DESIGN PROJECT

Frequency Generator

ECE/EEE/INSTR F241 - Microprocessor Programming
& Interfacing BITS- Pilani Goa Campus

Group No. 16:

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System to be designed: P 16) Frequency Generator

Problem Description: This system is used to generate a Sine/Triangular/Square waveform of Frequencies ranging from 10 Hz to 99KHz. Voltage is between 0-10V. On system power up the user has to configure the desired type of waveform (square/triangle/square), frequency and amplitude.

User Interface:
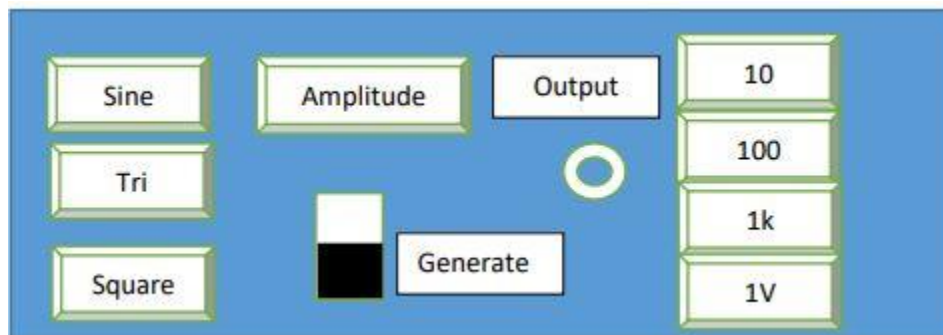
Assumptions:

1) To generate a Sine Waveform of Frequency 7.47 KHz the sine key has to be pressed, followed by 1K Key- 7 times, 100 Key –4 times 10 Key- 7 times.
2) To select the Amplitude, Amplitude key has to be pressed followed by the 1V key "n" number of times where "n" is the peak to peak amplitude of the waveform to be generated.
3) Only integer values of output voltages can be generated. Valid values of 'n' are from 1 to 10.
4) To generate frequency the generate switch should be turned on.
5) We have connected the generator to oscilloscope in the design to display the generated waveform.
6) When the generate switch is closed i.e. when it is enabled, to change the waveform to other form like square or triangular the corresponding

waveform button (i.e. key corresponding to square or triangle) needs to be pressed.

7) When a signal of different type/amplitude /frequency has to be generated, the generate switch has to be turned off and then the function generator has to be reconfigured as mentioned above.

8) When user enters the frequency value, corresponding count value is calculated which is loaded in 8254. The count value generated is an approximate value with an accuracy more than 90%.

9) User cannot choose to select two different waveforms before pressing the generate key. If user wants to change the waveform, he/she should follow the procedure mentioned in step (6).

10) Once the signal of specific frequency is generated, user cannot change the frequency. For doing the same, user has to reset the system.

Components / IC's used:

1. 8086 (Microprocessor)
2. 8284 (ClockGenerator)
3. 74LS373 (Octal latch) X 3
4. 74LS245 (Octal buffers) X 2
5. 2732 (ROM – 4K) X 4
6. 6116 (RAM – 2K) X 2
7. 74LS04 (Not Gate) X 2
8. 7432 (Or Gate) X 3
9. 74LS138(3:8Decoder)
10. 8255 (Programmable Peripheral Interface)
11. DAC0830 (Digital – Analog converter)
12. Op Amp LM741
13. KEYPAD (3 x 3)
14. 8254 (Programmable Interval timer)
15. Resistor (10k ohms)
16. Oscilloscope (used in proteus simulation for display)