CUSTOMER NOTIFICATION

SUD-T-4961
July 10, 2000
Yoshiro Miyaji, Senior Manager Microcomputer Engineering Dept. Solution Engineering Div. NEC Electron Devices NEC Corporation

CP(K)

V850 Family Real-Time OS
RX850/RX850 Pro
Specification Comparison

CONTENTS

1. OVERVIEW

This document compares the specifications of the V850 family real-time OSs “RX850” and “RX850 Pro”. The version of each OS is as follows:

Real-time OS	Version
RX850	Ver.3.13
RX850 Pro	Ver.3.13

2. SPECIFICATION COMPARISON

2.1 Comparison of System Calls

(1) System calls added to RX850 Pro

Table 2-1. System Calls Added to RX850 Pro

Item	System Call
Task-related	`cre_tsk, del_tsk, exd_tsk, vget_tid,`

Synchronous communication-related	`cre_sem, del_sem, vget_sid,`
	`cre_flg, del_flg, vget_fid,`
	`cre_mbx, del_mbx, vget_mid,`

Interrupt-related	`def_int`
Memory pool-related	`cre_mpl, del_mpl, vget_pid,`
Time management-related	`set_tim, get_tim, def_cyc`
Extensive SVC-related	`def_svc, viss_svc`

(2) System calls deleted from RX850 Pro

Table 2-2. System Calls Deleted from RX850 Pro

Item	System Call
1-bit event flag-related	`vset_flg1, vclr_flg1, vwai_flg1, vpol_flg1, vtwai_flg1, vref_flg1`
Fixed-length memory block-related	`get_blf, pget_blf, tget_blf, ref_blf, ref_mpf`

Cautions 1. The 1-bit event flag used in the RX850 can be substituted with an event flag of the RX850 Pro.

Cautions 2. The fixed-length memory pools used in the RX850 can be substituted with the variable-length memory pools of the RX850 Pro.

2.2 Specification Comparison in Terms of Resources

	RX850	RX850 Pro
Maximum number of tasks	127	32767
Task priority	1 to 31	1 to 252
Maximum number of event flags	127	32767
Event flag size	32 bits, 1 bit	32 bits
Event flag queuing mode	FIFO (in the case of 1-bit flag)	FIFO (when waiting for two or more event flags)
Maximum number of semaphore	127	32767
Number of semaphore count	127	2147483647 (0x7fffffff)
Semaphore queuing mode	FIFO	FIFO/task-priority sequence
Maximum number of memory pools	127	32767
Memory block length	Fixed/variable	Variable
Memory block queuing mode	FIFO	FIFO/task-priority sequence
Number of mail boxes	127	32767
Message queuing mode at mailbox	FIFO/priority sequence (0 to 31)	FIFO/message-priority sequence (–32767 to 32767)
Task queuing mode at mailbox	FIFO	FIFO/task-priority sequence
Maximum number of cyclic handlers	127	32767
Maximum number of extensive SVC handlers	–	32767

2.3 Memory Allocation

Table 2-3. Differences in Memory Allocation

	RX850	RX850 Pro
Management objects	.pool0 section (located at address 0 ±32 KB)	SPOL0 area
Task stack Handler stack	.pool0 or .pool1	SPOL0 area or SPOL1 area
Memory pool	.pool0 or .pool1	UPOL0 area or UPOL1 area
System information table	.sit section (located at address 0 ±32 KB)	ROM area
Kernel	Located within ±2 MB from task or handler	ROM area

2.4 Use of V850E Series-Specific Instruction "callt"

When the RX850 is used with the V850E/MS1, V850E/MA1, or NB85E, the callt instruction cannot be used in tasks and handlers. Therefore, do not use this instruction in the assembler source. In addition, specify an option that suppresses output of the callt instruction when the C source is compiled. With the V850 Pro, the callt instruction can be used.

The following table indicates how to suppress output of the callt instruction when the NEC C compiler CA850 (V2.20 or later) or GHS C compiler CCV850E (Rel.4.0.2 or later) is used.

Table 2-4. How to Suppress Output of callt Instruction

		How to Suppress Output of callt Instruction
CA850	Command line option	-Xpro_epi_runtime=off
	Project manager	Check "Default" on "Prologue Epilogue Runtime" of the [Output2] tab in the [Compiler Options] dialog box.
CCV850E	Command line option	-no_callt
	Builder	Check "Do not use V850E callt Instruction" in dialog box displayed by selecting [Option] → [CPU].

For details of the options, refer to the user's manual of each compiler.

2.5 Memory Size

Table 2-5. Comparison of Memory Size (1/2)

	RX850 (Bytes)	RX850 Pro (Bytes)
SBT	20	504
System memory pool management area	–	32
Ready queue	Priority level + 1	align4 ((priority level + 4) × 2□
Priority map	Included in SBT	align32 (priority level + 4)/8
Task (TCB)	9 × Number of tasks	56 × Maximum number of tasks
Task execution right	18 × Number of execution rights … Expression 1 Even if a task that does not wait for the task execution right is created, the above size (18 bytes) is always reserved. In the case below, the size described below is added to (Expression 1). If a variable-length memory pool or event flag is used in the system: (Expression 1) + 8 × Number of execution rights. If “Possibility of waiting for execution right” is specified when a task execution right is created: (Expression 1) + Specified number of execution rights.	–
Task stack	User-specified size × Number of execution rights The user-specified size must be at least the size necessary for the following contexts and interrupts. r22 mode: Context: 36 bytes Interrupt: 48 bytes r26 mode: Context: 44 bytes Interrupt: 56 bytes r32 mode: Context: 56 byes Interrupt: 68 bytes	100 + User-specified size × Maximum number of tasks The user-specified size includes the size of the stack used for interrupts that require 72 bytes.
Semaphore	2 × Number of semaphores	20 × Maximum number of semaphores
Event flag	5 × Number of event flags	20 × Maximum number of event flags
1-bit event flag	2 × Number of 1-bit event flags	–
Mail box	9 × Number of mail boxes	20 × Maximum number of mail boxes

Table 2-6. Comparison of Memory Size (2/2)

	RX850 (Bytes)	RX850 Pro (Bytes)
Variable length memory pool	16 × Number of memory pools + Total of memory pool size specified when each memory pool is created	24 × Maximum number of memory pools + Total of memory pool size specified when each memory pool is created
Fixed-length memory pool	4 × Number of memory pools + Total of memory pool size specified when each memory pool is created	–
Cyclic handler	10 × Number of cyclic handlers	40 × Maximum number of cyclic handlers
Interrupt handler	–	16 × Maximum number of interrupt handers + align4 (Maximum interrupt source number + 1)
Extensive SVC handler	–	16 × Maximum number of extensive SVC handlers
Stack for interrupt	User-specified size	(72 bytes (= One interrupt frame) × m) + (28 bytes × n) + Number of times function is pushed and popped m = Integer of 1 or greater. At least one interrupt frame is necessary. This stack area is used when an interrupt occurs in the idle status. n = Integer of 0 or greater. This stack area is used to save registers each time the handler is started. The values of m and n vary depending on how many interrupts are nested.

The stacks and variable-length memory pools of the RX850 Pro are reserved when they are created. Therefore, the memory size when all tasks and memory pools are simultaneously created is the total of all management blocks. In a system where not all tasks and memory pools are created at the same time, however, the memory size is that when as many tasks and memory pools as possible are created.

2.6 Comparison of Other Features

Table 2-7. Comparison of Other Features

	RX850	RX850 Pro
Memory allocation	A section that must always be located at 0xffff8000 through 0x00008000 exists.	No special restriction
Address limitation	System calls can be accessed only within the range of ±21 bits.	Entire 32-bit space can be accessed.
RX library	Only the RX library cannot be fixed because an interface library of system calls is not available.	Only the RX library can be fixed to ROM because an interface library of system calls is available.
Creating two or more load modules	An application using two or more load modules cannot be created.	Two or more load modules can be created by fixing the address of the system information table.
Addition of resources	Because resources can be created only statically, the resource information of the RX must be rewritten.	Because resources can be dynamically created, they can be added simply by rewriting the application.
Specifying idle status	An idle handler is available for specifying the idle status.	Because an idle handler is not available, an idle task (task with the lowest priority) must be created.
Register mode	Three types of modes selectable: 22-, 26-, and 32-register modes	32-register mode only
Timer count unit	TICK (number of times timer interrupt occurs)	ms

3. PORTING FROM RX850 TO RX850 Pro

To port an application using the RX850 to an application using the RX850 Pro, refer to the following document for the modifications that must be made.

Document Name	V850 Family Real-Time OS RX850 Pro Porting from RX850 (Ver.3.1x)
Document No.	SUD-T-4816-E