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**User's Manual** 

## **RX** Series

## **Real-Time Operating System**

Start for CubeSuite

Target Tool RX78K0R Ver.4.30 RX850 Pro Ver.3.30 RX850V4 Ver.4.30

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Printed in Japan

#### User's Manual U19428EJ1V0UM

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#### INTRODUCTION

Readers	This manual is intended for	or users who	design and develop application systems using
	78K0R microcontrollers ar	nd V850 mic	rocontrollers products.
Purpose	This manual is intended fo	or users to ur	nderstand the functions of real-time OS "RX
	Series" (RX78K0R, RX850	) Pro, and R	X850V4) manufactured by NEC Electronics,
	described the organization	listed belov	ν.
Organization	This manual consists of th	e following r	najor sections.
	• GENERAL		
	• FUNCTIONS		
How to read this manual	It is assumed that the rea electrical engineering, logi	ders of this r c circuits, mi	manual have general knowledge in the fields of icrocontrollers, C language, and assemblers.
	To understand the hard microcontrollers $\rightarrow$ Refer to the <b>User's Ma</b>	ware functio <b>nual</b> of each	ns of the 78K0R microcontrollers and V850
Conventions	Data significance:	Higher digit	s on the left and lower digits on the right
	Note:	Footnote fo	r item marked with <b>Note</b> in the text
	Caution:	Information	requiring particular attention
	Remark:	Supplemen	tary information
	Numerical representation:	BinaryXX	XX or XXXXB
		DecimalX	XXX
		Hexadecim	al0xXXXX
	Prefixes indicating power	of 2 (address	s space and memory capacity):
		K (kilo)	$2^{10} = 1024$
		M (mega)	$2^{20} = 1024^{2}$

#### **Related Documents**

Refer to the documents listed below when using this manual. The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

#### Documents related to development tools (User's Manuals)

Docun	nent Name	Document No.
RX Series	Start for CubeSuite	This document
	Message for CubeSuite	U19433E
RX78K0R Ver.4.30	Coding for CubeSuite	U19443E
	Debug for CubeSuite	U19446E
	Analysis for CubeSuite	U19448E
	Internal Structure for CubeSuite	U19453E
RX850 Pro Ver.3.30	Coding for CubeSuite	U19429E
	Debug for CubeSuite	U19431E
	Analysis for CubeSuite	U19432E
	Internal Structure for CubeSuite	U19434E
RX850V4 Ver.4.30	Coding for CubeSuite	U19436E
	Debug for CubeSuite	U19438E
	Analysis for CubeSuite	U19439E
	Internal Structure for CubeSuite	U19441E
CubeSuite	Start	U19549E
Integrated Development Environment	Programming	U19390E
	Message	U19550E
	78K0R Coding	U19382E
	78K0R Build	U19385E
	78K0R Debug	U19388E
	78K0R Design	U19379E
	V850 Coding	U19383E
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#### **CHAPTER 1 GENERAL**

This chapter describes the outline of real-time OS "RX series" manufactured by NEC Electronics.

#### 1.1 Outline

The RX series is a built-in real-time, multi-task OS that provides a highly efficient real-time, multi-task environment to increases the application range of processor control units.

The RX series is a high-speed, compact OS capable of being stored in and run from the ROM of a target system.

#### 1.1.1 Real-time OS

Control equipment demands systems that can rapidly respond to events occurring both internal and external to the equipment. Conventional systems have utilized simple interrupt handling as a means of satisfying this demand. As control equipment has become more powerful, however, it has proved difficult for systems to satisfy these requirements by means of simple interrupt handling alone.

In other words, the task of managing the order in which internal and external events are processed has become increasingly difficult as systems have increased in complexity and programs have become larger.

Real-time OS has been designed to overcome this problem.

The main purpose of a real-time OS is to respond to internal and external events rapidly and execute programs in the optimum order.

#### 1.1.2 Multi-task OS

A "task" is the minimum unit in which a program can be executed by an OS. "Multi-task" is the name given to the mode of operation in which a single processor processes multiple tasks concurrently.

Actually, the processor can handle no more than one program (instruction) at a time. But, by switching the processor's attention to individual tasks on a regular basis (at a certain timing) it appears that the tasks are being processed simultaneously.

A multi-task OS enables the parallel processing of tasks by switching the tasks to be executed as determined by the system.

One important purpose of a multi-task OS is to improve the throughput of the overall system through the parallel processing of multiple tasks.

#### 1.2 Features

The RX series has the following features.

#### (1) Conformity with $\mu$ ITRON3.0/ $\mu$ ITRON4.0 specification

The RX series is designed as a typical built-in control OS architecture that conform to the  $\mu$ ITRON4.0 [RX78K0R][RX850V4] /  $\mu$ ITRON3.0 [RX850 Pro] specification.

#### (2) High versatility

To support various execution environments, the RX series extracts hardware-dependent processing that is required to execute processing as user-own coding modules and target-dependent modules, and provides it as sample source files. This enhances portability for various execution environments and facilitates customization as well.

#### (3) Compact design

The RX series is a real-time, multi-task OS that has been designed on the assumption that it will be incorporated into the target system; it has been made as compact as possible to enable it to be loaded into a system's ROM. Since it is possible to link only those service calls that are used by the user within the system among the service calls provided by the RX series during system building, a real-time multitask OS that is ideally suited to the needs of the user while being compact can be built.

#### (4) Support tools related to real-time OS

The RX series provides tools that are useful during system building and system debugging.

#### (a) Configurator

Loads highly writable and readable system configuration files as input files, and outputs information files (system information table file, system information header file, etc.) as information files.

#### (b) Task debug tool

Task debug tool provides functions for efficient system debugging (OS resource display function, etc.).

#### (c) Analysis tool

System performance analyzer provides functions for performing quantitative performance analysis on processing programs (analysis related to time such as bugs in processing timing or performance evaluation of entire system).

#### 1.3 Configuration

The module construction of the RX series is as follows.

#### 1.3.1 RX78K0R

The RX78K0R consists of the following two types of modules.

#### (1) Kernel

The kernel, which is the processing block that forms the core of the RX78K0R and the main processing block for the service calls provided by the RX78K0R, provides the following functions.

- Task management functions
- Task dependent synchronization functions
- Synchronization and communication functions (Semaphores, Eventflags, Mailboxes)
- Memory pool management functions (Fixed-sized memory pools)
- Time management functions
- System state management functions
- Interrupt management functions
- System configuration management functions
- Scheduler

#### (2) User-own coding module

To support various execution environments, the RX78K0R extracts hardware-dependent processing that is required to execute processing as user-own coding modules, and provides it as sample source files. This enhances portability for various execution environments and facilitates customization as well.

The following lists the user-own coding modules extracted for each function.

- Interrupt management functions (Interrupt entry processing)
- System configuration management functions (Boot processing, Initialization routine)
- Scheduler (Idle routine)
- **Remark** For interrupt handlers written using the #pragma rtos\_interrupt directive, the user is not required to write the relevant interrupt entry processing because the C compiler automatically outputs the interrupt entry processing corresponding to the interrupt request name.
- Remark See "RX78K0R Coding" User's Manual for details.

#### 1.3.2 RX850 Pro

The RX850 Pro consists of the following three types of modules.

#### (1) Nucleus

The nucleus, which is the processing block that forms the core of the RX850 Pro and the main processing block for the service calls provided by the RX850 Pro, provides the following functions.

- Task management functions
- Task dependent synchronization functions
- Synchronization and communication functions (Semaphores, Eventflags, Mailboxes)
- Memory pool management functions (Fixed-sized memory pools)
- Time management functions
- Interrupt management functions
- System management functions
- Scheduler

#### (2) System initialization

System initialization includes the hardware initialization and software initialization necessary for the RX850 Pro to run.

When the system is started, therefore, system initialization is executed first.

Among the system initialization processes, sample source files are supplied for the portion that is dependent on the hardware configuration of the execution environment (boot processing and hardware initialization module) and the portion that makes the software environment conformable (initialization handler).

These sample source files improve transplantability to various target systems and facilitate customization.

#### (3) Interface library

When a processing program (task/non-task) is written in C language, the external function format is used to issue a system call or call an extended SVC handler. The issue format that can be understood by the nucleus (nucleus issue format), however, differs from the external function format.

Therefore, the interface library is supported to translate a system call, issued in external function format or an extended SVC handler called in that format, into the nucleus issue format. The interface library thus acts as an agent between processing programs and the nucleus.

**Remark** See "RX850 Pro Coding" User's Manual for details.

#### 1.3.3 RX850V4

The RX850V4 consists of the following three types of modules.

#### (1) Kernel

The kernel, which is the processing block that forms the core of the RX850V4 and the main processing block for the service calls provided by the RX850V4, provides the following functions.

- Task management functions
- Task dependent synchronization functions
- Task exception handling functions
- Synchronization and communication functions (Semaphores, Eventflags, Data queues, Mailboxes)
- Extended synchronization and communication functions (Mutexes)
- Memory pool management functions (Fixed-sized memory pools, Variable-sized memory pools)
- Time management functions
- System state management functions
- Interrupt management functions
- Service call management functions
- System configuration management functions
- Scheduler

#### (2) Target-dependent module

To support various execution environments, the RX850V4 extracts hardware-dependent processing that is required to execute processing as target-dependent modules, and provides them as sample source files. This enhances portability for various execution environments and facilitates customization as well.

- The following lists the target-dependent modules extracted for each function.
  - Task management functions (Post-stack overflow processing)
  - Interrupt management functions (Service call "dis\_int", Service call "ena\_int", Interrupt mask setting processing (overwrite setting), Interrupt mask setting processing (OR setting), Interrupt mask acquire processing)

#### (3) User-own coding module

To support various execution environments, the RX850V4 extracts hardware-dependent processing that is required to execute processing as user-own coding modules, and provides it as sample source files. This enhances portability for various execution environments and facilitates customization as well.

The following lists the user-own coding modules extracted for each function.

- Interrupt management functions (Interrupt entry processing)
- System configuration management functions (CPU exception entry processing, Initialization routine)
- Scheduler (Idle Routine)
- System initialization routine (Boot processing)

Remark See "RX850V4 Coding" User's Manual for details.

#### 1.4 Folder Configuration

This section explains the folder configuration of the files read from the supply medium when RX series has been installed. The RX series is supplied in the form of an object release version or a source release version.

- Object release version
- Source release version

#### 1.4.1 Object release version

The following shows the folder configuration when the files (object release version) stored in the RX series distribution media have been installed.

#### Figure 1-1. Folder Configuration (Object Release Version) [RX78K0R]











#### 1.4.2 Source release version

The following shows the folder configuration when the files (source release version) stored in the RX series distribution media have been installed.



NEC Electronics CubeSuite\CubeSuite





NEC Electronics CubeSuite\CubeSuite



Figure 1-6. Folder Configuration (Source Release Version) [RX850V4]



#### 1.5 Execution Environment

The following shows hardware required for the RX series to perform processing.

#### (1) CPU

The following shows CPU required for the RX series to perform processing.

- 78K0R microcontrollers [RX78K0R]
- V850 microcontrollers [RX850 Pro][RX850V4] (V850ES/V850E1/V850E2 core)

#### (2) Peripheral controller

To support various execution environments, the RX series extracts hardware-dependent processing as userown coding module and target-dependent modules, provides it as sample source files. Because the execution environment is supported just by rewriting the user-own coding module and target-dependent modules according to the environment, special peripheral controllers are not required.

Controllers such as a clock controller are required to use the time management functions provided by the RX series, or controllers such as an interrupt controller are required to use the interrupt management functions.

#### (3) Memory capacity

The following shows the memory capacity required for the RX series to perform processing.

Regarding the figures listed below, the required memory capacity can be minimized by setting limits on the total number of definitions of OS resource-related information defined during configuration and the types of service calls that are used by the system.

- RX78K0R
  - ROM area : 1 KB to 9 KB
  - RAM area : 1 KB or more
- RX850 Pro

- ROM area : 5 KB to 13 KB

- RAM area : 1 KB or more
- RX850V4
  - ROM area : 6 KB or more
  - RAM area : 1 KB or more

#### (4) Supported debug tool

Below is described the environment necessary for running the task debug tool and analysis tool.

	RX78	3K0R	RX85	0 Pro	RX8	50V4
	Task debug tool	Analysis tool	Task debug tool	Analysis tool	Task debug tool	Analysis tool
IECUBE	ОК	ОК	ОК	ОК	ОК	ОК
MINICUBE	NG <sup>Note1</sup>	NG <sup>Note1</sup>	ОК	OK <sup>Note2</sup>	ОК	OK <sup>Note2</sup>
MINICUBE2	ОК	NG	ОК	OK <sup>Note2</sup>	ОК	OK <sup>Note2</sup>
Simulator	ОК	ОК	ОК	ОК	ОК	ОК

Table 1-1. Supported Debug Tool

OK : It can be used by this combination.

NG : It can't be used by this combination.

Notes 1. MINICUBE isn't supporting 78K0R.

2. It can be used only by a soft trace form. It can't be used by a hard trace form.

#### **CHAPTER 2 FUNCTIONS**

This chapter describes how to install the real-time OS package, and how to start tools provided by it.

#### 2.1 Installing Real-time OS Package

This section describes how to install real-time OS package.

#### (1) Insert the CD-ROM into the drive.

The Preparing to Install page appears automatically.



NEC Electronics microcontroller development tools installer - Readme First		×
RX78K0R	Japanese	×
Readme first		
Thank you for purchasing the RX78KOR Following file contains descriptions of the development tools included in the CubeSuite and notes on using them. Be sure to read this document before using the RX78KOR		
Readme First Readme First(PDF) is not installed. Please preserve it in your PC.		
Installation		
RX78K0R Installation		
Click the following link, and run the integrated installer. o RX78KOR for CubeSuite CubeSuite is integrated development environment for developing applications and systems for NEC Electronics microcontrollers. Please install CubeSuite before you install RX78KOR Start the Installer for CubeSuite o RX78KOR for PM+ PM+ is old integrated development environment for developing applications and systems for NEC Electronics microcontrollers. Start the Installer for PM+		
Capyright(C) NEC Electronics Corporation 2008		(C)

Remark If the page does not appear automatically, open "Install.hta" in the CD-ROM.

#### (2) Click [Start the Installer for CubeSuite]

Click [Start the Installer for CubeSuite], real-time OS package install begins.

Product information (product name and version) appear along with notes when installing.

Product information (product name and version) and the notice when installing, are displayed.

The NEC Electronics Microcontroller Development To	ools Installer - step 1/8 🛛 🔀
C CubeSu	ite
Welcome to the NEC Electronics Microcotroller deve	elopment tools setup program.
	RX00000 Vx.xx [XXXxx2008]
Copyright (C) NEC	Electronics Corporation 2008
(Note)	
Please end all Windows programs before executing	this setup program.
© CubeSuite	<back next=""> Cancel</back>

Figure 2-2. Initial Window

Check the information, then click [Next].

**Remark** To use in the PM+ or GHS Multi environment, click [Start the Installer for PM+] or [Start the Installer for PM+ / Multi].

#### (3) Confirm the license agreement.

The installer asks if you agree to the license agreement. Read the agreement, and select "Agree" or "Disagree". If you agree, select "Agree", then click [Next].





Caution If you do not agree to the license, you cannot continue with the installation.

In the Software License Agreement Window, click [Next]. The Development Tools Selection Window appears.

Drive: C:
Free space:
Required space: YYY,YYYKB
Browse

Figure 2-4. Development Tools Selection Window

You cannot change the folder, because it is installed to the folder where CubeSuite was installed. Click [Next].

- **Remarks 1.** If you wish to change the installation folder, uninstall all CubeSuite products, then perform the installation.
  - If you wish to specify which products to install in detail, click [Details >]. The Advanced Tool Settings window appears. The [Component Selection] area shows a list of products related to the microcontrollers you selected in the Select Microcontrollers window.
     In the [Component Selection] area, clear the check boxes of the products that you do not wish to install.

After clearing the check boxes, click [Next].

Caution The check boxes of products that must be installed cannot be cleared.

Figure 2-5. Select components Window

Product Name	Size
Realtime DS Common Plugins Vxxx     RX000000 Vx.xx (Object Release) (Must Install)	ХХХКВ ХХХХХКВ
I Explanation:	Drive: C: Free space: XXX XXXKB Required space YY,YYYKB
nstall location	
C:\Program Files\NEC Electronics CubeSuite\	Browse
let a regram raise are closed and so babes and i	

#### (4) Enter your license key.

Click [License Manager...]. In the License Manager window, enter your license key. Registering your license key will enable updates. After it registers, click [Next].



lnstaller - step 5/8 [License registration]	
C CubeSui	te
License Key Registration Please click the button to the right to enter the produc The product that you registered the license can be up You can check for updates of this setup procedure at	t license key. License Manager date via the internet. the end.
© CubeSuite	< Back Next> Cancel



CubeSuite License Manager	
You can add and remove license of CubeSuite License key is case-insensitive and does not o Add this License <u>k</u> ey	e and related tools. contain alpabetical "O".
xxxxxxxxxxxxxxxxxxxxxxxxxxx	Add
Licenses	
	<u>R</u> emove

Caution The installer cannot be manipulated while the License Manager is running.

#### (5) Check the installation targets and installation.

The settings made in the Development Tools Selection window appear. Check the information, and if there are no problems then click [Next]. The installation begins.

Figure 2-8. Installation settings confirmation Window

🗿 Inst	aller - step 6/8 [Installation settings confirmation]	
	Setup is now ready to install CubeSuite on your computer. If the newer version is already installed , the older version may not be installed.	>
	Tools for 78K microcontrollers Install location C:\Program Files\NEC Electronics CubeSuite\	
	Click [Next] button to begin installation.	
G		cel

#### (6) The installation progress appears.

A progress bar displays the progress of the installation. After the installation of each tool is complete, the results of the installation appear in the [Install Status] area.

When all installations are finished, the [Next] button becomes enabled.

Install Status: RXxxxxx Vx.xx :Installing	
BXxxxx Vx.xx :Installing	
	~
	Abort Installations

Figure 2-9. Installation execution Window

# Remark When the installation begins, the [Abort Installations] button becomes enabled. If you click the [Abort Installations] button, a message stating that the user chose to cancel the installation appears in the[Install Status] area. The installation will halt when the installation of the product currently being installed finishes.

#### (7) Complete setup

When all setup-related tasks are finished, the results of the installation appear. Click [Finish] to complete setup.

staller - step 8/8 [Setup completion]	
Setup is complete. Click [Finish] to exit setting.	
<ul> <li>All installations were completed successfully.</li> </ul>	
<ul> <li>When a project is created or connect for the first till</li> </ul>	wa with a new device
the administrator authorization is required.	me with a new device,
🔽 Launch the update manager.	

Figure 2-10. Setup completion Window

When having a check in a [Launch the update manager] check box, the Update Manager window opens after setup completion.

#### 2.2 Uninstalling Real-time OS Package

There are two ways to uninstall real-time OS package. You can remove it using the CubeSuite Uninstaller, or from the Windows Control Panel, click Add/Remove Programs, and select individual programs to remove.

Here, explain the procedure for removing real-time OS package using the CubeSuite Uninstaller.

From the Windows [Start] menu, select [Programs] >> [NEC Electronics CubeSuite] >> [CubeSuite Uninstaller]. The uninstallation begins.

Please select th	e items to be uninstalled.	Select ail	Unsele <u>c</u> t all
Product		~	<u>U</u> ninstall
CubeSuite			and the second second second
CubeSuite C/	4850 Vx.xx	=	Abort Uninstallation
CubeSuite CA	178K0 Vx.xx		Evit
CubeSuite CA	A78KOR Vx.xx		LAI
CubeSuite Up	dateManager		
CuheSuite		*	
		>	
		~	
		3	

Figure 2-11. CubeSuite Uninstaller Window

The CubeSuite Uninstaller window looks up all CubeSuite products and real-time OS package products you have installed, and displays them in a list of check boxes.

Click [Select all] to select all the check boxes.

Click [Uninstall] to uninstall the selected products.

**Remark** You cannot remove the CubeSuite Utility Programs (NEC Electronics CubeSuite Utilities) using the CubeSuite Uninstaller. After you are finished removing programs with the CubeSuite Uninstaller, install it using Add/Remove Programs.

#### 2.3 Create Project for RX Series

The creation of a project for RX series is performed with the Create Project dialog box (See the CubeSuite Start "2.5.2 Create a new project").

From the [Project] menu, select [Create New Project...], the following dialog box will open.

Select the item below on [Kind of project].

- Project for RXxxxxx Vx.xx

Select this to generate a project for RX series.



create Project					
Kind of project:	Project fo	r RX78KOR	Vxxx		V
Using microcontroller:					
<ul> <li>78K0R/KC3-L</li> <li>μPD78F1000</li> <li>μPD78F1001</li> <li>μPD78F1001</li> <li>μPD78F1002</li> <li>μPD78F1002</li> <li>μPD78F1002</li> <li>μPD78F1003</li> <li>μPD78F1003</li> <li>μPD78F1003</li> </ul>	(44pin) (44pin) (48pin) (44pin) (48pin) (44pin)	<ul> <li>III</li> </ul>	Update Product Name:uPD78F10 Internal ROM size[Kbytes Internal RAM size[bytes]:	000_44 ]:16 1024	
TRUP TO TOUC		~			
Project <u>n</u> ame: Place:	(Input the	name of th	e project here, )	~	Browse
<ul> <li>(It is shown absolute path)</li> <li>(It is shown absolute path)</li> <li>Pass the file composition</li> <li>Project to pass:</li> </ul>	n of a project file t on of an existing (Input pro	o create.) project to t iject file to c	he new project livert.)		Browse
		<u>C</u> re	ate Cancel		<u>H</u> elp

#### 2.4 Task Debug Tool Is Started

When downloading the program for which the function of the real-time OS was used, it starts automatically. From [View] menu, select [Realtime OS] >> [Resource Information], task debug tool is started.

-	Save or Restore Doc <u>ki</u> ng Layout	٠		Performance <u>A</u> nalyzer
	Real <u>t</u> ime OS	×	2	<u>R</u> esource Information
ž	Forward to Next Cursor Position			
2	Back to Last Cursor Position			
2	Show Current PC Location Ctrl+L			
	Event			
	<u>D</u> isassemble	×		
	Tr <u>a</u> ce			
ŧ	<u>C</u> PU Register			
	IO <u>R</u>			
	<u>M</u> emory	×		
đ	Call <u>S</u> tack			
1	Local Variable			
I	<u>W</u> atch	×		
2	Output			
	Property			

Figure 2-13. [Resource Information] Item

Realtime OS Resource Information 🛛 🛛 🛛 🛛 🛛		
│ <b>S_</b> │ M │ T │ S │ E │ D │ M │	⟨M ⟨Fi ⟨V ⟨C ⟨Int ⟨Ini ⟨E ⟨R ⟨Ti ∖₹	
RTOS Name	RX850V4	
Version	0x422	
System Time	0x00000000001	
Iterrupt Nest	0	
Dispatching	Enable	
CPU Lock	Unlocked	
Stack Area	0xFFFFC584 · 0xFFFFCDE8 (0x864)	
Current SP	0xFFFFCDE8	
Idle Routine	0x0000A444	
Number of Priority	4	
Number of Task	5	
Number of Semaphore	2	
Number of Eventflag	1	
Number of Data Queue	2	
Number of Mailbox	2	
Number of Mutex	2	
Number of Fixed-Sized Memory Pool	2	
Number of Variable-Sized Memory Pool	2	
Number of Cyclic Handler	3	
Number of Interrupt Handler	3	
Number of Extended Service Call Routine	1	

Figure 2-14. Realtime OS Resource Information Panel [RX78K0R][RX850V4]

Figure 2-15. RD850Pro Window [RX850 Pro]

7% RD850Pro [TASK]				
<u>F</u> ile <u>Y</u>	⊻iew	<u>H</u> elp		
TSK	9[_task2,3,DMT]	A name: _task2		
EVF	lU[_task1,3,EVF]	entry: task.c#56(_t		
SEM		sts: DMT		
MBX		suscnt: 0		
MPL		pc: task.c#56(_t		
СУС		stksz: 0x100:SPOL1 stkptr: 0xffffce5c		
QUE		lang: TA_HLNG _		
SBT		keyid: not used iniintr:TA_ENAINT		
🗆 HLD				

#### 2.5 Analysis Tool Is Started

From [View] menu, select [Realtime OS] >> [Performance Analyzer], analysis tool is started.

Save or Restore Docking Lay	vout 📭	Performance <u>A</u> nalyzer
Real <u>t</u> ime OS	5 €	Resource Information
Forward to Next Cursor Posi	tion	
Back to Last Cursor Position		
Show Current PC Location	Ctrl+L	
<u>Event</u>		
<u>Di</u> sassemble	ו	
Tr <u>a</u> ce		
CPU Register		
IO <u>R</u>		
Memory		
Call <u>S</u> tack		
Local Variable		
<u>W</u> atch		
Output		
Property		
Project Tree		

Figure 2-16. [Performance Analyzer] Item



	😤 AZ:Analyze Window		
	File View Operation Brows	· Jump Help	
	🚅 🖬 📰 🖂 м 🕅	i 🗈 🛤 📻 🔐 📰 🗯 🗯	
	Shift + Click Ctrl + Click 0.066 0.125 Accri Name ID Pri	Click T0.063 [msec] V V V Click [msec] Data Length 0.063 [msec] V V V V V V V V V	
	INT1 ID_TASK1 ID_TASK2		
曜 AZ:Cpu Window			
Eile View Operation	Jump Help		
<b>B</b>	11 Mile		
T 0.066	0.129 <b>-</b> 0.063 [msec]	🛱 AZ:Pattern Window	
Name	Time[msec] 0 50	Elle View Option Operation Help	
ID_TASK1	0.034		
ID_TASK2	0.016 26.0%	Y 0.066 0.129 Y- 0.063 [msec] Average	0.016 [msec]
ID_TASK3	0.013 20.3%	From Task Switch ID_TASK1 -> ID_TASK2 Interrupt Valid	
		To Task Switch ID_TASK2 -> ID_TASK3 Interrupt Valid	Divide 🗟 🛨
< 3		[msec] 0 2	4
Task Run: 37.0	System:63.0%	0.016480 - 0.016480 1	
		0.016480 - 0.016480 0	
		0.016480 - 0.016480 0	
		0.016490 - 0.016490 0	
		0.016480 - 0.016480 0	

#### APPENDIX A WINDOW REFERENCE

This appendix describes the windows related to tools offered in the real-time OS package.

#### A.1 Description

Below is a list of the windows related to tools offered in the real-time OS package.

WindowWindow/Panel/Dialog Box Name	Function Description
Main window	The first window opened when CubeSuite starts.
Project Tree panel	Displays the project elements as a tree. (See "RX78K0R/RX850 Pro/RX850V4 Coding" User's Manual for details.)
Property panel	Displays details and change the settings of the node selected in the Project Tree panel. (See "RX78K0R/RX850 Pro/RX850V4 Coding" User's Manual for details.)
Create Project dialog box	Creates a new project or subproject. (See "CubeSuite Start" User's Manual for details.)
RD850 Pro window [RX850 Pro]	Displays real-time OS resource information (system information, memory area information, etc.). (See "RX850 Pro Debug" User's Manual for details.)
Realtime OS Resource Information panel [RX78K0R][RX850V4]	Displays real-time OS resource information (system information, memory area information, etc.). (See "RX78K0R/RX850V4s Debug" User's Manual for details.)
Service Call dialog box [RX850V4]	Executes processing of the service call from CubeSuite. (See "RX850V4 Debug" User's Manual for details.)
Analysis tool window	Executes basic operation of analysis tool (AZ78K0R, AZ850, AZ850V4). (See "RX78K0R/RX850 Pro/RX850V4 Analysis" User's Manual for details.)

Table A-1. Window/Panel/Dialog Box List

#### Main window

This is the start-up window that opens when CubeSuite is launched.

In this window, you can control the user program execution and open panels.

	RX78KOR - CubeSuite - [Project Tree]	
(1)	<u>File Edit Yiew Project Build Debug Tool Window H</u> elp	
(2)	General Content Con	
(2)		
Γ	Project Tree P × Property	<b>→</b> ×
	2 0 2 RX78KOR Property	
	Image: State Stat	
(3) —	Image: Construction of the second	
		- 
		* *
L	All Messages / Rapid Build /	-
	FI Open H., F2 Rename F3 Find No. F4 Replac. F5 Go F6 Build & F7 Build Pr., F8 F9 Set/DeL F19 Step D., F11 Step In	FIE Jump to

The following items are explained here.

- [How to open]
- [Description of each area]

#### [How to open]

- Select Windows [Start] >> [Programs] >> [NEC Electronics CubeSuite] >> [CubeSuite]

#### [Description of each area]

#### (1) Menu bar

This displays menus about real-time OS package.

#### (a) [View]

Realtime OS	Display a cascading menu for relating to real-time OS package.
Resource Information	Task debug tool is started. [RX78K0R] Open the Realtime OS Resource Information panel. [RX850 Pro] Open the RD850Pro window. [RX850V4] Open the Realtime OS Resource Information panel.
Performance Analyzer	Analysis tool is started. [RX78K0R] Open the AZ78K0R window. [RX850 Pro] Open the AZ850 window. [RX850V4] Open the AZ850V4 window.

#### (2) Toolbar

The toolbar shows command buttons relating to real-time OS package.

2	Task debug tool is started.
	[RX78K0R]
	Open the Realtime OS Resource Information panel.
	[RX850 Pro]
	Open the RD850Pro window.
	[RX850V4]
	Open the Realtime OS Resource Information panel.

#### (3) Panel display area

Panels are displayed in this area.

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