

## ELECTRONICS FOR ME Laboratory 2

### Purpose

At the conclusion of this lab, the student will:

1. Understand the purpose of an electronic filter;
2. Be able to design a filter to a set of specifications;
3. Build and test a bandpass filter circuit and verify its frequency response.

### Procedure

Build the circuit shown in Figure 1 (back side of this sheet) on the protoboard. Connect the power supply and function generator as shown.

Apply a 50 millivolt sine wave (frequency = 10 KHz) and determine the gain of the filter circuit at this frequency.

Decrease the frequency of the input voltage (on the function generator) until the output voltage of the filter falls to 0.707 of the value measured at 10KHz. Record this frequency as  $f_1$ . Now increase the frequency of the input voltage until the output voltage falls to 0.707 of its value at 10 KHz. Record this frequency as  $f_2$ .

Remove the two capacitors and repeat the procedure from steps 2 and 3.

### Data Analysis

Calculate the bandwidth for the filter ( $f_2 - f_1$ ) with the capacitors in place. Repeat this calculation for the filter circuit with the capacitors removed.

Calculate the theoretical values for the frequencies  $f_1$  and  $f_2$  using the formulas below. Compare these values to those measured above.

$$f_1 = \frac{1}{2\pi R_1 C_1}$$

$$f_2 = \frac{1}{2\pi R_2 C_2}$$

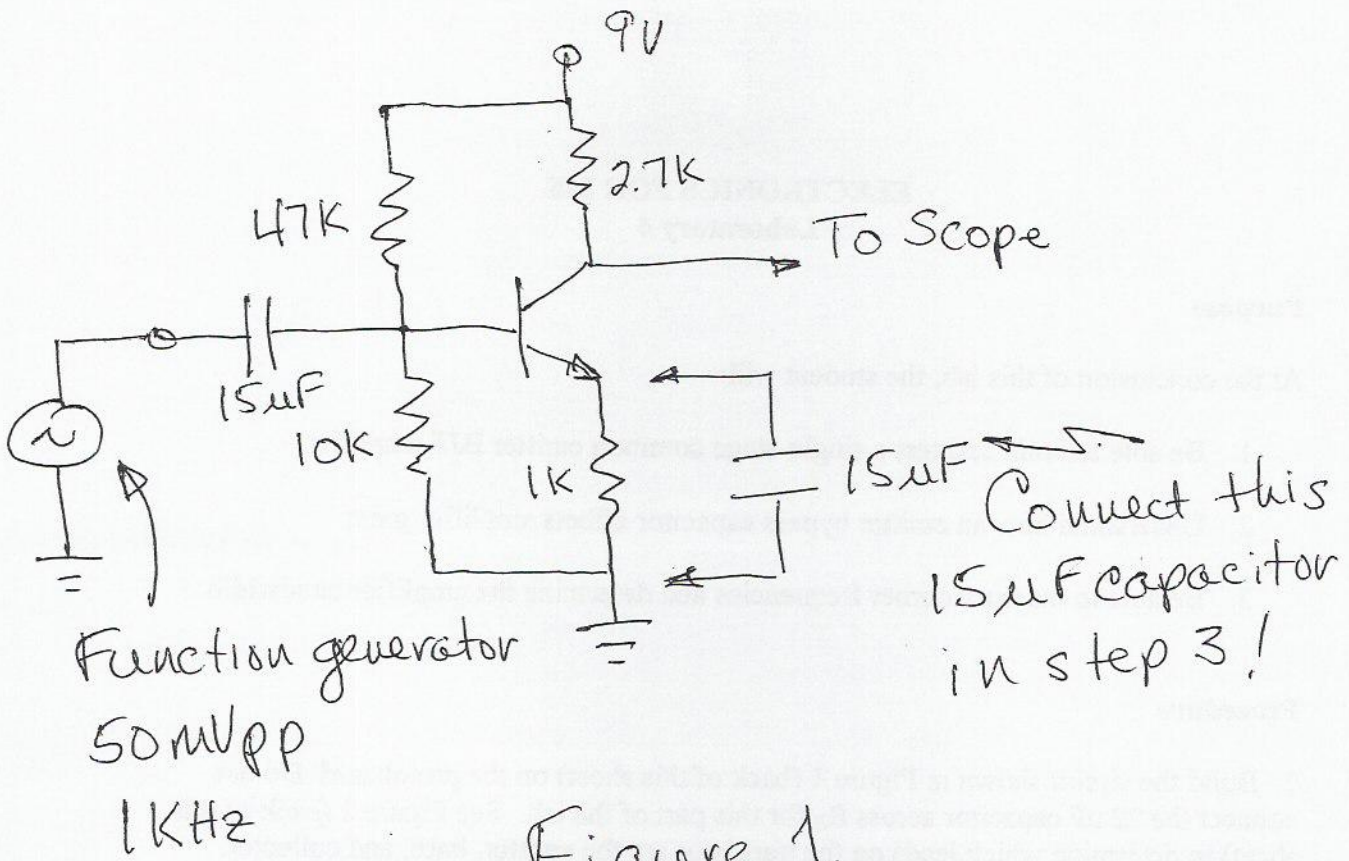


Figure 1

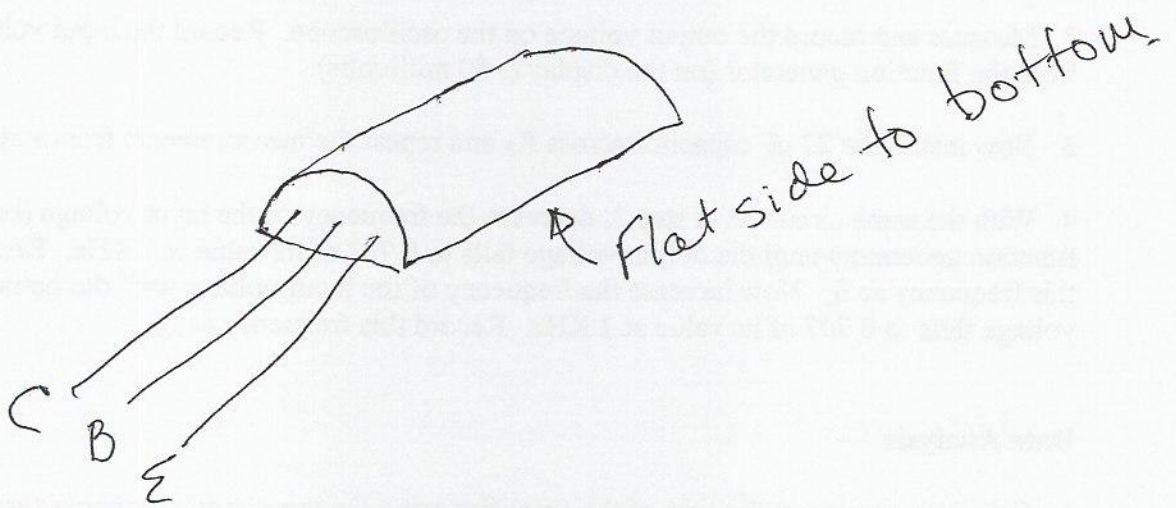


Figure 2