

## HARTLEY OSCILLATOR

**Aim:** To study the operation of Hartley's Oscillator using BJT.

### **Apparatus:**

Sl. No	Name of the component	Specifications or range	Quantity
1	Transistors	BC547 or BC548	1
2	Resistors	33KΩ, 1KΩ, 4.7KΩ, 5.6KΩ,	1,1,1,1
3	Capacitors, Decade capacitance box	4.7μF,	2,1
4	Decade inductance box	---	2
5	CRO	20MHz	1
7	Regulated power supply	(0-30)V, 1A	1
8	Connecting wires and probes	-----	Required no

### **Theory:**

An Oscillator is an electronic circuit that provides an A.C output (Oscillations) without using any external input. All sinusoidal oscillators use the concept of positive feedback to produce Oscillations. An Oscillator circuit must satisfy Barkhausen's criterion to produce oscillations.

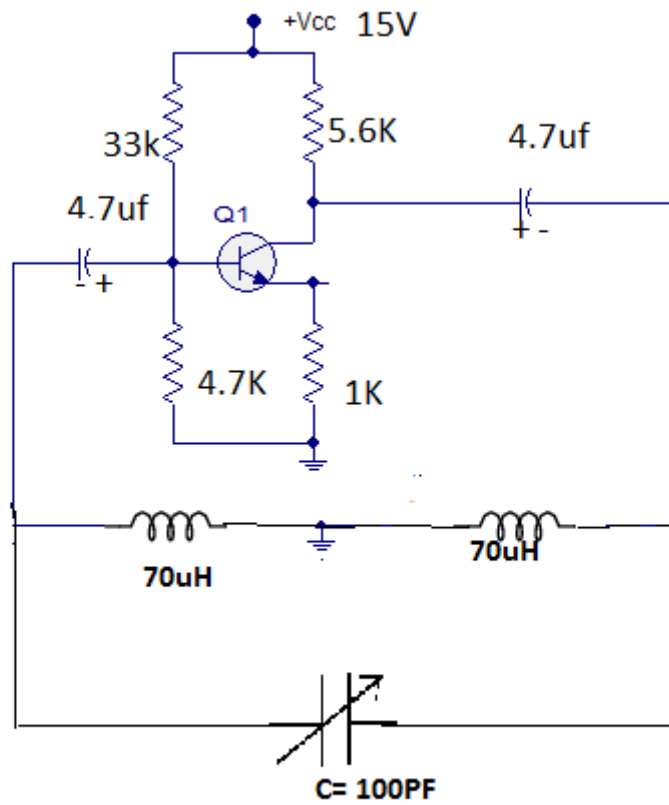
Hartley's oscillators are used at Radio frequencies.

We know that  $f_o = \frac{1}{2\pi(\sqrt{L_1+L_2+2M})C}$  assume that  $L_1 = L_2 = 70\mu H$  and  $C = 100PF$ .

and M is the mutual inductance between two coils  $M = 45\mu H$ .

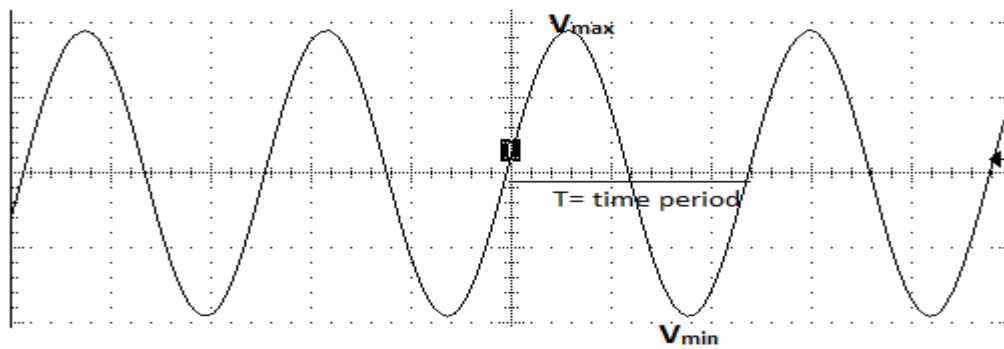
Refer textbook to write theory

### Circuit Diagram:



Hartley's oscillator

### Model graphs:



Oscillator output

### Experimental procedure:

1. Connections are made as per biasing circuit diagram and check D.C conditions.
2. Connect the circuit diagram as shown in the oscillator, adjust the capacitance to 100PF.
3. Observe the peak to peak output voltage and time period of the output waveform. Calculate the frequency of oscillation using  $f = 1/T$  Hz.
4. Now vary the Capacitance in appropriate steps and record the frequency in each case.
5. Compare practical frequencies with theoretical values.

### Observations:

Sl.No	Capacitance(PF)	Theoretical frequency $f_o = \frac{1}{2\pi(\sqrt{L_1 + L_2 + 2M})C}$ $L_1 = L_2 = 70\mu H$ $M = 45\mu H$	Practical frequency

### Precautions:

1. All connections must be done carefully.
2. Switch off power supply before making connections.

**Result:** Thus Hartley's oscillator operation was studied and the frequency of oscillation is obtained practically.