CP3UB17/CP3CN17 Evaluation Kit

Addendum for IAR Tool Chain

Revision 1.5

National Semiconductor
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Preface

Scope of This Document

This document describes how to set up a winIDEA project to call the IAR C compiler tool chain. The reader is assumed to have read the CP3UB17/CP3CN17 Evaluation Kit User's Guide.

Related Documentation

CP3UB17/CP3CN17 Evaluation Kit User's Guide—The quick guide to getting started with the CP3UB17/CP3CN17 evaluation kit. The procedures in this guide describe how to set up a winIDEA project to use the NSC tool chain, which is a port of the GNU tools.

CompactRISC CR16C Programmer's Reference Manual—This is the authoritative reference for the architecture of the CR16C CPU. Compiler writers and assembly-language programmers should consult this document for detailed information about the instruction set. After installation of the software on the evaluation kit CD-ROM, the default location for the Programmer's Reference Manual is **C:\National_SEK_X_Y\docs\Prog_16C.pdf**, in which X.Y is the version number of the release.

CP3UB17/CP3CN17 Data Sheets—These are the full data sheets for these devices in the CP3000 family of connectivity processors. Refer to these documents for information about the on-chip peripheral devices, signal descriptions, package pinout, and electrical specifi-

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cations. After installation of the software on the CD-ROM, the default location for the folder containing the data sheets is **C:\National_SEK_X_Y\docs**, in which X.Y is the version number of the release.

winIDEA Software Manual—This is the manual for the winIDEA IDE and debugger. It can be downloaded as a PDF file from the iSYSTEM web site at http://www.isystem.com. Select Support -> Downloads, select Documents, then click on winIDEA Software Manual.

Notational Conventions

Commands selected from menus are shown as "File -> New", which represents the "New" command selected from the "File" menu.

High-level language and assembly code, command lines, and macro file statements are shown in the Courier font, for example:

```
add r2,r3;
```

When a single command or statement is too long to fit on one line, a backslash (\) is used to indicate continuation on the following line, for example:

```
echo "ERROR 137 -- square root domain error, \
try using a positive number"
```

Revision History

Revision	Release Date	Summary of Changes
1.5	9/21/03	Original release.

Preface

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Overview

This application note describes the configuration of iSYSTEM's win-IDEA™ integrated development environment for use with IAR's C tool chain and National Semiconductor's software drivers. It gives a basic set of instructions to get the environment set up for building an application on a CP3000 device. For more detailed information please refer to the appropriate manuals provided by IAR, iSYSTEM, and National Semiconductor.

To simplify the instructions, the example will use National Semiconductor's software for the CP3UB17/CP3CN17 evaluation kit (National_SEK_x_y, where x_y is the version number). The example will use the CP3-DB-xx1x board to download the created hex file.

Project templates for winIDEA are distributed with National Semiconductor's software drivers.

Chapter 2—Setting Up the Demonstration. Describes how to set up the software and hardware for the procedures in the following chapters.

Chapter 3—Creating a New Project. Describes how to copy and modify the template files for compiling the CPDemo project using the IAR tool chain.

Chapter 4—Building the Application. Describes how to build the application, then download and execute it on the evaluation board.

Overview

2 Setting Up the Demonstration

2.1 Software Installation

To run the procedures in this addendum, you will need to have the following software installed:

- National Semiconductor's CP3UB17/CP3CN17 Evaluation Kit version 1.5 or higher (National_SEK_x_y, where x_y is the version number). If you are using another kit, the instructions will indicate where to make changes for your kit. To install the software, follow the instructions in the evaluation kit User's Guide.

- iSYSTEM's winIDEA version 9.4 build 49 or higher. To install the software, follow the instructions in the evaluation kit User's Guide.

- IAR's Embedded Workbench version 1.13 or higher (this can be an evaluation or a licensed version). To install the software, follow the instructions on the IAR CD-ROM.

The procedures in this addendum assume the reader is familiar with the evaluation kit and has worked through the examples in the evaluation kit User's Guide.

2.2 Creating the System Configuration Files

There are configuration settings which must be created before the software development environment can be used. These settings define features of the target configuration, such as the CPU type and board type. Once the settings are created, they are used by the compiler tool chain until they are redefined. The settings are global to all projects, not project-specific.

The settings are not specific to the tool chain. If you have already created these files for the NSC tools, it is not necessary to create them again for the IAR tools.

The Configurator program is a simple utility used to define these settings. This program is located in the executable file at **C:\National_SEK_X_Y\software\tools\bin\ConfigTool.exe**, in which X.Y is the version number of the software release. You can run the utility by selecting the Programs -> National SEK 1.5 -> Configuration Tool command from the Start menu.

After the Configurator program is run, two files are created in **C:\National_SEK_X_Y\software\cp3000\include**, called **settings.h** and **settings.mak**. These files must be created before attempting to compile the example programs.

2.2.1 Running the Configurator Utility

The following procedure selects the configuration settings and saves them in the **settings.h** and **settings.mak** files:

1. **Enter the Config Utility.** Programs -> National SEK 1.5 -> Configuration Tool command from the Start menu. This opens a new window with the view shown below.
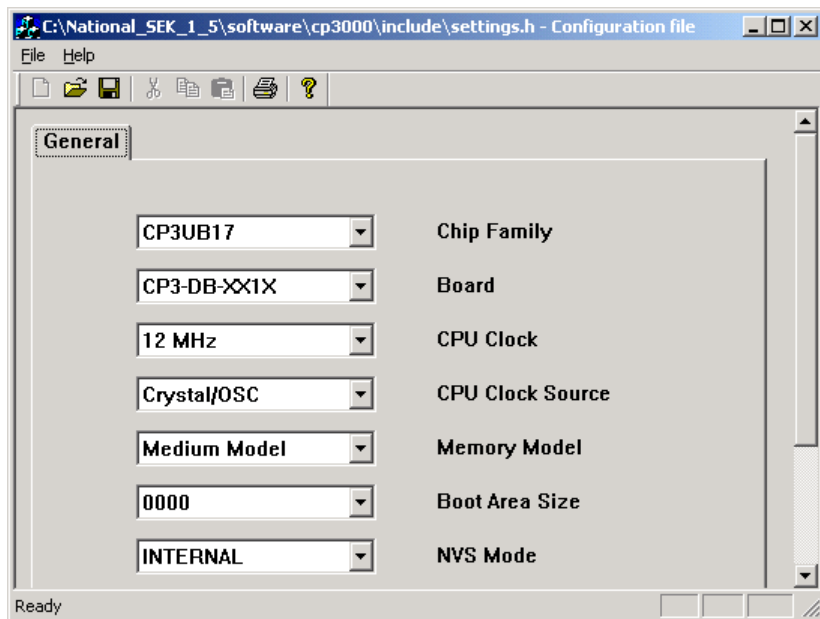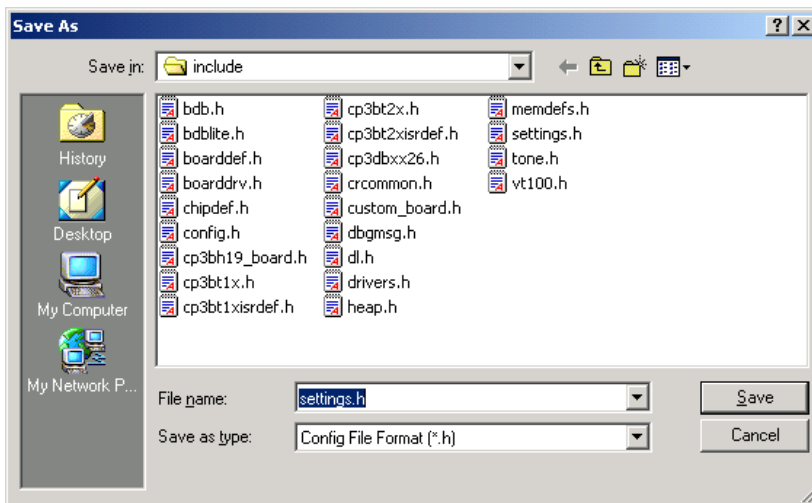

Change any default settings that are different from those shown above.

Setting Up the Demonstration

2. **Select Destination Folder for Saving the settings.h and settings.mak Files.** Select the File -> Save As command, then browse for the **C:\National_SEK_X_Y\software\cp3000\include** folder.

3. **Save the settings.h and settings.mak Files.** Click the Save button.

4. **Exit from ConfigTool.** Select the File -> Exit command.

2.3 Setting Up the Hardware

Figure 2-1 shows the hardware connections between the host PC and the CP3UB17/CP3CN17 Evaluation Board. The hardware configuration is the same as that described in Chapter 5 of the CP3UB17/CP3CN17 Evaluation Kit User's Guide.
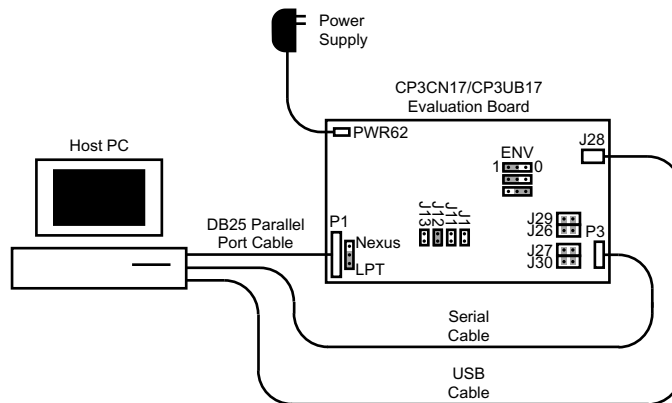

Figure 2-1. Hardware Connections

The following procedure sets up the hardware:

1. **Connect the Parallel Port on the Host PC to the Evaluation Board.** The cable is plugged into the connector for the LPT1 parallel port on the host PC and connector P1 on the evaluation board.

Setting Up the Demonstration

Setting Up the Hardware

2. **Connect a Serial Port on the Host PC to the Evaluation Board.** The cable is plugged into a connector for the COM1 or COM2 serial port on the host PC and connector P3 on the evaluation board.

3. **Connect a USB Port on the Host PC to the Evaluation Board.** The cable is plugged into a connector for a USB port on the host PC and connector J28 on the evaluation board.

4. **Configure the Clock Source Jumpers.** The clock source is controlled by jumpers J1, J11, J12, and J13, as described in Table 12-7. Select the oscillator module by installing jumper J12. Leave jumper positions J1, J11, and J13 empty.

5. **Configure the ENV Jumpers.** Configure the board for ERE mode, in which the on-chip flash memory and external flash memory are enabled. Jumpers J15 (ENV0) and J16 (ENV1) are installed on the 1 side of the jumper block. Jumper J17 (ENV2) is installed on the 0 side.

6. **Enable the Parallel Port Interface.** The connection used for downloading applications to the evaluation board can be the parallel port interface on connector J1 or the Nexus/JTAG interface on connector JP1. Enable the parallel port interface by installing jumper J25 on the LPT side of the jumper block.

7. **Apply Power to the Evaluation Board.** Plug the power supply into an AC outlet, and plug the power cable into connector PWR62 on the evaluation board.

Creating a New Project

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The following procedure creates a new winIDEA project by copying and modifying an existing set of template files:

1. **Browse to the Templates Folder.** After installing the evaluation kit CD-ROM, there will be a folder holding template files for win-IDEA projects. The default path name to the folder will be **C:\National_SEK_X_Y\software\cp3000\templates**, in which X.Y is the version number of the release.

2. **Copy the Template Files.** Copy the template files **template_IAR.jrf** and **template_IAR.QRF** to the folder which holds the CPDemo source files, located at **C:\National_SEK_X_Y\software\cp3000\example\CPDemo\fw**. Rename the template files **CPDemo_IAR.jrf** and **CPDemo_IAR.QRF**.
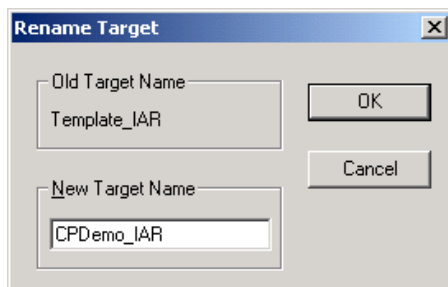
Creating a New Project

3. **Enter winIDEA.** Double-click on **CPDemo_IAR.jrf** to enter winIDEA and open the project template. winIDEA will start up with a view of a blank workspace, as shown below.
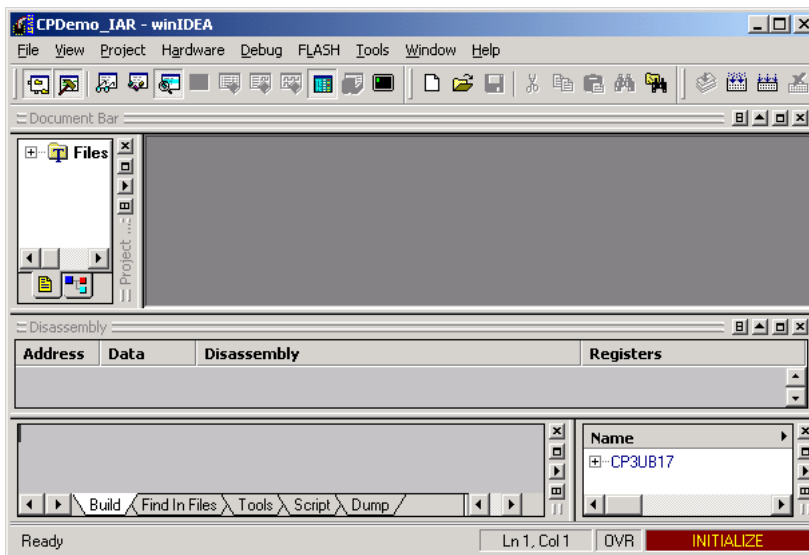
4. **Change the Target.** Select the Project -> Targets command. This brings up a dialog box for changing the compilation target.
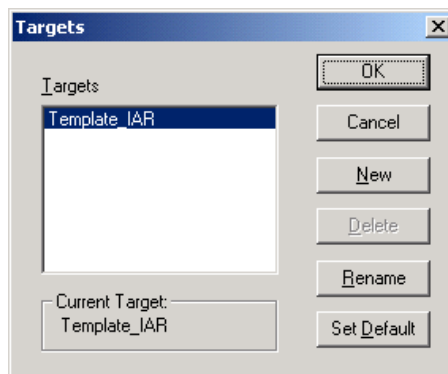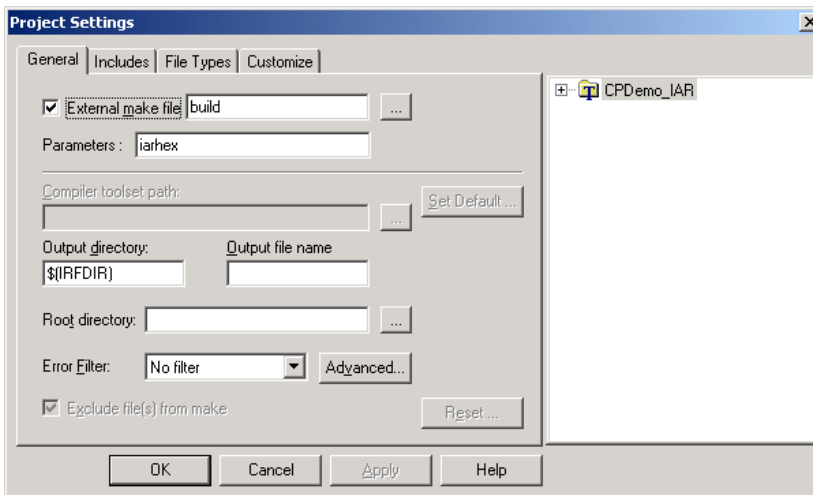

5. **Enter the New Target Name.** Click the Rename button. This brings up a dialog box for entering the new target name. Enter **CPDemo_IAR**, then click the OK button.

After returning to the Targets dialog box, click the OK button to proceed.

Creating a New Project

6. **Review the Project Settings.** Select the Project -> Settings command. This brings up the general project settings.

The **iarhex** setting in the Parameter box is passed to an external makefile to control the compilation. Defined settings are:

Parameter	Description
iarhex	Generate Intel hex format output (**.hex** file).
iar	Generate UBROF8 format output (**.dbg** file).
clean	Remove output files from project directory.
clobber	Remove output files from all directories.

7. **Edit the Search Path.** Click on the Customize tab. This brings up a view which shows the search path used by winIDEA.
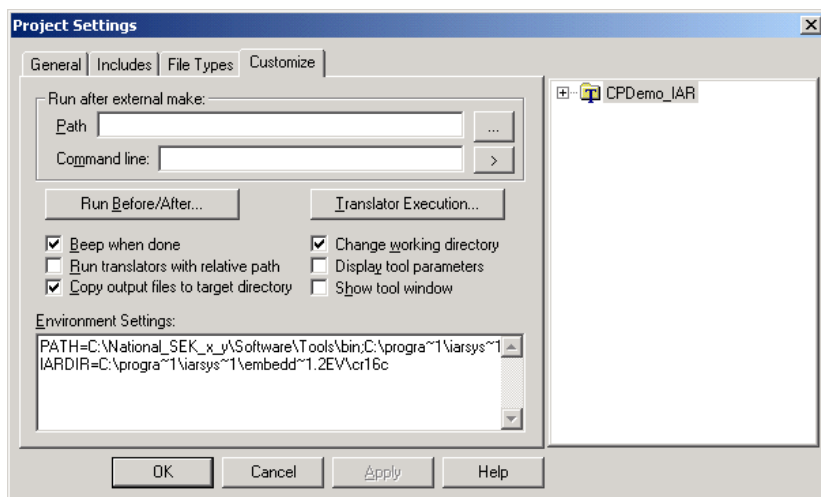

Edit the part of the search path which includes the release version (**National_SEK_x_y**) to match the file names used in your software installation. For example, for release 1.5, change this part to **National_SEK_1_5**. The search path is used to access the folders listed below. Click the OK button to proceed.

| Folder	Description
C:\National_SEK_1_5\software\tools\bin	Utilities (e.g. make)
C:\progra~1\iarsys~1\embedd~1.2EV\cr16c\bin	Compiler and assembler
C:\progra~1\iarsys~1\embedd~1.2EV\common\bin	Linker
C:\progra~1\iarsys~1\embedd~1.2EV\cr16c	Standard libraries

Creating a New Project

The previous example showed the search path used for the evaluation version of the IAR tool chain. If you install a licensed version, the search path you must specify in the Project Settings dialog box is slightly different, as shown below.
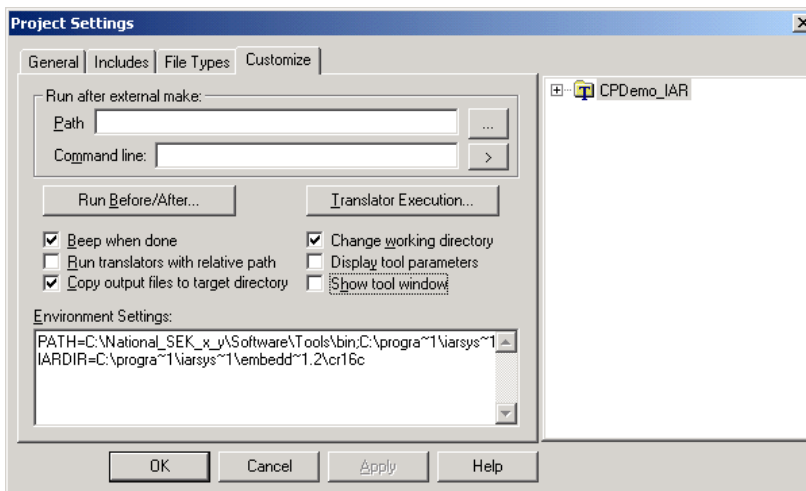
The folders accessed using the search paths in the Project Settings are listed below:

Folder	Description
C:\National_SEK_1_5\software\tools\bin	Utilities (e.g. make)
C:\progra~1\iarsys~1\embedd~1.2\cr16c\bin	Compiler and assembler
C:\progra~1\iarsys~1\embedd~1.2\common\bin	Linker
C:\progra~1\iarsys~1\embedd~1.2\cr16c	Standard libraries

8. **Add Source Files.** Select the Project -> Project Files command. This brings up a dialog box for selecting source files to add to the project. Select the **CPDemo.c** file as shown below, then click the OK button to proceed.
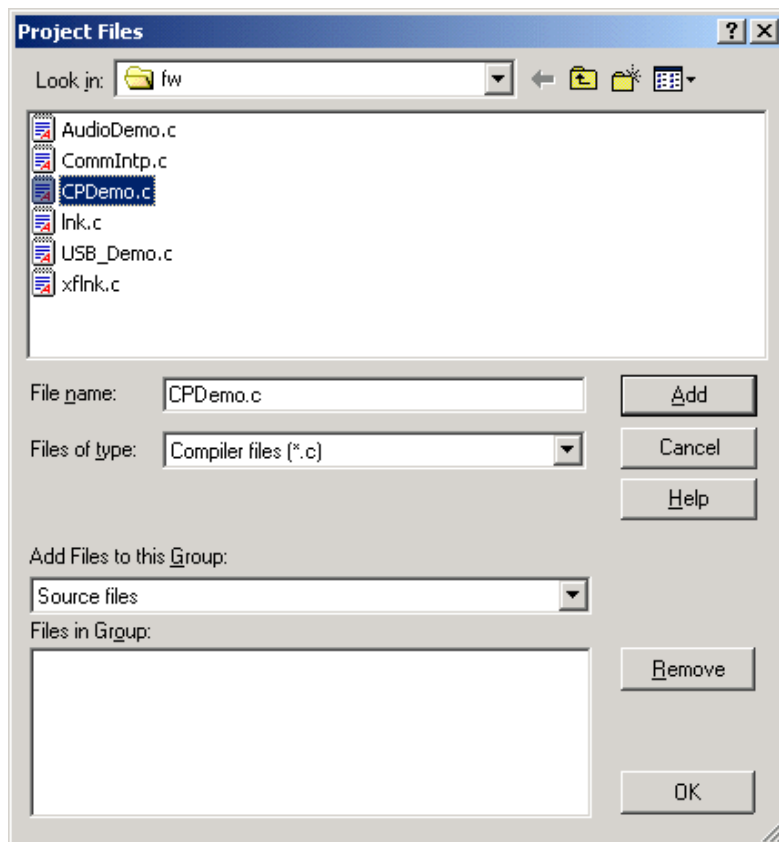
Creating a New Project

9. **Save Project Files.** Select the File -> Save All command to save the project files.
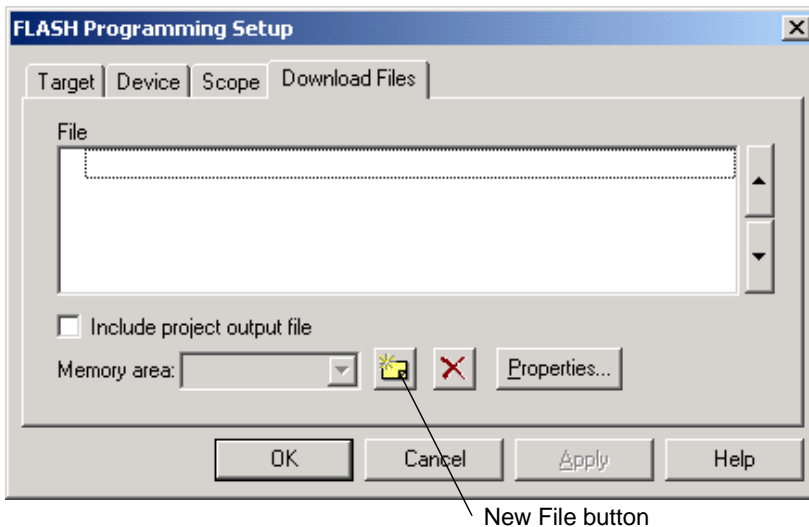
Building the Application

<div style="text-align: right">4</div>

The following procedure builds the executable file for the application, then downloads and executes it on the evaluation board:

1. **Build the Application.** Select the Project -> Make command (or hit the F7 function key) to compile and build the application. If the application was successfully built, several new files will appear in the project directory. **CPDemoIARXF.hex** is the executable file that can be downloaded to the evaluation board. This file contains the code for downloading to both the external flash memory and the on-chip flash memory. winIDEA allows specifying separate files for the external and on-chip flash memories, but in this example, **CPDemoIARXF.hex** is specified for both.

Building the Application

2. **Specify an External Flash Download File.** To specify the download file for the external flash memory, select the FLASH -> Setup command. In the dialog box that comes up, click on the Download Files tab, and then click on the New File button.

New File button

3. **Select the CPDemoIARXF.hex File.** Browse for the **CPDe-moIARXF.hex** file, select it, and then click on the Open button.
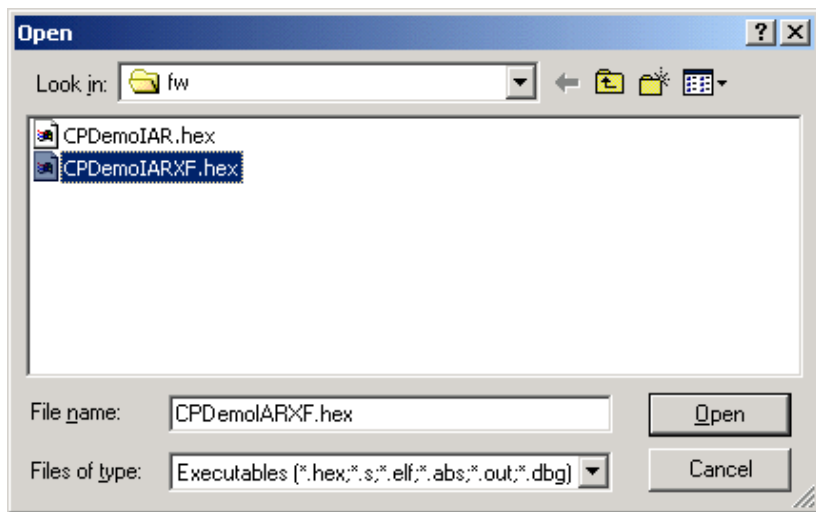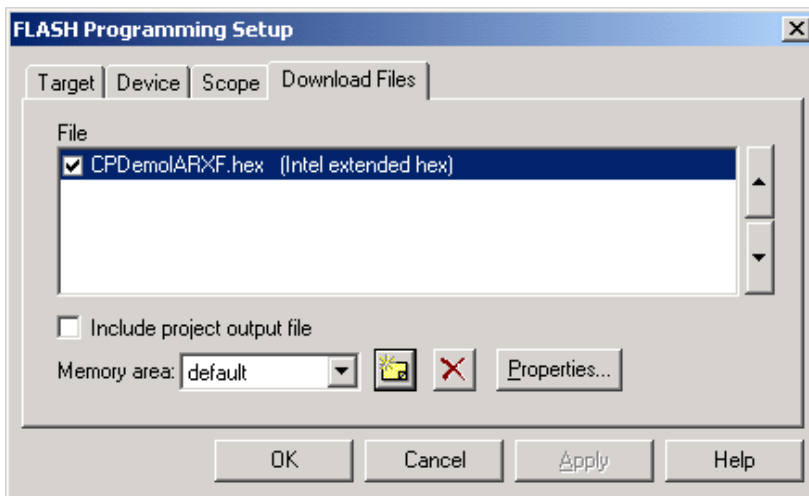

The **CPDemoIAR.hex** file only contains code for the on-chip flash memory, so it may be ignored.

Building the Application

4. **Click Through the Dialog Boxes.** After clicking the Open button, the Hex File Options dialog box will appear. Dismiss it by clicking the OK button.
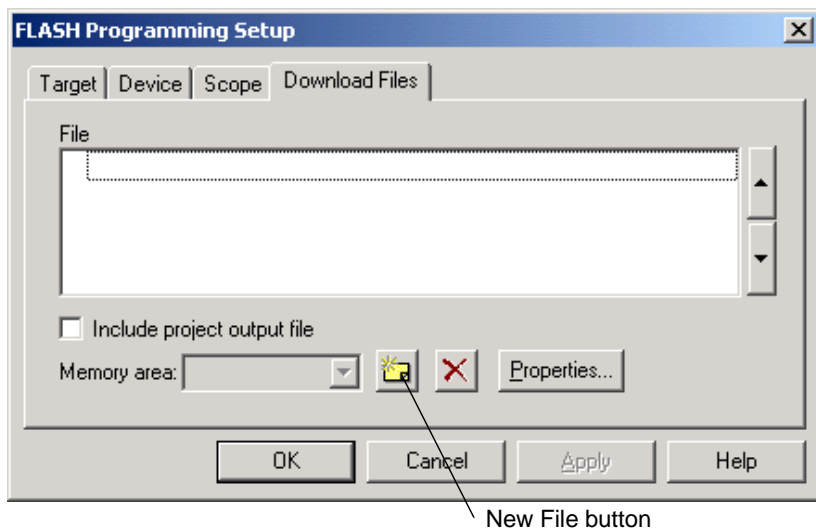
After dismissing the Hex File Options dialog box, the Download File Options dialog box will be in front. Dismiss it by clicking the OK button.

The FLASH Programming Setup dialog box will now be in front, and the **CPDemoIARXF.hex** file will be selected.


Dismiss the FLASH Programming Setup dialog box by clicking the OK button.

5. **Specify an On-Chip Flash Download File.** To specify the download file for the on-chip flash memory, select the Debug -> Files for Download command. In the dialog box that comes up, click on the New File button.


New File button

Building the Application

6. **Select the CPDemoIARXF.hex File.** Select the **CPDe-moIARXF.hex** file, and click on the Open button.
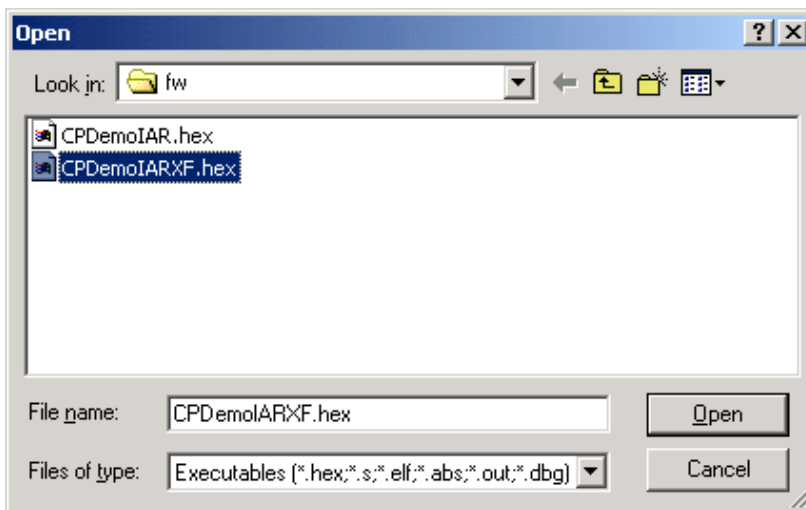
7. **Click Through the Dialog Boxes.** After clicking the Open button, the Hex File Options dialog box will appear. Dismiss it by clicking the OK button.

After dismissing the Hex File Options dialog box, the Download File Options dialog box will be in front. Dismiss it by clicking the OK button.

The Download dialog box will now be in front, and the **CPDemoIARXF.hex** file will be selected.
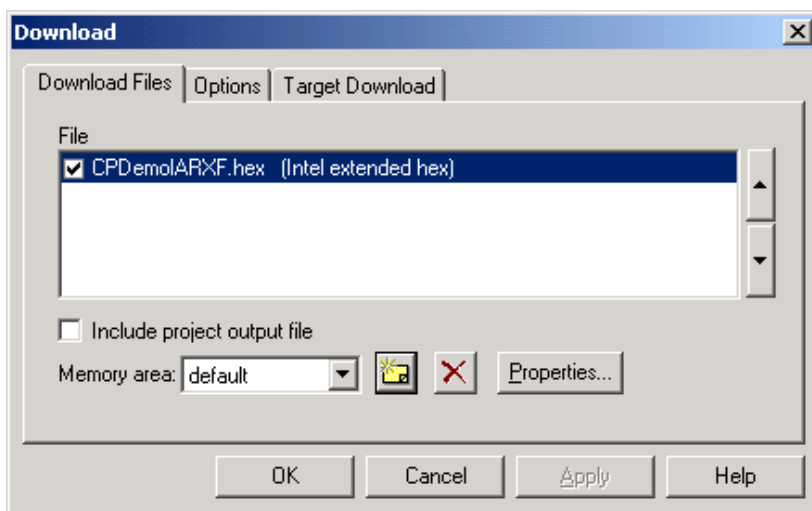
Dismiss the Download dialog box by clicking the OK button. At this point, the **CPDemoIARXF.hex** file has been specified as the download file for both the external and on-chip flash memories.

Building the Application

8. **Download Code to the Flash Memories.** Select the Debug -> Download command to download the application code to both the external and on-chip flash memories. This will take several seconds, during which a few windows will appear to inform you of the progress of the download.
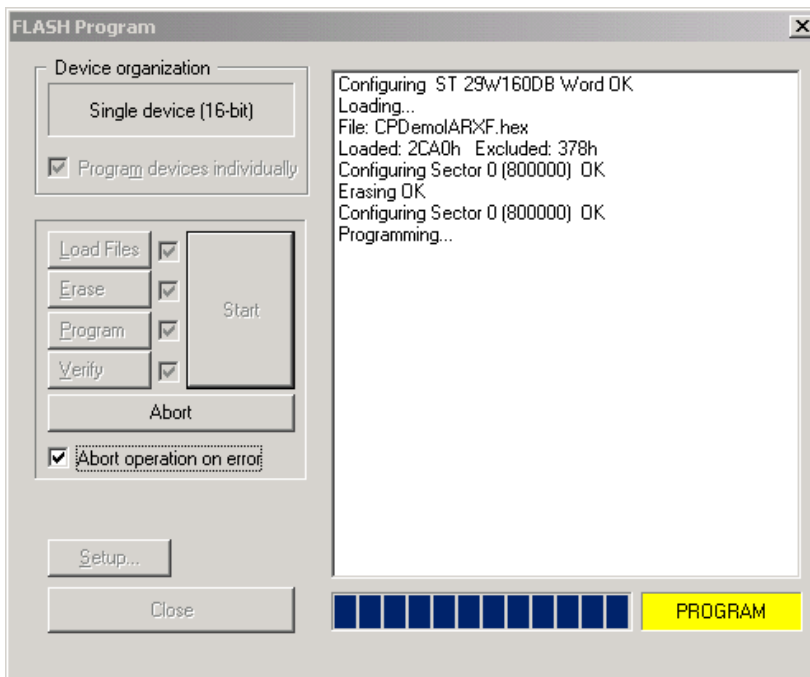
9. **Execute the Application.** Select the Debug -> Reset and Run command to execute the application on the evaluation board. LD1 and LD2 on the evaluation board will begin flashing, and the application can now communicate over a serial line to the demo software (**CPDemo.exe**) running on the host PC.

Building the Application

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