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Design Of Computer Based Signal Generator

Abdelhadi Husein Aburawis[1], Imam Much Ibnu Subroto[2], Muhammad Qomaruddin[2]
[1]Almergeb University, Libya
[2]Electrical Engineering Department, Islam Sultan Agung University
addres, telp/fax of institution/affiliation

email: aborwess@yahoo.com, email: imam@unissula.ac.id, mqomaruddin@unissula.ac.id

Abstract

The project includes various types of signals alternative study and representation of a computer in digital format and out through the port as an outlet for the output of digital data to generate signals and electronic control circuit of the printer parallel LPT1 prevailing used to generate signals. The aim of the research is to evaluate the usage of the computer including the advantage of its possibilities, capabilities in multiple signals processing, and control signal generation methods in many ways that are used to generate various signals at frequencies different capacities. The necessary software requires generating different types of signals, frequencies, and capacities. It is as well as the different software required for the purpose of controlling the electronic circuit. It has been relying on a programmatic method depends on the language of Visual Basic. In addition to the study of the physical system requirements, the analysis how to connect them with the computer and version control signals E-circle this study using speed of a transferring time for generator is Tc = 100nsec. The Speed of a computer which is used to treat 1000 MH', is got on the farthest frequency to get out from the circle is 2500 Hz. It is used to different signals, sine, triangular or square in 30 samples. The sample numbers are tested. The result of this study shows that each of the sample number, input frequency, and sample time influence the results clearly. If the sample numbers increase, the accuracy of the waves increases. If the input frequency increases, the width of the wave losses.

Keywords*: Signal Generator, Computer, Visual Basic, Signals, LPT1*

1. Introduction

Signal generator is a device that able to generate various electronic signals for different purposes. In audio-video related industry, signal generator act as testing and measurement device for quality improvement and troubleshooting problem. Signal generator also used in other situation such as educational based activity, testing, research and development, and experimental process. Various types of signal generators have been developed for different purposes and applications. This project focuses on type's signals generator [1].

That the great development in the field of computers led to a computer and an important means in many applications and reliable in many areas of life, and given the importance of applications to generate multiple benefits enjoyed by computer signals we have seen to be the subject of this purely is to design a signal generator PC with the help given for broad applications in electrical and electronic circuits the signal generation is very important; where the signal generator device used to provide us with knowledge for the purpose of evaluating the performance of electronic systems [2].

There are different types of signal generators but they share some characteristics such as reference frequency, which must be defined and stable, and the second is the capacity should be free of distortion. Sending and receiving and processing data as signs of electrical systems is the basis of the electronic control, communications and computers. Most of these systems deal with analog or digital signals to perform the function for which designed.

This study includes electronic system components and prepares the necessary plans and these include electronic components converting the digital signal generated by the

computer to process analog signal conditioning by this reference filter and amplifier signal code [3].

Oscilloscope is the most important electronic devices with multiple benefits in doing electrical measurements which fed into the device and the electrical signal amplitude. It changes by the time. Thus, it can be calculated as the frequency which be able to entered to two signals and comparing them in terms of voltage and frequency capacity in different phase.

The signal generation is crucial. It uses a signal generator for providing signals to assess the purpose of the various of electronic systems performance. It causes resin reference device which is expensive and not readily accessible. It is also because of the extensive applications in the electrical and electronic circuits. Great development in the field of computers in many areas of life give the importance of applications for the signals to generate multiple benefits for the computer components within this system.

There are different types of signal generators and the signal generators have some characteristics. The first characteristic is reference frequency which has to be defined and stable. The second characteristic is the capacity which should be free of distortion. Sending, receiving, and processing data as signs of electrical systems are the basis of the electronic control, communications, and computers. Most of these systems deal with analog or digital signals to perform the function which is designed.

Most of these systems deal with analog or digital signals which are designed for its performance function. Therefore, there is a need to form in addition to the specifications of these signals (amplitude – Phase – waver – boarding time, etc). these signals must be (Wave forms(which has different appropriate allowance. It means it is used to test the timing of the introduction of resorting. It refers to any system required testing and check up safety work output [1].

An engineer needs to generate signals or make a signal acquisition. We can say that to debug electronic equipments, the first weapon for the engineer is a signal generator and an oscilloscope. Without these equipments, engineer can't do the work. During the time, the electronics and equipments measurements envolved but the principle remained the same. we can see that today the measuring equipments are not cheaper than a few years ago. we can say that some times they are more expensive. And because of some of the errors that occur when recording to read oscilloscope device by engineers or technicians who oversee the writing of these readings. We often find mistakes and to avoid these mistakes and get correct results, we designed computer based on signal generator for widely applications in the electrical and electronic circuits.

Oscillators

The oscillators are electronic circuits which produce oscillators with high stability degree frequencies and the degree of frequent stability. It is a basic quality to any oscillators. Any oscillator which has high stability degree, if it is working in vacuum. stable heat degree has design contents with high stability degree as well. It feeds its circuit from feeding source with stable voltage without loading. This is caused by the output oscillator. These conditions are away from the real use of the oscillators. The difficulty of designing circuits of oscillators is used in attempt to get reasonable ability as an output in accurate heat because the frequency is stable. Oscillators are divided into two main parts.

One Harmonic Oscillator

One harmonic oscillator depends on its work on a principle of feedback. They produce harmonic wave (sine). They have many kinds: 1) 'RC' Oscillators, this kind consists of coil and resistance with operational amplifier like wine bridge. 2)'LC' Oscillators, this consists of coil and condenser which make ring circuit parallel and transistor which makes feedback in condition of co-impulse there are three kinds of ring oscillators: 1) Hartley Oscillator. It has ring circuit which has two coils and condenser. 2) Colpits Oscillator. It has a ring circuit consisting of two condensers and coil. 3) Clapp Oscillator. It has a ring circuit consisting of three condensers and coil [2].

Multi-Harmonic Oscillators

This kind of oscillator has something in common with two transistors connected to each other in a special way. One of them works for a period of time, the other does not. In other

words, one of them is in case of transit of current, other is not. Then they change the case of transit. For oscillators, they have two output signals. One of them takes from the first transistor group and second is from the second transistor group from electric theories. The output is low voltage from the transistor which is in the from electric theorie. The output is low voltage from the transistor which is in the case of passing and the output is high voltage from the transistor which is not in the case of passing. There are several kinds of oscillators. They are presented below.

One Stable Oscillator

This has one stable case and two transistors. One of them is in passing case and the other is not. Oscillator continues on this case till out influence comes in from of signal to switch trigger pulse. The result of the pulse changes the two transistors to transitional case in a limited period of time. After that, the oscillator comes back to the stable case without influence. This transitional period of time is defined by time stability of circuit. This oscillator is sometimes called one shoot oscillator. it has just one input. Yet, when increasing, the output becomes one for a specific period of time and then comes back to 'O', "stable case".

Two Stable Oscillators

This kind is called swing or change able oscillator. It has two inputs and two opposite outputs. (Ẋ,X) supposing that I=X. Oscillator will stay without change till motivating to one of input to be '1' and then becomes 0=X till motivating to again to be '2' and comes back 1=X, etc. In other words, it has two cases of stability continuously. On this way till out, the influence comes as a form of trigger pulse. It changes from a stable case to another case. it continues on this case till repeating the out influence. It comes back to the first case. Repetition changes from case to case with repetition of out influence.

Free Stable Oscillator

Free stable oscillator changes its case continuously. it is never stable when electrical feed reaches the oscillator. it produces high output and low output. this case continues for limited period of time. it stops on the value of time stability of circuit and then it transforms to the second case. Two outputs change the case. It continues this case for the same period of time. Then, it comes back to the first case the work of oscillator continues this way till separating electrical feed. This oscillator is called free-running. It comprises two opposite outputs without an input.

Principle of Oscillator Work

This kind of oscillator depends on using feedback from amplifiers. If the coefficient of feedback is 'B', it is enough to transfer amplifier to oscillator. Generating wave may take a form like harmonic (sine) or other forms like square wave, triangular wave following to value of coefficient of 'B'. It explains diagram forming of earning coefficient amplifier without feedback 'A' and positive feedback circuit has earning coefficient 'B'. When input pulse applies its value 'Vi' on entrance of the amplifier appears pulse on outlet its value. (Vo= BVi) appears on feedback outlet (Vf= BVo) if the value of Vf and Vi are equal. It can leave the input pulse 'Vi' representing Vf, the next input pulse which amplifier and repeats for second circle, therefore, it should be (AB > 1) or oscillator allays condition farms like this. When a limited frequency works on the oscillator automatically, multi-playing earning coefficient without feedback 'A' and coefficient 'B' for positive feedback of circuit are equal to one or more than one is correct. Feedback should be positive, therefore, phase differs between Vi and Vf is zero (0) or 2π. If three are more than a frequency which has the same two conditions. it produces the oscillator signal between two frequencies at the same time. To generate harmonic pulses, it should be (AB = 1) in addition to the second condition. If 'AB > 1', it changes the form of the pulse on harmonic form. This difference increases when 'AB' is away.

Programming Part for the System

The system will be programmed in a language which its visual basic considers space to develop harmonic applications with windows quickly and easily. This space includes everything needed to apply applications, repair, test, design, and translate them, such as: 1) Control tools, which users use to establish face of application and different creatures on screen (frames,

buttons, square texts, bars, etc.) from which they connect with the application. 2) Text editor is used to create programming code and release. 3) Debug is used to test your applications and its designs.

Compiler is used to create independent windows applications away from visual basic programmer. Visual means 'vision' or 'seeing' the way which develops the application. the way frames, buttons, square texts, and other contents are drawn are similar to the way of drawing creatures in any drawing programs in windows. Basic refers to the kind of programming which is written this part works on generating kinds of signals with different frequencies and produces control signals for a supporting electronic circuit and releases it by parallel outlet LPT1 [3].

2. Research Method

This type of study is an experimental study. This of study includes electronic contents for systems and prepares relevant diagrams. Electronic contents consist of operation of transferring digital signal which is created by a computer signal adopted by filter and programming signal amplifier.

The practical procedure to fulfill the system requires the preparation of primary block diagrams. Figure 1 is identified as block diagram for system that comprises the stage of a generating digital signals and also control signals for the amplifier of programming signal depending on parallel connection outlet without building outlet to do this job which gives the system generalization in using the outlet of printer and also shrinking the size of the material part.

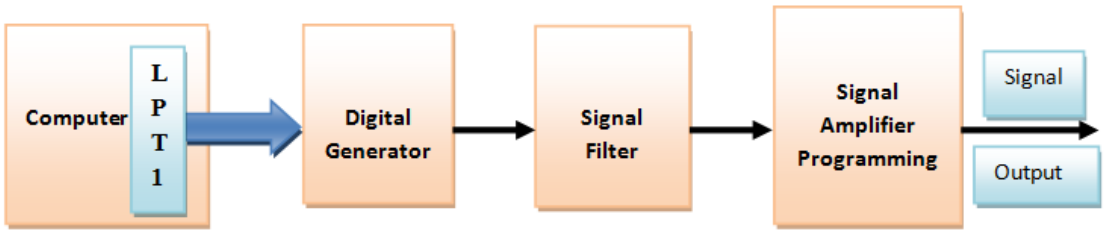


Figure 1. Block Diagram for the System

Independent Variable

Oscilloscope appliance the signal generator is exactly what its name implies: a generator of signals used as a stimulus for electronic measurements most circuits require some type of input signal which amplitude varies over time. The signal may be a true bipolar AC1 signal (with peaks oscillating above and below a ground reference point) or it may vary over a range of DC offset voltages, either positive or negative. It may be a sine wave or other analog function, a digital pulse, a binary pattern or a purely arbitrary wave shape. The signal generator can provide "ideal" waveforms or it may add known, repeatable amounts and types of distortion (or errors) to the signal it delivers this characteristic is one. Of the signal generator's greatest virtues, since it is often impossible to create predictable distortion exactly when and where it's needed using only the circuit itself. The response of the DUT in the presence of these distorted signals reveals its ability to handle stresses that fall outside the normal performance envelope.

Dependent Variables

Sine Wave

Sine waves are perhaps the most recognizable wave shape most AC power sources produce sine waves. Household wall outlets deliver power in the form of sine waves. The sine wave is almost always used in elementary classroom demonstrations of electrical and electronic principles. The sine wave is the result of a basic mathematical function graphing a sine curve through 360 degrees will produce a definitive sine wave image.

Triangular Wave

A triangle wave is a non-sinusoidal waveform named for its triangular shape. It is a periodic, piecewise linear, continuous real function. Like a square wave, the triangle wave contains only odd harmonics, demonstrating odd symmetry. However, the higher harmonics roll

off much faster than in a square wave (proportional to the inverse square of the harmonic numbers opposed to just the inverse).

Square Wave

Square wave is a non-sinusoidal periodic waveform (which can be represented as an infinite summation of sinusoidal waves), in which the amplitude alternates at a steady frequency between fixed minimum and maximum values, with the same duration at minimum and maximum. The transition between minimum to maximum is instantaneous for an ideal square wave; this is not realizable in physical system square waves are often encountered in electronics and signal processing. Its stochastic counterpart is a two-state trajectory. A similar but not necessarily symmetrical wave, with arbitrary durations at minimum and maximum, is called a pulse wave (of which the square wave is a special case).

Control Variables

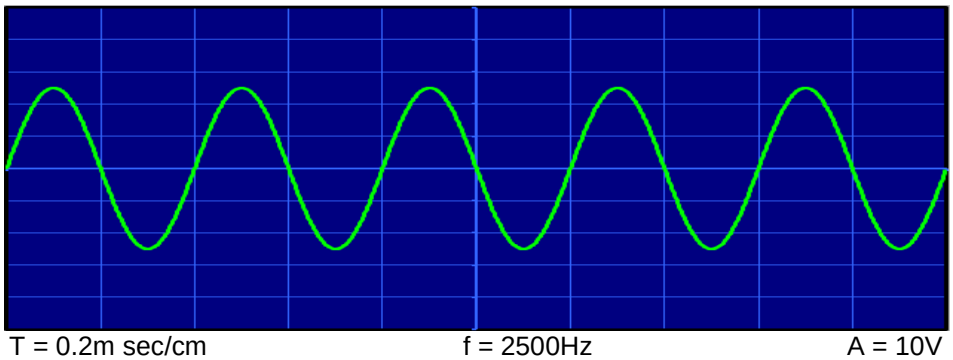
1. Computer.
2. The generator “DAC”
3. Amplifier of programmer signal
4. Form at signal.
5. Single generator.
6. Limited signal

3. Results and Analysis

Table 1 shows the input frequency from the program and output from oscilloscope.

Table 1. Sine wave test

No	Input Frequency f_i(Hz)	N	Output Frequency f_o(Hz)
1	50	30	50
2	100	30	100
3	200	30	200
4	300	30	286
5	400	30	400
6	500	30	500
7	1000	30	1000
8	1500	30	1333
9	2000	30	2000
10	2500	30	2500



T = 0.2m sec/cm f = 2500Hz A = 10V

Figure.1 Sine Wave, Frequency 2500 Hz, Amplitude 10 V

Table 1 and Figure 1 show attempts to produce sine waves. 10 (ten) trials had been done in order to determine the waves expected. The input frequency applied in each attempt varied, which ranged from 50 Hz to 2500 Hz, yet the samples (n) of each are of the same value, that is 30. Most trials resulted in the same output frequency as its input. Yet, in every electronically trial, there are chances of error occurrence, which is known as anomaly. As of these trials, errors are found in the fourth attempt, whose input frequency was 300 and output was 286 Hz, and also the eight attempt whose input frequency was 1500 and output was 1333 Hz. Since it is normal for errors to take place, the errors are ignored. Therefore, the sine wave form constructed will always be of the same form, this is due to its consistent value of period (0.2 ms/cm) and amplitude (10V). When the period and amplitude do not change, the form of the wave stays as well, despite the different input and output frequencies. This proves that input frequency only affects the wave length, and not the form.

As seen in the image, the sine wave is curvy. This is because the sine wave is the result of a basic mathematical function (y=A sin⁡[[2π⁡] ((t-t^o)/T)]), graphing a sine curve through 360 degrees will produce a definitive sine wave image.

Table 2. Triangular Wave Test

No	Input Frequency fi(Hz)	N	Output Frequency fo(Hz)
1	50	30	50
2	100	30	100
3	200	30	200
4	300	30	286
5	400	30	400
6	500	30	500
7	1000	30	1000
8	1500	30	1333
9	2000	30	2000
10	2500	30	2500

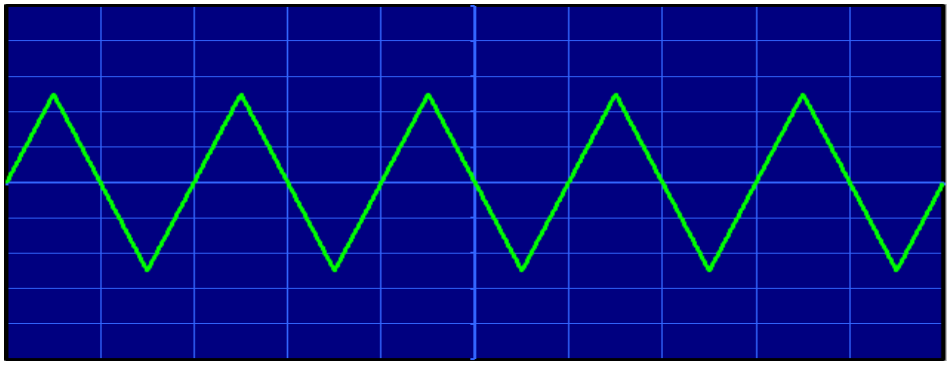


Figure 2. Triangular Wave, Frequency 2500 Hz, Amplitude 10 V.

Table 2 and Figure 2 show attempts to produce triangularwaves.10 (ten) trials had been done in order to determine the waves expected. The input frequency applied in each attempt varied, which ranged from 50 Hz to 2500 Hz, yet the samples (n) of each are of the same value, that is 30. Most trials resulted in the same output frequency as its input. Yet, in every electronically trial, there are chances of error occurrence, which is known as anomaly. As of these trials, errors are found in the fourth attempt, whose input frequency was 300 and output was 286 Hz, and also the eight attempt whose input frequency was 1500 and output was 1333 Hz. Since it is normal for errors to take place, the errors are ignored. Therefore, the triangular wave form constructed will always be of the same form, this is due to its consistent value of period (0.2 ms/cm) and amplitude (10V). When the period and amplitude do not change, the

form of the wave stays as well, in spite of the different input frequency. This proves that input frequency only affects the wave length, and not the form of the triangular waves.

As seen in the image, the triangular wave is almost similar to sine wave, yet it is sharper that it creates a form of a triangle. This is because the wave is the result of the function (v(x)=2A 1/T) where 0≤x ≤ 1/2 or (v(x)=2A {1- 1/A}) where 1/2≤x ≤ τ, graphing a non-sinusoidal waveform named triangular wave.

Table 3. Square Wave Test

No	Input Frequency fi(Hz)	N	Output Frequency fo(Hz)
1	50	30	50
2	100	30	100
3	150	30	143
4	200	30	192
5	300	30	281
6	400	30	357
7	500	30	465
8	1000	30	1000
9	1500	30	1265
10	2000	30	2000
11	2500	30	2500

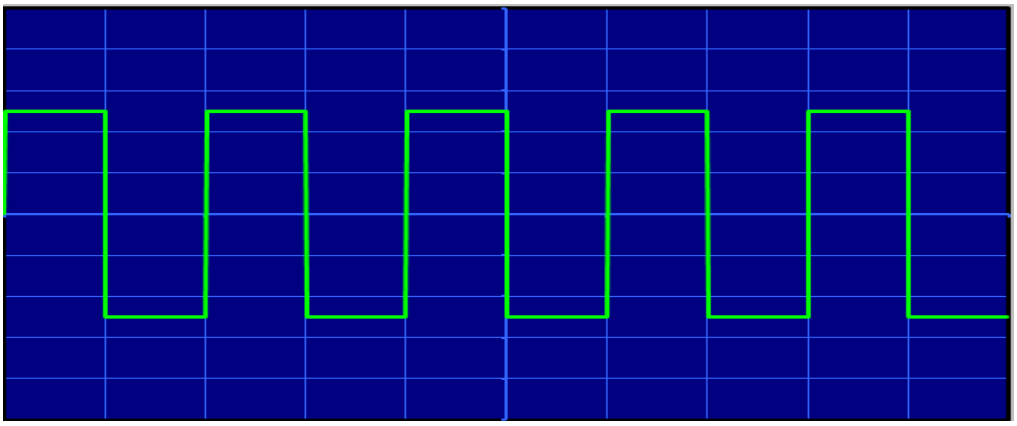


Figure.3Triangular Wave, Frequency 2500 Hz, Amplitude 10 V.

Table 3 and Figure 3 show attempts to produce square waves. 11 (eleven) trials had been done in order to determine the waves expected. The input frequency applied in each attempt varied, which ranged from 50 Hz to 2500 Hz, yet the samples (n) of each are of the same value, that is 30. Different output frequencies were gained in the attempts, except for the first, second, eighth, tenth, and eleventh attempts whose both input and output frequencies stay as they are. The square wave form constructed will always be of the same form, this is due to its consistent value of period (0.2 ms/cm) and amplitude (10V). When the period and amplitude do not change, the form of the wave stays the same, despite the different input frequency. This proves that input frequency only affects the wave length, and not the form of the square wave.

As seen in the image, the waves are square. This is because the transition between minimum and maximum is instataneous. The wave is the result of the function (x(t) = sgn(sin[t])), graphing a square formed wave.

From the three figures of waves presented above, although the values of the frequency, period, and amplitude are the same, the forms of the waves produced are different. This is because of the types of the waves are different as well.

4. Conclusion

Based on the results of research that have been done, it can be concluded that each of samples number, input frequency and sample time influence clearly on the results which are got. If samples numbers increase, the accuracy of wave increases If input frequency increases, the wave length will be lessens.

Because of the results which are got, are drawn by drawing signal device, there are mistakes are happened during this operation either these mistakes are measurement, accuracy of limit the points or accuracy of drawing device.

The least voltage value for the generator may treat is '0 V', the highest value is '10 V p-p'. Because of the non-symmetry of mistakes values and changes to characteristics of each element in the circle, it is noticed that there is a mistake ratio of 3% - 5% in the results.

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