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Chapter 1. Target Devices

The target devices supported by the CS+ are listed on the Website.
Please see this URL.
CS+ Product Page:

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

Chapter 2. User's Manuals

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

Manual Name	Document Number
CS+ V3.00.00 Installer	R20UT3094EJ0100
CS+ V3.00.00 Editor	R20UT3096EJ0100
CS+ V3.00.00 Python Console	R20UT3097EJ0100
CS+ V3.00.00 Updater	R20UT3098EJ0100
CS+ V3.00.00 Message	R20UT3099EJ0100
CS+ V3.00.00 Project Operation	R20UT3101EJ0100
CubeSuite+ V2.02.00 Analysis	R20UT2868EJ0100
CS+ V3.00.00 RH850 Debug Tool	R20UT3082EJ0100
CS+ V3.00.00 RX Debug Tool	R20UT3083EJ0100

Chapter 3. Keywords When Uninstalling the Product

There are two ways to uninstall this product.

- Use the integrated uninstaller from Renesas (uninstalls all CS+ components)
- Use the Windows uninstaller (only uninstalls this product)

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

- Programs and Features

Then select [CS+ for CC].

Chapter 4. Changes

This chapter describes changes from V2.02.01 to V3.00.00.

4.1 Improvement of CS+ functionality

4.1.1 Change of the name

CubeSuite+ has been changed to CS+ from this version.

The expression of "CubeSuite+" may remain in some documents but this should be read as "CS+".

4.1.2 Multiple startup menus

Startup from the Start menu of Windows is divided into two types.

- CS+ for CC (RX, RH850)
- CS+ for CA, CX (78K, RL78, V850)

Use either of the above startup menus according to the compiler in use.

Family		Compiler	Start Menu of Windows
RX		CC-RX	CS+ for CC (RX, RH850)
RH850		CC-RH	CS+ for CC (RX, RH850)
78K	78K0R	CA78K0R	CS+ for CA, CX (78K, RL78, V850)
	78K0	CA78K0	CS+ for CA, CX (78K, RL78, V850)
RL78		CA78K0R	CS+ for CA, CX (78K, RL78, V850)
V850	V850E	CA850	CS+ for CA, CX (78K, RL78, V850)
	V850E2	CX	CS+ for CA, CX (78K, RL78, V850)

Note that when CS+ is started up by double-clicking a project file, the CS+ appropriate for the project type will be started up.

4.1.3 Addition of a new facility to split panels

Highlighting of the focused tab in split panels is now supported.

4.1.4 Addition of the memory mapping profiler function

The memory mapping profiler function is now supported.

4.1.5 Improvement of the Option dialog box

[Build / Debug] is separated into [Build] and [Debug].

The [Enable parallel build between projects] check box is added to [Build].

4.1.6 Improvement of the external tool startup function

Placeholders that can be specified with startup options of an external tool are added.

Placeholder Name	Description
ActiveProjectDir	Replacement with the absolute path of the active project folder
ActiveProjectName	Replacement with the active project name
FileDir	Replacement with the absolute path of the folder containing the file that is currently selected in the Project Tree panel
MainProjectDir	Replacement with the absolute path of the main project folder
MainProjectName	Replacement with the main project name
MicomToolPath	Replacement with the absolute path of the installation folder of this product
ProjectDir	Replacement with the absolute path of the project folder
ProjectName	Replacement with the project name
TempDir	Replacement with the absolute path of the temporary folder
WinDir	Replacement with the absolute path of the Windows system folder

4.1.7 Change of the configuration of user's manuals and online help

The configuration for user's manuals and online help is changed. The main configuration is as follows:

- Installer (only user's manual and no online help)

- Project Operation

- Peripheral Function Operation

- Pin View

- API Reference

- Editor

- Compiler

- Build Tool Operation

- Debug Tool

- Analysis

- Python Console

- Updater

- Message

4.2 Improvement of functionality of build tool

4.2.1 Addition of the parallel build function

The parallel build function is now supported.

Usage of the parallel build function enables multiple CPU cores on the host machine to simultaneously execute compilation and thus reduce the build time. This function can also perform parallel build between projects, that is, simultaneous build of multiple projects.

4.3 Improvements to the debugging tool

4.3.1 Improvement of Debug Console Panel (RX)

The font of Debug Console Panel was changed into the monospaced font.

4.3.2 Improvement of Debug the program re-writing the on-chip FLASH (RX).

The specification was changed so that the software break could not be set as on-chip PROGRAM ROM and on-chip DATA FLASH, when "Debug the program re-writing the on-chip PROGRAM ROM" or "Debug the program re-writing the on-chip DATA FLASH" was set as YES.

4.3.3 Trusted memory function of RX64M series (RX).

The Trusted memory function of RX64M series was supported.

4.3.4 Improvement of Action Event (RX,RH850)

The specification was changed so that variable expression could also set up blank in Printf event tab.

4.3.5 Improvement of download (RX,RH850)

The specification was changed so that the applicable address might be displayed, when the error occurred.

4.4 Improvement of functionality of Python Console

4.4.1 Addition of Python functions

The following Python functions are added.

Function Name	Functional Overview
common.PythonInitialize	Initializes Python.
debugger.ActionEvent.Delete	Deletes an action event.
debugger.ActionEvent.Disable	Disables the action event settings.
debugger.ActionEvent.Enable	Enables the action event settings.
debugger.ActionEvent.Get	Refers to the action event results.
debugger.ActionEvent.Information	Displays the action event information.
debugger.ActionEvent.Set	Sets an action event.
debugger.GetIORList	Displays a list of IOR registers.

4.4.2 Addition of Python classes

The following Python classes are added.

Class Name	Functional Overview
ActionEventCondition	Sets conditions for action events.
ActionEventInfo	Holds information on action events.
ActionInfo	Holds information on action event results.
IORInfo	Holds information on IOR registers.

4.4.3 Addition of Python properties

The following Python properties are added.

Property Name	Functional Overview
common.ExecutePath	Refers to the absolute path of the folder for the exe file of the running CS+.
build.Compile.Macro	Sets or refers to definition macros which are compiler options of the active project.
build.Version	Refers to the version of the compiler package.
debugger.ActionEvent.GetLine	Sets or refers to the number of action event results to be held.
debugger.Option.AccessStopExecution	Sets or refers to an option of the debug tool.
debugger.Option.AfterTraceMemoryFull	Sets or refers to an option of the debug tool.

Chapter 5. Points for Caution

This section describes points for caution regarding CS+.

5.1 Points for caution regarding CS+ (general)

5.1.1 File names

The following rules apply to folder and file names.

- Folder and file names

Do not use folder or file names that cannot be created from Windows Explorer.

- Source file names, load module file names, and project file names

File names consist of the characters a-z, A-Z, 0-9, the period (.), the underscore (_), plus sign (+), and minus sign (-).

File names cannot start or end with a period (.).

File names cannot start with a plus sign (+) or minus sign (-).

CS+ is not case-sensitive to file names.

File names may have up to 259 characters, including the path.

Do not use source files with the same file name. Even if they are on different paths, CS+ cannot classify them.

- File names other than the above

File names comply with Windows conventions.

Note that the following characters cannot be used in file names.

\\ : * ? " < > | ;

File names cannot start or end with a period (.) or space.

CS+ is not case-sensitive to file names.

File names may have up to 259 characters, including the path.

- Folder names

Folder names comply with Windows conventions.

Note that the characters below cannot be used in file names.

() , =

5.1.2 Panel display

If your hardware environment does not meet the recommended specifications for CS+, the [Property] panel may appear small and have scrambled contents.

If this happens, move the [Property] panel outside the split panel area.

- Enable [Dockable], and make it a docking panel

- Enable [Floating], and make it a floating panel

5.1.3 User Account Control (UAC) function (Windows Vista, Windows 7)

If the UAC function is disabled on Windows Vista or Windows 7, then if a user without administrator privileges creates a project, and no Device Dependence Information is installed, installation of the Device Dependence Information will begin, but the installation will fail. If the UAC function is disabled, create projects after logging in with administrator privileges.

5.1.4 Command accelerators included in split panels/categories

Although accelerators are displayed in the command menus of split panels and categories, pressing these key combinations (shortcut keys) will have no effect. Use the mouse to select menu items.

5.1.5 Problem with a Windows update program

Your computer may suffer a "blue screen" error if you apply the KB2393802 patch published by Microsoft Corporation. If this error occurs, please apply the patch provided by your computer's manufacturer or another source.

5.1.6 Renesas Electronics real-time OS

If you use the real-time operating system for the RX family provided by Renesas Electronics, install CS+ in a folder and path where the names contain no parentheses. If you install it under the 64-bit version of Windows, it will be installed in the "Program Files (x86)" folder by default, and since the folder path includes parentheses, this will produce an error.

5.1.7 Changing microcontrollers

Note the following points for caution when changing the microcontroller.

- The microcontroller can only be changed to another within the same family, since this will correspond to the same build tool (RH850 and RX).
- When changing the microcontroller, do so while the debugger is not connected.
- Save the project before changing the microcontroller.
- Information on pin layout (design tool), code generation (design tool), and debugging (except for watch registration information) are not carried over after the microcontroller has been changed.

5.1.8 Plug-in Manager function

We recommend that the checkbox for the plug-in for the microcontroller that is the target for development is not deselected on the [Basic Function] tabbed page of the [Plug-in Manager] dialog box.

Deselect the checkboxes for the build tool and debugging tool plug-ins that are for microcontrollers that are not the target for development. For example, if only the plug-in for the build tool is deselected, the file to be downloaded by the debugging tool will not be found and an error will occur.

5.1.9 [Editor] panel

- The [Page Setup] dialog box is not available.
- Although there is a [Copy] button on the [Print Preview] toolbar, it does not work.
- When a variable or label is selected and the Jump to Function feature is used from the context menu, execution does not jump to the variable or label.
- The Jump to Function feature will not jump to a static function defined in another file.
- The following notes apply to the editor, when source files with the same name but from different folders are registered with a main project and a sub project, and load modules from both the main project and sub project are downloaded.
 - The address of the main project is displayed on the file.
 - At jumping to a source file from disassembled code, the file registered with the main project is opened.
 - If the file is opened from either project, only one file will be opened.
- The smart edit function does not work correctly for a structure that does not have a name.
- If the arguments of a function include a function call, incorrect information will be displayed in the tooltip.
- Names of member variables and functions are not correctly supplemented by the smart edit function in arrays of classes and of pointers to classes.
- Supplementation does not produce appropriate strings even if a part of a member name is entered and 'ctrl + (space)' is also entered.
- Outlining (collapse/expand) only works with files that have been registered with the project. Any files that have not been registered with the project will not be outlined in the [Editor] panel of CS+.
- On Windows 8, the display may become unclear due to anti-aliasing.
- In mixed display mode, if a line number is specified for a jump, the disassembled code is inserted and displayed, so the specified line may not be displayed on the screen.
- If a structure is nested, the smart edit function does not work on the third and subsequent stages. In addition, information is not displayed in the tooltip.
- For the first line of code immediately after '#ifdef - #endif', the smart edit function does not show candidate members. In addition, no tooltip is displayed.
- For the first variable in '#ifdef - #endif', the smart edit function does not show candidate members for the code after '#endif'. In addition, no tooltip is displayed.
- When a file not included in a project is opened, a bookmark is set, the project is closed, the setting for the bookmark in the file is changed, the project is opened again, and the [Bookmarks] dialog box is opened, the dialog box will display the bookmark with the setting when the project was closed while the source window displays the bookmark with the new setting that was made after the project was closed. That is, different settings are displayed for the bookmark in the dialog box and source window.

In such cases, close the file and then open it again. The display of the bookmark in the [Bookmarks] dialog box will then reflect the display in the source window.
- When the rectangular selection tool (obtained by holding the Alt key down and then using the

mouse to select an area) is used and the selected area is pasted to add lines in and after the last line, the selected area is pasted from the beginning of the line after last regardless of the location specified for pasting. Insert spaces after pasting as required.

- When saving a file in the [Save As] dialog box, the extension listed at the top of the [Save as type] drop-down list is automatically added unless another extension is specified. Note however, that an extension is not added when a file name is input with an extension that is selected in the [Save as type] drop-down list or with an extension that is registered with Windows. When an automatically added extension is not as expected, modify the name of the file by using, for example, Explorer.

5.1.10 Conversion from PM+ to CS+ projects

CS+ cannot read CA850 projects made by PM+ V6.00/V6.10/V6.11 then the Build Mode has been newly added. Handling by CS+ is as follows.

- 1) When [Debug Build] or [Release Build] is specified, information on the added Build Mode cannot be read.
- 2) When the added Build Mode is specified, it leads to an error.

[Workaround]

Use V6.20 or a later version of PM+ to read the project, save it, then read the project into CS+.

5.1.11 Debugging tool settings during project appropriation

When you create a project by appropriate settings from another project, only the settings for the default debugging tool will be imported. In the RX family, however, internal processing is common to the emulator and simulator, so the settings are imported regardless of which debugging tool is selected.

5.1.12 Online help

If you close the online help while the Search tab is being displayed and you then open the online help again and display the [Contents] tab, the Coding and Build sections may disappear.

If this happens, close the online help while the [Contents] tab is being displayed, and then open the online help again.

5.1.13 Changing the target device during the process of converting a project

When the target device is changed in the [Project Convert Setting] dialog box while it is open for conversion of a project created by using the High-performance Embedded Workshop, PM+, or an earlier version of CubeSuite, the value chosen in [Kind of project] is returned to the default value (top type in the combo box).

For example:

The setting for [Kind of project] changes to the default type (for example, [Application]) when the device selection is changed.

5.1.14 Converting High-performance Embedded Workshop projects

Attempting to load a High-performance Embedded Workshop project into the CS+ under certain conditions may not be possible, or may lead to an error during conversion or building of the project.

- (1) Converting a High-performance Embedded Workshop project to make it compatible with the CS+ fails when any of the following conditions is satisfied.
 - No toolchain from Renesas Electronics Corp. is selected for the project.
 - The project contains no tps file for use in setting up the High-performance Embedded Workshop environment (the tps file is automatically created when the project is opened through the High-performance Embedded Workshop). To avoid this problem, you should open the project through the High-performance Embedded Workshop once before starting conversion.
 - The project contains multiple CFG files, each of which is used to set up a realtime OS from Renesas Electronics Corp.
- (2) Converting a High-performance Embedded Workshop project to make it compatible with the CS+ succeeds but building of the project leads to an error when any of the following conditions is satisfied.
 - Placeholder \$(TCINSTALL) is used in the project.
 - \$(TCINSTALL) remains in the project even after conversion but the CS+ does not recognize \$(TCINSTALL). Placeholder \$(TCINSTALL) that has been used as a parameter for [Options] in the High-performance Embedded Workshop is simply passed to the CS+ and may cause an unintended result (e.g. an error) upon building of the project. For this reason, you should manually change \$(TCINSTALL) after converting the project.

- Placeholder \$(WORKSPDIR) is used in the project.
If you select a HEW project file (with extension hwp) in the CS+, this is automatically converted to "%ProjectDir%\.." (the directory above the project directory). An error may occur during building of the project if the workspace does not exist in the directory indicated by "%ProjectDir%\..".
For this reason, you should manually change "%ProjectDir%\.." after converting the project.
- A custom build phase is used in the project.
Since all custom phases are deleted upon conversion, an error may occur during building of a project that involved a file output created for a custom build phase in the High-performance Embedded Workshop.
After converting the project, register the custom build-phase command with the CS+ as a command to be executed before or after each phase as required.
- A custom placeholder is used in the project.
Custom placeholders are not converted because the CS+ does not recognize them. Any custom placeholder that has been used as a parameter for [Options] in the High-performance Embedded Workshop is simply passed to the CS+ and may cause an unintended result (e.g. an error) upon building of the project. For this reason, you should manually change the custom placeholders after converting the project.

(3) Other

- (a) \$(FILEDIR) is converted to %FileDir%.
Leaving %FileDir% as it is when the pathname is edited in the [Path Edit] dialog box will lead to the following error: The specified path contains a non-existent folder. (W0205012)
Edit the pathnames and replace %FileDir% with another placeholder or directory name.
- (b) \$(WINDIR) is converted to %WinDir%.
- (c) The order in which folders are displayed in CS+ may differ from that in the High-performance Embedded Workshop.
- (d) If a High-performance Embedded Workshop project for which downloaded files have been specified is loaded into CS+, CS+ will show these files as the second and subsequent items in the list of downloaded files for each debugging tool.
- (e) The compiler option -output=src is converted to -output=obj (default).
- (f) If you load a library project that has been linked to the standard library into CS+, the linkage setting will be discarded (this is indicated in the log information that is output as a result of loading the project).
- (g) If [Use an existing library file] has been selected for the library generator in the High-performance Embedded Workshop, the setting is changed to [Do not add a library file] in CS+. For this reason, linking with the specified library will not proceed (this is indicated in the log information that is output as a result of loading the project).
- (h) Option settings that were made on the [Toolchain Option] tabbed page of the High-performance Embedded Workshop are not converted but discarded (i.e. they are not moved across to CS+).
- (i) If a sub-command file has been selected for the linkage editor in the High-performance Embedded Workshop, the [Use external subcommand file] setting is discarded when the project is loaded into CS+. The linkage editor options will have their default settings.
- (j) Any files specified with the -library, -input, or -binary option will not be listed in the [Link Order] dialog box. The result is that the order of linkage for these files will not be selectable.
- (k) RTOS configuration files will not be displayed under the [Configuration file] category node after the project is loaded into CS+.
- (l) RTOS option settings that were made in the High-performance Embedded Workshop are discarded. RTOS options will have their default settings in CS+.
- (m) The build mode for RTOS projects will be "DefaultBuild" after the project is loaded into CS+. You will need to change the build mode as required.
- (n) The order of linkage of the assembly output files (ritbl.obj) for an RTOS project will differ from that in the High-performance Embedded Workshop.

5.1.15 Creating new projects

Applies to: RX

If a new project is created by selecting [Empty Application[CC-RX]] under the environment for the RX, building the project may lead to the following errors.

- ** L2132 (E) Cannot find "D" specified in option "rom"
- ** L2132 (E) Cannot find "D_1" specified in option "rom"
- ** L2132 (E) Cannot find "D_2" specified in option "rom"

If you encounter these errors, change the setting of [ROM to RAM mapped section] on the [Link Options] sheet in CS+.

5.1.16 Microsoft IME

If you are using Microsoft Office IME 2010, which is included in Office 2010 from Microsoft Corporation, CubeSute+ may output error E2000006.

Since Microsoft Office IME 2010 may have caused this problem, replace it with Microsoft's standard IME or install the KB2687611 module provided by Microsoft Corporation to fix Microsoft Office IME 2010.

5.1.17 Tutorials

The Code Generator Plug-in, Pin Configurator Plug-in and Program Analyzer Plug-in are used in tutorials. Enable them through the [Plug-in Manager] dialog box.

5.1.18 Starting multiple instances of CS+

Two or more instances of CS+ can be started on the same host machine, but if you do so, take note of the points listed below.

- When two or more instances of CS+ are started, the most recent information to have been written is saved in the information file for each user's own PC.
- When two or more instances of CS+ are started, the most recent information to have been written is saved in the information file for the stack analysis tools (including CallWalker).
- When the same project file is used in two or more instances of CS+, the most recent information to have been written is saved.
- When the same project file is used in two or more instances of CS+, do not attempt building from more than one instance at the same time since the names of the output files will be identical.

5.1.19 Options when starting CS+

Although the options below can be specified when starting CS+W.exe, do not specify them. If specified, they will prevent the edit function from operating normally.

- /npall
- /np to specify an editor

5.1.20 Mentions of "R8C" in user's manuals and online help

"R8C" is mentioned in the user's manuals and online help, but CS+ does not support the R8C family.

5.2 Points for caution regarding design tools

5.2.1 Changing packages

If you change the package name in the pin layout properties, the data input in the device top view and device pin list will be cleared.

5.2.2 Saving projects

If you save a project that has sub-projects while the [Device Top View] or [Device Pin List] panel is open, then the device top view and device pin list of the last sub-project in the Project Tree will always appear.

5.3 Points for caution regarding debugging tools

The abbreviations listed below collectively denote the corresponding tools in this section.

OCD (serial): E1 Emulator (serial), E20 Emulator (serial)

OCD (JTAG): E1 Emulator (JTAG), E20 Emulator (JTAG)

5.3.1 Adding sub-projects

Applies to: All debugging tools, common to all devices

Disconnect the debugging tool before adding a sub-project that handles a different device from the main project.

5.3.2 Low-power consumption modes

Applies to: All debugging tools for RX

When a forced break occurs in a low-power consumption mode (e.g. sleep, stop, or standby) or an instruction that makes the CPU enter a low-power consumption mode is executed during stepped execution, the behavior of the simulator and the emulator will differ as follows.

- **Emulator:** The forced break leads to release of the CPU from the low-power consumption mode. Furthermore, the CPU will enter the low-power consumption mode during stepped execution.
- **Simulator:** Transitions to low-power consumption modes (e.g. by a register setting) are not supported. Executing a WAIT instruction causes a break, with the PC placed at the address of the next instruction. During stepped execution, the CPU does not enter the low-power consumption mode and the PC is placed at the address of the next instruction.

5.3.3 Traces over desired intervals

Applies to: Simulator for all devices

If you perform a trace from a trace start event until a trace end event, the simulator will not include the trace end event in the results of the trace. For this reason, if you are using a simulator, set the trace end event one line below the range for which you require display of the trace data.

5.3.4 Adding sub-projects

Applies to: Common to all debugging tools and devices

If you add a sub-project while a debugging tool is connected, downloading and so on may fail. Only add sub-projects while the debugging tool is disconnected.

5.3.5 Breakpoints and other settings becoming invalid

Applies to: Common to all debugging tools and devices

If you use leading underscores to differentiate function or variable names, the debugger may recognize them incorrectly and change the symbols or invalidate breakpoint settings.

This applies in cases such as when you have two functions, one named `_reset` and the other named `__reset`.

5.3.6 Two or more variables having the same name

Applies to: All debugging tools for RX

When two or more variables are defined with the same name in unnamed name spaces of different source files, the [Watch] panel only shows the information on the first variable to be found.

5.3.7 Member-variable pointers

Applies to: All debugging tools for RX

After the member-variable pointer "mp1" defined in the program below is registered with the [Watch] and [Local Variables] panels, the type of the pointer is indicated as "int **", not "int Foo::*".

```
class Foo {
    int m1;
};
int Foo::*mp1 = &Foo::m1;
```

5.3.8 Assigning unions to registers

Applies to: All debugging tools for RX

When a union is assigned to a register, it is assumed that the members of the union are assigned to the lower-order bytes of the register. For this reason, the values of the members will be incorrect when displayed as big endian.

5.3.9 Functions with the same name and char-type parameters

Applies to: All debugging tools for RX

When three functions with char-type parameters are defined as shown below, the address of "Func(signed char)" will not be displayed (i.e. the address of "Func(char)" will be displayed instead).

```
void Func(char);
void Func(signed char);
void Func(unsigned char);
```

5.3.10 Char-type one-dimensional arrays

Applies to: All debugging tools for RX

When a char-type one-dimensional array is assigned to multiple locations in registers or memory as shown below, no character string will be displayed in the value column of the [Watch] or [Local Variables] panel even after the array "array" has been registered with the panel (" " is displayed instead).

```
char array[5] = "ABCD";
```

5.3.11 Changing the priority section among overlaid sections

Applies to: All debugging tools for RX

Changing the priority section among overlaid sections is not immediately reflected in debugger operations. To update the display of addresses in the editor, for example, you need to close the file and open it again. To update the display of variables in the [Watch] panel, execute a single step of the program.

5.3.12 Variables assigned to registers

Applies to: All debugging tools for RX

When the selection for [Scope] in the [Local Variables] panel is not [Current], the values of variables assigned to registers are not displayed correctly. Editing these values is also not possible.

5.3.13 Locations to which variables are assigned

Applies to: All debugging tools for RX

When a defined variable satisfies both of the conditions given below, the [Watch] and [Local Variables] panels indicate the location of the entire variable rather than the location of its member variables.

Conditions:

- (1) The variable is assigned to two or more addresses or registers (i.e. two or more addresses or registers are displayed in the address column).
- (2) A structure-, class-, array-, or union-type member is defined in the variable.

Example:

```
struct Mem {
    long m_base;
};
struct Sample {
    long m_a;
    struct Mem m_b; <- Condition (2)
};
```

```
main () {
    struct Sample obj;
}
```

Display in the [Watch] and [Local Variables] panels:

```
"obj"          -      { R1:REG, R2:REG }      (struct Sample)
  L m_a        0x00000000  { R1:REG }      (long)
  L m_b        -          { R1:REG, R2:REG } (struct Base)
    L m_base  0x00000000  { R2:REG }      (long)
```

5.3.14 Casting variables

Applies to: All debugging tools for RX

When a variable is cast to another type in the [Watch] panel, casting of the variable is C-style.

For this reason, the result of casting a class using virtual inheritance to its base class is not the same as the result of the cast within the program

```
class AAA [
    int m_aaa;
] objA;
class BBB : public AAA { // BBB inherits AAA.
    int m_bbb;
} objB;
class CCC { // CCC does not inherit AAA.
    int m_ccc;
} objC
```

```
class AAA* pa = objA;
class BBB* pb = objB;
class CCC* pc = objC;
```

```
"(AAA*)pa"      Usable
"(BBB*)pb"      Usable
"(AAA*)pb"      Usable
"(CCC*)pc"      Usable
"(AAA*)pc"      Not usable because pc is considered to point to the top address of AAA.
Image of the cast in a program: (AAA*)((void*)pc)
```

5.3.15 PC entering the sleep state

Applies to: OCD (JTAG) and OCD (serial) for RX

When a PC running Windows Vista or Windows 7 enters the sleep state, debugging by CS+ cannot be continued after the PC reawakes.

Please set up the PC so that it does not enter the sleep state.

5.3.16 Stopping and restarting tracing during program execution

Applies to: All debugging tools for RX

When trace start events and end events have been set, stopping and restarting tracing during program execution is not possible.

5.3.17 Timestamps of trace information

Applies to: OCD (JTAG) and OCD (serial) for RX

The timestamps of trace information will not indicate the right times if the time between frames exceeds that corresponding to the trace counter (20 bits) or when trace output is lost.

5.3.18 Linkage options of CC-RX

Applies to: All debugging tools for RX

CC-RX does not support the '-sdebug' linkage option.

Please set [Outputs debugging information] in the [output] category of the [Link Options] tabbed page to '-debug'.

5.3.19 Return-out command execution

Applies to: All debugging tools for RX

Executing a return-out command from a recursive function may lead to execution stopping at the address of the return instruction in the called function instead of the correct line in the calling function.

5.3.20 Startup program protection

Applies to: OCD (serial) for RX100

Executing a CPU reset after one of the following operations during the execution of a user program will lead to a discrepancy between the contents of ROM as displayed by the debugger and the contents of the actual ROM of the MCU.

In this case, the contents will match after re-executing then stopping the user program.

Calling the R_FCL_ChangeSwapFlag function to immediately swap boot areas

Controlling the flash initial setting register (FISR) to immediately swap boot areas

5.3.21 Coverage measurement function

Applies to: E20 emulator (JTAG) for RX64M

(1) If you connect the emulator by using hot plug-in, the coverage measurement function is not available.

If you use hot plug-in to connect the emulator, please select [No] for [Use code coverage measurement function] in the [Coverage] category of the debugging tool properties.

(2) When the error message "The system was reset." is displayed during program execution, coverage from the start of the program to the system reset will not have been measured.

5.3.22 The break point setup in for statement or inline-expanded function

Applies to: All debugging tools for RX

If the following programs are described in C source, the command of the source program is arranged at two or more addresses, but the editor panel shows only one address.

When the break point is set up to this line, the program stops only when the address that displayed on the editor panel is executed.

1. Inline-expanded function (*1)
2. template function
3. Head sentence of for statement or do-while statement

*1 Include the function that inline expansion was performed by optimization.

5.3.23 The setting for DMAC/DTC trace

Applies to: E20 emulator (JTSG) for RX64M

When [Bus Master of data access] in the [Trace] category on the Property panel's [Debug Tool Settings] tab is set as [DTAC/DTC], If [External trace output] in the [Trace] category is set as [Trace output], the trace function may not work correctly.

Please set as [CPU execution] or [Do not output].

5.3.24 Main clock source setting when PLL is selected as clock source

Applies to: OCD(JTAG),OCD(Serial),RX64M

Please set up the following, when PLL is selected as clock source.

Set the [Main clock source] of the [Clock] category of the [Connection settings] tab of a debug tool property as [EXTAL].

When EXTAL is selected as PLL clock source, set the frequency of EXTAL to [Main clock frequency].

When HOCO is selected as PLL clock source, set the frequency of HOCO to [Main clock frequency].

5.4 Points for caution regarding analysis tools

5.4.1 [Analysis Chart] panel

- The [Execution Time(Percentage) Chart] tabbed page of the [Analysis Chart] panel cannot be displayed (E1/E20 for RH850).
- [Variable Value Changing Chart] tabbed page of the [Analysis Chart] panel does not support "Analysis of trace data" mode (E1/E20 for RH850).
- When the emulator does not support the time tags of the internal trace, the [Analysis Chart] panel cannot be used (E1/E20 for RX).
- When a simulator is specified as the debugging tool in a graph of transitions in values, realtime sampling of IORSis not supported.
- The results on an [Execution Time(Percentage) Chart] may not be exact. This is because the counter for time-lag measurement of the trace is small and may overflow. Please check whether it has overflowed by checking the timestamp of the [Trace] panel (E1/E20 for RX).

5.4.2 [Function List] and [Variable List] panels (E1/E20 for RH850)

- The [Function List] panel does not support “Execution Time”, “Execution Time(Percentage)” and “Code Coverage”.
- The [Variable List] panel does not support “Data Coverage”.

5.5 Points for caution regarding the Python Console

5.5.1 Japanese input

The Japanese input facility cannot be activated from the Python Console. To enter Japanese text, write it in an external editor etc., copy it, and paste it into the console.

5.5.2 Display of the prompt

The Python Console prompt “>>>” may be displayed more than once, as in “>>>>>>”, results may be displayed after the “>>>”, or the caret may appear without a preceding “>>>” prompt. Entering functions is still possible in these situations.

5.5.3 Paths to folders and files

IronPython recognizes the backslash character (\) as a control character. For example, if a folder or file name starts with a “t”, then the sequence “\t” will be recognized as a tab character. Please use r + “path_name” to avoid this.

Example: r“c:\test\test.py”

A forward slash (/) can be used instead of a backslash (\).

5.5.4 Executing scripts for projects that do not have load modules

If a script is specified in the startup options for use with a project that does not have a load module file, or if project_file.py is placed in the same folder as the project file, then although the script would have been executed automatically after normal loading of the project, it will not be executed if there is no load module file.

5.5.5 Forced termination

The following actions while a script such as an infinite loop is running may lead to the results of function execution being in error because the actions forcibly terminate the execution of functions.

1. Forcible termination by selecting “Forcibly terminate” from the context menu or pressing Ctrl+D in the Python Console
2. Changing the active project in a project with multiple projects

5.5.6 Forced stopping

Executing “Abort” from the context menu will forcibly stop an executing script or function, but hook and callback functions that had not started at the time the “Abort” was executed will still be executed in order after that.

5.5.7 Executing Python commands during building

Do not issue Python commands while building is in progress.

5.6 I/O Header File Generation

5.6.1 A Function to set I/O Header Generation options

It is possible to set I/O Header Generation option at the [I/O Header File Generation Options] tab on the property panel of the build tool. The following 2 settings are now possible.

- Update I/O header file on build
- Other additional options

5.6.2 Generating I/O Header File

It is possible to generate I/O Header File when selecting “Generate I/O Header File” on the context menu of the build tool node on the project tree.

Chapter 6. Restrictions

This section describes restrictions on CS+.

6.1 Restrictions imposed by debugging tools

The abbreviations listed below collectively denote the corresponding tools in this section.

OCD (serial): E1 Emulator (serial), E20 Emulator (serial)

OCD (JTAG): E1 Emulator (JTAG), E20 Emulator (JTAG)

6.1.1 List of restrictions imposed by debugging tools

No.	Target tool	Target device	Description	Remarks
1	OCD (serial) OCD (JTAG)	RX64M	Restriction on ID code authentication due to an error	

6.1.2 Details of restrictions imposed by debugging tools

No.1 Condition leading to errors in ID code authentication

Applies to: OCD (serial) and OCD (JTAG) for RX64M

Description: When both of the following conditions are met, an error will occur in ID code authentication making it impossible to continue with debugging.

[Conditions]

1. A device having an ID code setting other than all FF is being debugged in user boot mode.
2. After downloading a program that includes data for the option-setting memory, the CPU is reset by a RESET command, RES# pin reset, or an internal reset.

Workaround: There is no workaround.

Chapter 7. Changes to the User's Manuals

This section describes changes to the user's manuals for CS+.

7.1 Changes to the description of hook processes

This section describes changes to the description of hook processes. Hook processes are described in the Debugging editions.

You can configure a hook transaction in the [Hook Transaction Settings] tab on the [Property] panel. Setting up a hook transaction provides a way of changing the values of I/O registers and CPU registers by executing a Python script before downloading a load module, or before running or after resetting the CPU. This makes the following points realizable.

- (1) In program development, even if the setting program for the I/O registers is incomplete, debugging can proceed by setting the I/O registers before running the program.
- (2) You can increase the download speed by configuring the I/O registers before downloading a program.
- (3) Downloading to external RAM can be easily handled by setting up I/O registers before downloading.

You can use the following commands in a Python script to be executed as a hook process of the debugger.

```
debugger.Register.GetValue
debugger.Register.SetValue
debugger.Memory.GetValue
debugger.Memory.SetValue
```

If you want to use other Python commands, please use the Hook command in the Python console.

7.2 Change to CubeSuite+ V2.02.00 Analysis

This section describes a change to the CubeSuite+ V2.02.00 Analysis:(document number R20UT2868EJ0100).

7.2.1 The setting of Dynamic analysis

(1) Change part 1

[Location] page 10 1.1.2 Types of analysis information (2) Dynamic analysis information (a) Trace function after remarks2.

[Before change]

non

[After change]

In order to use dynamic analysis using the trace function, it is necessary to set up the property of the debug tool.

Below, the list of each debug tool and properties to be set up is shown.

Debug tool	Properties	Description
[RH850] [Simulator] [RX] [Simulator]	[Debug Tool Settings]tab -> [Trace]category -> [Use trace function] property(*)	Select [Yes]
[RH850] [Full-spec Emulator]	[Debug Tool Settings]tab -> [Trace]category -> [Trace memory size[frames]] property	Select trace size from the drop-down list
[RH850] [Full-spec Emulator]	[Debug Tool Settings]tab -> [Trace]category -> [Select trace data] property	Select [Branch PC] when acquiring only the function information. Select [Data Access] when acquiring

		only the variable information. Select [PC + Data Access] when acquiring the function information and the variable information.
	[Debug Tool Settings]tab -> [Trace]category -> [Trace memory size[frames]] property	Select trace size from the drop-down list
[RH850] [E1]/[E20]	[Debug Tool Settings]tab -> [Trace]category -> [Select trace data] property	Select [Branch PC] when acquiring only the function information. Select [Data Access] when acquiring only the variable information. Select [PC + Data Access] when acquiring the function information and the variable information.
[RX] [E1]/[EZ Emulator]	[Debug Tool Settings]tab -> [Trace]category -> [Trace data type] property	Select [Branch] when acquiring only the function information. Select [Data Access] when acquiring only the variable information. Select [Branch + Data Access] when acquiring the function information and the variable information. The setup which can be selected is dependent on device.
[RX] [E20]	[Debug Tool Settings]tab -> [Trace]category -> [Usage of trace function] property (*)	Select [Trace]
	[Debug Tool Settings]tab -> [Trace]category -> [Trace data type] property	Select [Branch] when acquiring only the function information. Select [Data Access] when acquiring only the variable information. Select [Branch + Data Access] when acquiring the function information and the variable information. The setup which can be selected is dependent on device.
	[Debug Tool Settings]tab -> [Trace]category -> [Trace memory size[MByte]] property	Select trace size from the drop-down list.

(*)If [Settings] tab-> [General] category-> [Enable dynamic analysis information] property in Program Analyzer plugin is set as [Yes], the setting of the debug tool will be automatically changed at the time of connection

(2) Change part 2
 [Location] page 10 1.1.2 Types of analysis information (2) Dynamic analysis information (b) RRM function/RAM monitor (pseudo RRM) function after caution.
 [Before change]
 non
 [After change]
 In order to use dynamic analysis using the RRM function/RAM monitor (pseudo RRM) function, it is necessary to set up the property of the debug tool.
 Below, the list of each debug tool and properties to be set up is shown.

Debug tool	Properties	Description
[RH850] [Simulator] [RX] [Simulator]	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Access during the execution] property(*)	Select [Yes]
	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Display update interval[ms]] property	Specify the interval between 100 and 65500
[RH850] [Full-spec Emulator/ [E1]/[E20] [RX] [E1]/[EZ Emulator]	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Access during the execution] property(*)	Select [Yes]
	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Update display during the execution] property(*)	Select [Yes]
	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Display update interval[ms]] property	Specify the interval between 100 and 65500
[RX] [E20]	[Debug Tool Settings]tab -> [Trace]category -> [Usage of trace function] property	Select [Real-time RAM monitor]
	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Enable the automatic update of realtime display] property	Select [Yes]
	[Debug Tool Settings]tab -> [Access Memory While Running] category-> [Display update interval[ms]] property	Specify the interval between 100 and 65500

(*)If [Settings] tab-> [General] category-> [Enable dynamic analysis information] property in Program Analyzer plugin is set as [Yes], the setting of the debug tool will be automatically changed at the time of connection

(3) Change part 3

[Location] page 11 1.1.2 Types of analysis information (2) Dynamic analysis information (c) Coverage function after caution 3.

[Before change]

non

[After change]

In order to use dynamic analysis using the Coverage function, it is necessary to set up the property of the debug tool.

Below, the list of each debug tool and properties to be set up is shown.

Debug tool	Properties	Description
[RH850] [Simulator] [RX] [Simulator]	[Debug Tool Settings]tab -> [Coverage] category-> [Use coverage function] property(*)	Select [Yes]
[RH850] [Full-spec Emulator]/ [E1]/[E20] [RX] [E1]/[EZ Emulator]	-	The coverage function is not supported.
[RX] [E20]	[Debug Tool Settings]tab -> [Coverage] category-> [Use coverage function] property	Select [Yes] The device which is not supporting the coverage function does not display this property.
	[Debug Tool Settings]tab -> [Coverage] category-> [Coverage area of measurement] property	Specify the ranges where you want to measure coverage

(*)If [Settings] tab-> [General] category-> [Enable dynamic analysis information] property in Program Analyzer plugin is set as [Yes], the setting of the debug tool will be automatically changed at the time of connection

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