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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

M16C/80 Series

Variable Vector Table

1.0 Abstract

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

2.0 Introduction

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 FFE000H. 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 12 is used for timer A0 and software interrupt number 13 is used for timer A1.

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#44 and INT#45 are executed regardless of whether or not the interrupt enable flag (I) is set.

3.0 Programming Code

```
;*****************************************************************
;       M16C Program Collection
;       CPU : M16C/80 series
;*****************************************************************
VromTOP     .EQU    0FE0000H            ; Declares start address of ROM
VIstack     .EQU    002C00H             ; Interrupt stack pointer
Vintbase    .EQU    0FFE000H            ; Declares interrupt vector table address
TA0IC       .EQU    006CH               ; Timer A0 interrupt control register
TA1IC       .EQU    008CH               ; Timer A1 interrupt control register
TABSR       .EQU    0340H               ; Timer start flag
TA0         .EQU    0346H               ; Timer A0   register
TA1         .EQU    0348H               ; Timer A1   register
;
;=================================================================
;   Title: Variable vector table
;   Outline: Description example of variable vector table and software interrupt
;=================================================================
                .SECTION    PROGRAM,CODE
                .ORG        VromTOP; ROM area
MAIN:
  LDC       #VIstack,ISP                ; Sets interrupt stack pointer
  LDC       #Vintbase,INTB              ; Sets interrupt table register
;
  MOV.W     #100-1,TA0                  ; Sets timer A0 counter
  MOV.B     #00000001B,TA0IC            ; Sets interrupt level 1 for timer A0
  MOV.W     #1000-1,TA1                 ; Sets timer A1 counter
  MOV.B     #00000010B,TA1IC            ; Sets interrupt level 2 for timer A1
;
  MOV.B     #00000011B,TABSR            ; Timers A0 and A1 start counting
;
  FSET      I                           ; Enables interrupts
;
  INT       #12                         ; Performs timer A0 interrupt processing
                                        ; (TIMER_A0 is executed)
;
  FCLR      I                           ; Disables interrupts
  ;
  INT       #13                         ; Performs timer A1 interrupt processing
                                        ; (TIMER_A1 is executed)
  ;
  INT       #44                         ; Performs SOFTINT label interrupt processing
                    |
                    |
                    |
                    |

TIMER_A0:
      (Processing)
  REIT

TIMER_A1:
  (Processing)
  REIT

SOFTINT:
  (Processing)
  REIT
```

```
NOTUSE:
  REIT
  ;
                .SECTION        SPECIAL,ROMDATA
                .ORG            Vintbase            ; Variable vector table area
;------------------------------------------------------------------------------
;       Peripheral I/O interrupt vector table
;------------------------------------------------------------------------------
        .LWORD          NOTUSE                      ; Software interrupt number 0
        .LWORD          NOTUSE                      ; Software interrupt number 1
;
                .ORG            Vintbase+48
        .LWORD          TIMER_A0                    ; Software interrupt number 12
        .LWORD          TIMER_A1                    ; Software interrupt number 13
;
                .ORG            Vintbase+176        ; Software interrupt area

;------------------------------------------------------------------------------
;       Software interrupt vector table
;------------------------------------------------------------------------------
        .LWORD          SOFTINT         ; Software interrupt number 44
        .LWORD          NOTUSE          ; Software interrupt number 45

;
        .END
```

4.0 Reference

MCU Technical Information Homepage

http://www.infomicom.maec.co.jp/indexe.htm
(or http://www.mdece.com/ , http://www.mitsubishichips.com/products/mcu/index.html or your local Web Site.)

Technical Support

E-mail: support@apl.maec.co.jp
(or your local support E-mail address. A private e-mail address should NOT be used.)

Data Sheet

M16C/80 group
(Use the latest version on the Homepage: http://www.infomicom.maec.co.jp/indexe.htm)

User's Manual

M16C/80 group
(Use the latest version on the Homepage: http://www.infomicom.maec.co.jp/indexe.htm)

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