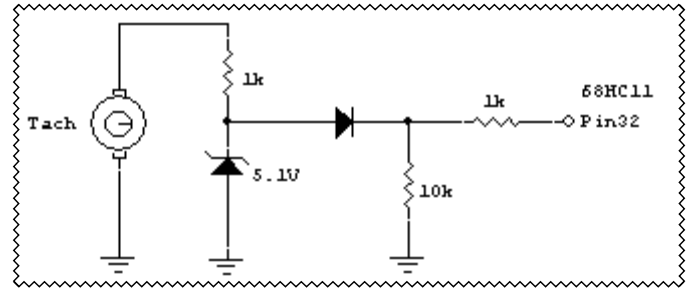


Lab 14 Part 1

Timer Events, Port A

1. Assemble the following circuit:
2. Create, assemble, make appropriate comments and save the following program:



Prepare registers

```
ORG    $0100
CLR    $1022 ;clear TMSK1
LDAA   #$10  ;bit pattern for capture of rising
STAA   $1021 ;edge stored at TCTL2
LDX    #$1000 ;index register loaded with base address
```

Capture first rising edge

```
GRAB   BSET   $23,X,#$04    ;set TFLG1 with $04 so IC1 is cleared
WAIT1  LDAA   $1023 ;capture occurs until IC1 returns to one
      BEQ    WAIT1 ;
      LDD    $1010 ;load double acc pulse count from TIC1
      STD    $0160 ;store pulse count
```

Capture second rising edge

```
      BSET   $23,X,#$04    ;set TFLG1 with $04 so IC1 is cleared
WAIT2  LDAA   $1023 ;capture occurs until IC1 returns to one
      BEQ    WAIT2 ;
      LDD    $1010 ;loads double acc from TIC1
```

Calculation of period of incoming waveform

```
SUBD   $0160 ;subtract contents of $0160 from double acc
STD    $0170 ;store contents of double acc, this is the period
LDY    $0170 ;loads index y with period and display by using
JMP    GRAB  ;RD (register display)
END
```

List of registers

TCTL2, timer control register 2, address: \$1021

TMSK1, timer interrupt mask register 1, address: \$1022

TFLG1, timer interrupt flag register 1, address: \$1023

TIC1, timer input capture register 1, address: \$1010

TCNT, timer count; address of high byte \$100E, low byte \$100F

3. Connect the circuit shown above. Notice that the schematic shows only the output tachometer and not the DC motor section. Set the voltage into the DC motor section to an initial value of 4V.
4. Observe Index Register Y which contains the number of pulses that occurred during the time of one incoming wave. Use this hexadecimal number to calculate the frequency of the output of the tachometer.
5. Use the frequency of the tachometer to calculate the speed of the motor at 4V, 5V, and 6V.