

Experiment Name: Timer/Counter Basics Using Timer/Counter0

Experiment Number: #2

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Lab Section: #1

Bench: #3

```
/*
NAME:    hardware_delay_test
AUTHOR:  B. Jarnagin
REV:     - >020160223
DESCRIPTION:    Creates a 1 ms wide pulse on OC0 pin
                  Interrupt controlled

TARGET:  ATMEGA128 @ 16 MHz
USES:    TC0, pin OC0
*/

#include <iom128.h>           //Atmegal28 definitions
#include <intrinsics.h>       //Intrinsic functions
#include <avr_macros.h>       //Useful macros

// COUNTER IN NORMAL MODE WITH CLK/64
const char COUNTER_MODE = (1 << CS01) | (1 << CS00);

// COUNTER WILL RUN FOR 1 ms = 64*(16E-6 sec)*(255-5)
const char DELAY_POSITION = 5;

// PIN B 4 is OC0
#define OC0 4

void main(){
    // SETUP PIN OC0 FOR OUTPUT
    DDRB = (1 << OC0);

    // SETUP INTERRUPT FOR OVERFLOW
    TIMSK = (1 << TOIE0);

    // LOAD VALUE FOR COUNTER
    TCNT0 = DELAY_POSITION;

    // BEGIN PULSE
    SETBIT(PORTB, OC0);

    // SETUP COUNTER PRESCALER/MODE
    TCCR0 = COUNTER_MODE;

    __enable_interrupt();

    // ENTER CAPTURE LOOP, DONE WITH SETUP
    while(1);
}

#pragma vector=TIMER0_OVF_vect
__interrupt void isr_TOV0(void){
    // DISABLE COUNTER
    TCCR0 = 0;

    // END PULSE
    // CLEARBIT(PORTB, OC0);
}
```

```
/*
NAME:    hardware_pulse_test
AUTHOR:  B. Jarnagin
REV:     - >020160223
DESCRIPTION:    Creates a 400 us wide pulse on OC0 pin followed by a ~1000 us delay repeat
                  Interrupt controlled

TARGET:  ATMEGA128 @ 16 MHz
USES:    TC0, pin OC0
*/

#include <iom128.h>           //Atmega128 definitions
#include <intrinsics.h>      //Intrinsic functions
#include <avr_macros.h>      //Useful macros

// COUNTER IN NORMAL MODE WITH CLK/64
const char COUNTER_MODE = (1 << CS01) | (1 << CS00);

// COUNTER WILL RUN FOR 400 us = 64*(16E-6 sec)*(255-100)
const char DELAY_POSITION = 155;

// PIN B 4 is OC0
#define OC0 4

void main(){
    // SETUP PIN OC0 FOR OUTPUT
    DDRB = (1 << OC0);

    // SETUP INTERRUPT FOR OVERFLOW
    TIMSK = (1 << TOIE0);

    // LOAD VALUE FOR COUNTER
    TCNT0 = DELAY_POSITION;

    // SETUP COUNTER PRESCALER/MODE
    TCCR0 = COUNTER_MODE;
    __enable_interrupt();

    // ENTER CAPTURE LOOP, DONE WITH SETUP
    while(1);
}

#pragma vector=TIMER0_OVF_vect
__interrupt void isr_TOV0(void){
    //DISABLE COUNTER
    TCCR0 = 0;

    // TURN OFF PIN
    // CLEARBIT(PORTB, OC0);

    // LOAD VALUE FOR COUNTER
    TCNT0 = DELAY_POSITION;

    // DELAY FOR 1000 us = (16E-6) * 16000
    __delay_cycles(16000);

    // TURN ON PIN
    SETBIT(PORTB, OC0);

    // SETUP COUNTER PRESCALER/MODE
    TCCR0 = COUNTER_MODE;
}
```