

Electronics Workshop - October 29, 2015

Time & Location:

7:00 PM

843 SW 21st St; Chehalis – Blue house with blue detached garage; 3rd side street from LCFD#6

Topic:

Oscilloscope Operation:

1. Probe compensation
2. Input amplifier bandwidth
3. Transmitter monitor
4. X-Y mode

Bring:

1. Chair
2. Pencil and Paper

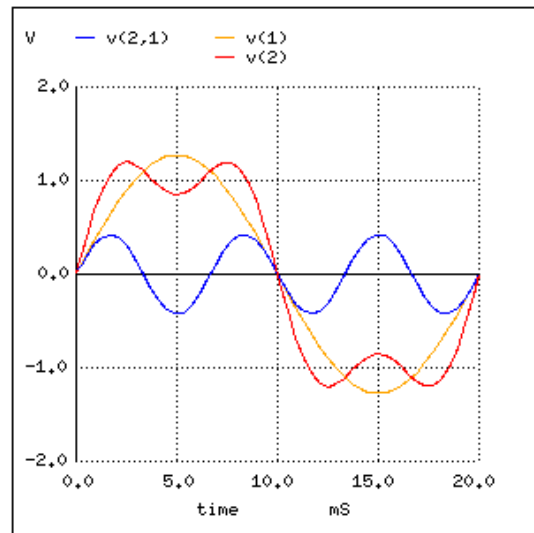
Optional:

1. Oscilloscope
2. Breadboard

Notes:

1. $1v f$ Hz square wave:
 $\left(\frac{4}{\pi}\right) (1v f \text{ sine wave}) +$
 $\left(\frac{4}{\pi}\right) \left(\frac{1}{3} v 3f \text{ sine wave}\right) +$
 $\left(\frac{4}{\pi}\right) \left(\frac{1}{5} v 5f \text{ sine wave}\right) \dots$
2. -

1.27v f + 0.424v 3*f

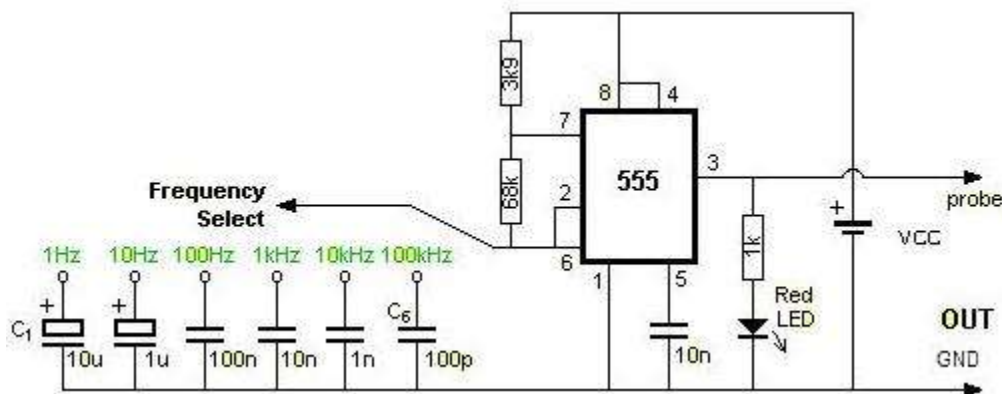


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Square Wave Generator:

The 555 timer is configured for astable operation, meaning that it will trigger itself and free run as a multivibrator. The timing elements are resistors R1, R2 and one of the capacitors (C1-6). For the values shown in this diagram, the six frequencies generated are 1Hz, 10Hz, 100Hz, 1kHz, 10kHz and 100kHz.

If you want to generate a variable frequency you can replace the 68k resistor with a 100k mini trim pot, connected in series with a 10 k resistor. This square wave oscillator electronic project can be powered from a power supply that can provide an output voltage between 5 and 18 volts DC, but typically it's recommended to use a 9 volt DC power supply.



$$t_1(\text{output high}) = 0.67 (R_A + R_B) C \quad \text{Note: } R_A = 3.9K; R_B = 68K \text{ in this circuit}$$

$$t_2(\text{output low}) = 0.67 R_B C$$

$$T = t_1 + t_2$$

$$\text{frequency} = 1/T = 1.49 / (R_A + 2R_B) C$$

$$\text{duty cycle} = (R_A + R_B) / (R_A + 2R_B)$$

Station Monitor:

Ref: https://www.youtube.com/watch?v=y4Zt_LJX1Tc

