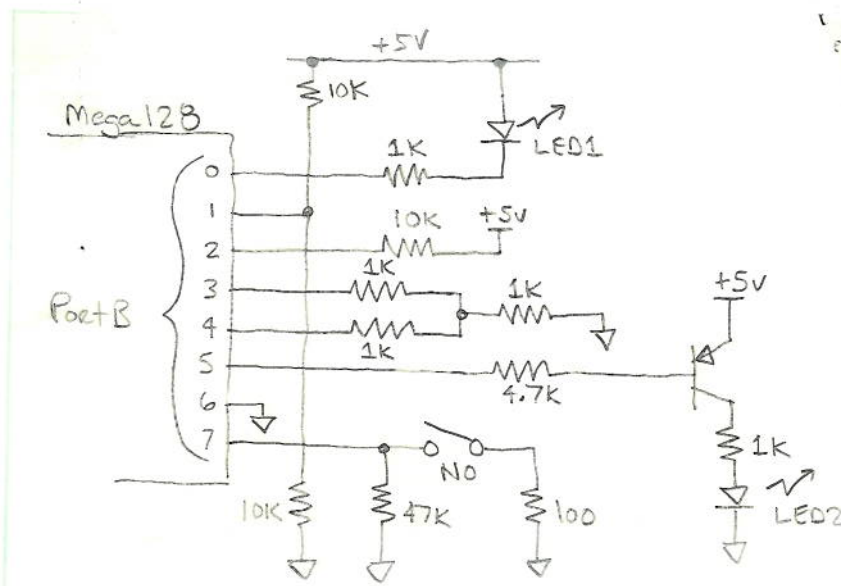


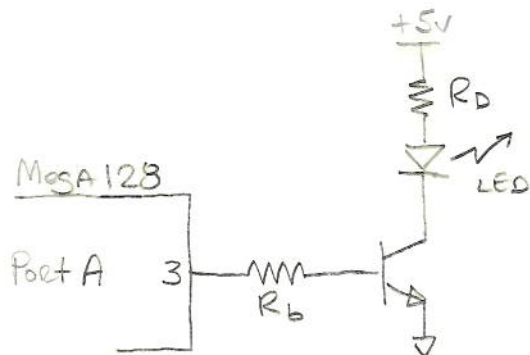
# Schematic for problem 13, 14, 15



**Notes:**

- (1)  $V_f$  of the LEDs is 2.0V
- (2) NO=normally open;
- (3) The PNP BJT is able to be saturated by the uC port
- (4)  $V_{in}$  low and high are as stated in the datasheet at  $V_{dd}=5.0V$

# Schematic for problem 39



for this circuit, BJT is saturated when  $I_B = 4 \text{ mA}$ .

$$V_{be} = 0.7V$$