

Contents

Chapter 1. Target Devices	2
Chapter 2. User's Manuals	3
Chapter 3. Key Points for Selecting Uninstallation Method.....	4
Chapter 4. Changes	5
4.1 Changes of CX.....	5
4.1.1 Improved optimization/changed output code.....	5
4.1.2 Added optimization item and parameter.....	5
4.1.3 -Xdelete_func option.....	6
4.1.4 -Xmerge_string option	6
4.1.5 Specific data section.....	6
4.1.6 Changes of function of .public and .extern directives.....	6
4.1.7 Added operation runtime functions.....	7
4.1.8 Added symbol information	7
4.1.9 -Xcref / -Xno_cref option.....	7
4.1.10 Additional error and warning messages	8
Chapter 5. Cautions.....	9
5.1 Handling of r1 register in interrupt function	9
5.2 Debug information.....	9
5.3 The access to bit field with structure packing	9
5.4 Specifying far jump calls for static functions	9
5.5 Symbol information file with variable defined in assembly source.....	10
5.6 Assembler instructions written within #pragma directive	10
5.7 -Xdelete_func option	10
5.8 Influence to debugging by subroutinization.....	10
Chapter 6. Restrictions.....	11
6.1 Restrictions of CX.....	11
6.2 Restrictions on Using V1.20.....	11
Chapter 7. Changes in User's Manual	12
7.1 Errata in Message Manual	12
7.1.1 Added description relating to Warnign Messages	12

Chapter 1. Target Devices

The target devices supported by the CX are listed on the Website.

Please see this URL.

CubeSuite+ Product Page:

<http://www.renesas.com/cubesuite+>

Chapter 2. User's Manuals

Please read the following user's manuals together with this document.

Manual Name	Document Number	PDF File Name
CubeSuite+ V1.00.00 Coding for CX compiler	R20UT0554EJ0100	R20UT0554EJ0100_QSCDCX.pdf
CubeSuite+ V1.00.00 Build for CX compiler	R20UT0558EJ0100	R20UT0558EJ0100_QSBDCX.pdf
CubeSuite+ V1.00.00 Message	R20UT0407EJ0100	R20UT0407EJ0100_QSER.pdf

Chapter 3. Key Points for Selecting Uninstallation Method

There are two ways to uninstall this product.

- Use the integrated uninstaller (uninstalls CubeSuite+)
- Use separate uninstaller (uninstalls this product only)

To use the separate uninstaller, select the following from the Control Panel:

- Add/Remove Programs (Windows XP)
- Programs and Features (Windows Vista, Windows 7)

Then select "CubeSuite+ CX V1.20".

Chapter 4. Changes

This chapter describes changes of CX.

4.1 Changes of CX

This section describes changes of CX from Ver.1.11 to Ver.1.20.

4.1.1 Improved optimization/changed output code

Optimization has been improved, and the output code changed. The main changes are as follows.

- Improved register allocations
- Effective use of runtime library for prologue/epilogue of function
- Improved output code of switch instruction
- Improved bit manipulation instruction
- Improved division of const variables

4.1.2 Added optimization item and parameter

Optimization item and parameter have been added as follows.

Added item and parameter are indicated by an underline.

Optimization Item (<i>item</i>)	Parameter (<i>value</i>)	Description
inline	0 to 3 (Integer value)	Inline expansion for functions 0: Suppresses all inline expansion including the function for which "#pragma inline" is specified. 1: Performs inline expansion for only a function for which "#pragma inline" is specified. 2: Distinguishes a function that is the target of expansion automatically and expands it. <u>3: Distinguishes the function that is the target of expansion automatically and expands it, while minimizing the increase in code size.</u>
<u>subroutine</u>	0 or 1	Subroutinization of common code 0: Does not perform subroutinization of common code. 1: Performs subroutinization of common code.
<u>tail call</u>	on or off	Converting function calls at the end of functions to jr If "on" is specified, then if there is a function call at the end of a function, and certain conditions are met, a jr instruction will be generated for that call rather than a jarl instruction. The lp store/restore code will be removed, reducing the code size. However, some debug functions cannot be used.

This option is equivalent to the following property in CubeSuite+.

- From the [Compile Options] tab, [Perform inline expansion], [Perform subroutinization of common code], [Use jr instruction to call a function at the end of the function] in the [Optimization(Details)] category
- From the [Individual Compile Options] tab, [Perform inline expansion], [Perform subroutinization of common code], [Use jr instruction to call a function at the end of the function] in the [Optimization(Details)] category

4.1.3 -Xdelete_func option

-Xdelete_func option has been added. This option deletes unused functions.

But this function is carried out based on an analysis of the C source file, so the function which is called from only the assembler source file is deleted as the unnecessary function.

If the function is not called from the source file, the function is deleted even if it is called from the other source files. It's possible to evade elimination of its function by specifying -Xsymbol_file option at the same time. So it's recommended to specify -Xdelete_func option and -Xsymbol_file option at the same time.

4.1.4 -Xmerge_string option

An -Xmerge_string option has been added. When the same string literals exist in the source file, this option merges them and allocates to the one area.

This option is equivalent to the following property in CubeSuite+.

- From the [Compile Options] tab, [Merge string literals] in the [Optimization(Details)] category
- From the [Individual Compile Options] tab, [Merge string literals] in the [Optimization(Details)] category

4.1.5 Specific data section

The following section is supported.

- Specific name section of the sconst attribute
- The section name which starts with a number

4.1.6 Changes of function of .public and .extern directives

Identical symbol can be designated more than one time by using .public and .extern directives.

And when the symbol designated by .public directive is not defined in the identical module, CX don't output error. CX will output warning.

4.1.7 Added operation runtime functions

The following operation runtime functions are added.

- ___icall_r10
- ___bcpy1
- ___bcpy2
- ___bcpy4

4.1.8 Added symbol information

-Xsymbol_dump option outputs symbol information to the link map file specified by the -Xmap option.

This option is equivalent to the following property in CubeSuite+.

- From the [Link Options] tab, [Output symbol information to link map file] in the [Link Map] category

4.1.9 -Xcref / -Xno_cref option

-Xcref and -Xno_cref option are added.

-Xcref option and -Xcube_suite_info option are different names for the same function. And -Xno_cref option and -Xno_cube_suite_info option are different names for the same function too. However, -Xcref and -Xno_cref option are recommended in CX V1.20 and later.

4.1.10 Additional error and warning messages

The following 13 error and warning messages have been added.

F0595001	[Message]	Cannot open file " <i>file</i> ".
F0595002	[Message]	Cannot read file " <i>file</i> ".
F0595003	[Message]	Cannot write file " <i>file</i> ".
F0595004	[Message]	Cannot close file " <i>file</i> ".
W0511143	[Message]	The "-Xfloat" option is ignored because specified device does not have FPU.
W0511144	[Message]	"-C" option and "-Xcommon" option is mismatch. Instruction set by " <i>string1</i> " option is ignored. Create common object for " <i>string2</i> " instruction set.
W0511146	[Message]	" <i>string1</i> " specified in the " <i>string2</i> " option is not allowed for a preprocessor macro. Recognized only as an assembler symbol.
W0511162	[Message]	The " <i>option</i> " option is ignored when the " <i>option</i> " option is not supported for this device.
W0511163	[Message]	The argument of the " <i>option</i> " option is invalid. The argument of the " <i>option</i> " option is changed to " <i>val</i> ".
W0550023	[Message]	Start address of programmable io is out of range(0x0, <i>value1-value2</i>), ignored -Xprogrammable_io option.
W0550029	[Message]	Can not use r0 as destination in mul/mulu in V850ES core.
W0550030	[Message]	can not use mul/mulu X,Y,Y format in V850ES core.
W0550031	[Message]	<i>identifier</i> undefined.

Chapter 5. Cautions

This section describes cautions for using CX V1.20.

5.1 Handling of r1 register in interrupt function

The assembler uses the r1 register as a temporary register when expanding an instruction. Consequently, the r1 register may be used through instruction expansion even if there is no description on the r1 register in an assembler source file.

Save/restore the r1 register contents when describing interrupt functions with the assembler.

5.2 Debug information

Debug information is not output to codes in a file specified by the `.binclude` quasi directive, codes in a macro defined by the `.macro` quasi directive.

5.3 The access to bit field with structure packing

If the width of a bit field is less than the data type of a member when the bit field is accessed during structure packing, the bit field is read as having the width of the data type of that member. Consequently, an area outside the object (an area where there is no data) is also accessed. This access is usually executed correctly but it might be invalid if I/O is mapped.

Example:

```
struct S {
    int x:21;
} subj; /* 3 bytes */
subj.x = 1;
```

5.4 Specifying far jump calls for static functions

When specifying a static function in the far jump calling function list file, please add a period (".") and number after the function name.

At compile time, CX converts the names of the static functions to label names consisting of the function name followed by the period and number. For this reason, even if you specify a static function in the far jump calling function list file, you must specify a period and number after the function name. Please output the assembler source file, and check this label name.

Example: Function "func" with "static" is called via far jump

1. Search for the call to function "func" in the assembler source file, and check the converted label name.

jarl _func.0, lp <- It has been converted to a label name with a period and number added

2. In the far jump calling function list file, enter the label name you checked in 1.

[func.fjp]

3. Use the "-Xfar_jump" option to specify the far jump calling function list file you created in step 2.

>cx.exe -Cf3507 -Xfar_jump=func.fjp main.c

4. The call to function "func" is converted to code using the jarl32 or jr32 instruction.

5.5 Symbol information file with variable defined in assembly source

In an application where a variable is defined in the assembly source and that variable is referenced in the C source, an error occurs if the symbol information file is generated by symbol file generator.

Please delete the variable in the assembly source from the symbol information file.

5.6 Assembler instructions written within #pragma directive

CX can't support .macro, .rept, .irp macro directives within #pragma directive. If these macro directives are written, compiler error will occur.

5.7 -Xdelete_func option

This option deletes the function which is called from only the assembler source file as the unnecessary function.

5.8 Influence to debugging by subroutinization

When applying automatic subroutinization, there is a possibility that the program can't be debugged right.

- A break point can't be set near the subroutinized code.
- Step execution can't be done near the subroutinized code or the line status isn't correct.
- Variable value isn't correct after subroutinized code.

Chapter 6. Restrictions

This chapter describes the restrictions of the CX.

6.1 Restrictions of CX

Below is a list of restrictions of the CX V1.20.

No.	Restrictions
1	Specifying the "-Xno_romize" and "-Xtwo_pass_link" options simultaneously causes an error
2	Input file names containing non-ASCII characters

6.2 Restrictions on Using V1.20

The following restrictions apply to CX V1.20.

No. 1 [Specifying the "-Xno_romize" and "-Xtwo_pass_link" options simultaneously causes an error](#)

[Description] When the "-Xno_romize" and "-Xtwo_pass_link" options are specified simultaneously, then an F0562003 error will occur if a file with the same name as the output load module file already exists.

F0562003:"*file*" is not ELF file.

[Workaround] Delete any file with the same name as the output load module file before running.

No. 2 [Input file names containing non-ASCII characters](#)

[Description] If the file name (including the path) contains no-ASCII characters, one of 1 or 2 below will occur if "-Xpass_source" is specified.

1. C source lines output as comments in the assembler source file will be invalid

2. An E0592018 error will occur

E0592018:Failed to open an list file "*file*".

[Workaround] Change the file name (including the path) to one that does not contain non-ASCII characters.

Chapter 7. Changes in User's Manual

This chapter describes errata in CubeSuite+ documentation. The same content is also contained in the Help file, and should be replaced by this content.

7.1 Errata in Message Manual

This section describes errata in Message Manual (document # R20UT0407EJ0100).

7.1.1 Added description relating to Warnign Messages

Location: Page 358

Addition:

W0511143	[Message]	The "-Xfloat" option is ignored because specified device does not have FPU.
W0511144	[Message]	"-C" option and "-Xcommon" option is mismatch. Instruction set by " <i>character string1</i> " option is ignored. Create common object for " <i>character string2</i> " instruction set.

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