```
;*****************************************
;interrupt_generates_square_wave_50%_duty_cycle.asm
;*****************************************
        PROCESSOR PIC16F628
        #include <P16F628.INC>
        __CONFIG    _CP_OFF & _MCLRE_OFF & _HS_OSC & _LVP_OFF & _WDT_OFF

        cblock  0x20
            temp
            temp1
            count
            count0
            count1
            count2
            w_temp
            OPTION_REG_temp
            STATUS_temp
        endc
        ORG 0x00        ;reset vector
        goto main

        ORG 0x04        ;interrupt vector
        goto TMR0_ISR       ;exit Interrupt Service Routine

;---push pop---
        PUSH    MACRO
        movwf   w_temp      ;   w_temp = w
        swapf   w_temp,f    ;   swap them, ใช้ swap เพราะ movf มีโอกาสที่จะไปเปลี่ยน zero
        flag ใน status register
        banksel TRISA       ;   select bank1
        swapf   OPTION_REG,w;   w= OPTION_REG
        movwf   OPTION_REG_temp;OPTION_REG_temp= w
        banksel PORTA       ;   select bank0
        swapf   STATUS,W    ;   w= STATUS
        MOVWF   STATUS_temp ;   STATUS_temp= w
        ENDM
        ;PUSH uses 8uS

        POP MACRO
        SWAPF   STATUS_temp,w
        MOVWF   STATUS
        banksel TRISA       ;   select bank1
        swapf   OPTION_REG_temp,w
        movwf   OPTION_REG
        banksel PORTA       ;   select bank0
        swapf   w_temp,w
        ENDM
        ;POP uses 7uS
        ;push+pop = 15uS
;---end push pop---

main:
        call init
foreground_task:
        nop
        nop
        nop
        goto foreground_task

;---interrupt---
;clock 4MHz, 1cycle=1uS
;generates square wave, T=200uS, f=5KHz, duty 50%
;on 100uS, off 100uS -> Timer0 = 256-100 = 156


TMR0_ISR:
        PUSH                    ; 8 cycles
        bcf     INTCON,T0IF     ; clear Timer0 interrupt flag
```

```
68          movlw   .156
69          movwf   TMR0            ; reload for another 100uS period
70  ;--------toggle with xor for 50% duty only-----------------
71          movlw   B'10000000'     ; w='10000000'
72          xorwf   PORTB,F         ; xor=toggle
73  ;--------end toggle with xor for 50% duty only------------------
74  ;--------toggle with complement for 50% duty only------------------
75          ;comf   PORTB,F
76  ;--------end toggle with complement for 50% duty only------------------
77  ;--------toggle long code for any% duty only-----------------
78  ;       btfss   PORTB,7
79  ;       goto    set_hi
80  ;set_low:bcf        PORTB,7
81  ;       goto    set_done
82  ;set_hi: bsf        PORTB,7
83  ;set_done:
84  ;--------end toggle long code for any% duty only-----------------
85          POP                     ; 7 cycles
86          RETFIE
87  ;---end interrupt---
88
89
90
91  init:
92          ;---Port Config---
93          ;CMCON is not necessary if PORTA isn't used
94          banksel TRISB       ; select Bank1
95          bcf     TRISB,7     ; Port RB0 is an output pin (bcf=0=output,
            bsf=1=input)
96          banksel PORTB       ; select Bank0
97          ;---End Port Config---
98          ;---Interrupt Config---
99          bsf     INTCON,T0IE ; enable timer0 interrupt
100         bcf     INTCON,T0IF ; clear timer0 interrupt flag
101         movlw   .156        ; reload value for 100uS interrupt period
102         movwf   TMR0        ; set TMR0 = 156
103         bsf     INTCON,GIE  ; enable global interrupt *enable GIE should be
            the last code line (dunno why)
104         ;---End Interrupt Config---
105         ;---Option Config---
106         banksel OPTION_REG
107         movlw   B'00001000'
108         movwf   OPTION_REG
109         banksel PORTB
110         ;---End Option Config---
111         clrf    PORTB
112         return
113
114         END
115
```