NEC

16-Bit Timer 0 (TM0) in Square-Wave Output Mode

On-Chip Peripheral Program Example August 1999

Description

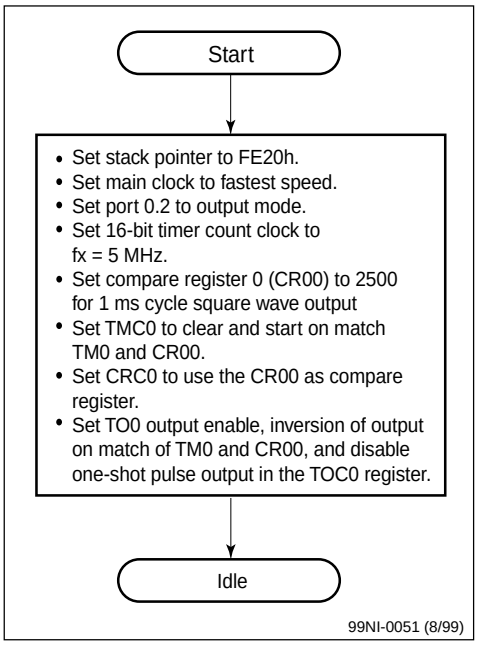
The 16-bit timer/event counter 0 (TM0) in the μPD7805x/78005x subseries can be used for an interval timer, external event counter, pulse-width modulator output, square-wave output, one-shot pulse output or pulse-width measurement.

This program demonstrates the 16-bit timer/event counter in square-wave output mode. Timer output 0 (TO0) toggles each time the value in the 16-bit TM0 register matches the count value preset in the CR00 capture/compare register 0.

Program Specifications

- Timer count clock: 5 MHz
- Square-wave interval: 500 μs
- Square-wave frequency: 1 kHz
- Pins used in program: TO0/P30 (toggles every 500 μs)

Block Diagram



Assembly Language Program

```
;*********************************************************************
; Date:       07/19/1999
;
; Parameters:  - Fastest CPU clock
;                (fx = 5.00 MHz, 1 CPU clock cycle = 200 ns
;              - Square-wave cycle: 1 ms (1 kHz)
;              - Timer count clock: fx = 5.0 MHz
;              - Output port:       TO0/P30
;
;*********************************************************************

;=======================================
;=     Specify Interrupt Vectors        =
;=======================================
Res_Vec  CSEG AT 0000h           ; Set main program start vector
         DW   Start

;=======================================
;=     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

         CLR1        P3.0        ; Set port 3.0 latch to low
         CLR1        PM3.0       ; Set port 3.0 to output mode

         MOV         TCL0,#020h  ; Select counter clock to fx = 5 MHz
         MOVW        CR00,#2500  ; Set Compare register to 2500
                                 ; 1 ms square-wave output
         MOV         TMC0,#0Ch   ; Set to clear and start on match TM0 and CR00
         CLR1        CRC0.0      ; Set CR00 operation to compare register
         MOV         TOC0,#03h   ; Set T00 output enable, inversion of
                                 ; output on match of TM0 and  CR00,
                                 ; and disable ONE-SHOT mode

Loop1:   BR   $Loop1             ; Endless loop

         END
```

C Language Program

```
/************************************************************************
; Date:       07/19/1999
;
; Parameters: - Fastest CPU clock
;               (fx = 5.00 MHz, 1 CPU clock cycle = 200 ns
;             - Square-wave cycle:  1 ms (1 kHz)
;             - Timer count clock:  fx = 5.0 MHz
;             - Output port:        TO0/P30
;
;************************************************************************/

/* 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 */

/*;=====================================
;      Constants/Variables             =
;=====================================*/
#define TRUE        1
#define FALSE       0

/*=====================================
;      Main Program                    =
;=====================================*/
void main(void)
{
       OSMS = 0x01;        /* Don't use scaler */
       PCC = 0x00;         /* Main system clock at fastest setting */

       P3.0 = 0;           /* Latch port 3.0 low */
       PM3.0 = 0;          /* Set port 3.0 as output */
       TCL0 = 0x20;        /* Select counter clock to fx = 5 MHz) */
       CR00 = 2500;        /* Set compare register to 2500 for
                              1 ms square-wave output */
       TMC0 = 0x0C;        /* Set to clear & start on match TM0 and CR00 */
       CRC0.0 = 0;         /* set CR00 operation to compare register */
       TOC0 = 0x03;        /* Set T00 output enable, Inversion of output on
                              match of TM0 & CR00, and disable ONE-SHOT mode*/

       while(TRUE);        /* Endless loop */
 }                         /* End of function main() */
```

NEC

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