

## **CHAPTER 4**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

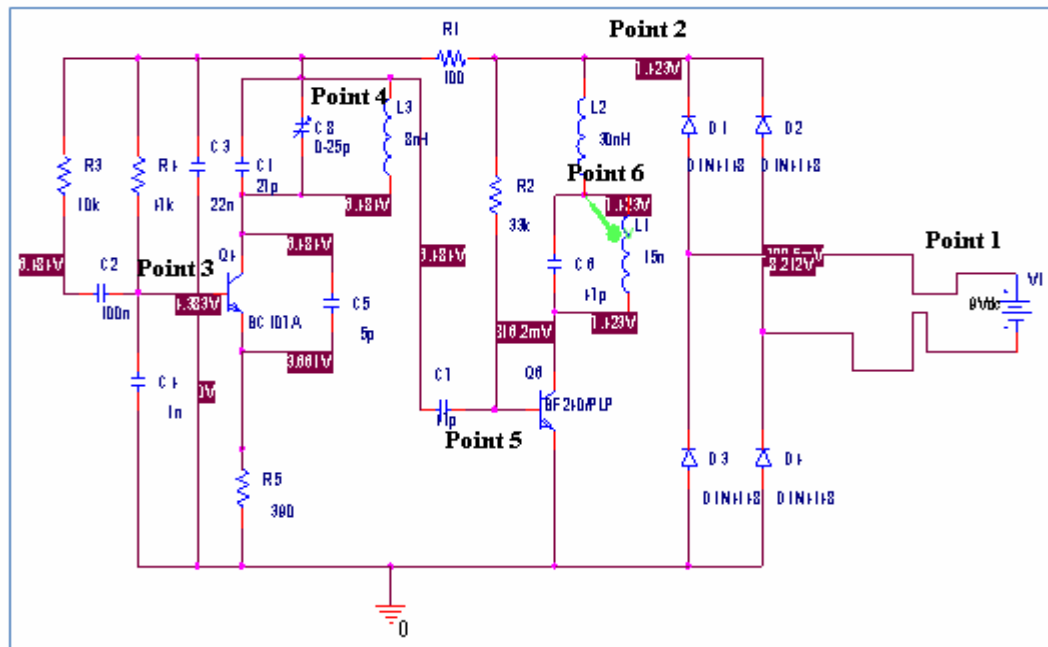
This chapter will elaborate more on the findings gathered of this project. This chapter will perform all the mechanism involved with the result refers to the theory of FM telephone transmitter circuit. Base on the result occurred, I would discuss about the performance of the circuit and any things that related with the project.

#### **4.2 Lab results**

In the lab, I do testing on my projects that involves with the lab equipments such as oscilloscope, power supply and multimeter. With supply voltage 9 Volt DC, I stated down the results, which includes the voltage reading and waveform when it's display at oscilloscope. The results was taken for several points where it is determine earlier refer with every circuits involved.

### 4.2.1. Voltage Reading

The table stated as below is a voltage reading taken when the supply voltage given at 9 DC Volt. The reading was taken by using Multimeter and this stage I have compare with the result from OrCAD Capture CIS.

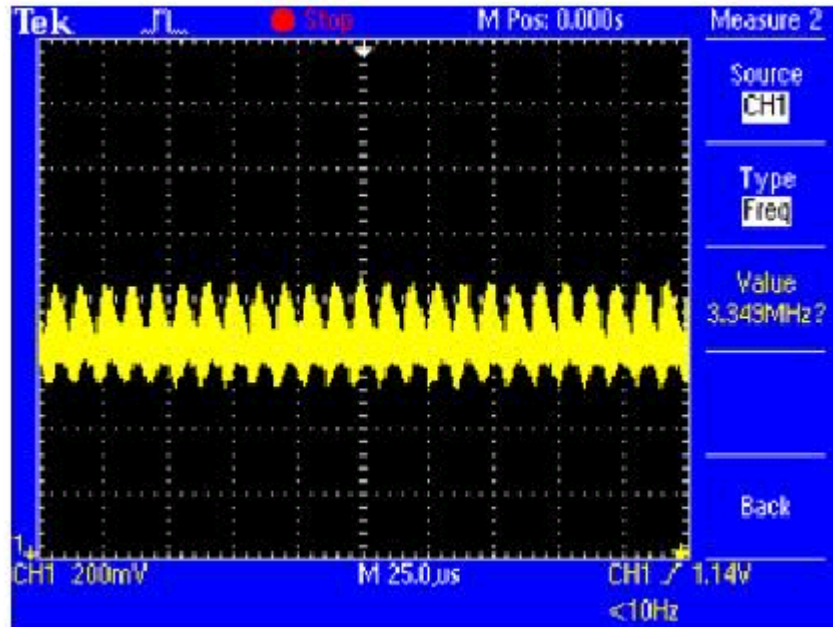


No	Tap Point	Voltage Reading
1	Input	9 Volt
2	Rectifier Circuit	8.4 Volt
3	Base Voltage for FM Oscillator	3.25 Volt
4	Output of FM Oscillator	7.9 Volt
5	Base Voltage for Power Amplifier	6.01 Volt
6	Output for Power Amplifier	8.38 Volt

**Table 4.1: The Voltage Reading**

## 4.2.2. Waveform

### i. Base of Transistor, Q4

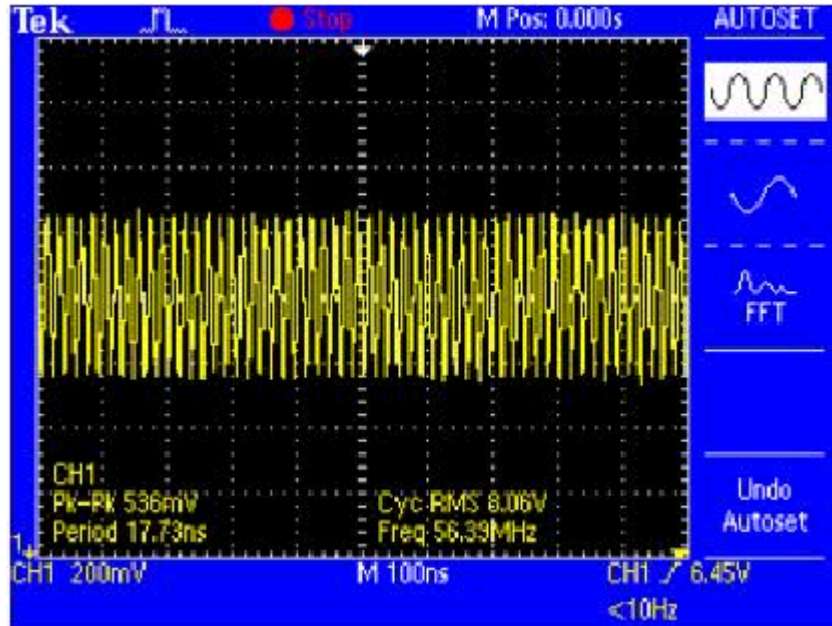


**Figure 4.1:Waveform at Base of Transistor, Q4**

The waveform above shows the result before the oscillation and modulation process. The frequency value states that the frequency is 3.343MHz where it is the approximately true result compared to the theory. Before the oscillation process that frequency is directly comes from the output of telephone line where it is still low but higher than human voice (300Hz to 3KHz).

The type of waveform also shows the form before the modulation process. The form of result is still show likes the Amplitude Modulation waveform. Amplitude Modulation (AM) broadcasting frequency is a medium frequency (MF) and it's placed at around 300kHz to 3MHz. The waveform performed the similar result compare to the theory where before the modulation process the carrier frequency is followed the envelope of modulating signal. The amplitude of audio signal is impressed onto the amplitude of carrier signal, producing a modulated signal (RF).

ii. **Output for FM Oscillator**



**Figure 4.2: Waveform at Output of FM Oscillator**

The waveform above, figure 4.2 shows the result after the oscillation and modulation process. After the oscillator circuit the frequency is up to 56.39 MHz where it was generated by oscillator circuit. The frequency output of this oscillator circuit is still low compare to the theory where it is suppose provide the frequency at more than 87.5 MHz due to do the broadcasting process.

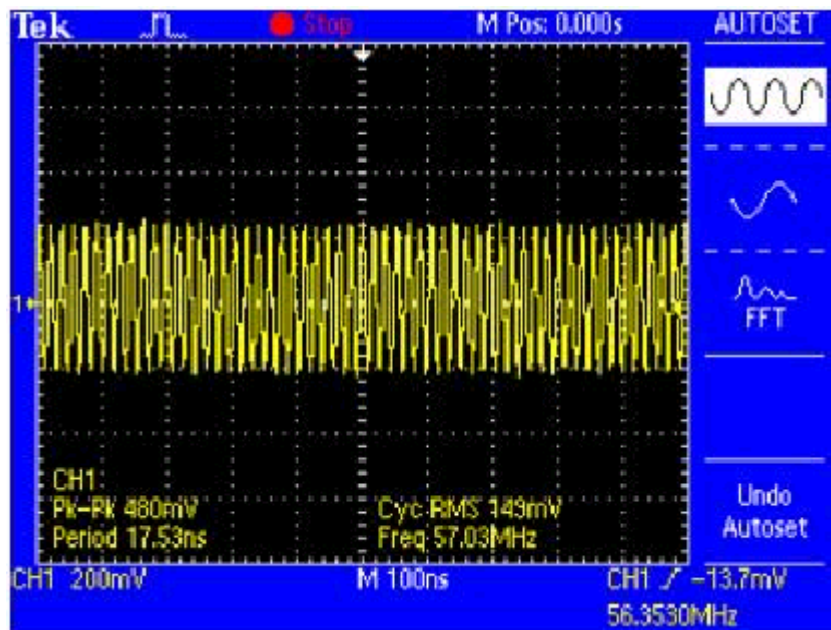
This problem may cause of the oscillator circuit itself where the component related have to replace to another base on the specification of the output needed. The component related with the factor, such as the transistor where the type of serial number have to replace with another component which consist the same function of oscillator circuit, generating the frequency.

The other method of increasing the frequency of the oscillator circuit is do additional circuit or does some modification of the circuit such the frequency multiplexing circuit.

The result waveform of the output of oscillator circuit performs the type of Frequency Modulation form. The form of waveform perform the constant amplitude and I found that the carrier frequency is varies with the magnitude variations of modulating signal. The carrier frequency is made to fluctuate according to the modulating signal.

So, base on the result output of oscillator circuit found that the output performed the Frequency Modulation form but the output frequency is still low due to do the broadcasting to the FM Radio.

### iii. Base of Transistor, Q6

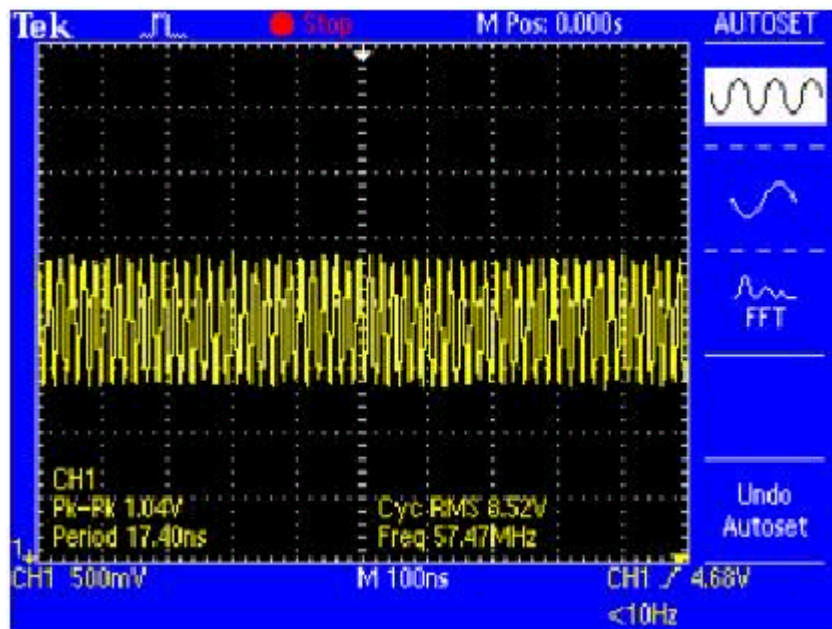


**Figure 4.3:Waveform at Base of Transistor, Q6**

The waveform above, figure 4.3 shows the result before run in the power amplifier circuit. Actually the form related is the output of the oscillator circuit but it was through the RC circuit, capacitor C7, 47pF and the Resistor R2, 33Kohm. The Voltage drop at the base of transistor Q6, is low compare to voltage drop at output of oscillator circuit. The voltage drop is very important due to switch on the transistor Q6, operation of power amplifier circuit.

The frequency performed 57.03 MHz, before the power amplifier circuit, means that the frequency is up for a few while the type of frequency is still the same method of modulation (FM). So, at the next stage, means at the power amplifier output should perform gain of power since the power amplifier circuit it makes to transmit the signal to FM Radio.

#### iv. Output of Power Amplifier



**Figure 4.4: Waveform at Output of Power Amplifier**

The waveform above, figure 4.4 shows the result after the power amplifier circuit. The transmitter circuit must provide sufficient power amplification to ensure that the signal level is high due to carry over the desired distance.

Same as the output of oscillator circuit, the waveform is performs the method of modulations in Frequency Modulation. The output frequency of power amplifier circuit is still low and cannot broadcast to FM Radio where the minimum frequency of FM Radio is 87.5 MHz. The output is measured at inductor L2, where it is acts as an antenna for this FM telephone transmitter circuit.

Base on the waveform result found that the result of output is in the Frequency Modulation method, low frequency to broadcast the signal and voltage power is up to 1.04Vpp compared to the earlier stage.

Overall, the result of every stage is perform the real method of modulation process, Frequency Modulation but for the output of frequency to broadcasting is low and cannot reach at the proper standard of Frequency Modulation range (88 MHz to 108 MHz). The voltage power is base on the theory and performing according with every stage of circuit. The overall result of the FM Telephone Transmitter circuit is the frequency output is low and failed to reach proper standard FM range due to do the broadcasting to FM Radio. Refer with the method of modulation it is in the Frequency Modulation method, and the power performed according with the stage of FM transmitter concept.

### **4.3. Discussion**

While doing the designation of FM telephone transmitter circuit, I have faced a problem with the electronic component such the transistor and the variable capacitor referred with the serial number and the value to be use. In this part of problem I was required to solve it and some alternative and creativity are needed to apply.

While doing the construction process I found that several components is hard to do the soldering. It's cause of the tracks circuit is design too thin at project circuit board (PCB), and it makes the copper on the track draw out when soldering process done for many times. It is very important to give attention due to produce the printed project circuit board soon.

I have to care about the value of the components related where the values of the components will affect the output of the FM telephone transmitter circuit. After do the adjustment of the component's value we have to do the simulation where the simulation result is performed by waveforms. We have been analyzing the waveforms and do comparisons with the theory due to checked and identified for any error related with.

During completing this project, I have facing several problems related for any scope of project. Any problems happen, the alternatives have been taken due to resolve the problem related. I have to care for any alternatives taken to makes the good results for this project.

#### **4.4 Conclusion**

From the result, I found that the comparison between theory and practical. The voltage reading and the waveform result are compared to the theory result. The results are performs for every output of the small circuit in the FM telephone transmitter circuit. From there we can analyze the performance of the actual circuit practically and the achievement of this project.

In the discussion part, it is consist into two parts where it's discussed on results performance and overall of the project. By dividing into two parts, I can perform the discussion in different perspective, due to gain the knowledge of the project making and takes some alternative to resolve the problem related.