```
;>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
;1DT301, Computer Technology I
;Date: 2019-10-09
;
;Author:
;   Student name 1:          Einar van de Velde
;   Student name 2:          Abdulla Mehdi
;
;Lab number:                 4.
;Title:                      Task 2.
;
;Hardware:                   STK600, CPU ATmega2560.
;
;Function:                   Creates a square wave with the frequency 1 Hz.
;                            Use two push buttons to change the duty cycle up
;                            and down
;
;Input ports:                PORTD.
;
;Output ports:               On-board LEDs connected to PORTB.
;
;Subroutines:                None.
;
;Included files:             m2560def.inc
;
;Other information:
;Changes in program:
;        File Created (2019-10-09)
;                Program is runnable (2019-10-09)
;
;<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
.include"m2560def.inc"

.CSEG
.org 0x0000
rjmp START

.org OVF0ADDR
jmp TIMER_INTERRUPT

.org INT0ADDR
rjmp BUTTON_INTERRUPT_INCREASE_PWM

.org INT1ADDR
rjmp BUTTON_INTERRUPT_DECREMENT_PWM

.org 0x72

;-----------------------------------------------------;
```

```
START:
   ldi r20, HIGH(RAMEND)          ; Load Immediate
   out SPH, r20
   ldi r20, LOW(RAMEND)
   out SPL, r20

   ldi r16, 0b00000011
   out EIMSK, r16

   ldi r16, 0b00001010
   sts EICRA, r16                 ; Store Direct To SRAM

   ldi r21, 0b00000101
   out TCCR0B, r21

   ldi r21, (1<<TOIE0)
   sts TIMSK0, r21                ; Store Direct to SRAM

   ldi r21, 200
   out TCNT0, r21

   sei                            ; Enable Global Interrupts
   ser r17                        ; Set Register 17
   out DDRB, r17
;-----------------------------------------------------;
; INITIALIZE REGISTERS
;-----------------------------------------------------;
   ldi r24, 0
   ldi r25, 255
   ldi r18, 5

;-----------------------------------------------------;
MAIN:
   nop ; No Operation
rjmp MAIN

;-----------------------------------------------------;
LED_ON:
   clt                            ; Clear T In SREG
   out TCNT0, r24
   com r17                        ; Ones Compliment
   out PORTB, r17
reti                              ; Interrupt Return

;-----------------------------------------------------;
LED_OFF:
   set ; Set T in SREG
   out TCNT0, r25
   com r17
```

```
   out PORTB, r17
reti

;-----------------------------------------------------;
BUTTON_INTERRUPT_INCREASE_PWM:
   cpi r24, 255                    ; Compare Register With Immediate
   breq MAX_PWM                    ; Branch If Equal
   add r24, r18                    ; Add Two Registers
   sub r25, r18                    ; Subtract Two Registers

;-----------------------------------------------------;
MAX_PWM:
reti

;-----------------------------------------------------;
BUTTON_INTERRUPT_DECREMENT_PWM:
   cpi r24, 0
   breq LOW_PWM
   add r25, r18
   sub r24, r18

;-----------------------------------------------------;
LOW_PWM:
reti

;-----------------------------------------------------;
TIMER_INTERRUPT:
   brts LED_ON                     ; Branch If T Flag Set
   brtc LED_OFF                    ; Branch If T Flag Cleared
reti
```