

Be sure to read this note

C compiler for R8C/Tiny Series only M3T-NC8C V.5.30 Release 1 Release Note

First Edition

Renesas Solutions Corporation

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Abstract

Welcome to M3T-NC8C(abbreviated as NC8C) V.5.30 Release 1 for R8C/Tiny series only. This document contains supplementary descriptions to User's Manual. When you read certain items in the User's Manual, please read this document as well.

Also, this document contains a License Agreement in the last. Please read it before using. By using the software, you are accepting and agreeing to such terms.

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1. The latest info and FAQs

Please refer to the useful following sites:

Tool News:

<http://www.renesas.com/jpn/products/mpumcu/tools/index.html>

FAQs:

http://www.renesas.com/jpn/products/mpumcu/toolhp/faq/m16c80/nc30wa/nc30wa_j.htm

2. About this product

The Free version is **not to be supported and warranted**. Accordingly, for the directions for use of Free version or the like, you cannot apply to our company. However, if you inform us of any idea that may flash upon your mind and your comments, if any, we are ready to take up your suggestions and hints for future improvements. However, please take note that we may not give our reply to you as to your idea.

3. About the specification of this product

- (1). The address space is 64 K bytes.
- (2). About the Default Attributes of ROM and RAM

Both ROM data and RAM data assume the attribute *near* by default. (The default attribute of data with the *const* qualifier also is *near*.)

* The *far* and *-far* qualifiers are ignored.

- (3). About the option of NC8C, AS8C and LN8C

You can not use the following options.

C compiler(NC8C)	
Debug Option	-gold
Code generated Option	-finfo, -fnear_ROM(-fNROM), -ffar_RAM(-fFRAM), -fno_carry(-fNC), -fchange_bank_always(-fCBA), -fnear_ROM(-fNROM) -fmake_special_table(-fMST)
Assemble & Link Option	-as30, -ln30
Assembler(AS8C)	
Option	-finfo, -P, -M, -M60, -M61, -M62E, -PATCH(6N)_TA, -PATCH(6N)_TAn -fMST
Linkage Editor(LN8C)	
Option	-M60, -M61, -fMST

- (4). About software tools and an utility

You can not use the following software tools and an utility.

Software Tools	StkViewer, MapViewer, Librarian, Structured description assembler, Standard Library source file
Utility	Ut130(The SBDATA declaration & SPECIAL page Function declaration Utility)

- (5). About ROM code protect function and ID code for ID check function.

Code store address of the above function is changed.

option	function
-protectx	The specified value is stored in protect code store address FFFFH.
-ID	The specified ID code is stored as 8-bit data in ID store addresses (FFDFH, FFE3H, FFE7H, FFEFH, FFF3H, FFF7H and FFFBH).

For details on the ROM code protect function, see the hardware manual of the microcomputer.

- (6). About the description of #pragma.

Don't describe the extension function of following #pragma.

#pragma SPECIAL

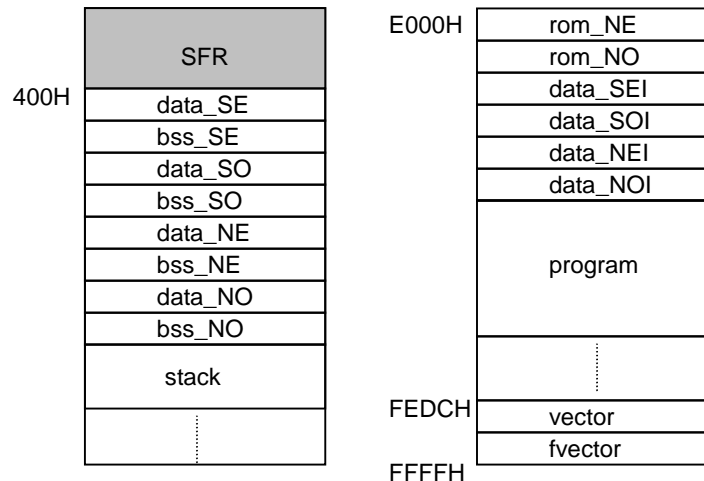
#pragma EXT4MPTR

However, if “-Wunknown_pragma(-WUP)” is specified, a warning is output for the extended functions of #pragma mentioned above.

(7). About the startup program

For the startup program for the R8C/Tiny, use the ncr0.a30 (startup file) and sect30.inc (section definition file) stored in the src8c\startup directory under the install directory.

An example section location in the section definition file is shown below.



(8). About User's manual

Please change the following word of the production name, the program composition and the environment variable in NC8C and AS8C User's manual and read.

	Before	After
Production name:	Compiler NC30 Assembler AS30	Compiler NC8C Assembler AS8C
Program composition:	Compile driver nc30 Compiler ccom30 Preprocessor cpp30 Assembler optimizer aopt30 Assembler driver as30 Macro processor mac30 Assembler processor asp30 Linkage editor ln30 Load module converter lmc30 Cross referencer xrf30 Absolute lister abs30	Compiler driver nc8c Compiler ccom8c Preprocessor cpp8c Assembler optimizer aopt8c Assembler optimizer as8c Macro processor mac8c Assembler processor asp8c Linkage editor ln8c Load module converter lmc8c Cross referencer xrf8c Absolute lister abs8c
Environment variable:	LIB30 INC30 BIN30 TMP30 AS30COM	LIB8C INC8C BIN8C TMP8C AS8CCOM

4. Precautions

Please observe the following precautions before using NC8C.

4.1. Precaution MCU-Dependent Code.

You may need to use specific instructions when writing to or reading registers in the SFR area. Because the specific instruction is different for each model, see the User's Manual for the specific Machine. These instructions should be used in your program using the asm function.

[Problem]

When -O5 optimizing options is used, the compiler generates in some cases BTSTC or BTSTS bit manipulation instructions. In M16C, the BTSTC and BTSTS bit manipulation instructions are prohibited from rewriting the contents of the interrupt control registers. However, the compiler does not recognize the type of any register, so, should BTSTC or BTSTS instructions be generated for interrupt control registers, the assembled program will be different from the one you intend to develop. For detailed information about this, see Section 5, "Precautions for Interrupts" Described in Related Documents (Excerpts).

When using any of the products concerned, ensure that no incorrect code is generated.

Note:

In the products other than those concerned, this problem does not occur because BTSTC and BTSTS instructions are not generated if any of the above-mentioned optimizing options is used.

[Workaround]

This problem will be circumvented in either of the following ways:

1. Suppress the generation of the BTSTC and BTSTS instructions resulting from using an optimizing option by selecting the -ONA (or -Ono_asmopt) option together with any of the above-mentioned optimizing options.
2. Add an asm function to disable optimization locally, as shown in the example below.

Example:

```
-----
while(TA0IC.IR==0)
{
    asm(); /* An asm function added to disable
           optimization for TAOIC.IR */
}
-----
```

Make sure that no BTSTC and BTSTS instructions are generated after these side-steppings.

[Example]

When -O5 optimizing options is used in the program shown below, a BTSTC instruction is generated at compilation, which prevents an interrupt request bit from being processed correctly, resulting in the assembled program performing improper operations.

```
-----
#pragma ADDRESS TA0IC    0055h /* M16C/62 MCU's Timer A0 interrupt control register */
struct {
char    ILVL : 3;
char    IR   : 1; /* An interrupt request bit */
char    dmy  : 4;
} TA0IC;
void wait_until_IR_is_ON(void)
{
while (TA0IC.IR == 0) /* Waits for TA0IC.IR to become 1 */
{

```

```

    ;
}
TA0IC.IR = 0;      /* Returns 0 to TA0IC.IR when it becomes 1 */
}

```

=====

== "Precautions for Interrupts" Described in Related Documents (Excerpts) ==

The excerpts of the descriptions on "Precautions for Interrupts" in data sheets and User's Manuals of M16C MCUs are shown below.

[Precautions for Interrupts]

When a instruction to rewrite the interrupt control register is executed but the interrupt is disabled, the interrupt request bit is not set sometimes even if the interrupt request for that register has been generated. This will depend on the instruction. If this creates problems, use the below instructions to change the register.

Instructions: AND, OR, BCLR, BSET

When accessing registers in the SFR area in C language, make sure that the same correct instructions are generated as done by using asm functions, regardless of the compiler's version and of whether optimizing options are used or not.

4.2. Precaution for startup .

For C-language programs to be written into ROM, NC8C comes with a sample startup program written in the assembly language to initial set the hardware (M16C), locate sections, and set up interrupt vector address tables, etc. This startup program needs to be modified to suit the system in which it will be installed. See the manual or data book for your machine for the address of the processor mode register and the bit settings and for your machine for the address of the interrupt vector.

4.3. Suggestions Concerning File Names

The file names that can be specified are subject to the following restrictions:

- Directory and file names that contain kanji cannot be used.
- Only one period (.) can be used in a file name.
- Network path names cannot be used. Assign the path to a drive name.
- Keyboard shortcuts cannot be used.
- Directory and file names that contain a space character cannot be used.
- The "..." symbol cannot be used as a means of specifying two or more directories.
- A file name in length of 128 characters or more including path specification cannot be used.

4.4. Precautions about virus check programs

If the virus check program is memory-resident in your computer, NC8C may not start up normally. In such a case, remove the virus check program from memory before you start M3T-NC8C.

4.5. Precautions regarding the preprocessing directive #define

To define a macro which will be made the same value as the macro ULONG_MAX, always be sure to add the prefix UL.

4.6. About specifying the interrupt control register

NC8C supports the function that set or change the value of an interrupt priority level to conform to MESC TECHNICAL NEWS(No. M16C-14-9805).

- case of specifying the value

Please use SetLevel function. In this time, please be sure to include "intlevel.h" file.

```
SetLevel(char *adr, char val)
```

```
adr      : Address of the interrupt control register
```

```
val      : Specifying the value
```

- case of changing the value

Please use ChgLevel function. In this time, please be sure to include "intlevel.h" file.

```
ChgLevel(char *adr, char val)
```

```
adr      : Address of the interrupt control register
```

```
val      : Specifying the value
```

[Example]

```
#include <intlevel.h>
#pragma ADDRESS timerA 55H
char *timerA;
void func(void)
{
    SetLevel(timerA,2); // Specifying the value "2" to the interrupt priority level
    :
    ChgLevel(timer A,4); // Changing the value "4" to the interrupt priority level
}
```

4.7. Precautions to be taken when using #pragma ASM/ENDASM

- Regarding debug information when using #pragma ASM outside functions, if you write #pragma ASM anywhere outside functions, no C source line information will be output. For this reason, information regarding descriptions in #pragma ASM to #pragma ENDASM, such as error message lines when assembling or linking and line information when debugging, may not be output normally.
- Do not write branches (including conditional branches) in the register or variable areas, that would allow the asm functions to affect program flow during program flow analysis and processing by the compiler.
- C compilers generate code of arguments to be passed via registers and of register variables by analyzing their scopes. However, if manipulations of register values are described using inline assemble functions (such as #pragma ASM/#pragma ENDASM directives and asm function), C compilers cannot hold information on the scopes of the above-mentioned arguments and register variables. So, be sure to save and recover register contents on and from the stack when registers are loaded using inline assemble functions

4.8. Searching for files to include

If you give a file to include together with a drive name in the #include line, and attempt to compile the file from a directory different from the one in which the file to compile is present, instances may occur in which the file to include cannot be searched.

[Example]

```
#include "c:\user\test\sample.h"
main(){}
```

```
C:\user>nc8c \user\test2\sample.c -silent
\user2\test\aa.c
```

```
[Error(cpp8c.21):\user2\test2\sample.c, line 1] include file not found 'c:\user\test\sample.h'
```

4.9. Note of Debugging the program using _Bool type

When you debug the program which uses the _Bool type, please confirm whether the debugger is supporting the _Bool type.

In using the debugger which is not supporting the _Bool type, please use a debugging option

- “-gbool_to_char (-gBTC)” at the time of compile.

4.10. About the standard I/O function

The standard I/O functions consume many RAM. If you use the standard I/O functions in your program for R8C/Tiny Series, please check that there is no problem on your system.

5. Precautions to be taken when Using HEW

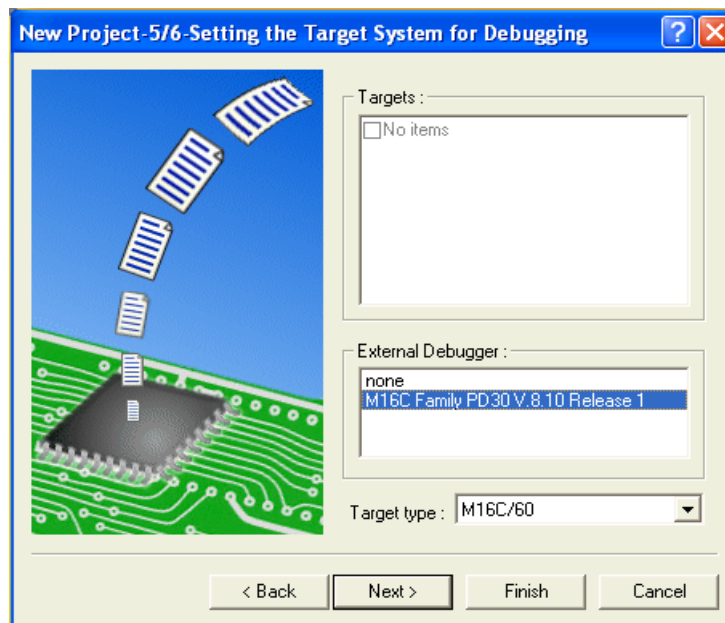
5.1. About changing from NC30WA compiler to NC8C compiler

You can not change the project that made by HEW for NC30WA compiler to Hew for NC8C compiler. If you use NC8C compiler, please make the project again.

5.2. Using the PDxx Debugger

When you use the following debuggers, please choose the debugger used at the time of work space new creation.

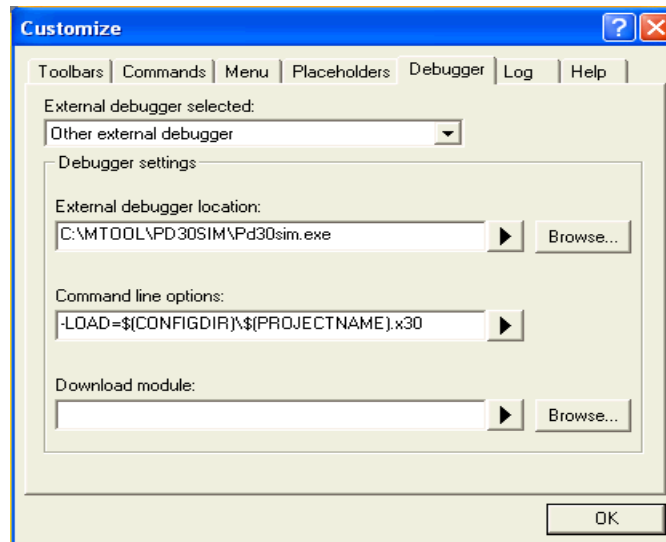
PD30	V.8.10 or later
PD30F	V.2.10 or later



How to register a debugger of which version is former than the above debuggers is following.

- (1) Select menu [Tool->Customize...].
- (2) Select "Debugger" tab on the Customize dialog box.
- (3) Select "other external debugger" for the [External debugger selected].
- (4) Specify the location of the executable file PDxx.exe for the [External debugger location].
- (5) Input "-LOAD=\$(CONFIGDIR)\\$(WORKSPNAME).x30" to the [Command line options].

The following is an example for the setting.



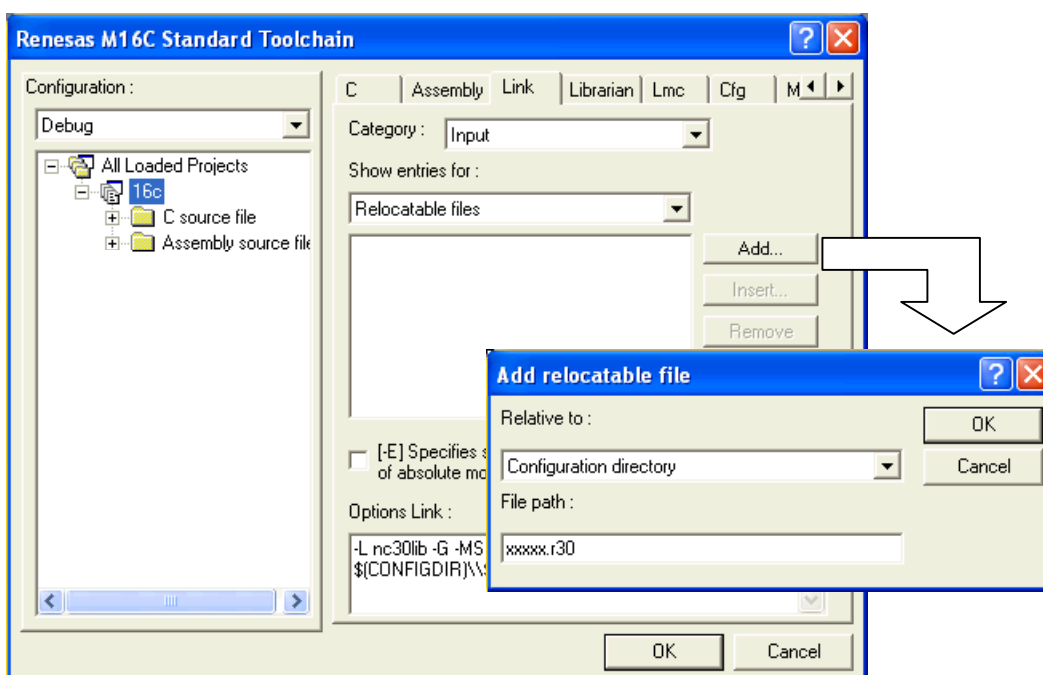
5.3. Start-up program is linked to a head.

If a default start-up program (ncrt0.a30) is specified when work space creates, this file is automatically linked to a head.

5.4. User defined start-up program is linked to a head

When user defined start-up program (without "ncrt0.a30") is linked to a head, please set up HEW in the following procedure.

- (1) From the menu, click [Options] -> [Renesas M16C Standard Toolchain...].
(This opens [Renesas M16C Standard Toolchain] dialog..)
- (2) Click [Link] tab.
- (3) Select [Input] form the [Category:].
- (4) Select [Relocatable files] from [Show entries for:].
- (5) Click [Add] button.(This opens [Add Relocatable files] dialog..)
- (6) Select [Configuration directory] from [Relative to:].
- (7) Input [ncrt0.r30] to [File path:].
- (8) Click OK button in [Add Relocatable files] dialog..
- (9) Click OK button in [Renesas M16C Standard Toolchain] dialog.



6. Installing M3T-NC8C

6.1. Before installing M3T-NC8C

Please confirm as follows before installing M3T-NC8C in your computer.

- Please carefully read the "Release Note" included with your product before using M3T-NC8C. If you've installed this product in your computer, it is assumed that you've agreed to the provisions stipulated in the License Agreement.
- In order that M3T-NC8C operates comfortably, it requires at least 32Mbytes of memory and a hard disk having 20Mbytes or more of space.
- Use the dedicated installer to install M3T-NC8C.

6.2. Precaution about installing this product

- When you install this product, this installer is sure to install HEW (High-performance Embedded Workshop), too.
- If the dialog described the following message is output during installing, please select "Yes to All".

Dialog Message:

The following file is already on your computer.

C:\WIN98\TEMP\NC8C\...

Do you wish to overwrite this file?

:

6.3. M3T-NC8C Installer

The installer is provided for each of the environments (supported host, supported OS and language) listed below. Check the product you've purchased to find the appropriate installer.

Supported host	Supported OS	Installer name	Directory on CD-ROM
IBM PC/AT compatible	Microsoft Windows 98 Microsoft Windows Me Microsoft Windows NT Microsoft Windows 2000 Microsoft Windows XP	SETUP.EXE	\NC8C\W95E

6.4. The directory in which NC8C will be installed

You can not specify a name that contains a blank for the directory in which AS8C will be installed. For other points to note, see "Precautions on PC version" in this note.

Note, When changing the item "Installation directory" from the "Select Components" screen by using "Browse..." during installation, a trouble sometimes occurs that you cannot select some of the drives displayed by "Drives:" on the "Chose Directory" screen. In such a case, return to the "Select Components" screen and use "Disk Space..." on that screen to specify a drive. If you still have difficulty, reexecute the installer after restarting Windows.

6.5. Setting environment after installation

After you finished installing M3T-NC8C, set environment variables next.

The environment variables marked by "Auto" in the tables below do not need to be set because the Windows installer automatically rewrites AUTOEXEC.BAT.

Environment variable	Example of setting
----------------------	--------------------

BIN8C	Auto (SET BIN8C=C:\MTOOL\BIN)
INC8C	Auto (SET INC8C=C:\MTOOL\INC8C)
LIB8C	Auto (SET LIB8C=C:\MTOOL\LIB8C)
TMP8C	Auto (SET TMP8C=C:\MTOOL\TMP)
NCKIN	SET NCKIN=SJIS
NCKOUT	SET NCKOUT=SJIS
Command path	Auto (C:\MTOOL\BIN is added)

7. Operating environments that have been confirmed to be good

The table below lists the host computers and OS versions with which NC8C has been confirmed to be operating normally.

Host computer	OS version	CD-ROM directory
IBM ⁴ PC/AT ¹	Microsoft ² Windows ⁵ 98	W95E
	Microsoft Windows NT ⁵ 4.0	
	Microsoft Windows Me	
	Microsoft Windows XP	
	Microsoft Windows 2000	

If in Windows NT environment the command prompt size is set to other than "80 x 25," the command prompt size will change frequently as you start the compiler. Make sure the command prompt size is set to "80 x 25."

8. Software version list of NC8C V.5.30 Release 1

The following lists the software items their versions included with NC8C V.5.30 Release 1

nc8c	V.6.00.03	Compile driver
cpp8c	V.4.05.00	Preprocessor
ccom8c	V.5.30.05	Compiler
aopt8c	V.1.02.00	Assembler's optimizer
as8c	V.5.10.00	Assemble driver
mac8c	V.3.40.01	Macro processor
asp8c	V.5.10.00	Assemble Processor
ln8c	V.5.10.01	Linkage Editor
lmc8c	V.4.00.01	Loadmodule Converter
xrf8c	V.2.01.00	Cross Referencer
abs8c	V.2.11.00	Absolute listor

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- (b) The customer shall fully comply with any and all provisions provided for in "Software User License Agreement" which Renesas Solution offers bellow.

Product Name : M3T-NC8C(R8C/Tiny series Only version)

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- 11.3 This Agreement is made under and shall be construed in accordance with the Laws of Japan. Licensee agrees that any disputes related to this Agreement shall be settled by the jurisdiction of the court determined by Licensor.
- 11.4 Matters not stipulated in this contract and doubts arising between the Licensee and the Licensor shall be settled by consultation between the two parties.
- 11.5 The Licensor reserves the right to change the Licensed Software and its specifications and the information written in the manual in the future without prior notification to the Licensee.

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