On-Chip Peripheral Program Example August 1999

Description

The µPD7805x/78005x subseries has an 8-bit real-time output port that can be triggered by either of two internal 8-bit timers or an external interrupt. Using real-time output, a signal can be output without jitter, which is suitable for control of stepper motors.

This program demonstrates the real-time output port triggered by an internal timer interrupt. Each time timer 1 times out, an interrupt automatically triggers the real-time output. Previously toggled data in the port latch is output immediately.

Program Specifications

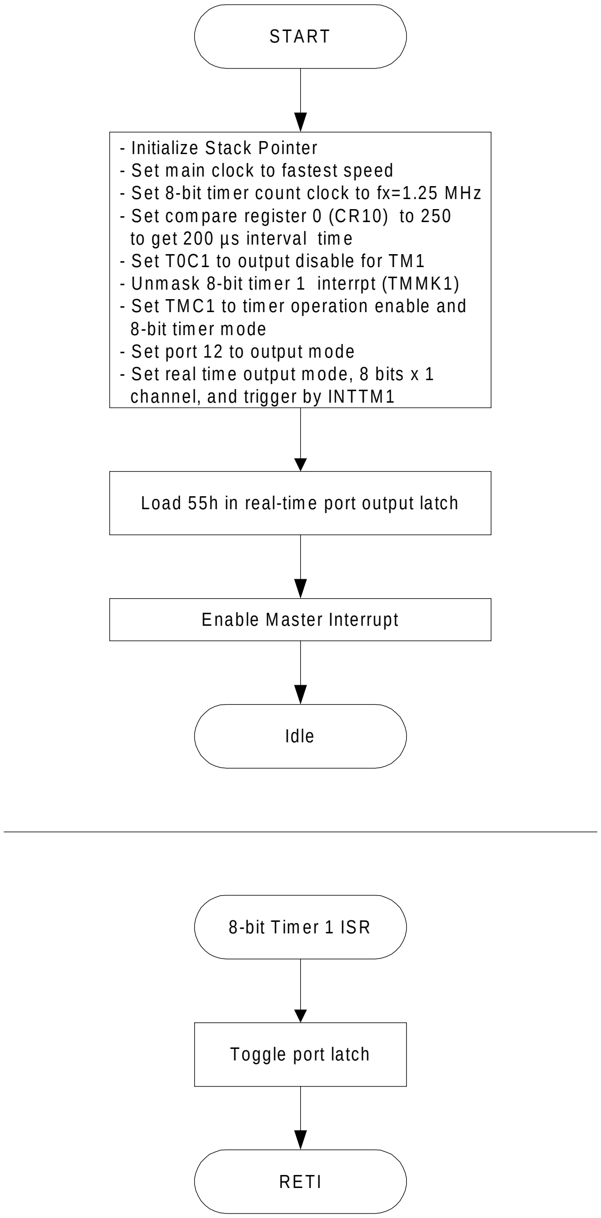
❑ Operation mode: 8 bits x 1 channel

❑ Output trigger: 8-bit timer 1 (TM1)

❑ Output period: 200 µs

❑ Pins used in program: port 12 (output port)

Flowchart


START
- Initialize Stack Pointer
- Set main clock to fastest speed
- Set 8-bit timer count clock to fx=1.25 MHz
- Set compare register 0 (CR10) to 250
to get 200 µs interval time
- Set T0C1 to output disable for TM1
- Unmask 8-bit timer 1 interrpt (TMMK1)
- Set TMC1 to timer operation enable and
8-bit timer mode
- Set port 12 to output mode
- Set real time output mode, 8 bits x 1
channel, and trigger by INTTM1
Load 55h in real-time port output latch
Enable Master Interrupt
Idle
8-bit Timer 1 ISR
Toggle port latch
RETI

Assembly Language Program

```
;**************************************************************************
; Date:       08/23/1999
;
; Parameters: - fastest CPU clock
;               (fx = 5 MHz; 1 CPU clock cycle = 200 ns)
;             - Real-time output mode:  8-bit x 1 channel
;             - Output trigger:         8-bit timer 1 (TM1)
;             - Output data pattern:    AAh and 55h by turn
;             - Output frequency:       5 kHz (200 μs)
;*************************************************************************

;========================================
;       Specify Interrupt Vectors       =
;========================================
Res_Vec  CSEG AT 0000h                ; Set main program start vector
         DW        Start
         ORG       0024h              ; Set interrupt vector
         DW        TM1_ISR            ; for 8-bit timer 1

;========================================
;       Main Program                    =
;========================================
MAIN     CSEG
Start:   DI                           ; Disable interrupts
         MOVW      AX, #0FE20h        ; Load SP address
         MOVW      SP, AX             ; Set stack pointer
         MOV       OSMS,#01h          ; Don't use scaler
         MOV       PCC, #00h          ; Main system clock at fastest setting
         MOV       TCL1,#07h          ; Select counter clock to fx = 1.25 MHz
         MOV       CR10,#250          ; Set compare register to 250 (200 μs)
         MOV       TOC1,#00h          ; Disable timer output function
         MOV       TMC1,#01h          ; Set timer 1 operation enable
         CLR1      TMMK1              ; Unmask 8-bit timer interrupt
         MOV       PM12,#00h          ; Set port 12 to output mode
         MOV       RTPM,#0FFh         ; Set port 12 to real time output mode
         MOV       RTPC,#02h          ; Set real-time output mode:
                                      ;   - 8-bits x 1 channel
                                      ;   - Timer 1 as trigger input
         MOV       RTBL,#55h          ; Load value into real-time output port latch
         EI                           ; Enable interrupts

Loop:    BR        Loop               ; CPU idle

;========================================
;=      8-bit timer ISR                 =
;========================================
ISR      CSEG
TM1_ISR:
         MOV       A, RTBL            ; Read back the port latch
         XOR       A, #0FFh           ; Toggle all bits
         MOV       RTBL, A            ; Write back into port latch
         RETI                         ; Return from interrupt

         END
```

C Language Program

```
/***************************************************************************
; Date:       08/23/1999
;
; Parameters: - fastest CPU clock
;               (fx = 5 MHz; 1 CPU clock cycle = 200 ns)
;             - Real-time output mode:  8-bit x 1 channel
;             - Output trigger:         8-bit timer 1 (TM1)
;             - Output data pattern:           AAh and 55h by turn
;             - Output frequency:    5 kHz (200 µs)
;*************************************************************************/

/* extension functions in K0/K0S compiler */
#pragma sfr       /* key word to allow SFR names in C code */
#pragma asm       /* key word to allow ASM statements in C code */
#pragma DI        /* key word for DI instruction in C code */
#pragma EI        /* key word for EI instruction in C code */

/*======================================
;       Specify Interrupt Vectors      =
;=====================================*/

#pragma interrupt INTTM1 TM1_ISR     /* TM1 interval timer vector */

/*======================================
;       Main Program                   =
;=====================================*/
void main(void)
{
         OSMS = 0x01;                /* Don't use scaler */
         PCC = 0x00;                 /* Main system clock at fastest setting */
         TCL1 = 0x07;                /* Select counter clock to fx = 1.25 MHz */
         CR10 = 250;                 /* Set compare register to 200 µs interval */
         TOC1 = 0x00;                /* Disable timer output function */
         TMC1 = 0x01;                /* Set timer 1 operation enable */
         TMMK1= 0;                   /* Unmask 8-bit timer 1 interrupt */

         PM12 = 0x00;                /* Set port 12 to output mode */
         RTPM = 0xFF;                /* Set port 12 to real time port mode */
         RTPC = 0x02;                /* Set real-time output mode
                                               - 8 bits x 1 channel
                                               - Timer 1 as trigger input */
         RTBL = 0x55;                /* Load value into real-time output latch */
         EI();                       /* Enable interrupts */

         while(1);                   /* loop here */
}                                    /* end of function main() */

/*=======================================
;       8-bit timer 1 ISR               =
;======================================*/
void TM1_ISR(void)
{
         RTBL ^= 0xFF;               /* Toggle each port bit */

}
```

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