

On-Chip Peripheral Program Example

August 1999

Description

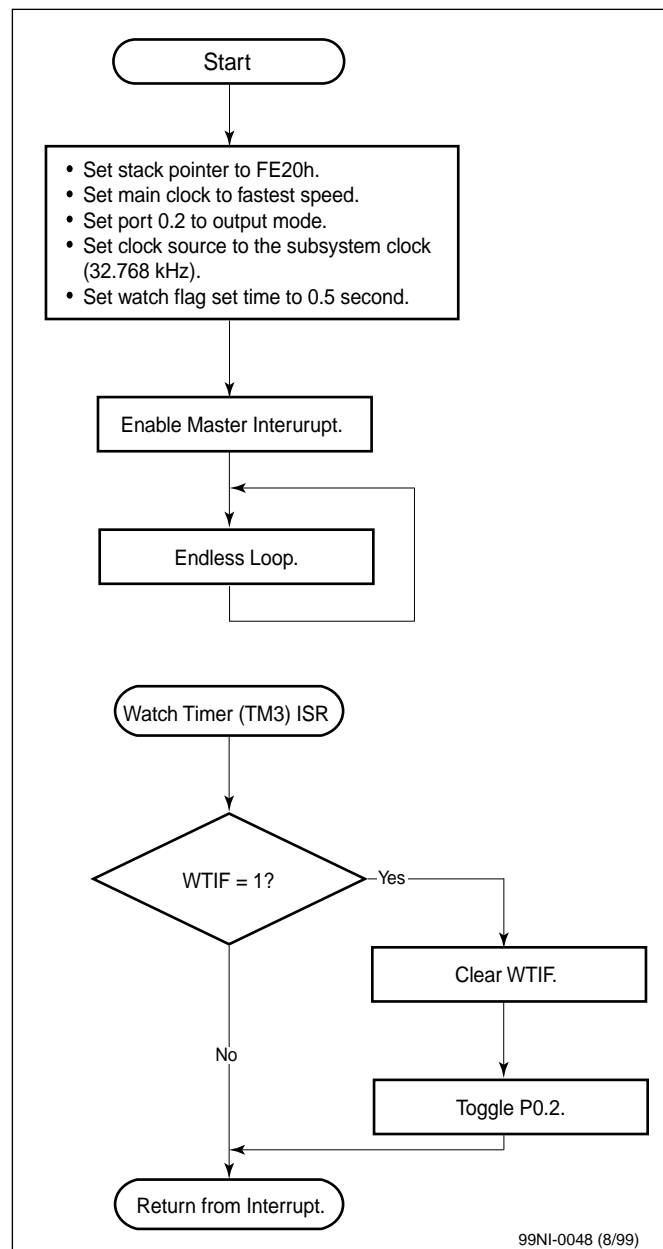
The 8-bit watch timer in the μ PD7805x/78005x subseries can be used in watch timer and interval timer mode at the same time, as demonstrated in this program example.

The timer generates an interrupt every 0.5 seconds, and operates from the subsystem clock. After every interrupt, port 0 bit 2 is toggled. The timer can also be operated from the main system clock.

Program Specifications

- ☐ Count clock frequency: 32.768 kHz (subsystem clock)
- ☐ Square wave frequency: 1 Hz (1 second period)
- ☐ Pins used in program: P02/INTP2 (port pin toggles every 0.5 seconds)

Flowchart



Assembly Language Program

```

;*****
; Date:          06/22/1999
;
; Parameters:   - fastest CPU clock
;                (fx = 5.00 MHz; 1 CPU clock cycle = 200 ns)
;                - Subsystem clock (32.768 kHz) is watch timer clock
;                - Port 0.2 outputs 1 Hz square wave
;*****

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

              ORG         001Eh
              DW          WATCH_ISR      ; Watch timer interrupt vector

;=====
;=          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
              CLRL        P0.2          ; Latch port 0.2 low
              CLRL        PM0.2         ; Set port 0.2 to output mode
              MOV         TCL2,#10h      ; Select counter clock to fxt = 32.768 kHz
              MOV         TMC2,#06h      ; Set TMC2 to WATCH TIMER operation enable,
                                          ; 0.5 seconds selection
              CLRL        TMMK3         ; Unmask the watch timer interrupt mask bit
              EI                      ; Enable interrupts

Loop:        BR           $Loop          ; endless loop

;=====
;=          Watch timer ISR                  =
;=====
WATCH_ISR:   BF           WTIF,$Watch10  ; Watch timer overflow flag on?
              CLRL        WTIF          ; Clear Watch timer IRQ flag
              XOR         P0,#04h       ; Toggle port 0.2
Watch10:     RETI

              END

```

C Language Program

```

/*****
; Date:          06/22/1999
;
; Parameters: - fastest CPU clock
;              (fx = 5.00 MHz; 1 CPU clock cycle = 200 ns)
;              - Subsystem clock (32.768 kHz) is watch timer clock
;              - Port 0.2 outputs 1 Hz square wave
;*****/

/* extension functions in K0/K0S compiler */

#pragma sfr /* key word to allow SFR names 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 INTTM3 WATCH_ISR

/*=====
; 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 */
    P0.2 = 0; /* Latch port 0.2 low */
    PM0.2 = 0; /* Set port 0.2 Output mode */
    TCL2 = 0x10; /* Select counter clock to fxt = 32.768 kHz */
    TMC2 = 0x06; /* Set TMC2 to WATCH TIMER operation enable,
                  0.5 seconds selection */
    TMMK3= 0; /* Unmask the watch timer interrupt mask bit */
    EI(); /* Enable interrupts */

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

/*=====
; Watch timer ISR =
;=====*/

void WATCH_ISR(void)
{
    if(WTIF) /* Test Watch Timer overflow flag */
    {
        WTIF = 0; /* Clear Watch Timer IRQ flag */
        P0 ^= 0x04; /* Toggle port 0.2 */
    }
}

```



For literature, call **1-800-366-9782** 7 a.m. to 6 p.m. Pacific time
or FAX your request to **1-800-729-9288**
or visit our web site at **www.necel.com**

In North America: No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics Inc. (NECEL). The information in this document is subject to change without notice. All devices sold by NECEL are covered by the provisions appearing in NECEL Terms and Conditions of Sales only. Including the limitation of liability, warranty, and patent provisions. NECEL makes no warranty, express, statutory, implied or by description, regarding information set forth herein or regarding the freedom of the described devices from patent infringement. NECEL assumes no responsibility for any errors that may appear in this document. NECEL makes no commitments to update or to keep current information contained in this document. The devices listed in this document are not suitable for use in applications such as, but not limited to, aircraft control systems, aerospace equipment, submarine cables, nuclear reactor control systems, and life support systems. "Standard" quality grade devices are recommended for computers, office equipment, communication equipment, test and measurement equipment, machine tools, industrial robots, audio and visual equipment, and other consumer products. For automotive and transportation equipment, traffic control systems, anti-disaster and anti-crime systems, it is recommended that the customer contact the responsible NECEL salesperson to determine the reliability requirements for any such application and any cost adder. NECEL does not recommend or approve use of any of its products in life support devices or systems or in any application where failure could result in injury or death. If customers wish to use NECEL devices in applications not intended by NECEL, customer must contact the responsible NECEL salespeople to determine NECEL's willingness to support a given application.