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April 1st, 2010
Renesas Electronics Corporation

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R8C/Tiny Series
General-purpose Program for Variable Vector Table

1. Abstract

This program shows an example for setting variable vector tables and an example for using software interrupts.

2. Introduction

This program is an example using R8C/10 group microcomputers.

A variable vector table is a 256-byte interrupt vector table whose start address (IntBase) is indicated by the content of the interrupt table register (INTB). The variable vector table in this program has its start address at 0D000H. The variable vector table has individual vector tables each comprised of 4 bytes, and each vector table contains the start address of an interrupt routine.

There are software interrupt numbers (0 to 63) available for each vector table. The INT instruction uses these software interrupt numbers. No labels can be used in place of the software interrupt numbers. Peripheral I/O interrupts are assigned software interrupt numbers 0 to 31. In this program, software interrupt number 22 is used for timer X and software interrupt number 23 is used for timer Y. Software interrupt numbers 32 to 63 are used for software interrupts. This type of interrupt is generated by the INT instruction. Therefore, software interrupts are used in the same way as a subroutine by using the INT instruction. The INT instruction is executed even when interrupts are disabled. After interrupts are disabled (FCLR I) in this program, INT#23 and INT#32 are executed regardless of whether or not the interrupt enable flag (I) is set.

This program can also be used when operating other microcomputers within the R8C/10 group, provided they have the same vector table as the R8C microcomputers. However, some functions may have been modified. Refer to the User’s Manual for details. Use functions covered in this Application Note only after careful evaluation.
3. Flowchart

MAIN

Set interrupt stack pointer (ISP) address

Set interrupt table register (INTB) address

Set timer X

Set timer Y

Start timer count

Interrupt enabled

INT#22 interrupt instruction

Interrupt disabled

INT#23 interrupt instruction

INT#32 interrupt instruction

TIMER_X

RTS

TIMER_Y

RTS

SOFTWARE INTERRUPT

RTS
4. The example of a reference program

```
.include sfr_r811.inc ; special include file

;******************************************************************************
; R8C Program Collection No. 33
; CPU : R8C/Tiny

;******************************************************************************

.VromTOP .EQU 00D100H ; Declares start address of ROM
.Vstack .EQU 00060h ; Interrupt stack pointer
.Vintbase .EQU 00D00h ; Declares interrupt vector table address
FIX_VECTOR .EQU 00FFDCh ; Declares fixed interrupt vector address

;******************************************************************************
; Title: Variable vector table
; Outline: Description example of variable vector table and software interrupt
;******************************************************************************

.SECTION PROGRAM, CODE
.ORG VromTOP ; ROM area

MAIN:

LDC #Vstack,ISP ; Sets interrupt stack pointer
LDINTB #Vintbase ; Sets interrupt table register

mov.B #00000000b,tcss ; Timer Source select register
MOV.B #00000000B,txmr ; Timers X mode Register
mov.B #00000000b,tymr ; TimerY/Z mode Register

MOV.W #100-1,prex ; Sets timer X counter
MOV.B #00000001B,txic ; Sets interrupt level 1 for timer A0
MOV.W #0E7h,prey ; Sets timer Y counter
MOV.B #3h,typr ; Sets timer Y counter
MOV.B #00,tysc ; Sets timer Y counter
MOV.B #0000010B,tyic ; Sets interrupt level 2 for timer A1

BSET txs ; Timers X start counting
BSET tys ; Timers Y start counting

FSET I ; Enables interrupts

INT #22 ; Performs timer X interrupt processing

FCLR I ; Disables interrupts

INT #23 ; Performs timer Y interrupt processing

INT #32 ; Performs SOFTINT label interrupt processing
```
```assembly
; (Here is your program.)
jmp MAIN

TIMER_X:

; (Here is your program.)
REIT
TIMER_Y:

; (Here is your program.)
REIT
SOFTINT:

; (Here is your program.)
REIT
NOTUSE:

; (Here is your program.)
REIT

; .SECTION  SPECIAL_ROMDATA
; .ORG     Vintbase ; Variable vector table area

;Peripheral I/O interrupt vector table

;-----------------------------------------------------------------------;
.lword  NOTUSE ; BRK instruction    (vector 0)
.org     (Vintbase+52)
.lword  NOTUSE ; Key input interrupt (vector 13)
.lword  NOTUSE ; A-D                (vector 14)
.org     (Vintbase+68)
.lword  NOTUSE ; UART0 transmit     (vector 17)
.lword  NOTUSE ; UART0 receive      (vector 18)
.lword  NOTUSE ; UART1 transmit     (vector 19)
.lword  NOTUSE ; UART1 receive      (vector 20)
.lword  NOTUSE ; INT2               (vector 21)
.lword  TIMER_X ; Timer X          (vector 22)
.lword  TIMER_Y ; Timer Y          (vector 23)
.lword  NOTUSE ; Timer Z           (vector 24)
.lword  NOTUSE ; INT1              (vector 25)
.lword  NOTUSE ; INT3              (vector 26)
.lword  NOTUSE ; Timer C           (vector 27)
.org     (Vintbase+116)
.lword  NOTUSE ; INT0              (vector 29)
.org     (Vintbase+128)
.lword  SOFTINT ; vector 32 (for user or MR30)
.lword  NOTUSE ; vector 33 (for user or MR30)
```
General-purpose Program for Variable Vector Table

.R8C/T

 Ny S e

General-purpose Program for Variable Vector Table

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5. Reference

HARDWARE MANUAL
R8C/10 group HARDWARE MANUAL
(Acquire the most current version from Renesas web-site)

6. Web-site and contact for support

Renesas Web-site

http://www.renesas.com

Contact for M16C family microcomputer technical support

Mail to: support_apl@renesas.com
## REVISION HISTORY

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