

Multiple Target Features Using CodeWarrior

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1. Abstract

One of the benefits of the Software Development Kit (SDK) for Motorola's Digital Signal Processor (DSP) family of processors is its flexibility. The SDK provides Stationery (templates) to address External RAM and Flash. However, templates to address new product hardware may be required and can be developed using tools in CodeWarrior. This document details the steps required to create a new build target.

There are two meanings for the term "target", as used by CodeWarrior:

A **build target** is a particular collection of settings and files that determines the content of your code and the process in which the code is compiled and linked into the final output.

A **platform target** is the processor or operating system for which you are writing code, represented as the choice of linker specified in the build target settings panel.

In this document, the term "target" refers to a build target.

2. Introduction

This application note details how to create the new Stationery and build target for a prototype product configuration, possibly differing in software, hardware, or both, from the *Flash* and the *External RAM* build targets supplied with standard SDK build Stationery. The new build target, *proto*, is in addition to the existing build targets defined in the Stationery.

These are the tasks required to add multiple varied build targets:

1. The Stationery must be expanded

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2. The new build target is added
3. The settings of the new build target are edited to differentiate it from the other build targets' settings, so it evolves separately as development of the prototype progresses
4. The new Stationery is related to the project file structure
5. The *BuildAll* target is updated

A step-by-step, illustrated procedure follows.

Prior to undertaking this procedure, back up the contents of the directory:

C:\Program Files\Metrowerks\CodeWarrior\Stationery\Embedded SDK\dsp56805evm\nos

After completion of the procedure, back up the new contents in a separate place so that in the event of a subsequent installation of Metrowerks or the SDK, there is no possibility of lost work.

3. Expand Stationery

Project Stationery is a write-protected model project copied into a new project area. The Stationery is supplied with the SDK, but located in the Metrowerks' program area. When a new project is created with CodeWarrior, a prompt to select Stationery automatically appears.

In this first section, the Stationery supplied with SDK in the Metrowerks' directories is expanded for the new build target, *proto*. In the following, ... *nos* stands for:

C:\Program Files\Metrowerks\CodeWarrior\Stationery\Embedded SDK\dsp56805evm\nos

This file address will differ if CodeWarrior is not installed in the default location.

The new Stationery is named *ER_and_Fl_and_proto_Application*, and is designed to support three build targets:

- ER = External RAM
- Fl = Flash
- Proto = Prototype System

♦ Copy the folder:

..*nos*\ExtRam_and_Flash_Application

to:

..*nos*\ER_and_Fl_and_proto_Application

Note: After copying the folder, make the new folder and its contents read/write access using a dos window and the attrib command, or ask your system administrator for assistance. These new files are modified to suit the prototype needs. **Figure 1** illustrates the new folder, *ER_and_Fl_and_proto_Application*.

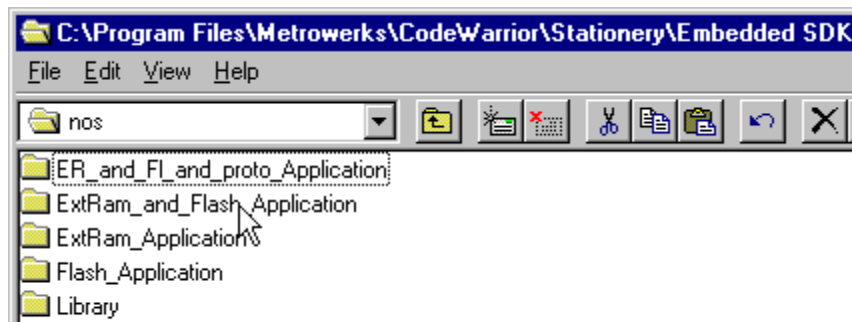


Figure 1. ER_and_Fl_and_proto_Application

- ◆ Copy the folder:

`..nos\ER_and_Fl_and_proto_Application\configextram`

to:

`..nos\ER_and_Fl_and_proto_Application\configproto`

This procedure provides the *proto* application an identical configuration to the External RAM build target settings. The new *proto* build target settings will be changed as required in the *configproto* folder. Figure 2 illustrates the new folder, *configproto*. The Stationery has been expanded with another available selection.

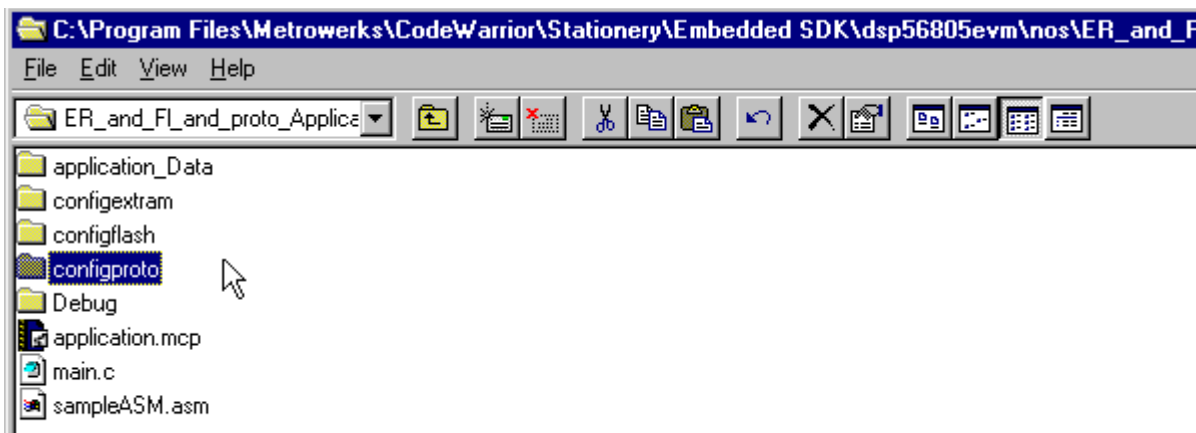


Figure 2. configproto

4. Add a New Build Target

Using the newly-defined Stationery, a new build target will be delineated for the prototype system. Initially, this build target will be similar to the External RAM build target.

- ◆ Create a folder on the desktop to house this demonstration project creation and name it *an_app*
- ◆ Using the Windows Start button, launch CodeWarrior through the Motorola Embedded SDK tree
- ◆ In Metrowerks' CodeWarrior program, click **New** on the **File** menu, as shown in **Figure 3**

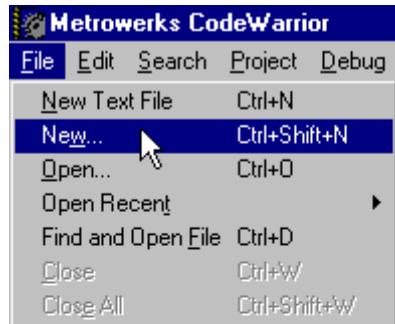


Figure 3. New Project File

Once the **New** selection is made, CodeWarrior will offer a choice of Stationery, overviewed in **Figure 4**.

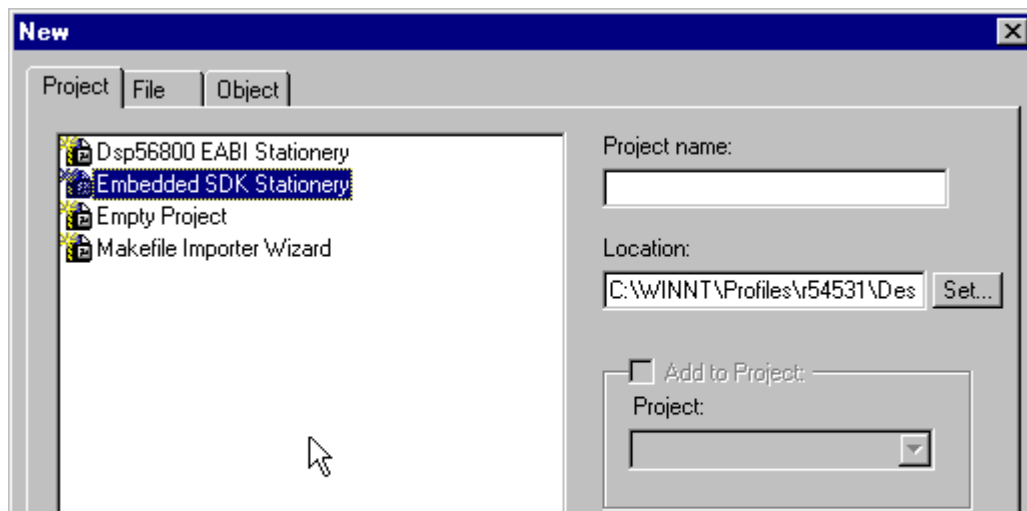


Figure 4. CodeWarrior Stationery Categories

- ◆ In the *New* screen, click **Embedded SDK Stationery**
- ◆ Click the **Set** button to browse the desktop
- ◆ Locate the *an_app* folder, **Figure 5**, which will house the new project

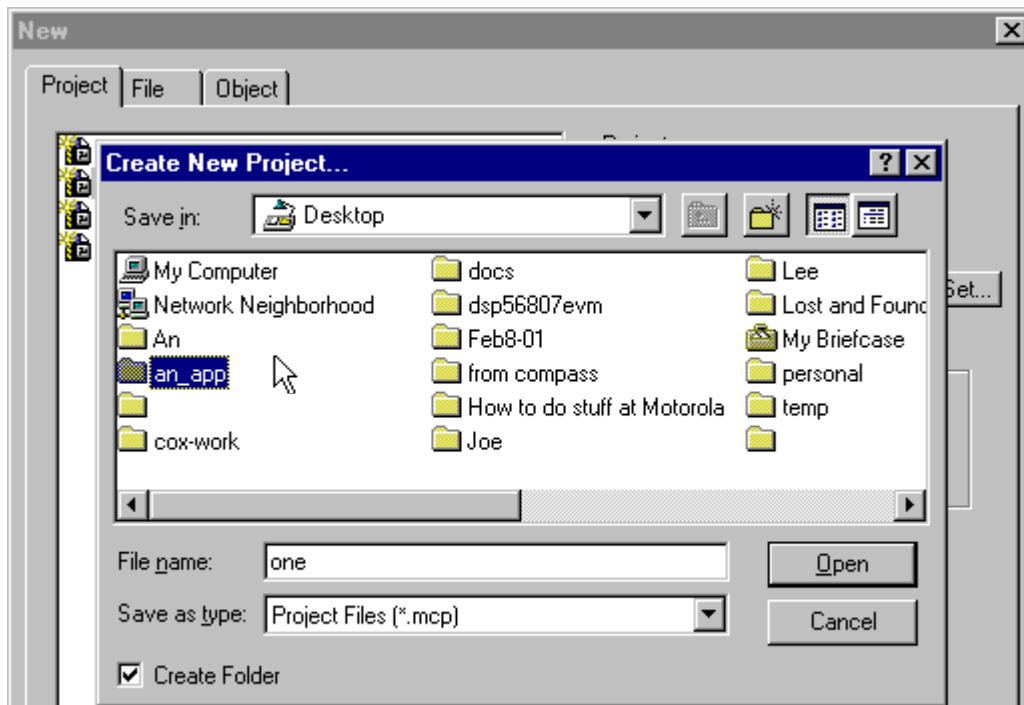


Figure 5. Name the New Project

- ◆ Name the project file *one*, as shown in [Figure 5](#)
- ◆ Click the *Open* button; the file name becomes the project name. See [Figure 6](#).

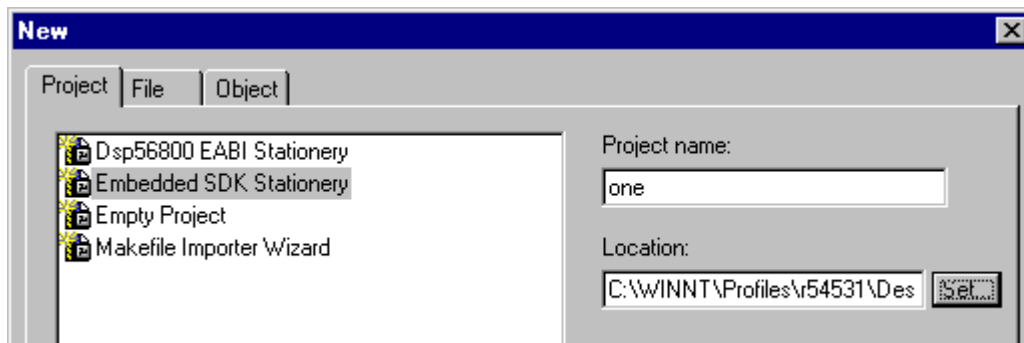


Figure 6. Project Name Appears

The project name and its location will now appear as illustrated in [Figure 6](#).

- ◆ Click OK; the new “project window” appears
- ◆ Click **DSP805EVM** at the plus sign
- ◆ Click **nos** at the plus sign, revealing choices for Stationery, as illustrated in [Figure 7](#)

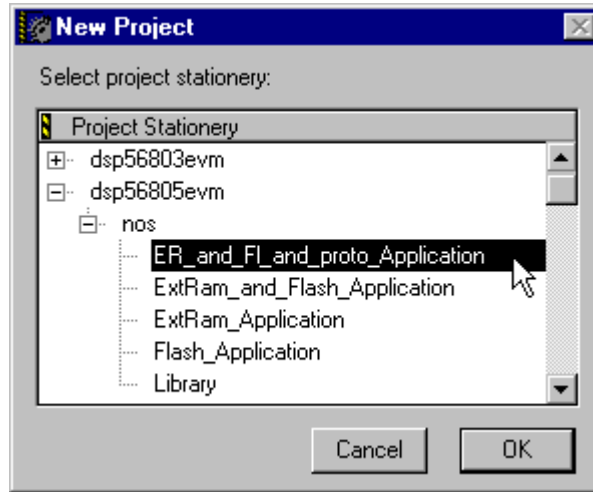


Figure 7. Select Stationery Created Earlier in the Paper

- ◆ Click the newly-created Stationery, illustrated in [Figure 7](#)
- ◆ Click **OK** in the *New Project* screen. A new project window, *one.mcp*, will appear, displaying one of the selected build targets; in this case, *External RAM*. See [Figure 8](#).

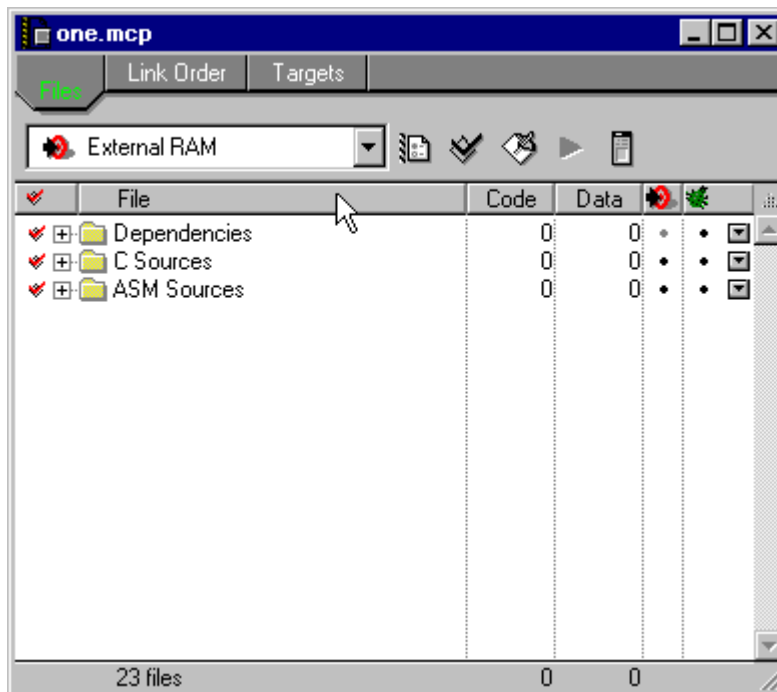


Figure 8. *one.mcp* Project Window

To see other possible build targets defined:

- ◆ Open the *Target* pop-up menu, as illustrated in **Figure 9**

Note: There is no build target yet defined for *proto*; other build targets are *Flash* and *BuildAll*.

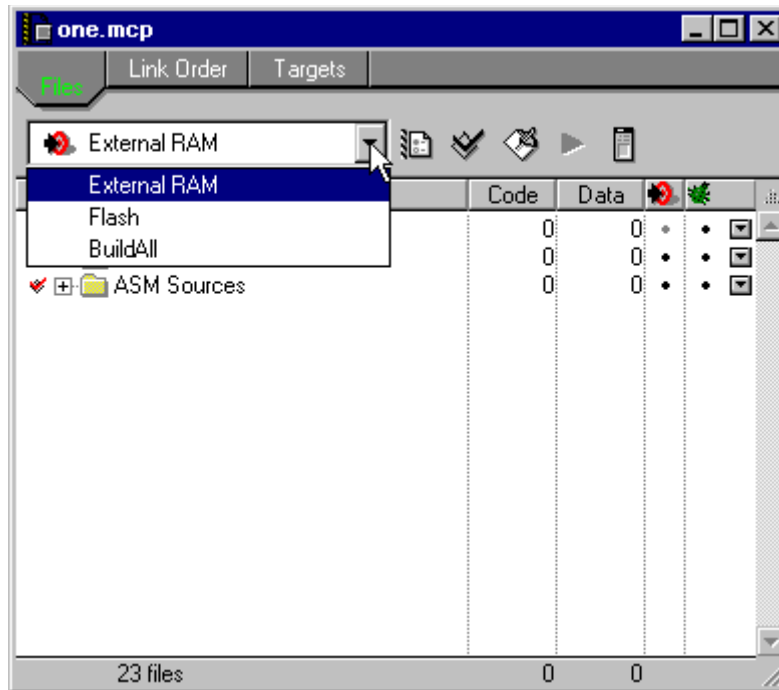


Figure 9. Target Pop-Up Menu

- ◆ *BuildAll* creates both *Flash* and *External RAM*. A new build target called *proto* will be added next. Then *BuildAll* will be modified to build the *proto* build target.

To generate the *proto* build target, follow the procedure in the CodeWarrior Help Section “Create Targets”. To do this:

- ◆ Click the *Targets* tab of the *one.mcp* screen; see [Figure 10](#)

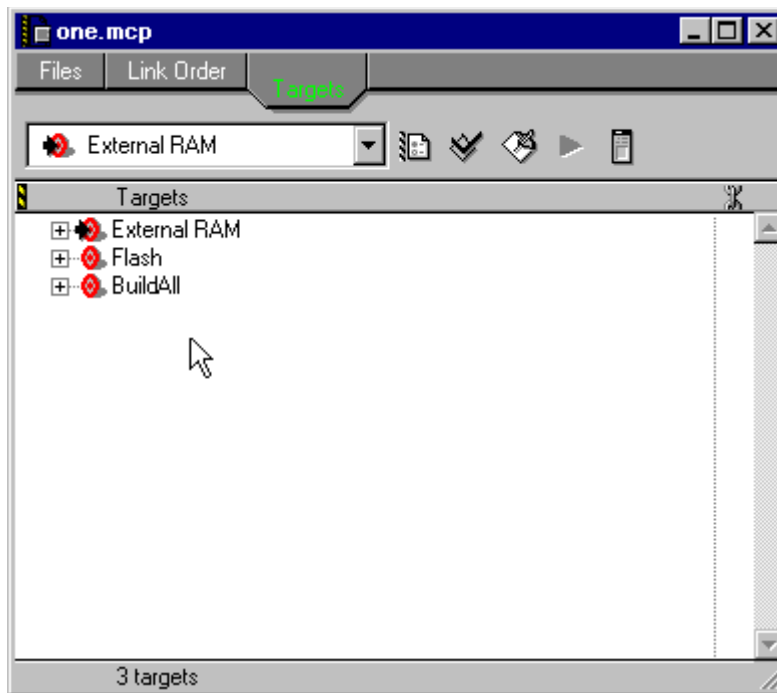


Figure 10. Targets Tab Contents

The build targets shown are:

- *External RAM*
- *Flash*
- *BuildAll*

Targets will appear toward the right in the screen. Under the CodeWarrior Project pull-down menu,

- ◆ Click *Create New Target*; see [Figure 11](#)

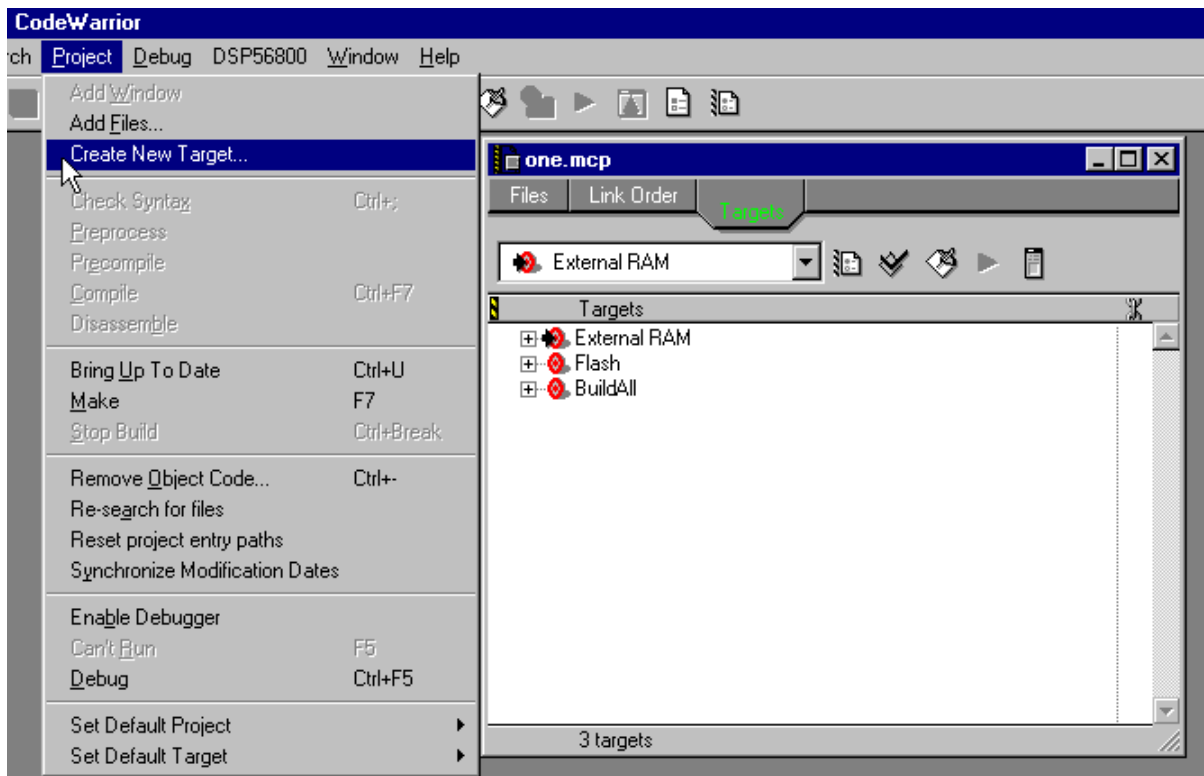


Figure 11. Create a New Build Target

When a new build target is requested, CodeWarrior provides a pop-up box, called New Target, with a field for the build target's name. **Figure 12** illustrates an empty target, currently selected, and an existing target, *External RAM*, to be cloned. New projects often evolve from existing projects.

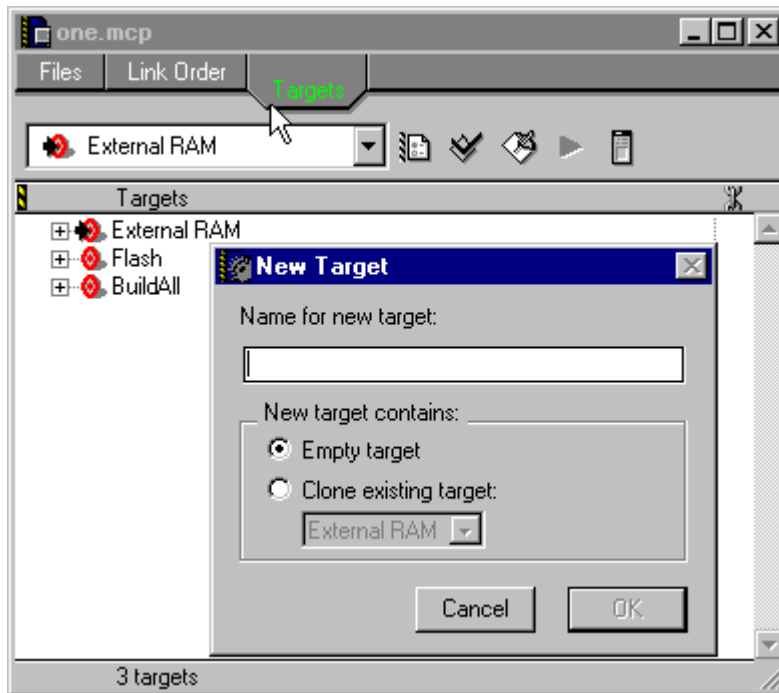


Figure 12. New Target Pop-Up Box

To clone a new target from the *External RAM* target, type the new build target's name, *proto*, in the *Name for new target* field in the *New Target* box and click *Clone existing target*. See [Figure 13](#). The *proto* target will initially have all the settings and features of the *External RAM* target.

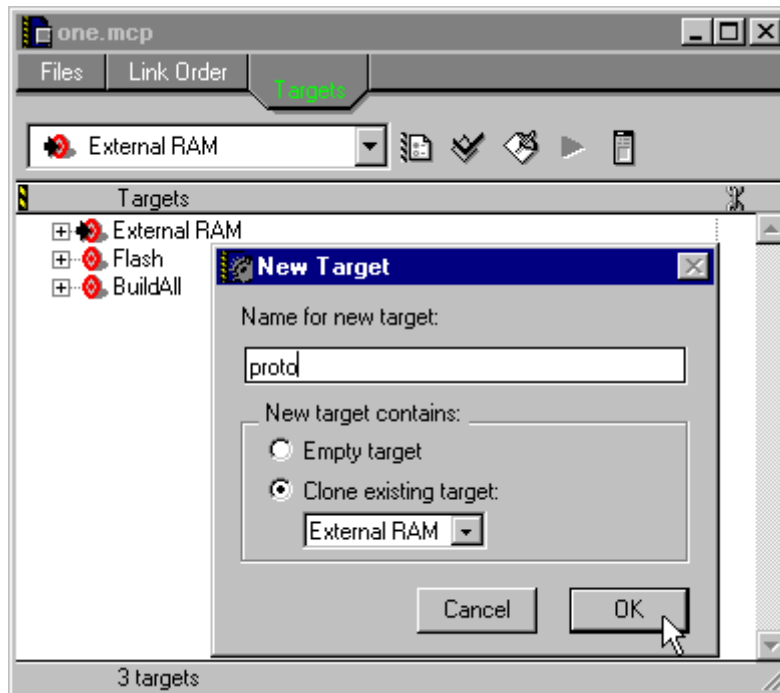


Figure 13. Naming a New Target and Cloning an Existing Target

A new build target choice, *proto*, will appear in the *one.mcp* screen; refer to [Figure 14](#). Of course, this build target is not actually new, because it is a clone of the *External RAM* build target. To insure the build target will run on the prototype board, customize the new build target clone to use the prototype configuration.

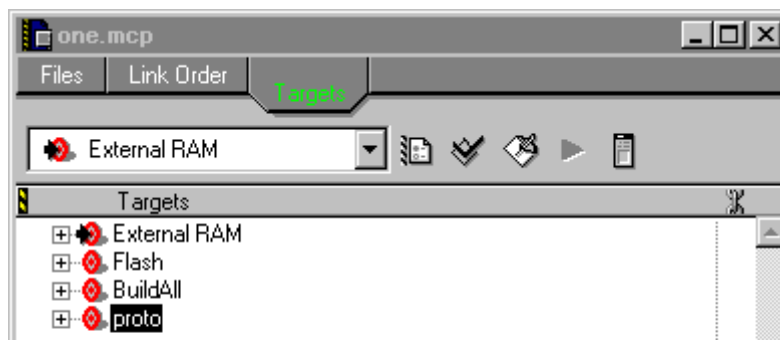


Figure 14. A New Target, *proto*

5. Edit Prototype Build Target Settings

To edit the settings for the new build target, *proto*:

- ◆ In the *one.mcp* screen, select *proto* under *Targets*
- ◆ A new choice, *proto Settings*, appears in the Metrowerks' CodeWarrior *Edit* menu, as shown in [Figure 15](#); this choice allows edits of settings for the new *proto* build target

Note: This is an important step, because it allows *proto* to differ from the clone that produced it, *External RAM*. If no changes were made to *proto*'s settings, *proto* would create the same build target from the same files as the *External RAM* build target.

- ◆ In the **Edit** menu of CodeWarrior, click *proto Settings...* as illustrated in [Figure 15](#)

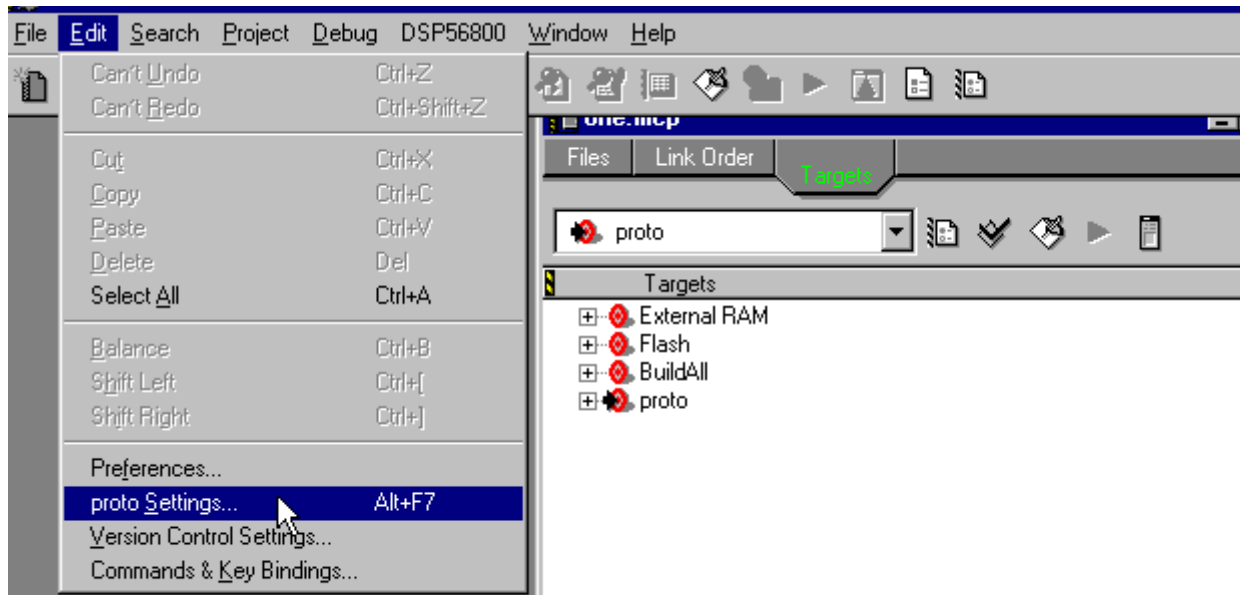


Figure 15. Click proto Settings

Note: The new choice in the *Edit* menu, *proto Settings*, is provided because *proto* is being targeted in the *one.mcp* screen. The *Edit* menu would have provided a different choice if another build target were selected; e.g., *Flash Settings* had the *Flash* build target been selected.

- ◆ When the box *proto Settings* appears, shown in **Figure 16**, select *Target Settings* from the *Target Settings Panels* and click the desired access path

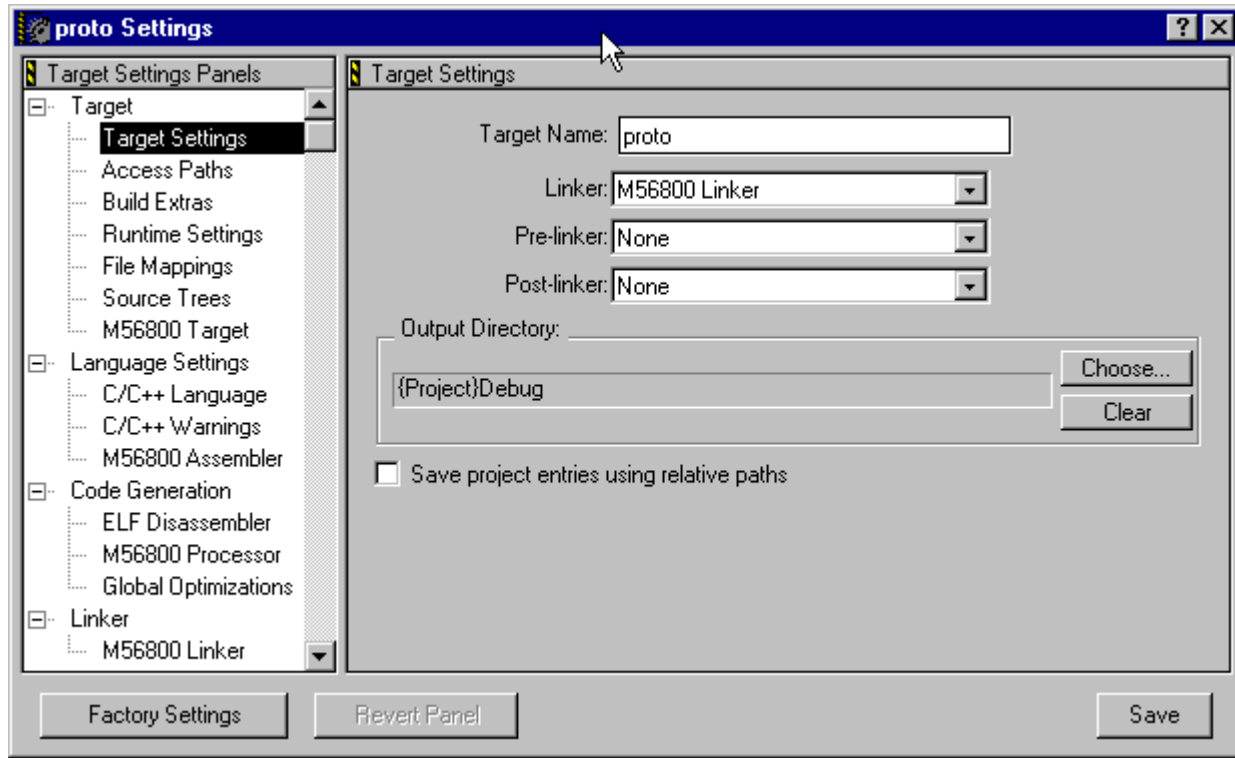


Figure 16. proto Settings Box

Use the new configuration files from the new portion of the project Stationery created earlier for the prototype build target. Refer to [Figure 16](#).

Note: The selected new build target is indicated in the *one.mcp* screen as *proto*. This agrees with the left side of the screen, indicating operation on the *proto* build target.

As shown in [Figure 17](#), the *Add...* button is located at the bottom of the *proto Settings* screen.

◆ Click *Add...* to add the *configproto* access path relative to the project. The prototype configuration is the local project.

These files may be modified to fit the prototype, after the prototype build target is tested in the External RAM of the EVM.

◆ Add the config files to this target so it can use them instead of other versions of the files with the same file name. These configuration files are part of the Stationery and are named:

- *linker.cmd*
- *appconfig.c*
- *appconfig.h*

Files *must* be named identically to those above in the *configproto*, *configextram*, and *configflash* build directories. The files are tailored for each of the three build targets:

- *proto*
- *extram*
- *flash*

◆ Click **OK** in the window named *Please Select an Access Path*

A new directory, *configproto*, will appear, illustrated in [Figure 17](#).

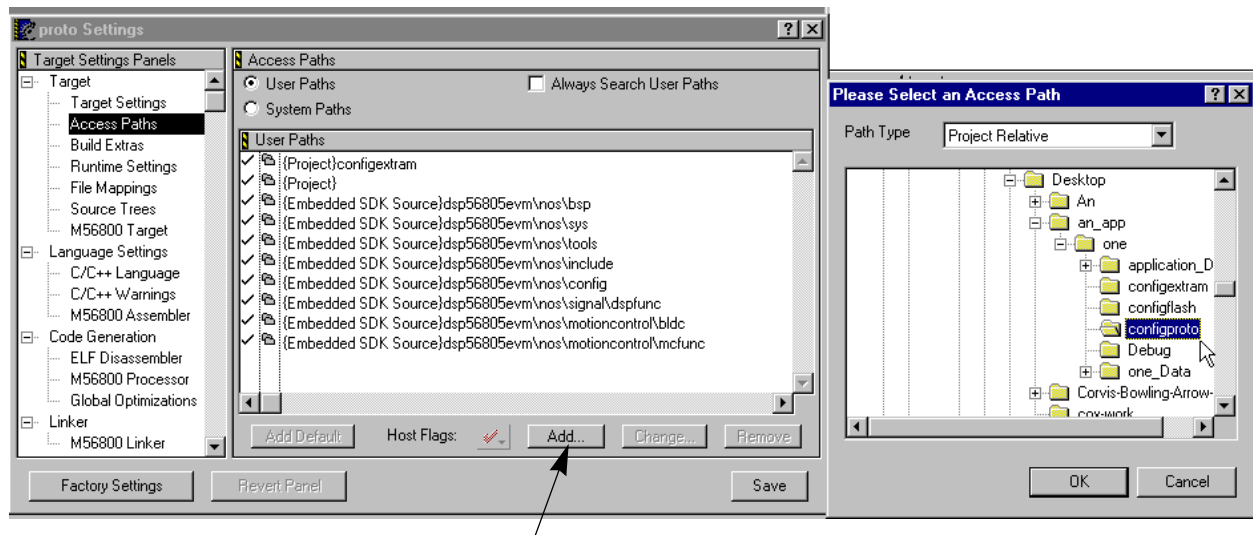


Figure 17. *configproto* Access Path

◆ Find **{Project}configproto**, the last directory under *User Paths* in the *proto Settings* window shown in [Figure 18](#)

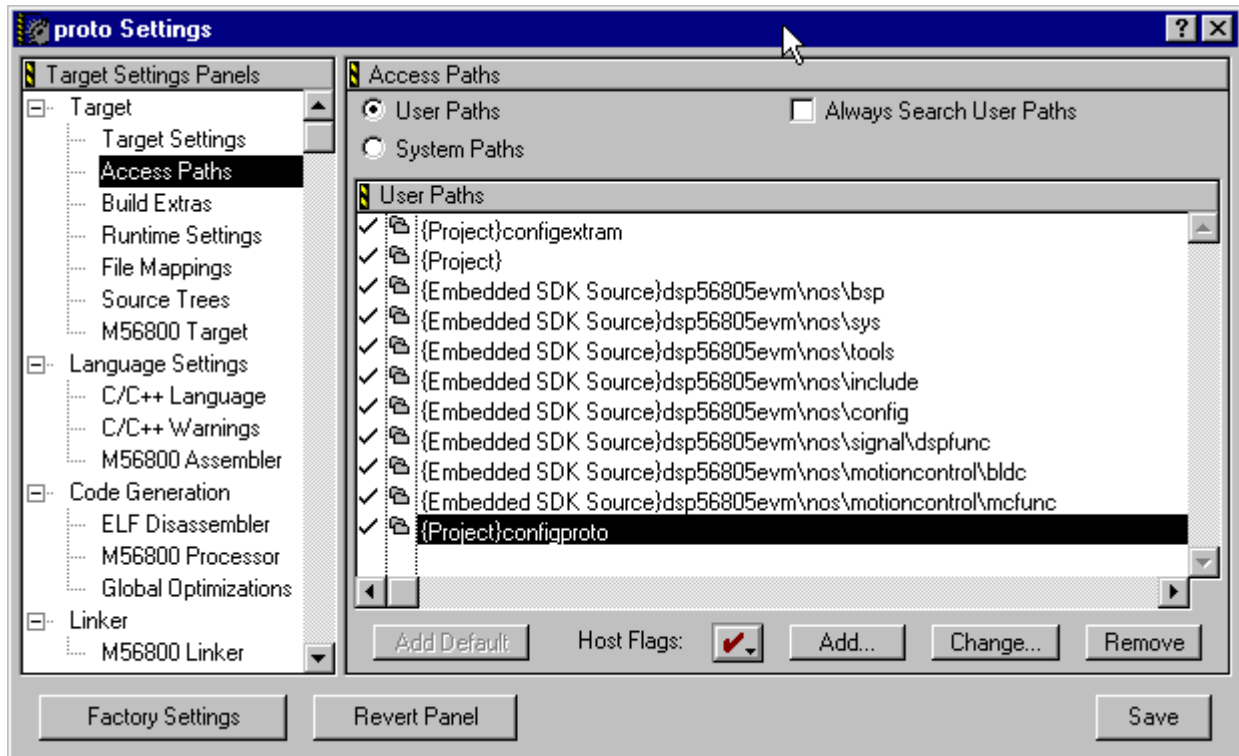


Figure 18. {Project} configproto Before Move

- ◆ Drag and drop the **{Project}configproto** to the top of the list under Access Path, illustrated in [Figure 19](#).

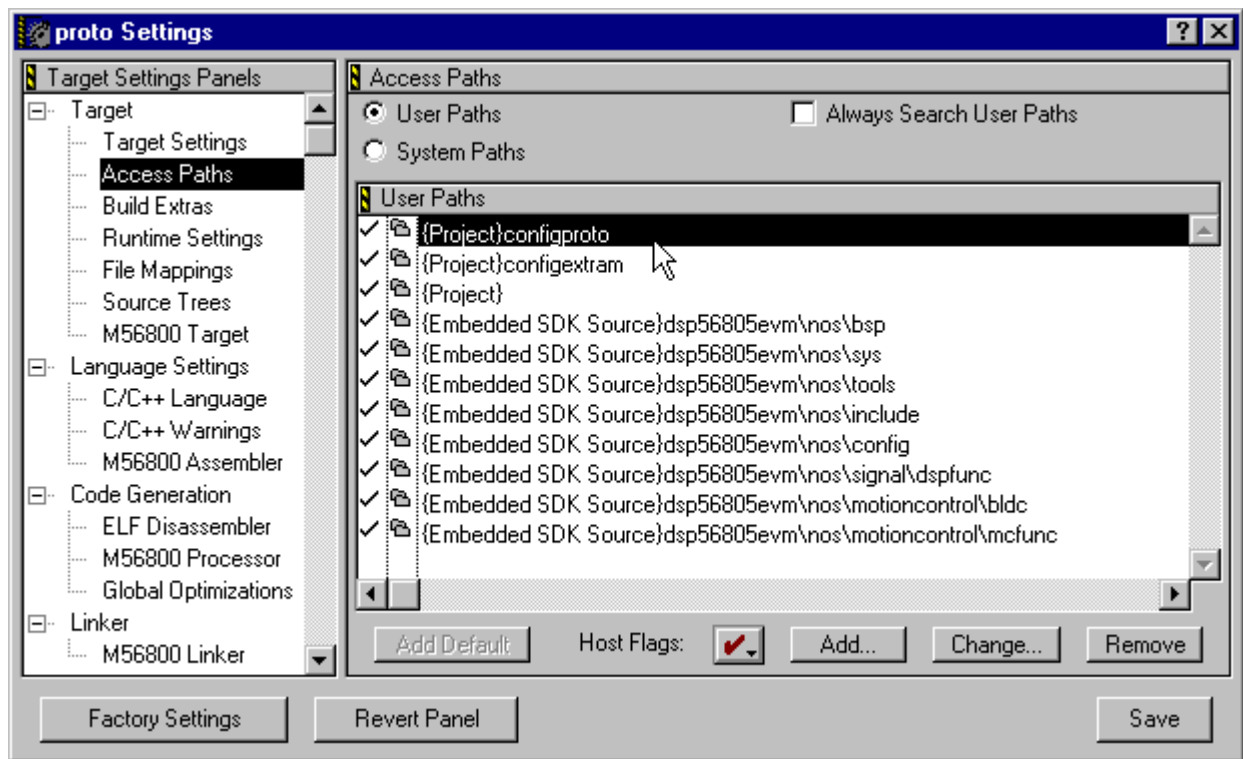


Figure 19. {Project} configproto After Move

- ◆ Click *M56800 Target* and overwrite the External RAM elf file name. The Output File Name, as shown in [Figure 20](#), must be changed from *ExtRam.elf*.

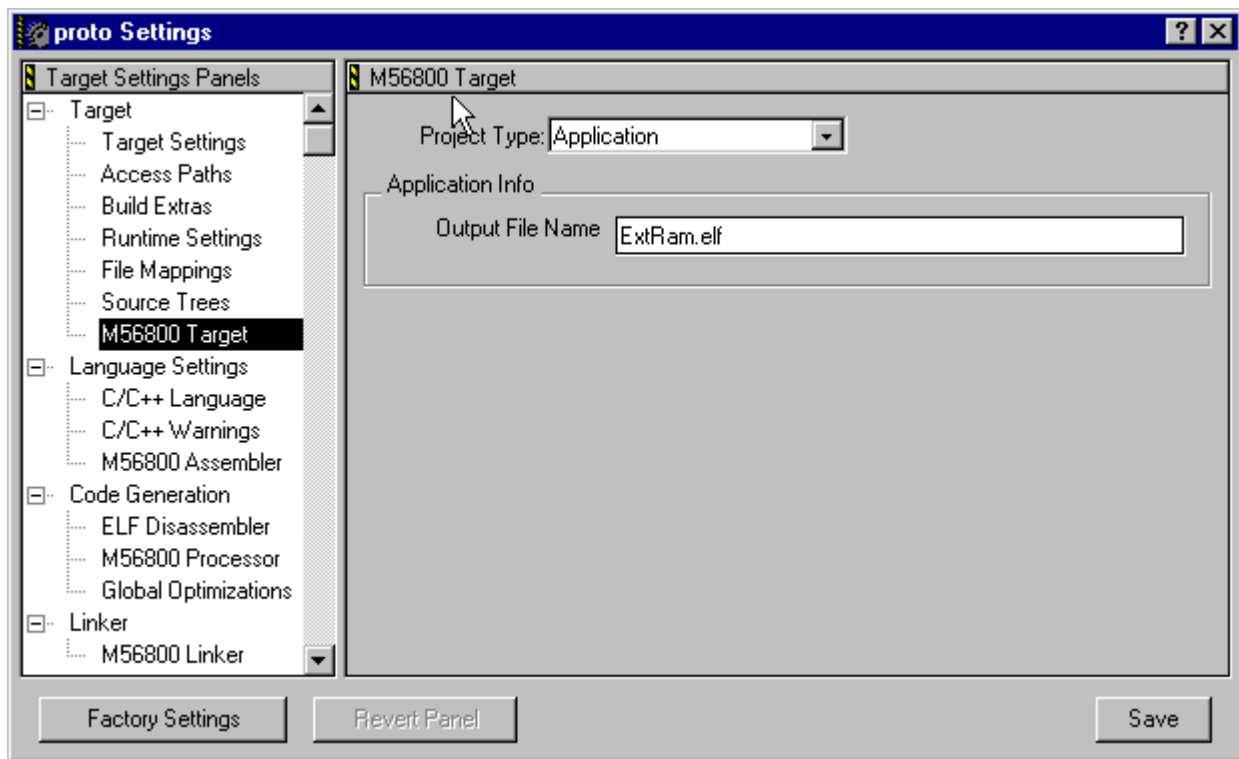


Figure 20. Proto Settings Output File Name Before Name Change

- ◆ Rename the file *proto.elf*; refer to [Figure 21](#)

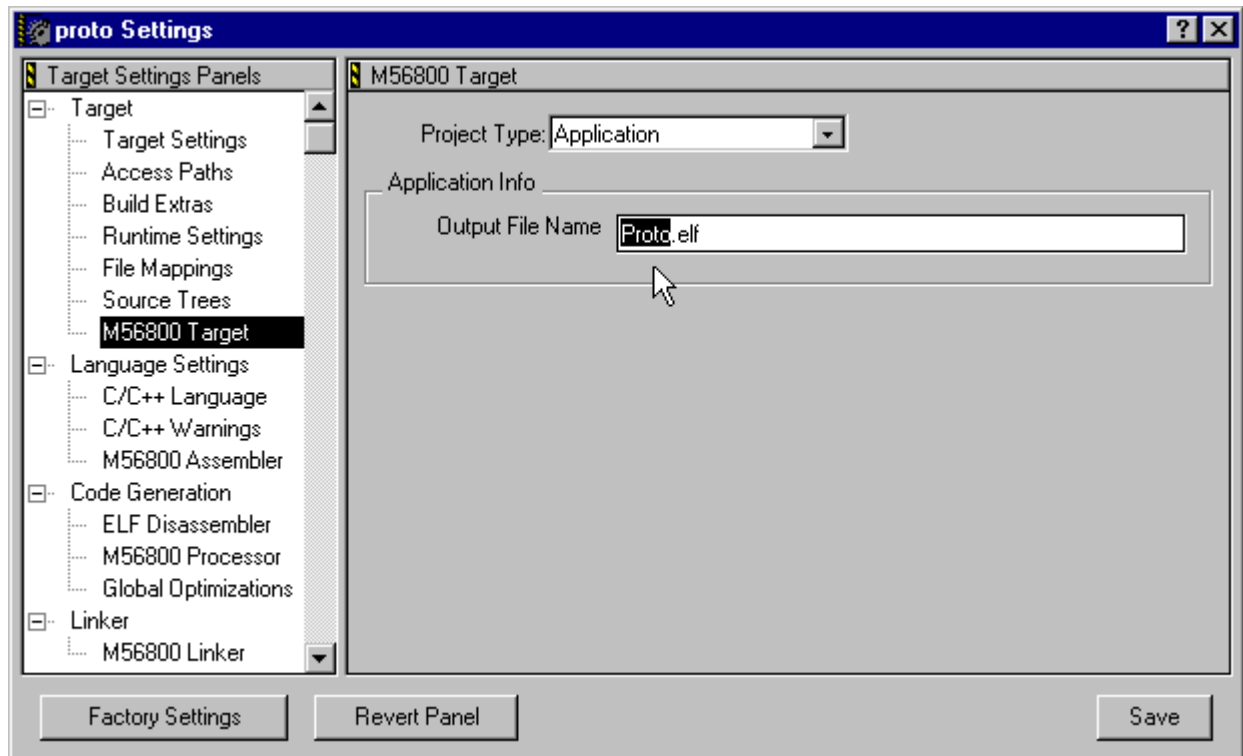


Figure 21. proto Settings Output File Name After Name Change

- ◆ Click **Save** to save the settings for *proto*

Compare [Figure 20](#) and [Figure 21](#).

The new *proto* target is created.

6. Relate New Build Target to Project Files

The Files tab under the *one.mcp* screen now has three files and three copies of the configuration files, instead of two. One of the new sets is for the new target, *proto*. It's important to differentiate among the files because they all have the same name, but without individual, specific paths. As shown in [Figure 22](#), it's difficult to know where the files reside or even which file is which.

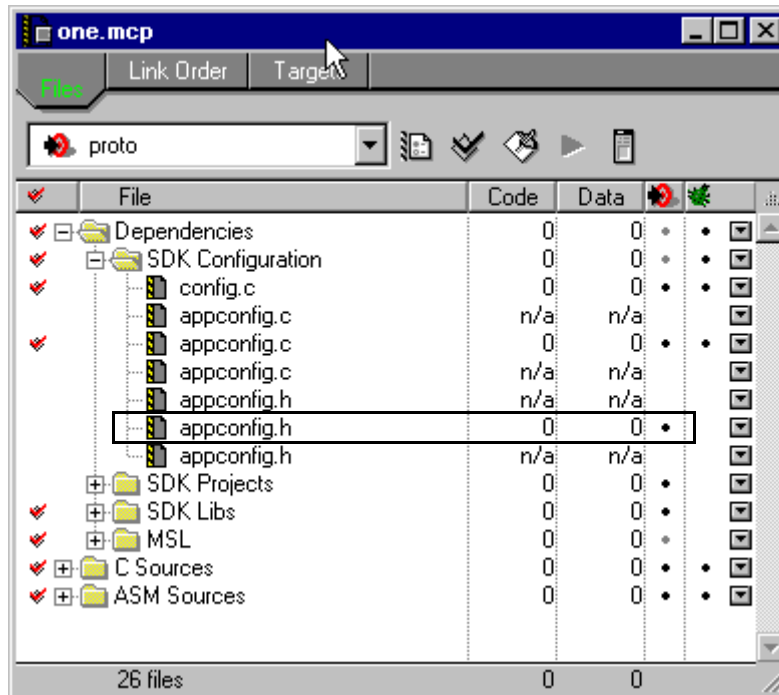


Figure 22. Undifferentiated Configuration Files

To locate files:

- ◆ Left click the *Files* tab at the top of the *one.mcp* window
- ◆ Right click the *appconfig.h* file with a black dot under the target column, the second column from the right side of the window; this is the file *proto* will use

This step uses the Windows Explorer program to identify the location of the file; see [Figure 23](#).

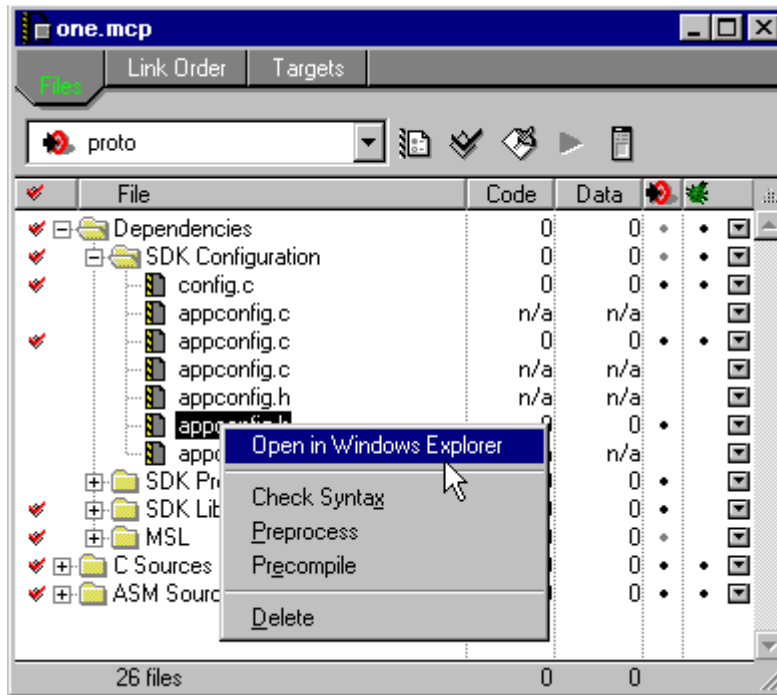


Figure 23. Select *appconfig.h* File *proto* Will Use

Figure 24 illustrates the full path to the sought file.

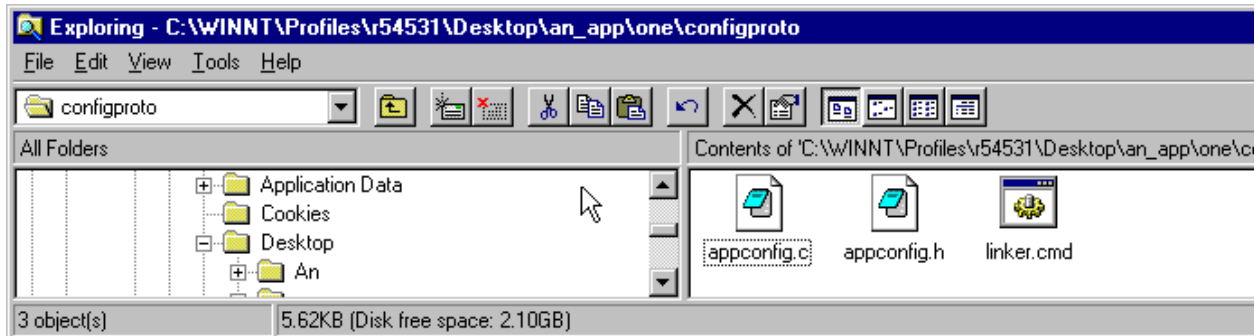


Figure 24. Path to *configproto*

The files *appconfig.c*, *appconfig.h* and *linker.cmd* are present in this folder. All files may be customized for the prototype without affecting the other targets, *External RAM* or *Flash*.

7. Update the *BuildAll* Target to Include the New Prototype Target

Update the *BuildAll* target so it will build the new *proto* target. This process may be repeated for each version of required settings on each target product.

To update the *BuildAll*:

- ◆ In *one.mcp*, click the *Target* tab and expand the *BuildAll*, which does not yet have the new target.
- ◆ To add the new *proto* target to the *BuildAll* target, simply drag it to the *BuildAll* target.

Figure 26 illustrates prior to relocating the *proto* target file, while Figure 27 illustrates the moved file.

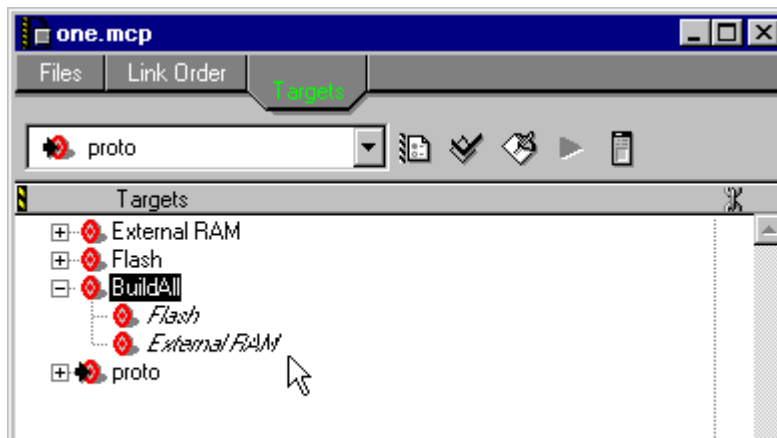


Figure 25. Before Adding *proto* to BuildAll Target

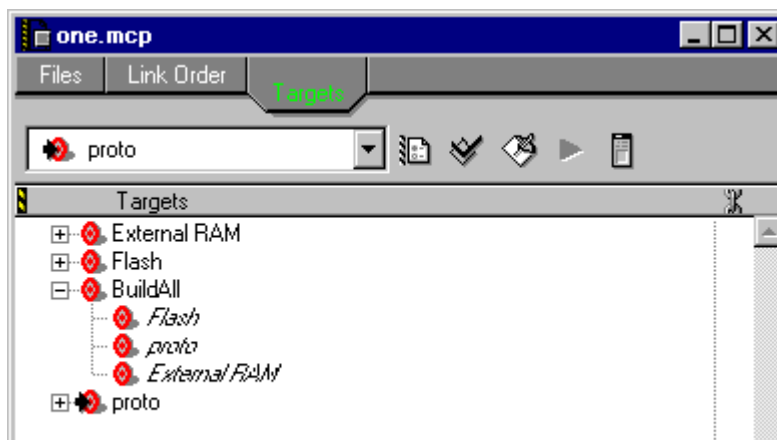


Figure 26. After Adding *proto* to BuildAll Target

To order the files:

- ◆ Drag and drop the files, placing them in a desired order, as illustrated in [Figure 27](#).

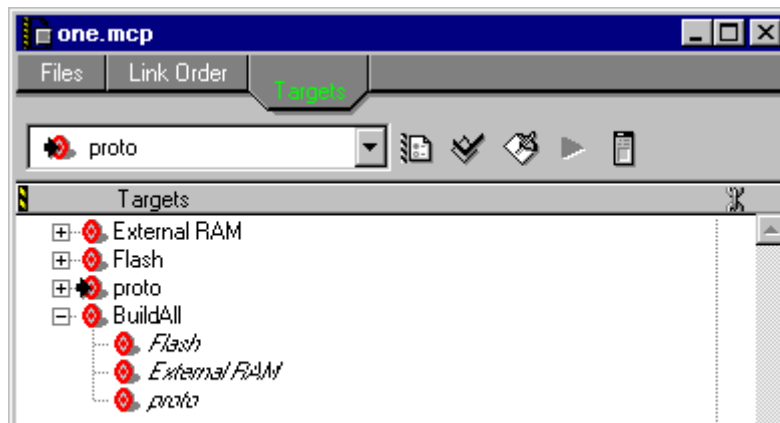



Figure 27. Files Arranged in Desired Order

8. Conclusion

A single CodeWarrior project can support a growing family of products. Project Stationery may be enhanced and multiple additional targets may be built to support permutations of hardware and product features within a single project.

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