Lab 10 (Rev. 1)
Part 1
Positive Feedback Schmitt Trigger Oscillator

1. Assemble the circuit if Fig.1:

Fig. 1

2. What are the two possible outputs for this circuit?

V_{OUT} = _____

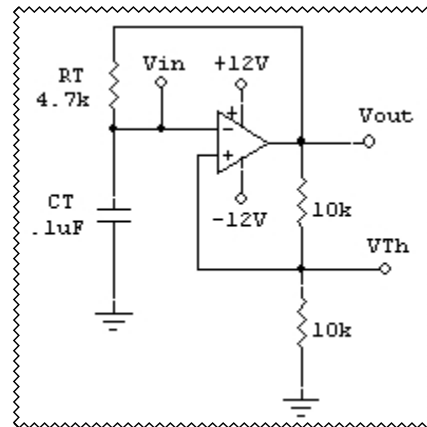What are the two possible thresholds for this circuits?

V_{THR} = _____

3. Calculate the frequency of oscillation:

$$F_R = \frac{1}{2RC} = $$

4. Connect channel 1 of the oscilloscope to V_{IN} and channel 2 to V_{OUT}.

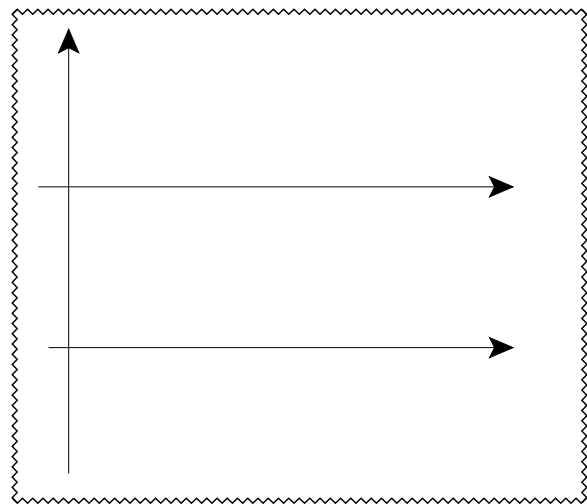5. Sketch the two waveforms in Fig. 2; indicate the output levels and the thresholds levels.

Fig. 2

6. Measure the frequency of oscillation; does the measured frequency match the calculated frequency?
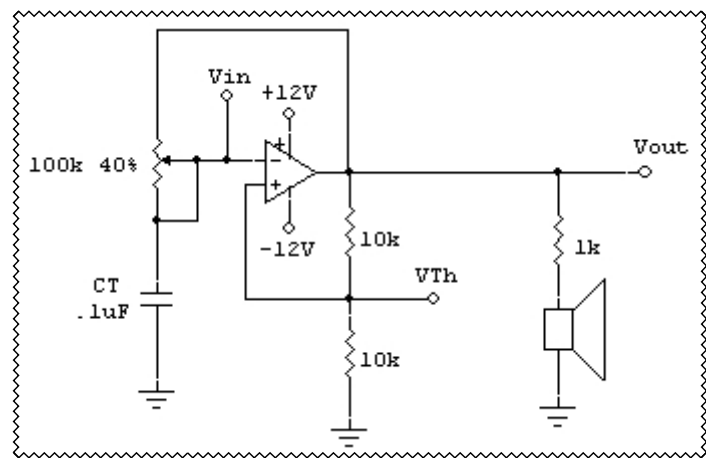
7. Modify the circuit as in Fig. 3:

Vin
+12V

100k 40%

−12V

Vout

10k

VTh

1k

CT
.1uF

10k

Fig. 3

8. Operate the circuit; what is the lowest frequency   that this oscillator will produce?

F_L = _____

9. What is the highest frequency that is produced?

F_H = _____

Lab 10 Part 2
Schmitt Trigger with "Deadband"

1. Assemble the circuit in Fig. 4. Place the voltmeter at V_{TH} in order to measure the upper and lower trip points.

Fig. 4

2. Rotate the potentiometer so that the forward biased LED is on. Measure the value of "upper trip point" when this LED is on:
UTP = _____

3. Rotate the potentiometer in the opposite direction so that the reverse biased LED is on and measure the "lower trip point" LTP = _____

4. The results of the measurements in step 2 and 3 is that there are two trip points, upper and lower. Also there are only two possible outputs, positive and negative saturation. Place the voltmeter at V_{OUT} and measure the two output voltages (by rotating the potentiometer to create forward and reverse outputs:)
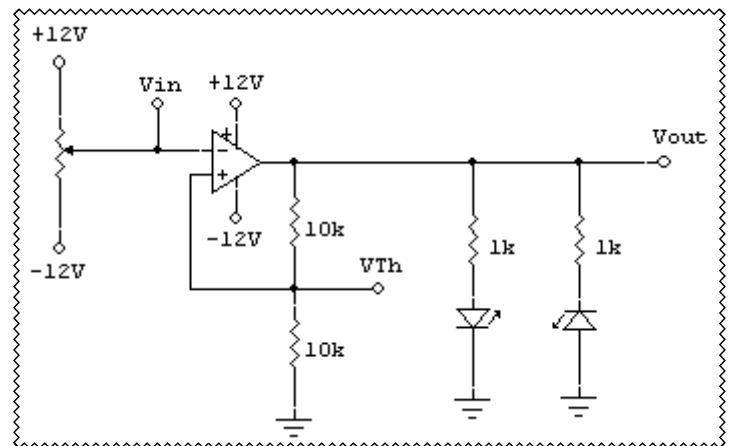
$+V_{SAT}$ = _____

$-V_{SAT}$ = _____

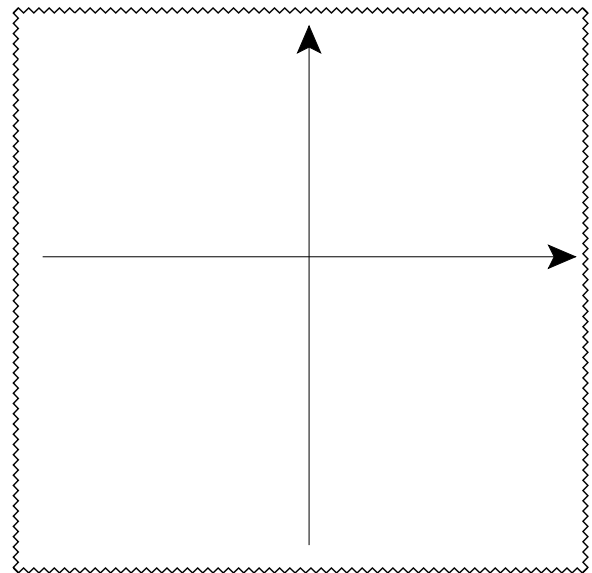Fig. 5

5. Plot the two trip points and the two saturations in Fig. 5:

6. The "deadband" is the distance between the two trip points; what is this deadband in volts?   V = _____

7. Move the potentiometer in both directions. Measure the value of V_{IN}. If V_{IN} is above the "upper trip point", the output should saturate negative. But if V_{IN} is below the "lower trip point", the output should saturate positive; is this true?

8. What happens to the output inside the "deadband"?