
Converting Projects for ColdFire V1 to CodeWarrior Microcontrollers 6.3

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Terms and Abbreviations

The following terms and abbreviations are used in this document:

- MSL - Main Standard Libraries
- EWL - Embedded Warrior Libraries
- MCU 6.2 - Refers to CodeWarrior Development Studio for Microcontrollers, Version 6.2
- MCU 6.3 - Refers to CodeWarrior Development Studio for Microcontrollers, Version 6.3

Libraries

Embedded Warrior Libraries (EWL) introduces a new library set aiming at reducing the memory footprint taken by IO operations and introduces a simpler memory allocator. The IO operations are divided in three categories: printing, scanning and file operations.

The printing and scanning formatters for EWL are grouped in an effort to provide only the support required for the application:

```
int - integer and string processing
int_FP - integer, string and floating point
int_LL - integer (including long long) and string
int_FP_LL - all but wide chars
c9x - all including wide char
```

The buffered IO can be replaced by raw IO, this works solely when printf and scanf are used to perform IO, all buffering is bypassed and writing direct to the device is used. EWL libraries contain prebuilt versions for all formatters and IO modes. Selecting a model combination enables correct compiling and linking. The EWL layout for ColdFire is built per core architecture. It is composed of:

```
libm.a - math support (c9x or not)
libc.a - non c9x std C libs
libc99.a - c9x libs
librt.a - runtime libraries
libc++.a - non-c9x matching c++ libraries
libstdc++.a - c9x/c++ compliant libs
fp_coldfire.a - FPU emulation libraries
```

Selecting an EWL model for the libraries frees the user from adding libraries to the project, the linker will determine from the settings the correct library set, these settings are: processor, pid/pic, hard/soft FPU. The process of selecting a model is explained in the Librarian section below. Although the library names are known to the toolset their location is not.

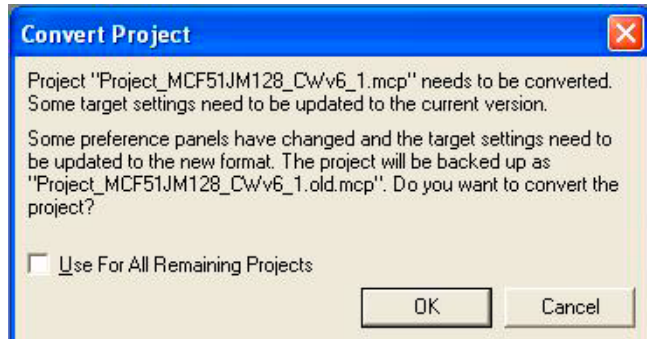
Access Include Paths D:\Projects

The "System Access Paths" point to code in MSL. These have to be changed to point to EWL. The new system access paths are (compiler relative & recursive).

```
{Compiler}\ColdFire_Support\ewl\EWL_C
{Compiler}\ColdFire_Support\ewl\EWL_C++
{Compiler}\ColdFire_Support\ewl\EWL_Runtime
{Compiler}\ColdFire_Support\ewl\lib
```

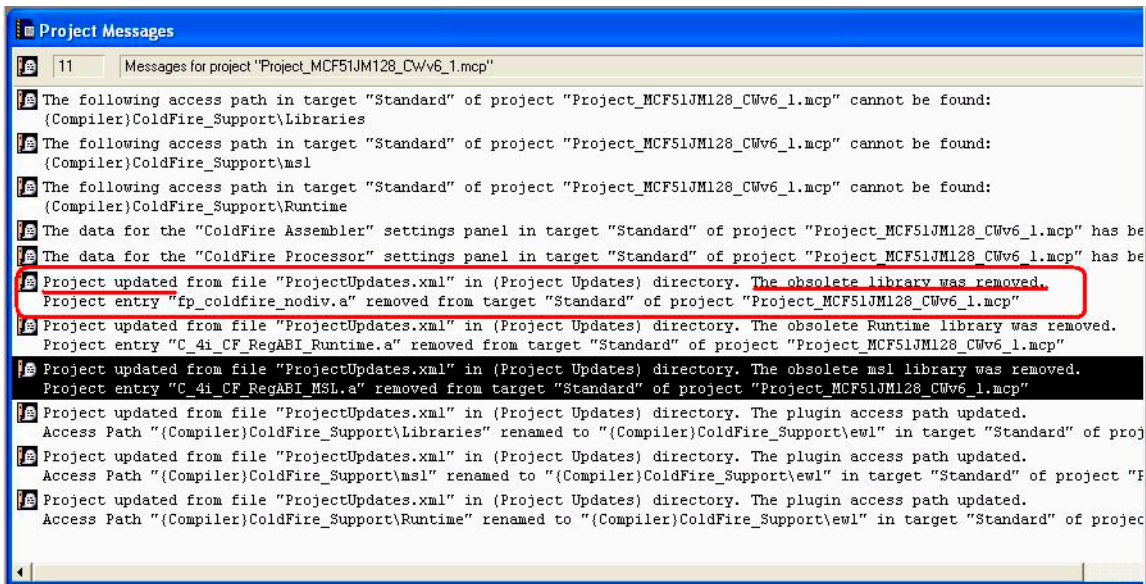
NOTE These access path changes are done automatically during Project conversion by the IDE, when opening a project that was built using MCU 6.2.

Figure 1.1 Converter Message



NOTE When opening a MCU 6.2 project, with target CF v1, using MCU 6.3 after conversion there are some messages that the obsolete library was removed.

Figure 1.2 Project Messages



Librarian

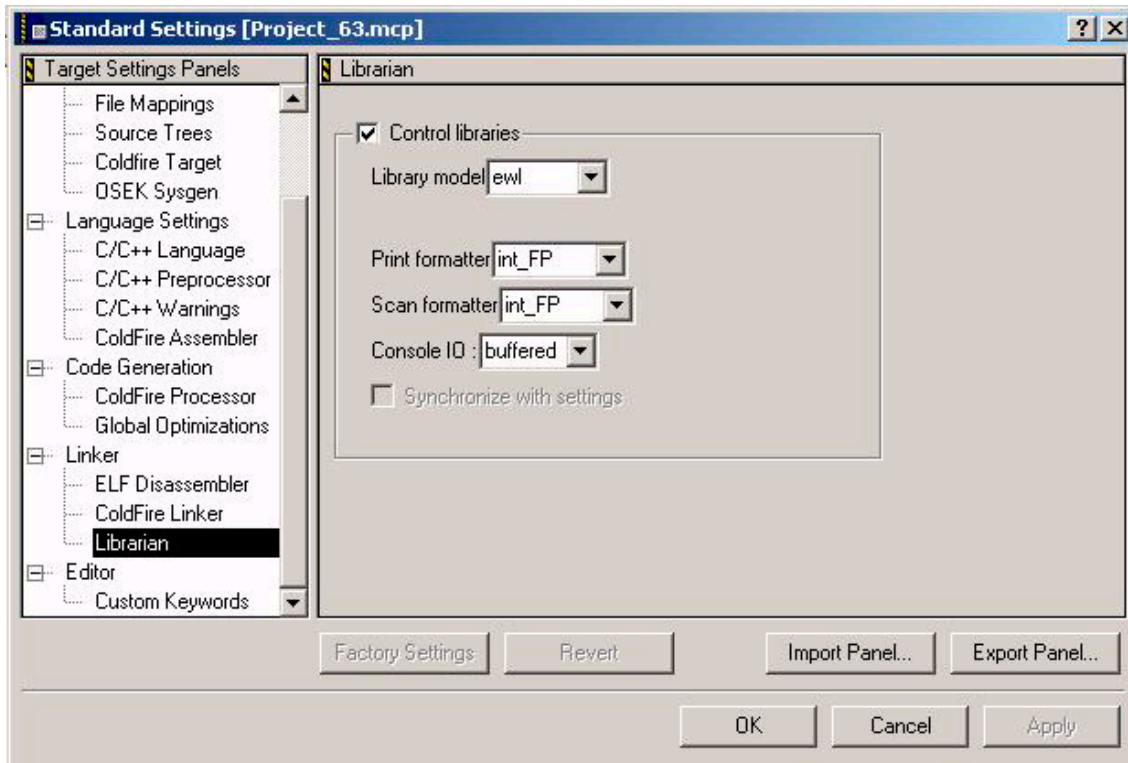
The Librarian panel allows the user to select a "Library model" from a pre-defined list of available models. The lists of available models are:

- "ewl"
- "ewl_c++"
- "c9x"

"c9x_c++"

The "ewl" and "ewl_c++" have a smaller memory footprint, while the "c9x" and "c9x_c++" models are fully C99 compliant. The "ewl" and "ewl_c++" models have relevant sub-models that allow the user to pick the desired print and scan formatters and the desired IO scheme. The "c9x" and "c9x_c++" models do not have sub-models.

Figure 1.3 Console External RAM Settings - Librarian



For the print and scan sub-models the available choices and the functionality that they cover are listed in the "Libraries" section above.

When choosing the "c9x" or the "c9x_c++" models, the sub-model drop-downs are disabled, as they do not apply to these models.

The "Control libraries" check-box, determines whether or not the EWL mechanism of library selection will be used by the build tools (compiler and linker). When this check-box is not selected, the user has to manually add the required library files to the project.

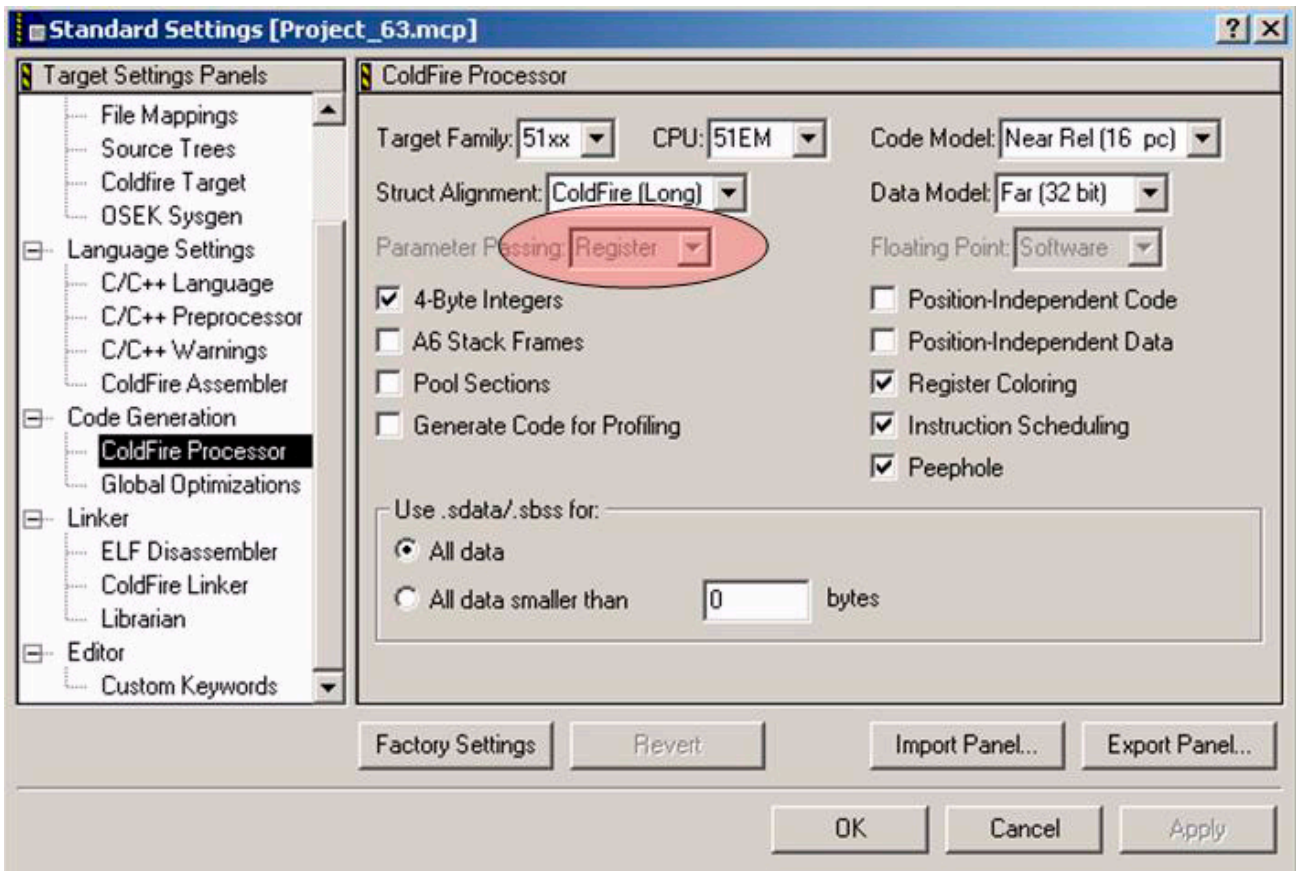
The user can select the relevant library files by choosing the correct architecture (CF v1) and whether or not FPU and PIC/PID is used.

NOTE When opening a MCU 6.2 project, with target CF v1, using MCU 6.3 the converter, chooses the "ewl" model with the print and scan formatter set to "int_FP" and "Console IO" set to "buffered".

Parameter Calling Convention

The parameter passing affects space and time performance. The best performance for both occurs when selecting the register passing ABI. The default parameter passing convention is Register, and it can not be changed from the "ColdFire Processor" panel.

Figure 1.4 Console External RAM Settings - ColdFire Processor



NOTE When using the MCU 6.3 product the "Parameter Passing" drop down, in the "ColdFire Processor" panel is disabled and fixed to "Register".

Other calling conventions are available through one of the following methods:

1. Use `declspec` for function prototypes, also described in the “Declaration Specifications” section of the *ColdFire V1 Build Tools Reference Manual for Microcontrollers*:

```
asm void __declspec(compact_abi) check_CC(unsigned long)
{
    ....
}
```

2. Use `pragma` to specify the calling convention for function defined from:

```
#pragma compact_abi
asm void check_CC(unsigned long)
{
    ....
}
```

Assembly Function Declarations and Definitions

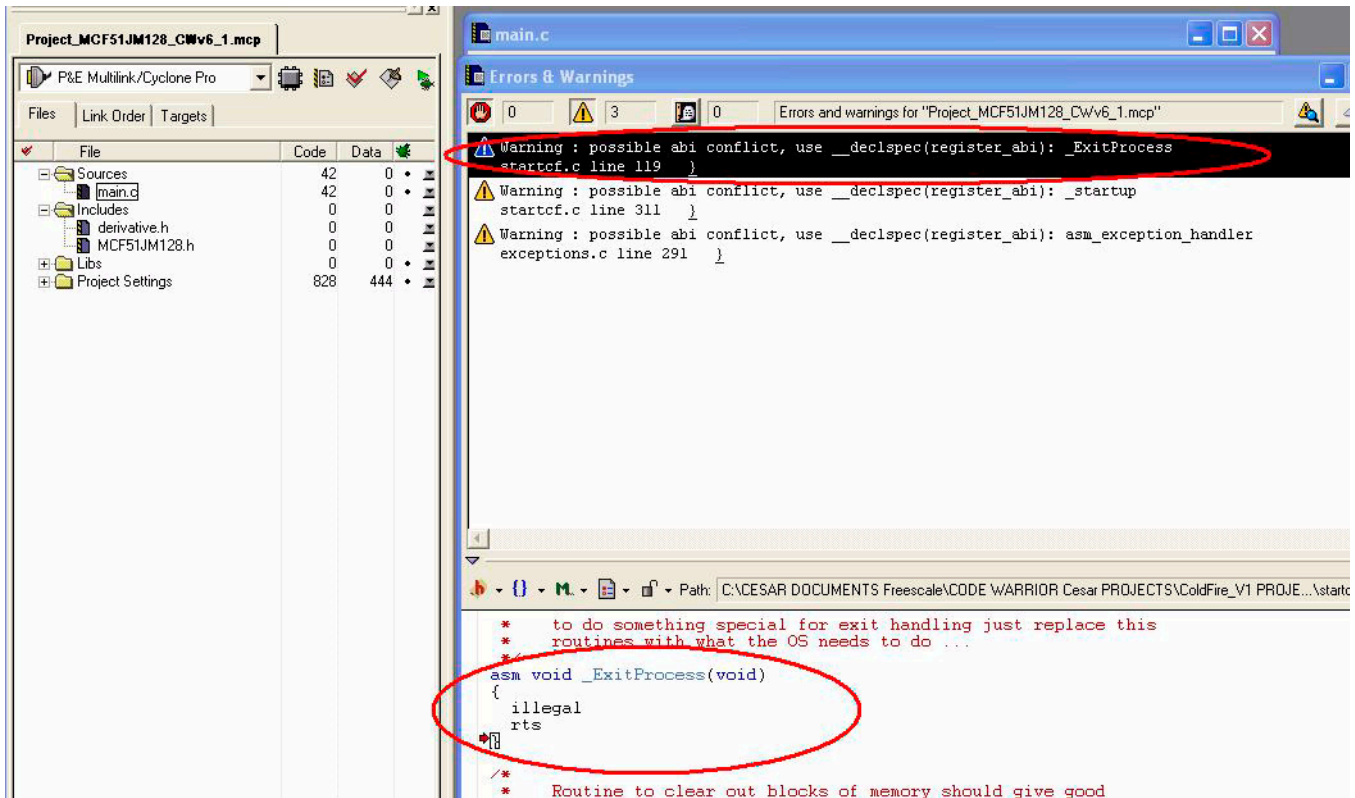
For all functions in the application that are pure assembly functions, the function definition and declaration(s) should contain a "declspec" qualifier that defines the parameter passing convention. For example,

```
asm void __declspec(register_abi) TrapHandler_printf(void)
```

Without this `declspec`, following warning appears.

WARNING! “possible abi conflict, use `__declspec(register_abi):`”
generated by the compiler for all such assembly only functions.

Figure 1.5 Asm function warning if the declaration (definition) doesn't contain "cdeclspec" qualifier



Please note while converting CF v1 projects for MCU 6.2 to MCU 6.3 the user has to modify their code such that the assembly functions contain the "`__cdeclspec`" qualifier. Also if the function contains code that assumes a different calling convention, and is called from a "C" function, for example,

```
asm void mcf5xxx_wr_vbr(unsigned long) { /* Set VBR */
move.14 (SP) ,D0
  movec d0,VBR
nop
rts
}
```

The code should be modified to use the "Register" parameter passing convention. In this example, the line `move.14 (SP) ,D0` must be removed.

EWL Memory Allocation Scheme

EWL supports an improved memory allocation scheme. The memory allocation scheme in EWL requires the following symbols to be defined in the LCF file: `__mem_limit` and `__stack_safety`.

`__stack_safety` is the size of the cushion between the stack and the heap.

In the example below, it is set to 16 bytes, which is typical.

```
___mem_limit = ___HEAP_END;  
___stack_safety = 16;
```

These symbols can be added to the LCF file right after the definition of ___HEAP_END.

Additional Information

See the CodeWarrior Development Studio for Microcontroller Architectures 6.3 Release Notes and documentation for more information.

Visit <http://www.freescale.com/support> for additional assistance.

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