

**DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING**  
**BANGLADESH UNIVERSITY OF ENGINEERING & TECHNOLOGY**  
**COURSE NO.: EEE 208**  
**EXPT. NO. 09**

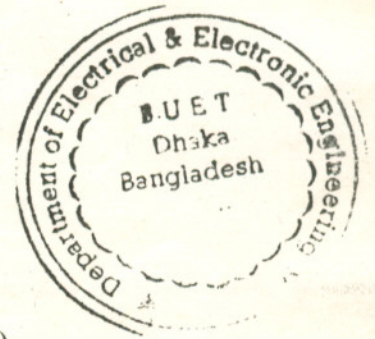
**Name of the Experiment:** Study of Class-B Complimentary Power Amplifier

**Objective**

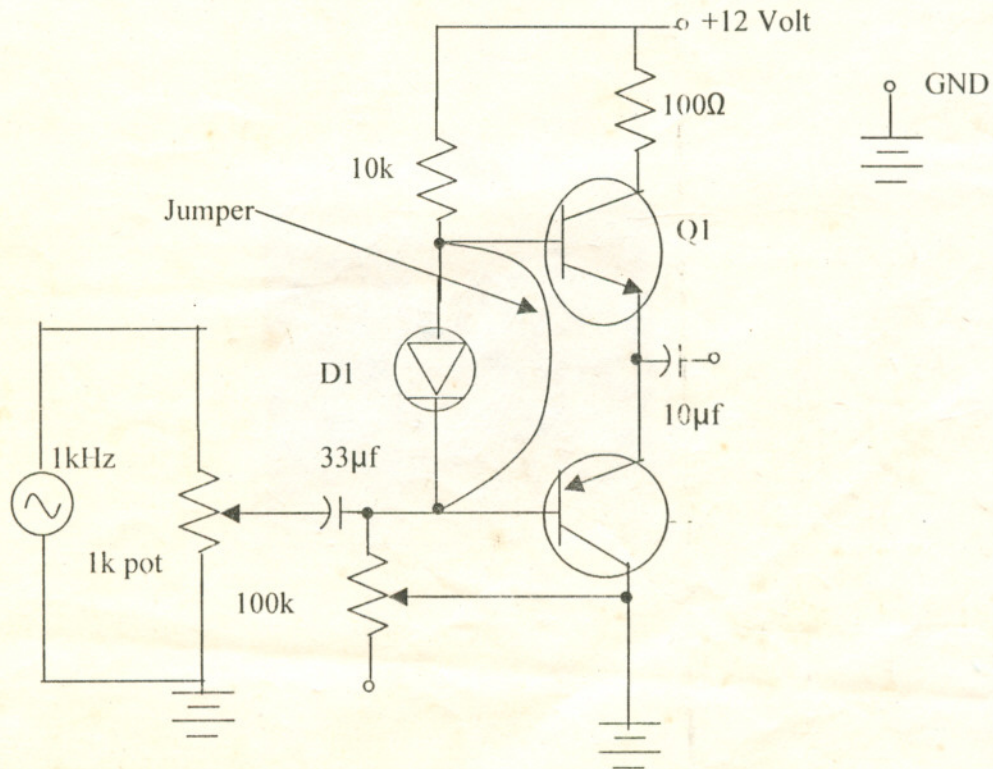
- (i) To demonstrate two different types of distortion occur in complimentary amplifier.
- (ii) To be able to recognize each of two type of distortion by observing it on an oscilloscope or hearing it from a loudspeaker.

**Equipments Required**

- (i) ED-2100 trainer
- (ii) Multimeter
- (iii) Oscilloscope
- (iv) NPN transistor-2 piece
- (v) PNP transistor-1 piece
- (vi) Stabistor-1 piece
- (vii) Pot ( 1K,100K)
- (viii) Resistor ( 4.7K,8.2K,10K,47K,100Ω-2 piece,300Ω-2 piece, 4.7Ω)
- (ix) Capacitor (0.01μf,1μf,10μf,33μf,100μf,220μf).



**Circuit Diagrams**



**Figure for part A**

*mw*

*[Handwritten signature]*

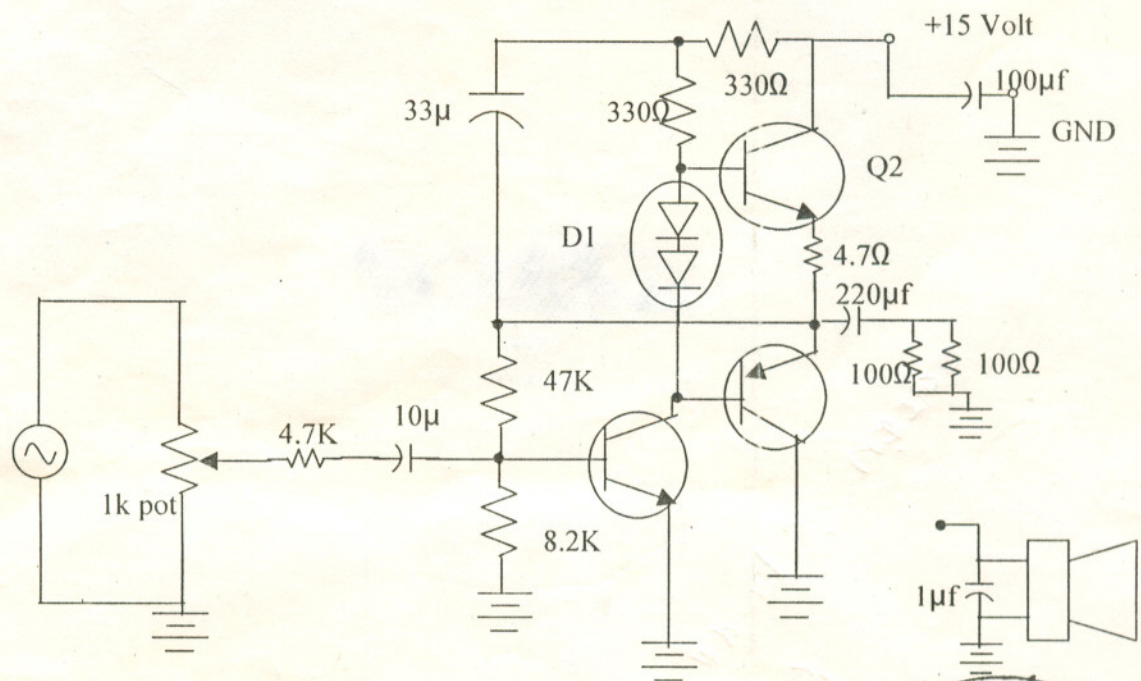
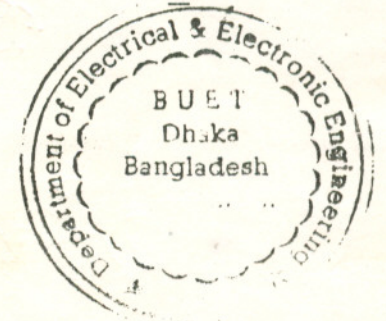


Figure for part B



## Procedures

### Part A:

1. Construct the circuit as shown in the figure for part A. Place a wire jumper across the diode D1 (continuous curved line indicates it). Set 1K pot such that CW rotation produces maximum signal output.
2. Make 1K pot in full CCW rotation. Adjust power supply to +12 Volt and signal generator to 1 KHz frequency.
3. Adjust 100K pot such that base to collector voltage of Q2 is +6 Volts. Measure collector current through Q1. You can use voltage across collector resistance (100Ω).
4. Connect two channel of oscilloscope- one in input signal and another in output. Rotate the 1K pot to CW. Draw the corresponding input-output wave shape. Note the distortion occurs at the output.
5. Disconnect the jumper from across D1. Rotate 1K pot to fully CCW position. Measure collector current through Q2.
6. Rotate the 1K pot to CW until you obtain maximum undistorted output. Record the output waveform along with input.

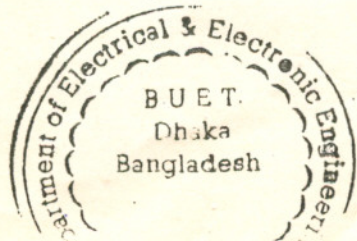
## Reports

- (i) What are the Q-points of the amplifier in two different conditions -with and without jumper? What do they signify?

- (ii) Give the reasons behind the crossover distortion you observe in the output of such complimentary power amplifier.
- (iii) In this experiment what is the trade to reduce nonlinear distortion?
- (iv) Give some practical example where such complimentary power amplifier is required.

**Part B:**

1. Construct the circuit as shown in the figure for part B. Set 1K pot such that CW rotation produces maximum signal output. Note that symbol for D1 has been changed to indicate that it is a stabistor. Stabistor is actually two diodes in series that specially design for the stabilization of this circuit.
2. Make 1K pot in full CCW rotation. Adjust power supply to +15 Volt and signal generator to 1KHz frequency.
3. Rotate 1K pot CW until output waveform just starts to flatten either on the top or the bottom. Record the peak-to-peak voltage and therefore output power ( $P_{out} = E_{rms}^2 / R_{load}$ ).
4. Repeat step 2 & 3 except that power supply is only +10 Volts.
5. Rotate 1K pot fully CCW position. Remove the load (2 no. of 100Ω in parallel) and connect a loudspeaker with a 0.1μf capacitor across it.
6. Adjust the power supply to +15 Volts. Connect the oscilloscope lead to the output. Every time make sure that at least half of the waveform (+ve or -ve) can be displayed.
7. Adjust 1K pot to a LOW comfortable listening level. Repeatedly connect and then disconnect a jumper across the diode D1 while looking at the oscilloscope and listening to the signal. Note the level of distortion keeping the wire disconnected.
8. Rotate 1K pot in CW to make a HIGH listening level. Perform step 7 once again.
9. Keeping the HIGH listening level reduce supply voltage by CCW rotation of knob of in power supply until you have appreciable distortion on oscilloscope display or in hearing. Note the distortion level here.
10. Reset the supply voltage to +15 Volts. Rotate 1K pot in CCW to make a LOW listening level. Keeping the LOW listening level reduce supply voltage by CCW rotation of knob of in power supply until you have appreciable distortion on oscilloscope display or in hearing. Note the distortion level here.



## Reports

- (i) What is the output power in step 3 & 4?
- (ii) Step 7 & 8 shows the distortion due to crossover. When this distortion is pronounced- in LOW listening level or in high listening level? Explain your observation.
- (iii) Step 9 & 10 shows the distortion due to excess power supply. When this distortion is pronounced- in LOW listening level or in high listening level? Explain your observation.

Updated by: Yeasir Arafat on 7<sup>th</sup> February, 2006

