C Compiler Package for RL78 Family V1.11.00
Release Note

R20UT5086EJ0101
Rev.1.01
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Thank you for using our product.

This document describes the restrictions and points for caution. Read this document before using the product.

Contents

Chapter 1.   **User's Manuals**

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

Name	Document Number
CC-RL Compiler User's Manual	R20UT3123EJ0111
CS+ Integrated Development Environment User's Manual: CC-RL Build Tool Operation	R20UT3284EJ0110

Chapter 2.   **Changes**

This section describes changes to CC-RL from V1.10.00 to V1.11.00.

2.1   Enhancement of the -SECURITY_ID option

The size (number of digits) of values that are specifiable for the -SECURITY_ID option has been changed from the previous fixed 10 bytes to the size determined by the setting of the -DEVICE option.

2.2   Addition of the .type directive

The .type directive has been added to allow specifying whether a symbol defined in assembly language is a function or a variable and the size of the symbol.

The specified information is output to the linkage map.

Input source

```
.TYPE symA, FUNCTION, 8
symA:
```

Output list file

```
SYMBOL ADDR SIZE INFO COUNTS OPT
  symA
    00000000 8 func ,l 0
```

2.3   Addition of the .alias directive

The .alias directive has been added to allow the specification of an alias for a symbol definition.

An alias can have a different linkage attribute from that of the corresponding symbol.

The following source code restricts reference to "symB" from outside the module to the use of its alias "symA".

Input source

```
symB:
.PUBLIC symA
.ALIAS symA, symB
```

Output list file

```
SECTION=
SYMBOL ADDR SIZE INFO COUNTS OPT

  symA
    00000120 0 none ,g 0
  symB
    00000120 0 none ,l 0
```

2.4 Addition of the .weak directive

The .weak directive has been added to allow specifying a symbol as having the weak linkage attribute.

Reference to a weak symbol from an external module is possible in the same way as for a symbol having the external linkage attribute. Note that if weak symbols having the same name are found in multiple modules, only one of them will be linked but no error will occur.

2.5 Addition of characters that can be specified in symbol names

The character '$' can now be specified in symbol names. Note, however, that a symbol name must not begin with '$'.

In addition, the character '.' had only been allowed at the beginning of symbol names in former versions, but it can now be specified at any location in a symbol name.

2.6 Improvement of messages regarding the compiler license

The target type of license and the required actions have been added to messages regarding the compiler license.

Message number	Message
E0511178	"*string*" option is unavailable because the license of CC-RL V1 Professional edition is not found. Please consider purchasing the product of Professional edition.
W0511180	The evaluation period of CC-RL V1 has expired.
W0511185	The trial period for the features of the Professional edition expires in *number* days. Please consider purchasing the product of Professional edition.
W0561016	The evaluation version of CC-RL V1 is valid for the remaining *number* days. After that, link size limit (64 Kbyte) will be applied. Please consider purchasing the product.
W0561017	The evaluation period of CC-RL V1 has expired. Please consider purchasing the product.
F0563430	The total section size exceeded the limit of the evaluation version of CC-RL V1. Please consider purchasing the product.

2.7 Addition of a message

The following message has been added. It is output when the relevant assembler directive specification does not include the required operand.

Message number	Message
E0550272	"*string*" required.

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2.8 Enhancement of the -DEBUG_MONITOR option

The specifications of the option have been modified so that the memory area for the OCD monitor is allocated in accordance with the specifications of the device set by the -DEVICE option.

V1.10.00 and earlier versions
- This option fills addresses 0x2, 0x3, 0xCE to 0xD7, and the area from the OCD monitor start address to the OCD monitor end address with 0xFF.

V1.11.00
- This option fills addresses 0x2 and 0x3, a memory area determined by the device specifications, and the area from the OCD monitor start address to the OCD monitor end address with 0xFF.

2.9 Modification of the storage duration of variables

The function for improving the efficiency of reference to variables defined with the storage class specifier "static" has been enhanced.
The storage duration of such variables is changed from static to automatic for acceleration.
To enable this function, omit the -Olevel option or specify any of the following options.
・-Odefault, -Osize, or -Ospeed

For the following source code, this reduces both the size and execution time of the output code.

Example of source code

```
unsigned id(unsigned parameter){
    static unsigned result;
    result = parameter;
    return result;
}
```

Output code

V1.10 (-cpu=S3)	V1.11 (-cpu=S3)

.SECTION .textf,TEXTF
_id:
  .STACK _id = 4
  movw !LOWW(_result@1@id), ax
  ret
  .SECTION .bss,BSS
  .ALIGN 2
_result@1@id:
  .DS (2)
	.SECTION .textf,TEXTF
	_id:
	  .STACK _id = 4
	  ret

2.10   Support for the MACHU and MACH instructions

Generation of the multiplication-accumulation instructions MACHU and MACH provided by the S3 core is now supported.

To enable this function, specify the following option.

    ·-use_mach=mach

The -use_mach option is described below.

==

[Specification format]

-use_mach={not_use|mach}

    not_use : Generated code uses neither the MACHU nor the MACH instruction.

    mach : Generated code uses the MACHU and MACH instructions.

[Interpretation when omitted]

The code is handled as if -use_mach=not_use option is specified.

[Detailed description]

- This option specifies whether to use the multiplication-accumulation instructions MACHU and MACH.

- A compilation error will occur If the -use_mach=mach option is specified along with the -cpu=S1 or -cpu=S2 option.

- When the -use_mach=mach option is specified, the value of the MACR system register, which is used by the multiplication-accumulation instructions MACHU and MACH, is saved before and restored after a function call or interrupt generation.

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In the CS+ integrated development environment, this option can be specified in the following field in the Property panel.

    Build Tool > Compile Options > Others > Other additional options

In the e2 studio integrated development environment, this option can be specified in the following field in the project property settings.

    C/C++ Build > Settings > Compiler > User > User-defined options

For the following source code, this reduces both the size and execution time of the output code.

    Example of source code

```
long mach(long src, short* lhs, short *rhs){
    src += (long)lhs[0] * (long)rhs[0];
    src += (long)lhs[1] * (long)rhs[1];
    src += (long)lhs[2] * (long)rhs[2];
    return src;
}
```

    Output code

V1.10 (-cpu=S3)	V1.11 (-cpu=S3 -use_mach=mach)

```
        .SECTION .textf,TEXTF
_mach:
        .STACK _mach = 12
        push bc
        subw sp, #0x04
        movw hl, ax
        push de
        movw ax, [de+0x02]
        movw bc, ax
        movw ax, [sp+0x0C]
        movw de, ax
        movw ax, [de+0x02]
        mulh
        movw [sp+0x02], ax
        movw ax, bc
        movw [sp+0x04], ax
        pop de
        push de
        movw ax, [de]
        movw bc, ax
        movw ax, [sp+0x0C]
        movw de, ax
        movw ax, [de]
        mulh
        addw ax, hl
        movw hl, ax
        movw ax, [sp+0x06]
        sknc
.BB@LABEL@1_1:; entry
        incw ax
.BB@LABEL@1_2:; entry
        addw ax, bc
        movw [sp+0x06], ax
        movw ax, [sp+0x02]
        movw bc, ax
        movw ax, hl
        addw ax, bc
        movw [sp+0x02], ax
        movw ax, [sp+0x04]
        movw bc, ax
        movw ax, [sp+0x06]
```

```
        .SECTION .textf,TEXTF
_mach:
        .STACK _mach = 12
        movw hl, !0xFFF0
        push hl
        movw hl, !0xFFF2
        push hl
        push ax
        push bc
        movw ax, [sp+0x0C]
        movw hl, ax
        movw ax, [de]
        movw bc, ax
        movw ax, [sp+0x02]
        movw 0xffff0, ax
        movw ax, [sp+0x00]
        movw 0xffff2, ax
        movw ax, [hl]
        mach
        movw ax, [de+0x02]
        movw bc, ax
        movw ax, [hl+0x02]
        mach
        movw ax, [de+0x04]
        movw bc, ax
        movw ax, [hl+0x04]
        mach
        movw ax, 0xffff2
        movw bc, ax
        movw ax, 0xffff0
        addw sp, #0x04
        movw hl, ax
        pop ax
        movw 0xffff2, ax
        pop ax
        movw 0xffff0, ax
        movw ax, hl
        ret
```

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| ```
       sknc
.BB@LABEL@1_3:; entry
       incw ax
.BB@LABEL@1_4:; entry
       addw ax, bc
       movw [sp+0x06], ax
       pop hl
       push hl
       movw ax, [hl+0x04]
       movw bc, ax
       movw ax, [de+0x04]
       mulh
       movw de, ax
       movw ax, [sp+0x02]
       addw ax, de
       movw de, ax
       movw ax, [sp+0x06]
       sknc
.BB@LABEL@1_5:; entry
       incw ax
.BB@LABEL@1_6:; entry
       addw ax, bc
       movw bc, ax
       movw ax, de
       addw sp, #0x08
       ret
``` | |

2.11   Improvement of code generated for 1-bit logic operations

The code generated in cases where memory access is to a constant address value and 1-bit logical
operations are executed has been improved.

For the following source code, this reduces both the size and execution time of the output code.

  Example of source code

```
typedef struct{
   unsigned char _b0:1;
   unsigned char _b1:1;
   unsigned char _b2:1;
   unsigned char _b3:1;
   unsigned char _b4:1;
   unsigned char _b5:1;
   unsigned char _b6:1;
```

```
    unsigned char _b7:1;
  } MyStruct;


  #define SFR0 ((MyStruct*)0xfffe)
  #define SFR1 ((MyStruct*)0xffff)
  void test(void){
    SFR0->_b2 &= SFR1->_b3;

  }
```

出力例

V1.10 (-cpu=S1)	V1.11 (-cpu=S1)
_test:	_test:
.STACK _test = 4	.STACK _test = 4
movw hl, #0xFFFF	mov a, 0xFFFFE
mov a, 0xFFFFE	mov1 CY, a.2
mov1 CY, a.2	and1 CY, 0xFFFFF.3
and1 CY, [hl].3	mov1 a.2, CY
mov1 a.2, CY	mov 0xFFFFE, a
mov 0xFFFFE, a	ret
ret	

2.12 Improvement of code generated for a function call immediately below the current function

The code generated in cases where a function immediately below the current function is called at the end of the current function has been improved.

This handling is only applied if the -Onothing option is not specified.

For the following source code, this reduces both the size and execution time of the output code.

Example of source code

```
  #pragma noinline callee
  void callee(void);
  void caller(void){
    callee();
  }
  void callee(void){
  }
```

出力例

V1.10 (-cpu=S1)	V1.11 (-cpu=S1)
_caller:	_caller:
.STACK _caller = 4	.STACK _caller = 4

br $_callee
_callee:
    .STACK _callee = 4
ret
	_callee:
	    .STACK _callee = 4
	ret

2.13 Rectified point for caution

The following point for caution no longer applies. For details, refer to Tool News or FAQ.

- Using the pack function (CCRL#027)
- When an invalid bit position is specified for a bit-manipulation instruction (CCRL#028)
- Use of struct/union type arguments (CCRL#029)
- Cast from pointer type to other type (CCRL#030)
- Use of an anonymous struct/union (CCRL#031)
- Use of an address read from memory after writing the address to the memory (CCRL#032)
- FAQ 3000575 Warning (W0561321, W0561110) occur when using CC-RL V1.10.00 (CC-RL)
- FAQ 3000576 An error (C0564001) occurs when using CC-RL V1.10.00 (CC-RL)

Revision History

Rev.	Date	Description	
		Page	Summary
Rev.1.00	Dec 01, 2021		First Edition issued
Rev.1.01	Jan 16, 2022	10	Fixed 2.13

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