Sine wave generator project

Electrical department

First year

section:2

Project made by:

omar mohsen emam	2017015
ali mohamed ali	2017080
omar abdelmeniem	2017156

SEVEN WAYS TO GENERATE A SINE WAVE:

1- WIEN BRIDGE OSCILLATOR.

2-PHASE-SHIFT OSCILLATOR.

3-COLPITTS CRYSTAL OSCILLATOR.

4-SQUARE WAVE AND FILTER.

5-DIRECT DIGITAL SYNTHESIS.

6-FUNCTION GENERATOR.

7-PULSE-BASED SINE WAVE GENERATORS.

SQUARE WAVE AND FILTER:

*Tools:

1- Ic 555 (CMOS 555 timer)

2- 2Resistnace of value 10k

3- 2 capacitors of 0.01 µF
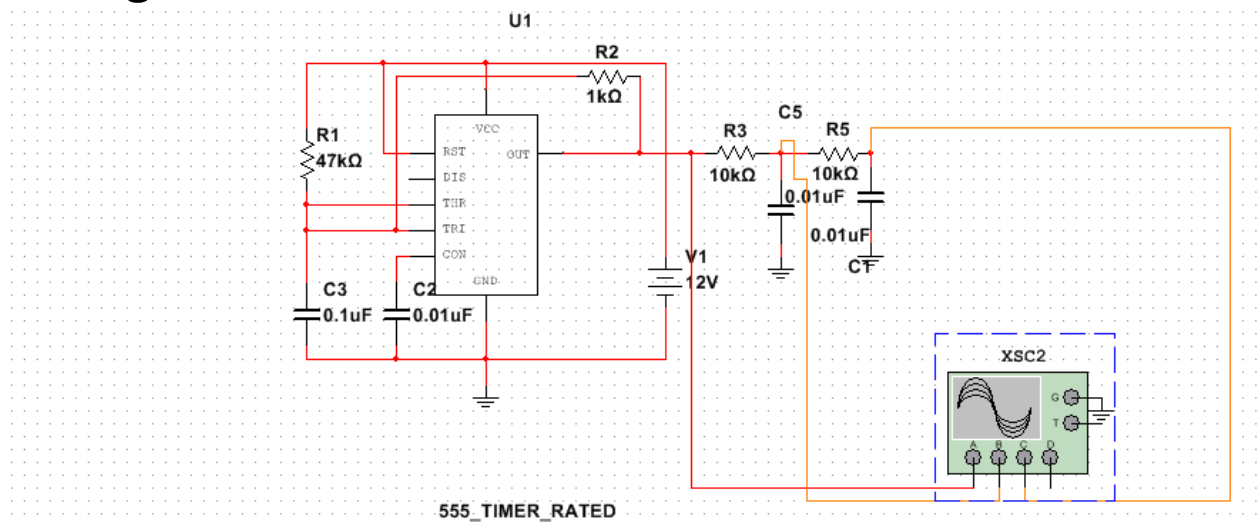
4- ic 555 connection circuit

5- power of 5 - 15 volt

*introduction to filtered square wave method:

This way produce a sine wave by selecting it with a filter. The idea is to generate a square wave first. As it turns out, it's often easier to generate a square wave or rectangular wave than a sine wave. According to Fourier theory, the square wave is made up of a fundamental sine wave and an infinite number of odd harmonics.

A CMOS 555 timer IC produces a 50% duty cycle square wave. Its output is sent to a low pass RC filter that filters out the
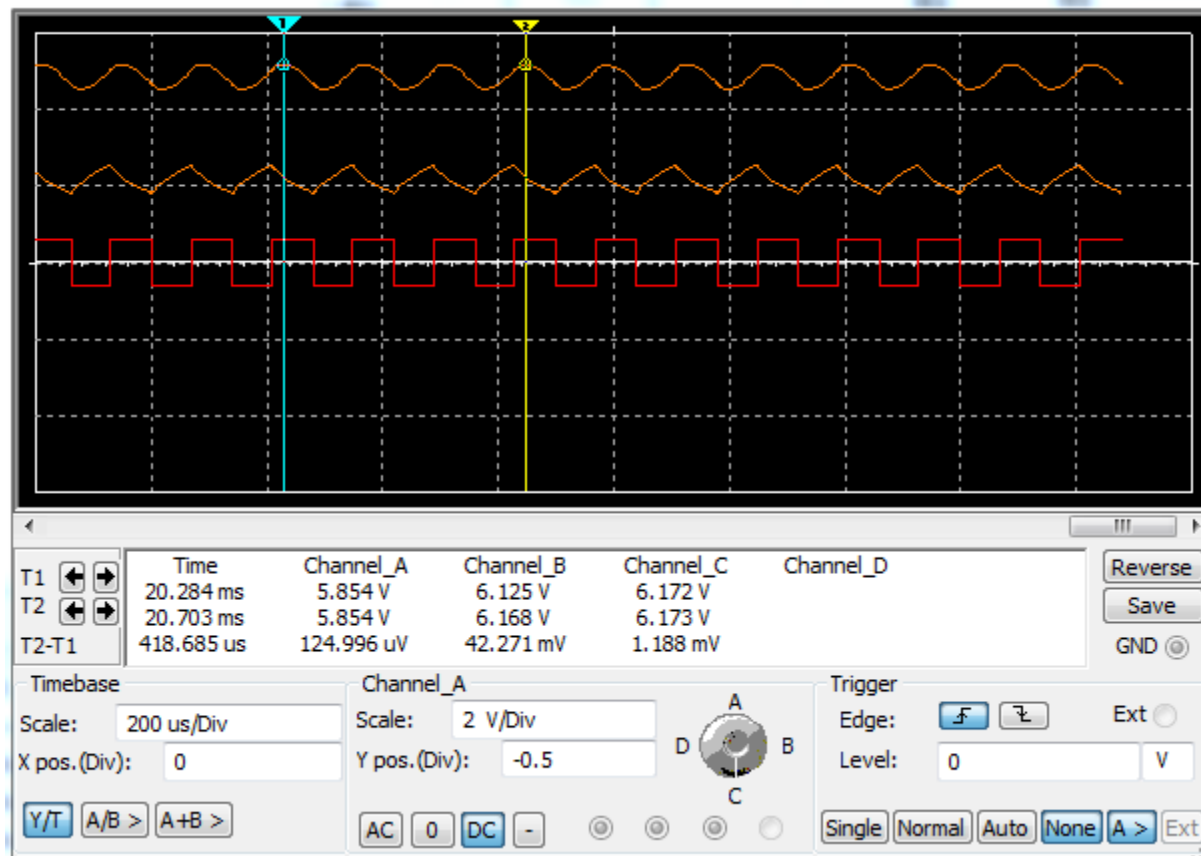
harmonics, leaving only the fundamental sine wave. Some distortion is common as it's difficult to completely eliminate the harmonics. A more selective LC filter can be used to improve sine wave quality. Keep in mind that you can also use a selective band pass filter to pick out one of the harmonic sine waves.

*Design:

*idea:

For this method we connect 2 integrator circuits (consists of a resistor and a capacitor) to convert the square wave resulted from the ic 555 connection to a sine wave, as we know from the capacitor equation $i_c = C(dV_c/dt)$ by using the first integrator circuit the square wave resulted from the ic 555 will be converted to a triangle wave then we use other integrator circuit to convert the triangle wave to a sine wave.

Four channel oscilloscope-XSC2

	Time	Channel_A	Channel_B	Channel_C	Channel_D	
T1	20.284 ms	5.854 V	6.125 V	6.172 V		Reverse
T2	20.703 ms	5.854 V	6.168 V	6.173 V		Save
T2-T1	418.685 us	124.996 uV	42.271 mV	1.188 mV		GND

Timebase
Scale: 200 us/Div
X pos. (Div): 0

Y/T   A/B >   A+B >

Channel_A
Scale: 2 V/Div
Y pos. (Div): -0.5

AC   0   DC   -

Trigger
Edge: Ext
Level: 0   V

Single Normal Auto None A > Ext

as we can see from the oscilloscope above is connected to the circuit with three wires each wire is connected to a converting point .

the change in the wave type can be noticed.

time constant = RC = 5.28*10^-6 sec