MP309

Experiment 7

RC Differentiator and Integrator

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Part 1 :- RC Integrator

Figure 1: Oscilloscope

Figure 2: Oscilloscope Probe

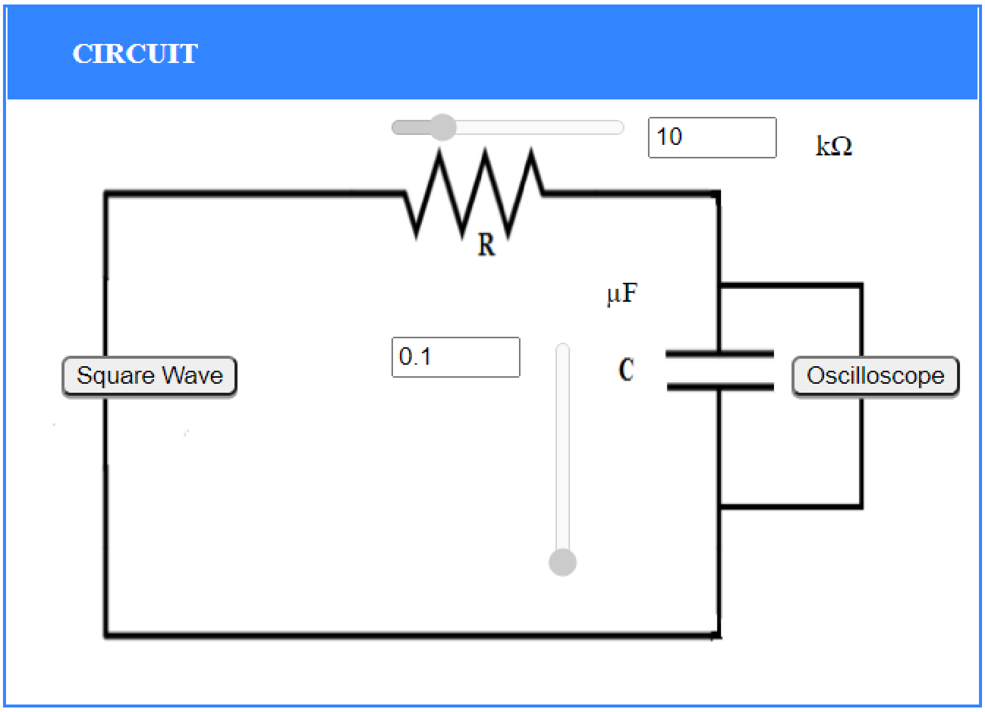

Figure 3: RC Integrator Circuit

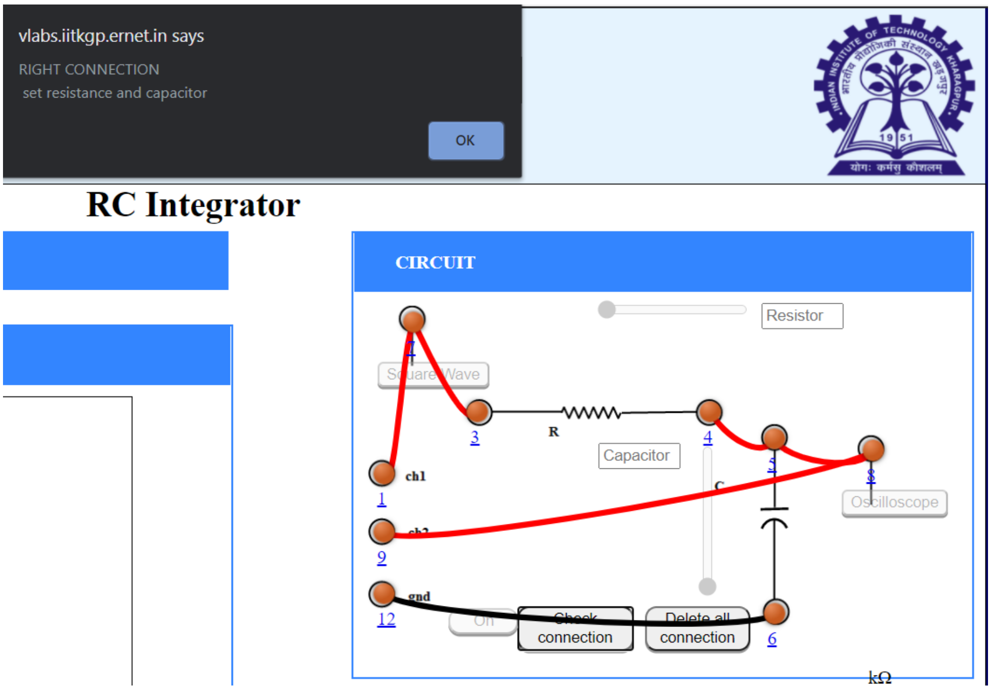

Figure 4: RC Integrator Circuit Connections

Initial Parameters :-
- Resistance(R) = 10 kΩ
- Capacitance(C) = 0.1 μF

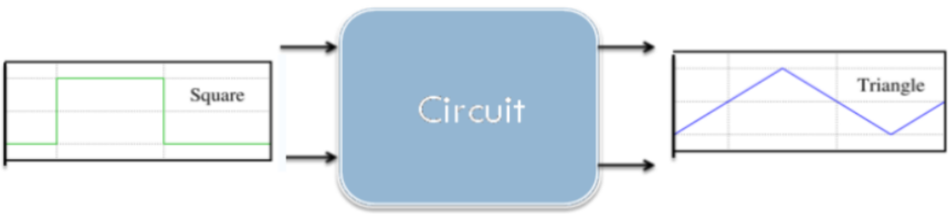

Figure 5: The Integrator is a circuit that converts or 'integrates' a square wave input signal into triangular waveform output.

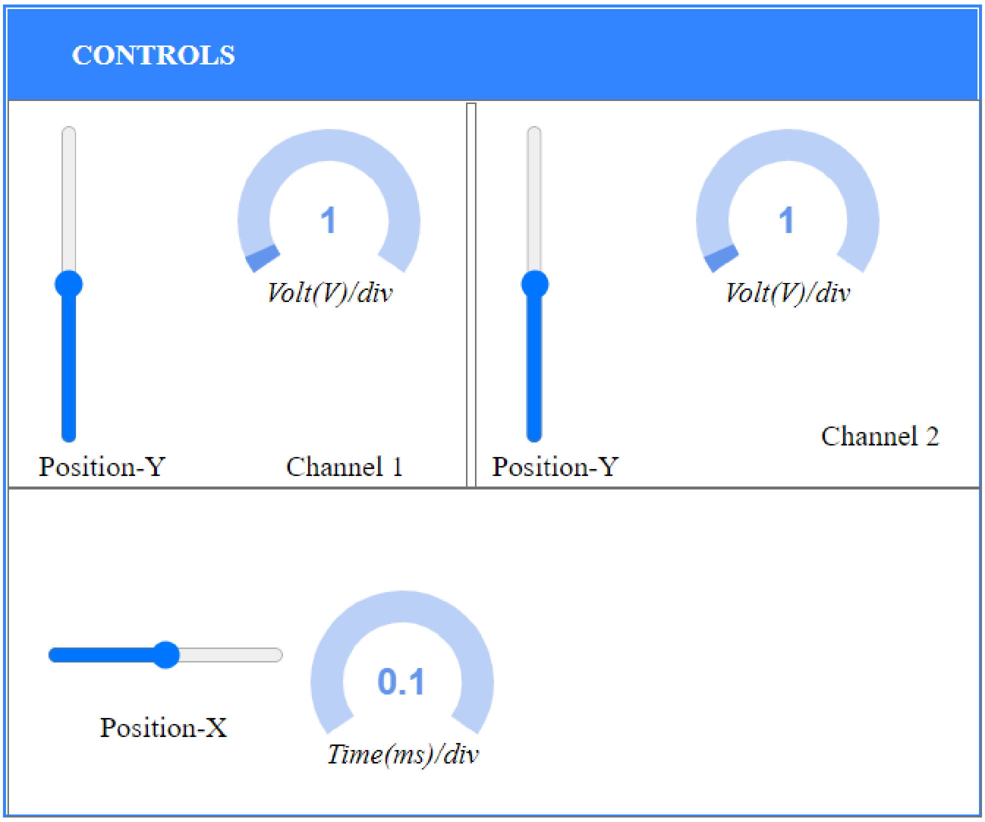

Figure 6: Controls

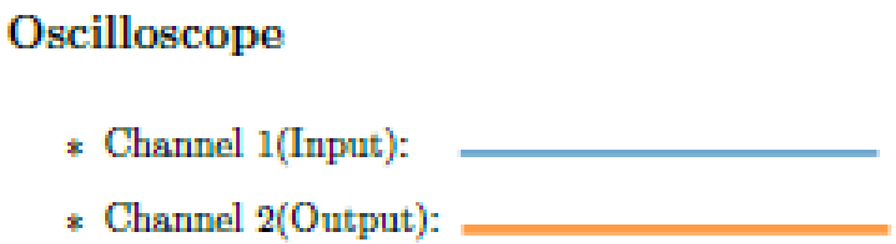

Figure 7: Oscilloscope Channel representation

Figure 8: Square Wave at Frequency = 1000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

i.e. Time Period = (1 / 1000) = 1msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Figure 9: Square Wave at Frequency = 2000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

i.e. Time Period = (1 / 2000) = 0.5msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Figure 10: Square Wave at Frequency = 3000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

i.e. Time Period = (1 / 3000) = 0.333msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Figure 11: Square Wave at Frequency = 4000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

i.e. Time Period = (1 / 4000) = 0.25msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

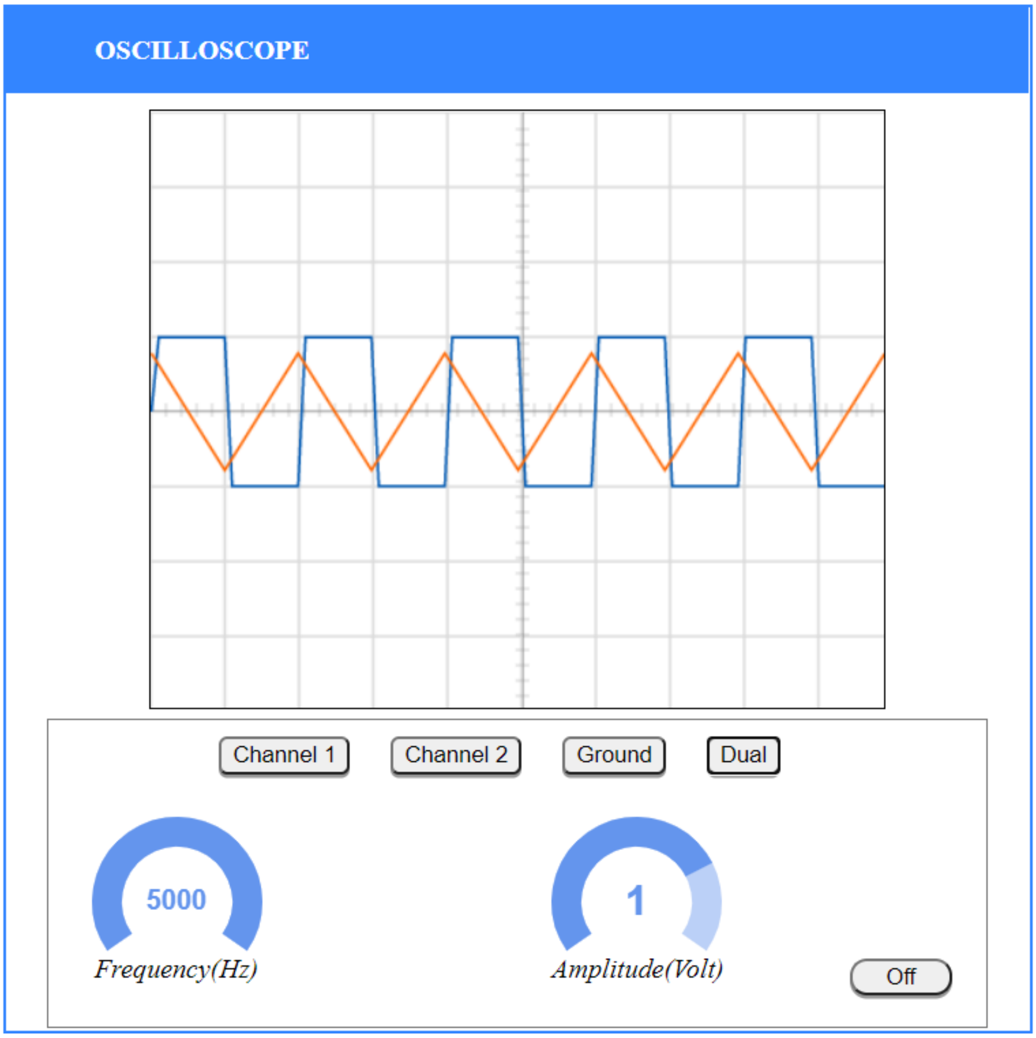

Figure 12: Square Wave at Frequency = 5000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

i.e. Time Period = (1 / 5000) = 0.2msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Part 2 :- RC Differentiator

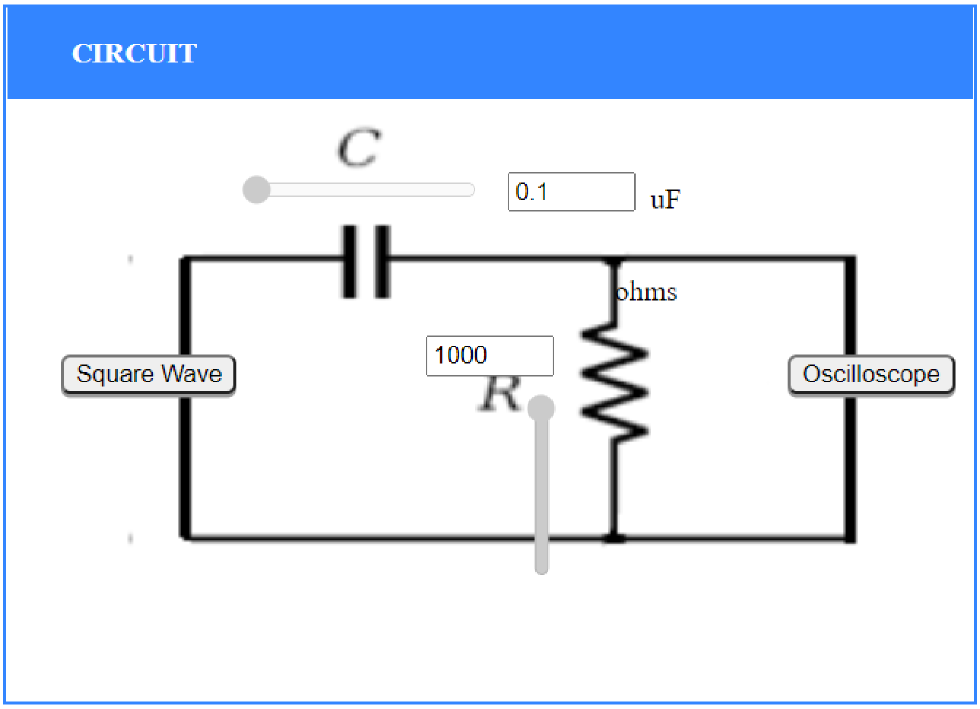

Figure 1: RC Differentiator Circuit

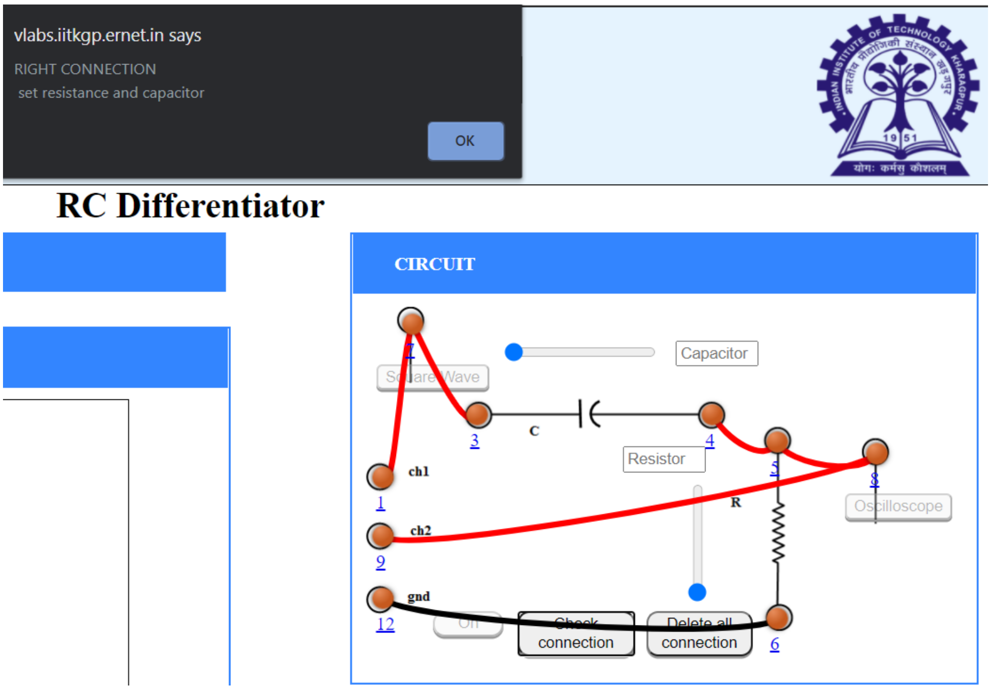

Figure 2: RC Differentiator Circuit Connections

Initial Parameters :-
- Resistance(R) = 1 kΩ
- Capacitance(C) = 0.1 μF

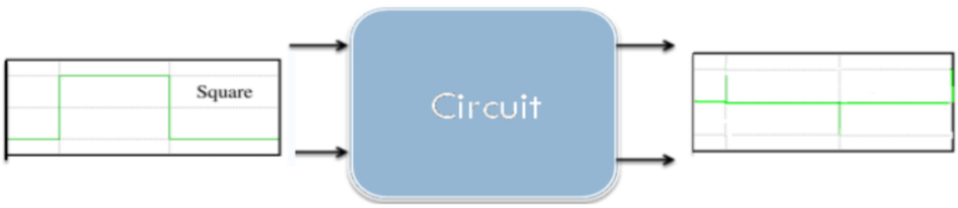

Figure 3: The Differentiator circuit converts or 'differentiates' a square wave input signal into high frequency spikes at its output.

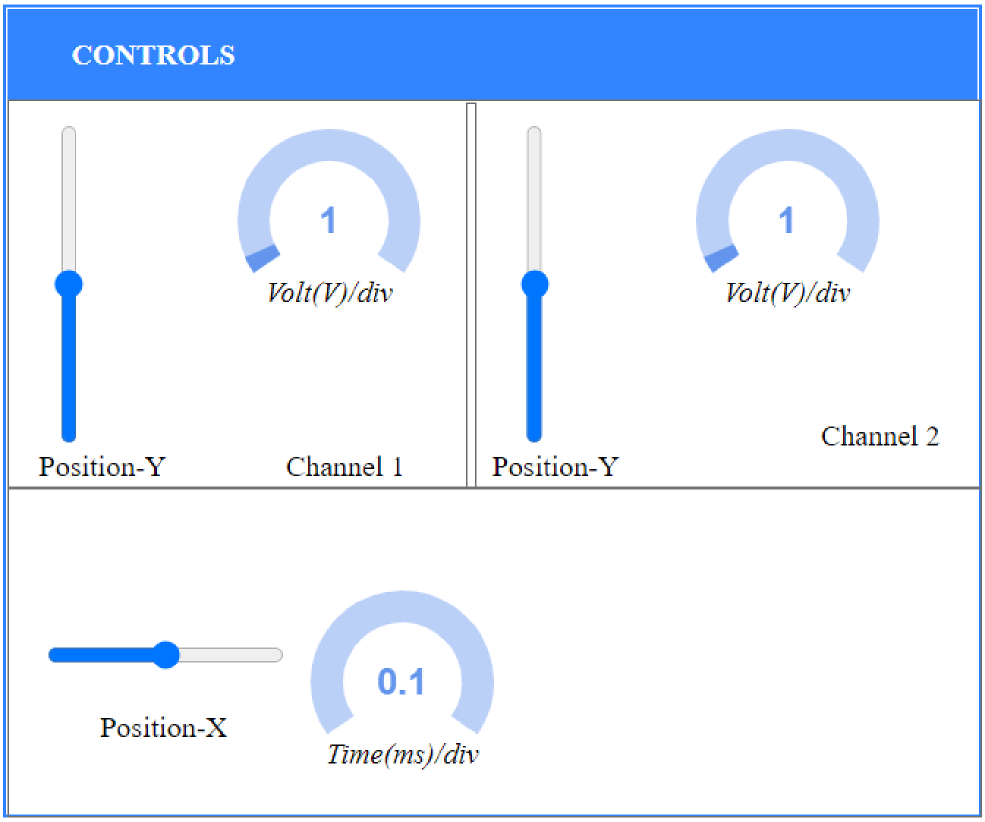

Figure 4: Controls

Figure 5: Oscilloscope Channel representation

Figure 6: Square Wave at Frequency = 1000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

Time Period = (1 / 1000) = 1msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Figure 7: Square Wave at Frequency = 2000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

Time Period = (1 / 2000) = 0.5msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Figure 8: Square Wave at Frequency = 3000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

Time Period = (1 / 3000) = 0.333msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

Figure 9: Square Wave at Frequency = 4000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

Time Period = (1 / 4000) = 0.25msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms

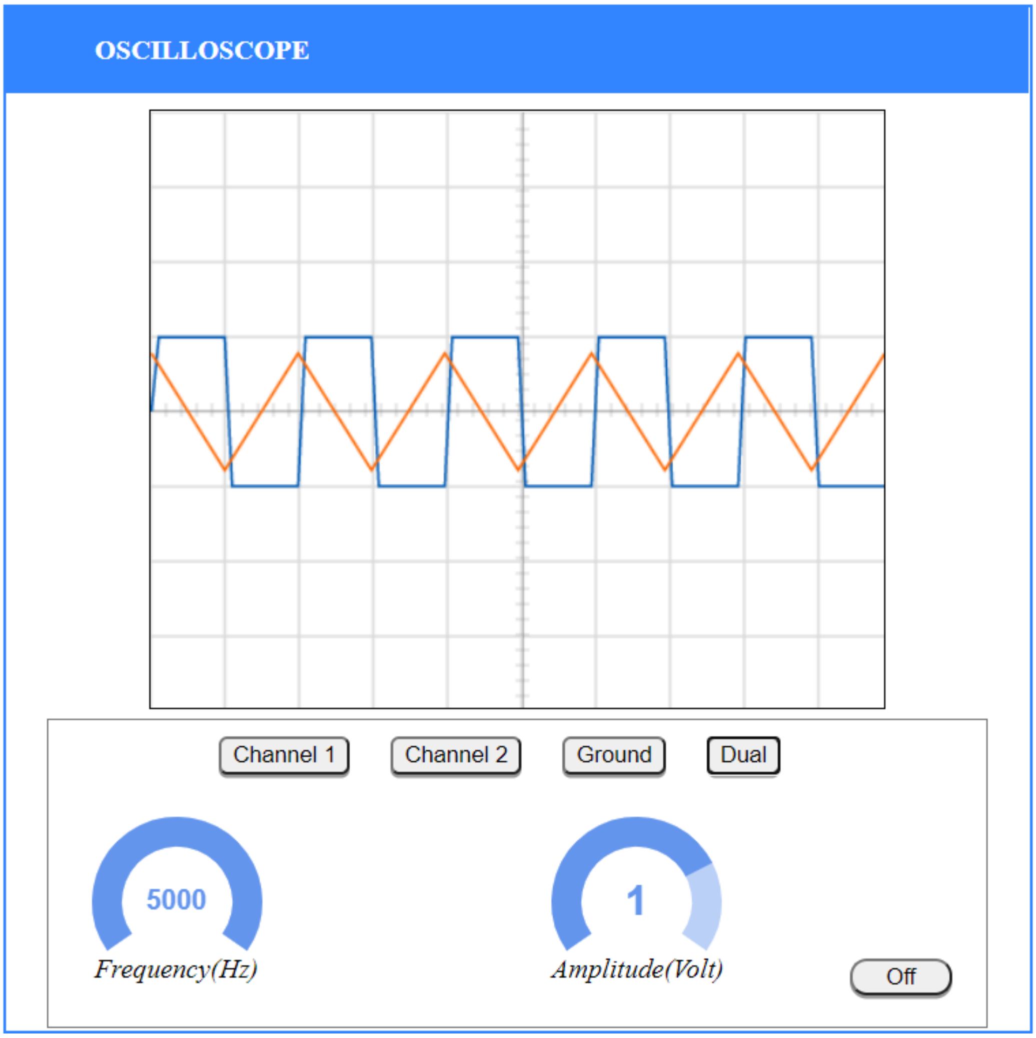

Figure 10: Square Wave at Frequency = 5000

Frequency = (1 / Time Period)

Time Period = (1 / frequency)

Time Period = (1 / 5000) = 0.2msec

Amplitude (Volt/div) = 1 V

Time(ms)/div = 0.1 ms