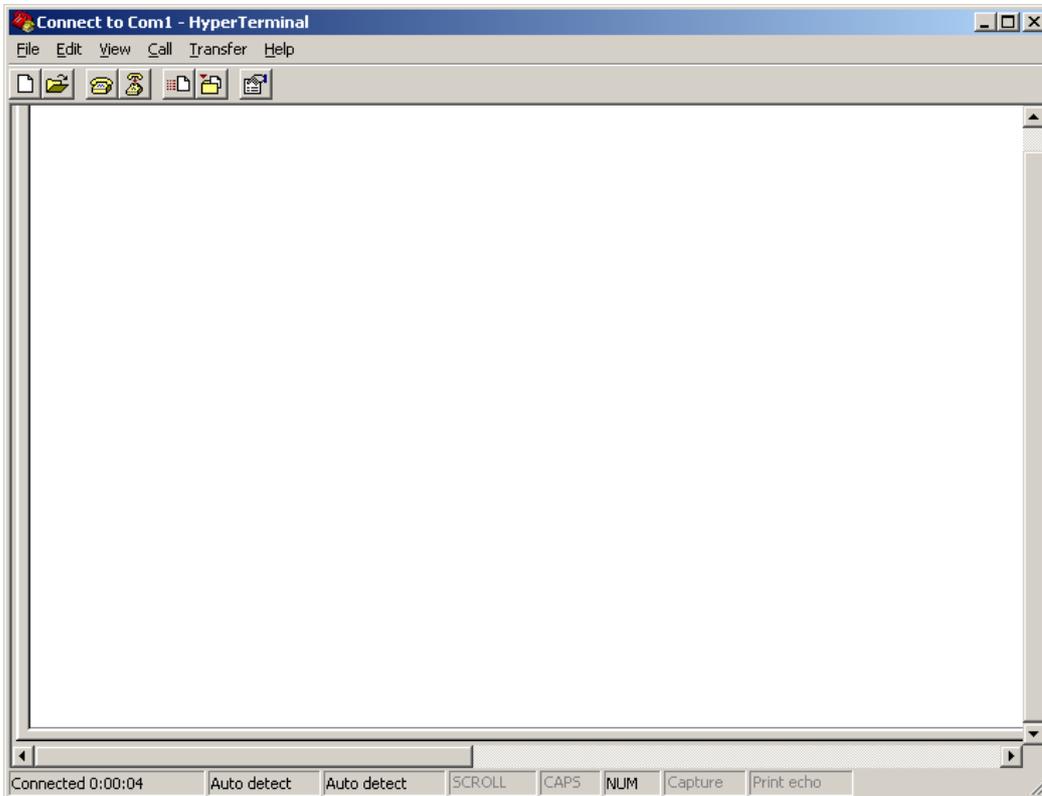


- Click *OK* again to advance to the next window (COM1 Properties). Then set the following COM parameters: Bits per second = 19200; Data bits = 8; Parity = None; Stop Bits = 1; Flow Control = None.



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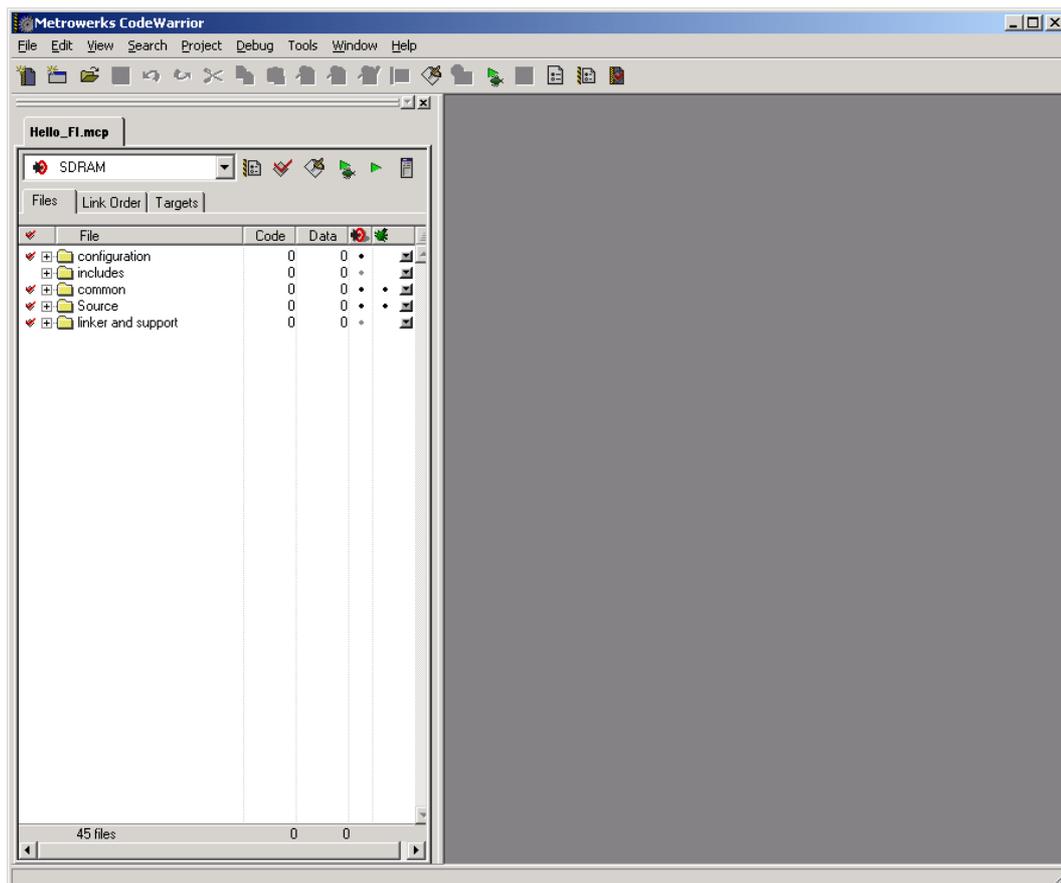
- Selecting *OK* advances you to the COM Direct – HyperTerminal monitoring window. Notice the connection status report in the bottom lower corner of the window.



HyperTerminal is now prepared to view the output of the example program once it is executed.

2.4.2 Running the Hello_Fl.mcp Demo Project in RAM

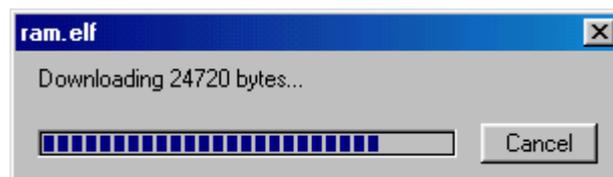
- Return to the Metrowerks CodeWarrior IDE, leaving the HyperTerminal session open and connected to the target hardware.
- Open the **Hello_Fl.mcp** project file by selecting *File / Open* from the pull-down menu and navigating to **C:\PHYBasic\pC-MCF548x\Demos\Hello_Fl**.
- The **Hello_Fl.mcp** project file will open in a project window.
- If not already selected, select the software target "SDRAM" from the pull-down at the top of the project window.
- Notice the red check marks in front of the individual file groups in the project window. This indicates that the project is not up to date and a new build should be performed. This typically happens when you open an existing project for the first time.



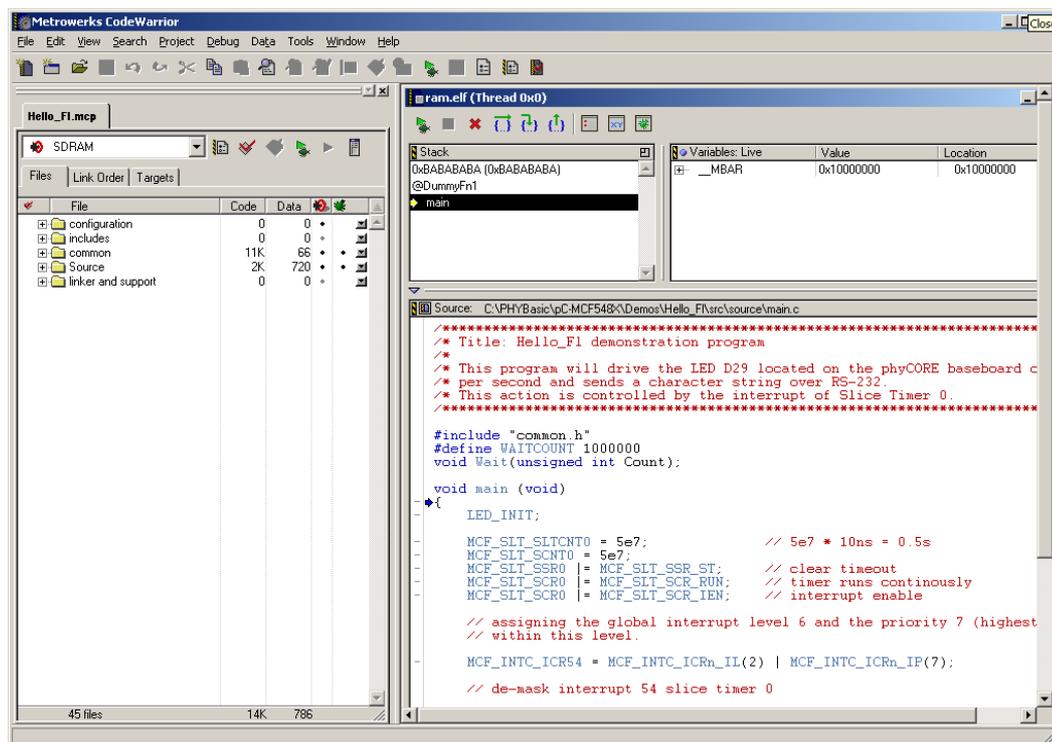
- Perform the build process by clicking the *Make*  icon or select *Project / Make* from the IDE pull-down menu.
- The Make process generates an actual output binary (*ram.elf*). The Make status window will appear within the CodeWarrior IDE while the project is being compiled and linked. Once complete the project window will be visible.

Notice that the red check marks in front of the individual file groups in the project window have disappeared showing the project is up to date and all necessary output files have been created.

- Start the download process by clicking on the green debug  arrow at the project window tool bar. You can also perform the download by pressing the <F5> function key or selecting the *Project / Run* item in the main menu bar.
- The following status window will appear during the download.

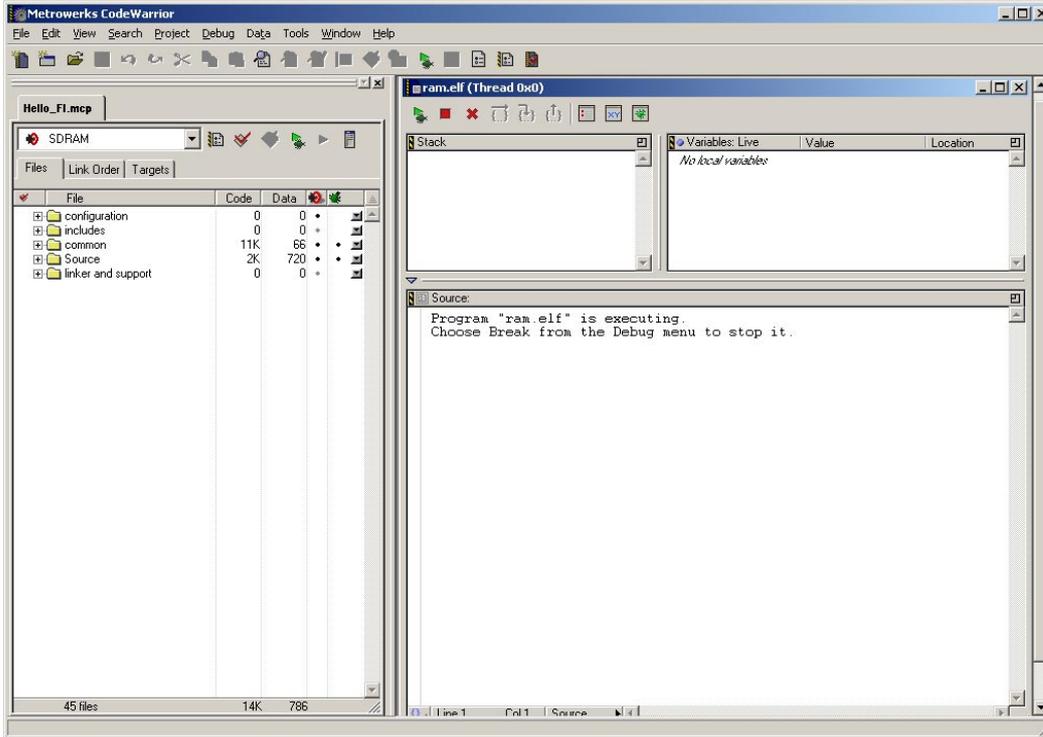


- Once download is complete, the debugging window will open.



- Run the code by clicking on the  green debug arrow again (or press <F5> or select *Project / Run* in the main tool bar). This will run the main code, starting from the location indicated by the blue arrow in the source window [first line after main()]. The lower portion of the *ram.elf (Thread 0x0)* window will indicate that the demo program is executing.

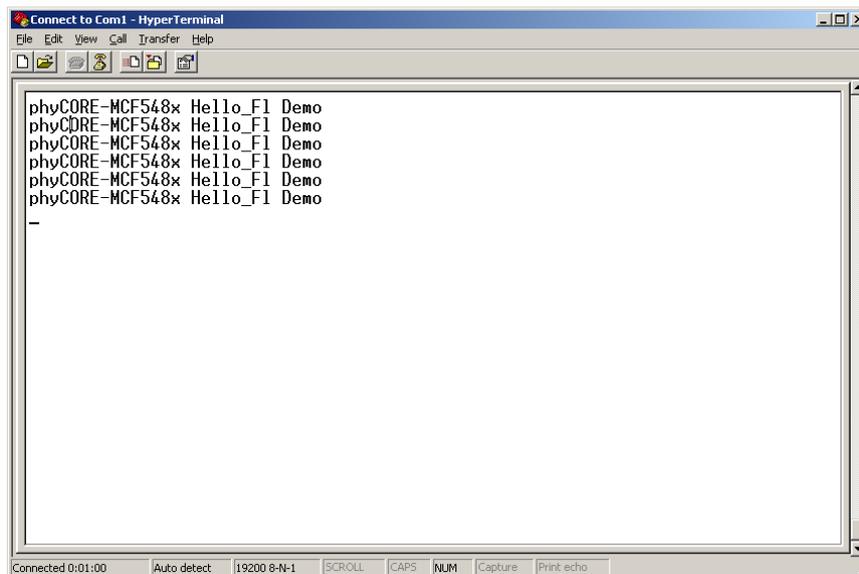
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The red LED D29 on the Development Board will flash on and off.

- Switch back to the HyperTerminal program to view the output of the demo program, which will print the character string:

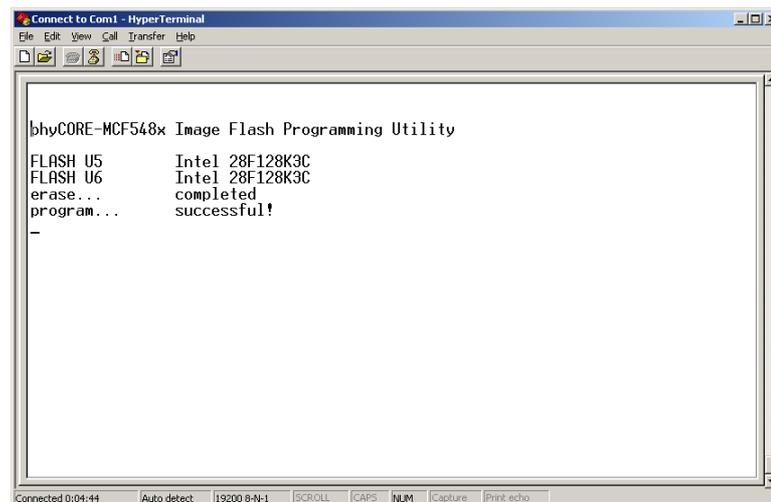
"phyCORE-MCF548x Hello_Fl Demo"



2.4.3 Downloading Code to the MCF548X External Flash

The *flash_MCF548x* application is used to download an executable to the external Flash (28F128K3 type) at U5/U6 on the phyCORE-MCF548x. The executable code is contained in file *hex_image.c*.

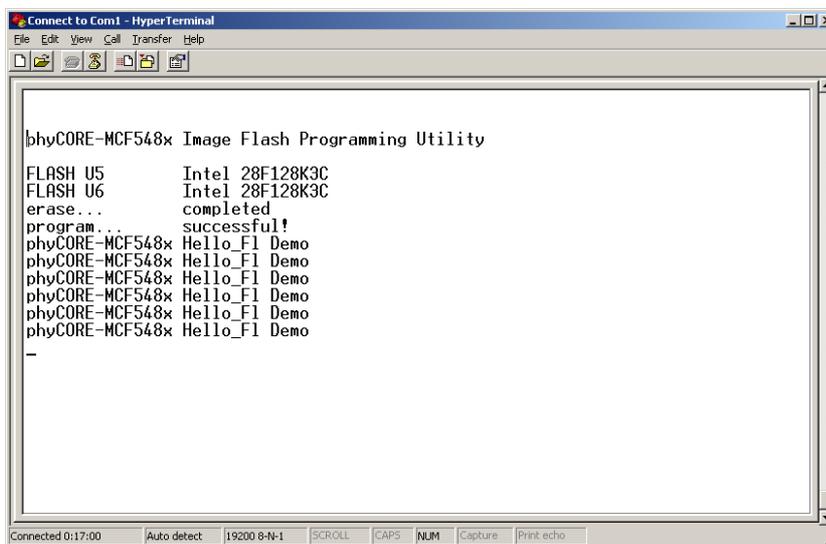
- Kill execution of the running demo and the current project by clicking on the red  symbol at the top of the project window (or press <Shift>+<F5> or select *Debug / Kill* in the main tool bar).
- Open the *flash_MCF548x.mcp* project file by selecting *File / Open* from the pull-down menu and navigating to *C:\PHYBasic\pC-MCF548x\Demos\flash_MCF548x*.
- Perform the build process by clicking the make  icon at the project window tool bar.
- Start the download process by clicking on the green run  arrow at the project window tool bar.
- Switch back to the HyperTerminal program to view the output of the Flash programming utility application running out of RAM. The status of the Flash download procedure will be displayed.
- Wait until the program is finished, indicated by:
program... succesful!



```
Connect to Com1 - HyperTerminal
File Edit View Call Transfer Help
bhyCORE-MCF548x Image Flash Programming Utility
FLASH U5 Intel 28F128K3C
FLASH U6 Intel 28F128K3C
erase... completed
program... successful!
-
```

- Back in the Metrowerks CodeWarrior IDE, kill the execution of the running demo by clicking on the red  symbol at the project window toolbar.
- Disconnect the power supply from the phyCORE Development Board unplug the BDM interface.
- Reconnect the power supply.
- Switch back to the HyperTerminal program to view the output of the demo program, which will print the character string,

"phyCORE-MCF548x Hello_Fl Demo"



```
phyCORE-MCF548x Image Flash Programming Utility
FLASH U5      Intel 28F128K3C
FLASH U6      Intel 28F128K3C
erase...      completed
program...    successful!
phyCORE-MCF548x Hello_Fl Demo
-
```

The red LED D29 on the Development Board will flash on and off.

- Close all open projects within Metrowerks CodeWarrior IDE.

3 Getting More Involved

In this section you will create a new project based on the existing *Hello_Fl.mcp*, modify the source code, build the new project, and generate and download the new executable output file to the target hardware.

3.1 Creating a New Project from the Existing Source File

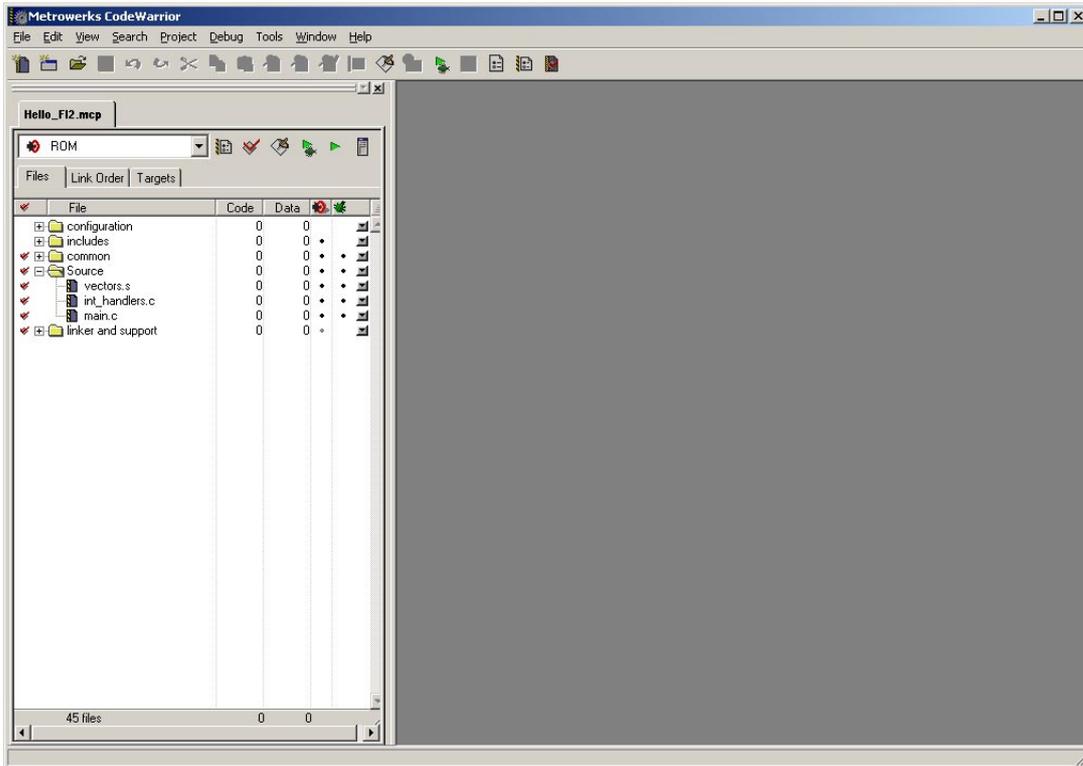
For ease of creating a new project for the phyCORE-MCF548x it is recommended that the provided *Hello_Fl* project is used as a template. The *Hello_Fl* project already has the target, linker, compiler, debugger, and startup code correctly configured for the phyCORE-MCF548x target.

- Create a new folder named *Hello_Fl2* in the same directory as the original *Hello_Fl* and copy the contents of the *Hello_Fl* folder to the new folder.
- Rename the *Hello_Fl.mcp* project file to *Hello_Fl2.mcp*.

At this point a new project was simply created based on the existing *Hello_Fl* project. The next step is to modify the source before building the new project.

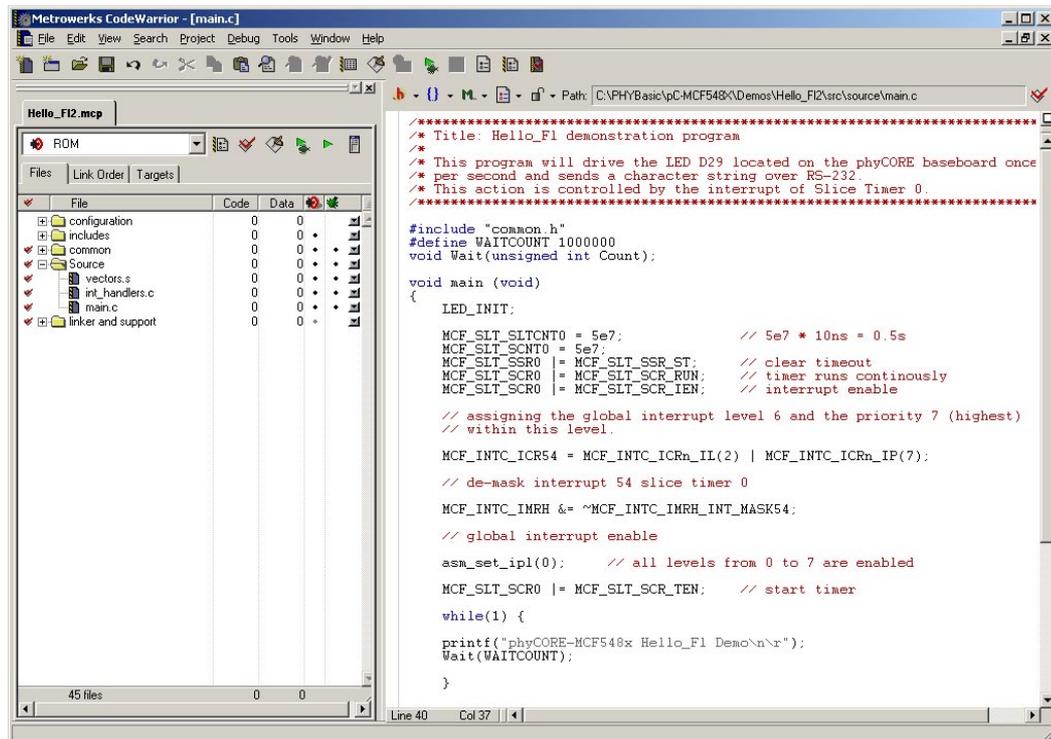
3.2 Modifying the Source Code

- From within Metrowerks CodeWarrior IDE open the new *Hello_Fl2* project.
- If not already present, select the software target "**SDRAM**" from the pull-down at the top of the project window.



From the project window you can add or remove source files, add code libraries, modify compiler and linker settings, and compile and link a project. The files shown within this window are arranged in groups which can be expanded or compressed.

- From the project window **Source** group open the **main.c**.



- Navigate to line 40 and modify the *printf* command:

```
printf("phyCORE-MCF548x Hello_Fl Demo\n\r");
```

to

```
printf("phyCORE-MCF548x Hello_Fl2 Demo\n\r");
```

- Perform the build process by clicking the  icon at the project window tool bar. This will compile the source files and build the executable *.elf* file.

The executable output file *rom.elf* will be generated if no errors occurred during the build process.

- Close the *Hello_Fl2* project and any source files that might be open.
- Browse to the *rom.elf* file located in:

C:\PHYBasic\pC-MCF548x\Demos\Hello_Fl2\obj

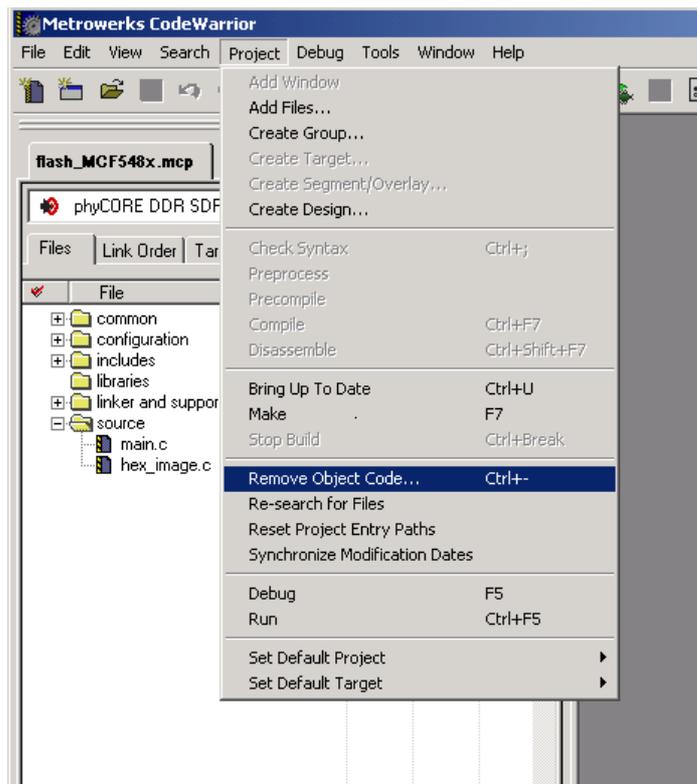
and copy to:

C:\PHYBasic\pC-MCF548x\Demos\flash548x\image

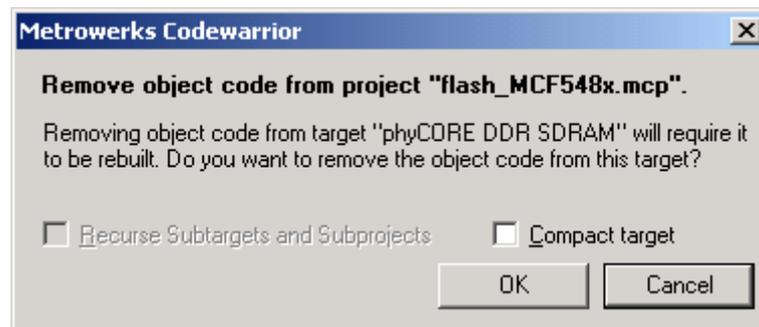
3.3 Building the hex_image.c File and Downloading to Flash

The *flash_MCF548x* application is used to program an executable to the external-Flash on the phyCORE-MCF548x. The executable is contained in the *hex_image.c* file. To build the *hex_image.c* from an executable file a command line converter (*ihex2c.exe*) needs to be used.

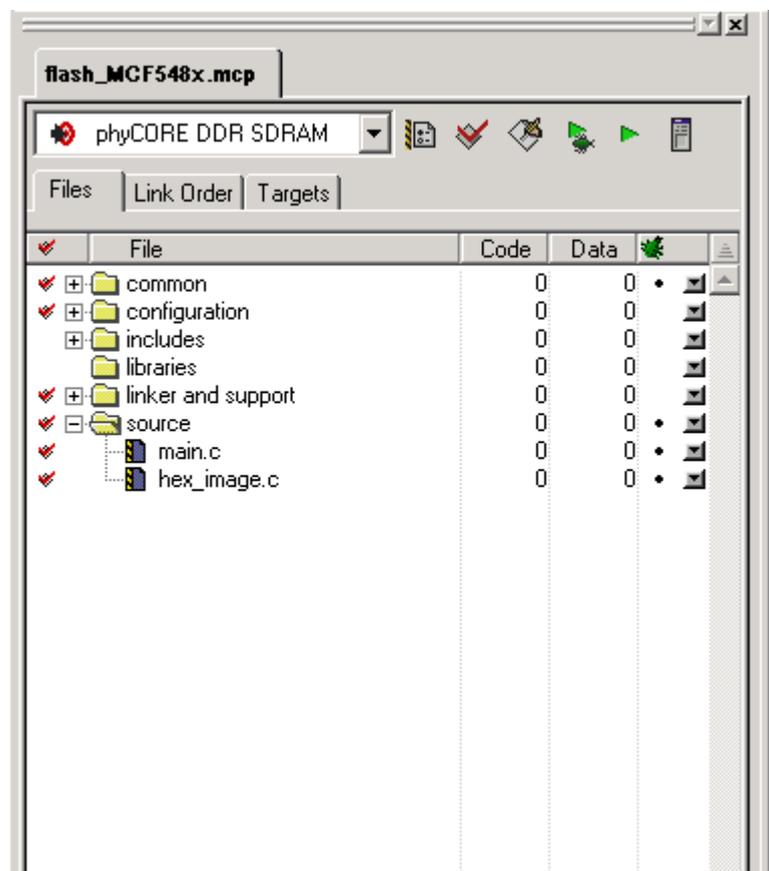
- From *C:\PHYBasic\pC-MCF548x\Demos\flash548x\image* double-click on the *elf2c.cmd* command script file. This file will rename the file *ROM.elf* to *ROM.hex* and invoke the *ihex2c.exe* program, which converts *ROM.hex* to *hex_image.c*.
- From within Metrowerks CodeWarrior IDE open the *flash548x.mcp* project.
- Remove the object code for the old hex_image by selecting *Project / Remove Object Code* from the main menu bar.



- Click OK in the window that appears next.



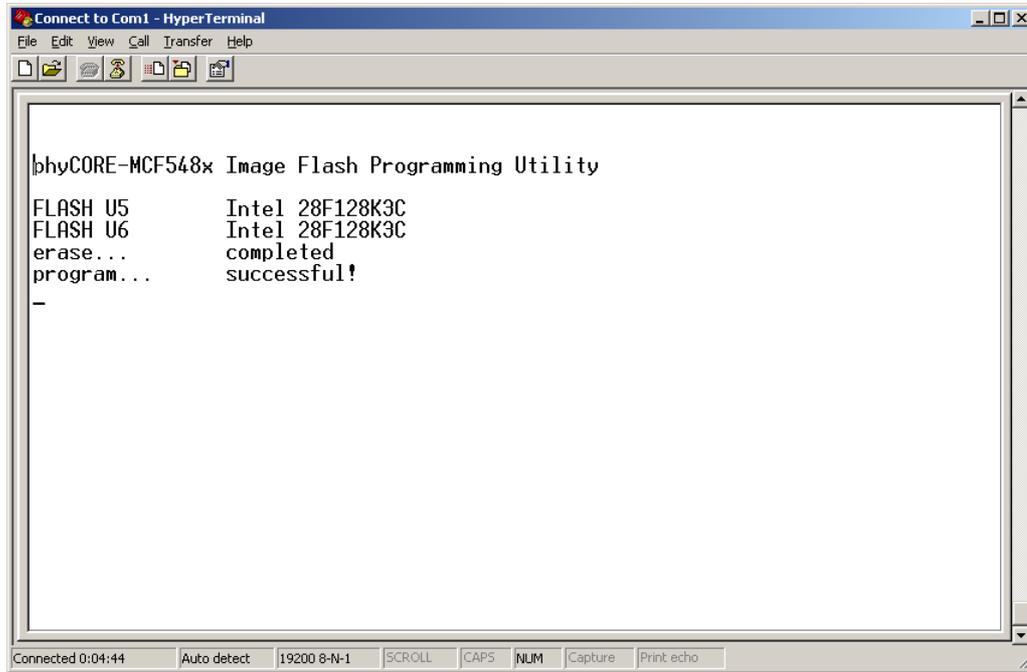
- Your project window should now look as follows (notice the red check marks):



- Start the download process by clicking on the green run  arrow at the project window tool bar. This will first perform a "build all" operation before downloading the new output file to the target.

phyCORE-MCF548x QuickStart Instructions

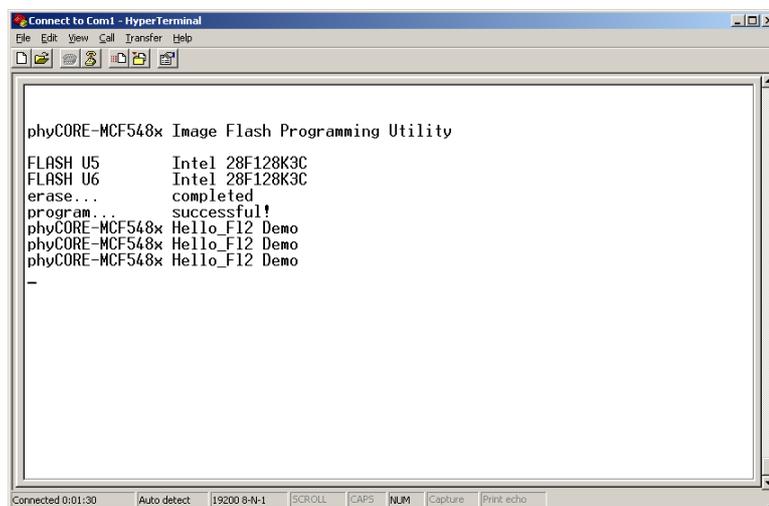
- Switch back to the HyperTerminal program to view the output of the demo program, which will print the status of the program.
- Wait until the program is finished, indicated by:
program... succesful!



```
Connect to Com1 - HyperTerminal
File Edit View Call Transfer Help
[Icons]
phyCORE-MCF548x Image Flash Programming Utility
FLASH U5      Intel 28F128K3C
FLASH U6      Intel 28F128K3C
erase...      completed
program...    succesful!
-
Connected 0:04:44  Auto detect  19200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

- Back in the Metrowerks CodeWarrior IDE, kill the execution of the running demo by clicking on the red  symbol at the project window toolbar.
- Disconnect the power supply from the phyCORE Development Board and remove the BDM interface.
- Reconnect the power supply.
- Switch back to the HyperTerminal program to view the output of the demo program, which will print the character string:

"phyCORE-MCF548x Hello_F12 Demo"



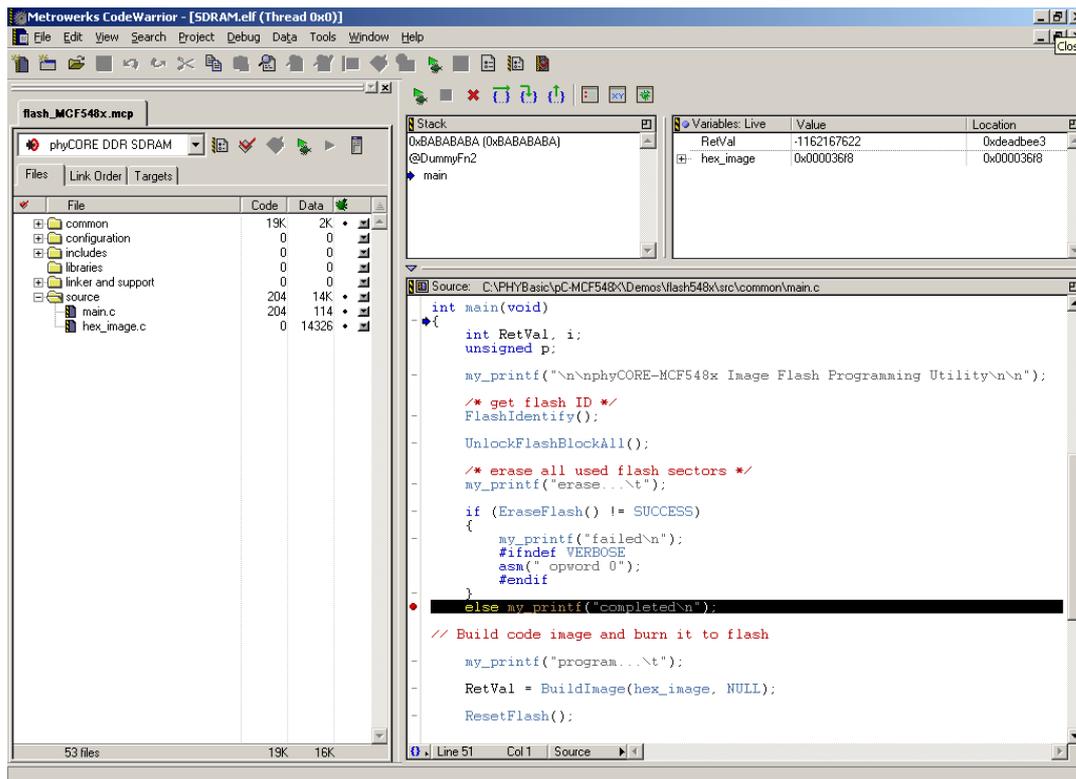
```
phyCORE-MCF548x Image Flash Programming Utility
FLASH U5      Intel 28F128K3C
FLASH U6      Intel 28F128K3C
erase...      completed
program...    successful!
phyCORE-MCF548x Hello_F12 Demo
phyCORE-MCF548x Hello_F12 Demo
phyCORE-MCF548x Hello_F12 Demo
-
```

You have now successfully created a new project, modified source code, rebuilt the project, downloaded and executed the application.

3.4 Erasing Flash

You can erase any application program from Flash by setting a breakpoint in the *main.c* file right after the erase sequence is executed.

- Open the *flash548x.mcp* project.
- Click on the green debug  arrow at the project window tool bar. This will download the main code into RAM.
- Set the cursor to line 51 in the *main.c* file and set a breakpoint by selecting *Set Breakpoint* from the *Debug* menu bar.
- Now click on the Run  arrow to execute the code in the *main.c* Flash programming utility. The program will stop just before the image is burned into Flash.



Document: phyCORE-MCF548x QuickStart Instructions
Document number: L-664e_0, Preliminary, May 2005

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Did you find any mistakes in this manual? _____ page

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