

Using the Time Base in the HT49 MCU Series

D/N : HA0025E

Introduction

The Time Base function in the HT49 series of MCUs offers a means of providing a periodical interrupt function. The clock source configuration options for the Time Base include the system clock/4 (instruction clock), the RTC oscillator and the WDT oscillator. If the system clock/4 is chosen, the Time Base will stop functioning if the system enters the HALT mode while for the other two clock options the Time Base will continue to operate. The time for its overflow to occur can be set from the Time Base clock source/ 2^{12} ~clock source/ 2^{15} configuration option. Once a Time Base overflow signal occurs, a Time Base interrupt will be generated and the program will jump to its corresponding vector which is located at address 14H where the corresponding subroutine can be called. The overflow time signal of the Time Base can also be used as a clock source for the Timer/counter 1 in order to obtain longer overflow time cycles.

Program Example

- Options
 - The internal WDT oscillator is chosen as the clock source
 - The clock source for Timer1 is the Time Base overflow interrupt signal
 - Time Base frequency is clock source/ 2^{15}
 - LCD duty : 1/4 duty
- Program description
 - Start the LCD simulator and display message "WAIT"
 - The first time a Time Base interrupt occurs, display the message "THE 1 TBI"
 - The second time a Time Base interrupt occurs makes the Timer/Counter 1 overflow (the initial value is 0FEH), display the message "TMER1 OV" using the HT49 timebase LCD simulator.
- Instruction
 - The purpose of using the LCD is to check the occurrence of the Time Base interrupt more directly.

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Program list :
;-----
;FILE NAME : 49TIMEBASE.ASM
;Writer:Chin Juan
;Purpose: An introduction to using the Time Base
;;;
;-----
include ht49r50a-1.inc
data .section      'data'
count db ?

;-----
code .section      'code'
    org 00h
    jmp      start
    org 10h
    jmp      timer1 ;jump to timer/counter 1 interrupt subroutine
    org 14h
    jmp      timebase ;jump to Time Base interrupt subroutine

;-----
org 20h
start:
    clr      count      ;show "WAIT"
    clr      bp
    set      bp.0
    mov      a,40h
    mov      mp1,a
    mov      a,01h
    mov      [02h],a
    set      intc0.0      ;show operation finished
                        ;start the interrupt function
    mov      a,03h      ;timer/counter 1 and Time Base interrupt
    mov      intc1,a
    mov      a,80h      ;set the timer/counter 1 mode
    mov      tmrlc,a
    mov      a,0feh      ;set the timer/counter 1 initial value
    mov      tmrl,a
    set      tmrlc.4      ;enable timer/counter 1
    jmp      $           ;no action
timer1:
                        ;the timer/counter 1 overflows,
                        ;break-service program
                        ;display "TIMER1 OV"
    clr      bp
    set      bp.0
    mov      a,40h
    mov      mp1,a
    mov      a,08h
    mov      [02h],a      ;information shown operation finished
                        ;timer/counter overflows, program ends
    reti

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timebase:                                ;Time Base break-service subprogram
    inc    count                          ;count the break-off of the time base
    mov    a,count
    sub    a,02h
    sz     acc                            ;judge if the break-off overflows twice
    jmp    first
    reti

first:
    clr    bp                              ;Time Base first break-off shown
                                           ;"THE 1 TB1"

    set    bp.0
    mov    a,40h
    mov    mpl,a
    mov    a,02h
    mov    [02h],a                        ;shown operation finished
    reti                                  ;shown operation finished, back to
                                           ;the break-off

end
```