

# To Design and Develop 2MHz Portable Waveform Generator

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## **Abstract:**

*We plan to build a waveform generator that can be carried around. Waveform generators are utilized in circuit testing. (Take, for example, the input to a clipper or clapper circuit.) The function generator, on the other hand, has the drawback of being non-portable. As a result, we're developing a function generator that can be carried anywhere and used whenever it's needed...*

**Keywords:** *frequency & amplitude variation, waveform generation.*

## Introduction:

The General Radio 403 was the first commercial signal generator to be sold in June 1928. It was capable of operating at frequencies ranging from 500Hz to 1.5MHz. In addition, General Radio offered the first commercial frequency standard with a frequency of 50KHz in April 1929. We are still employing enormous bulky waveform generators with some wonderful features in the 2000s and beyond. As a result of taking the initiative, we are creating a portable waveform generator that will be useful in the electronics business. As a result, the portable waveform generator should be capable of producing waveforms such as (sine wave, square wave). The device will feature manual controls for changing the duty cycle, frequency, and amplitude.

The amplitude range of the output waveform will be 1V to 12V. We found several references that met our needs. A waveform generator is a critical piece of technology in electronics and communication. It is used to generate various sorts of signals and frequencies for a number of applications such as testing, debugging, and design. As technology advances, we want incredibly tiny waveform generators that are both cost and time effective.

## Block Diagram:

We utilized an atmega32P as a microcontroller, which will serve as the system's brain. Their single rotary encoder is used to choose whether the output is a triangle or a sin wave. The LCD is used to show frequency and amplitude changes. The AD9833 will create the waveform, which will then be fed into an op-amp to raise the amplitude of the waveform.

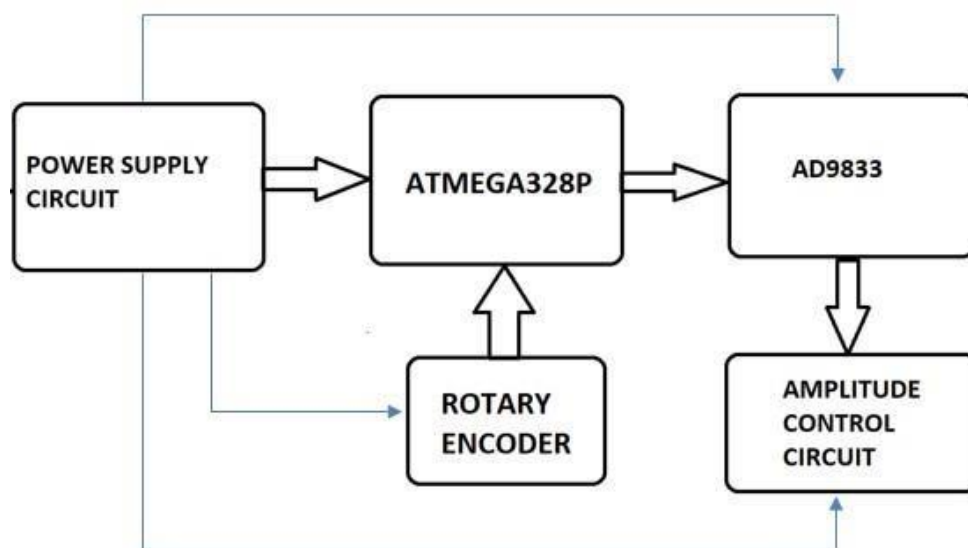
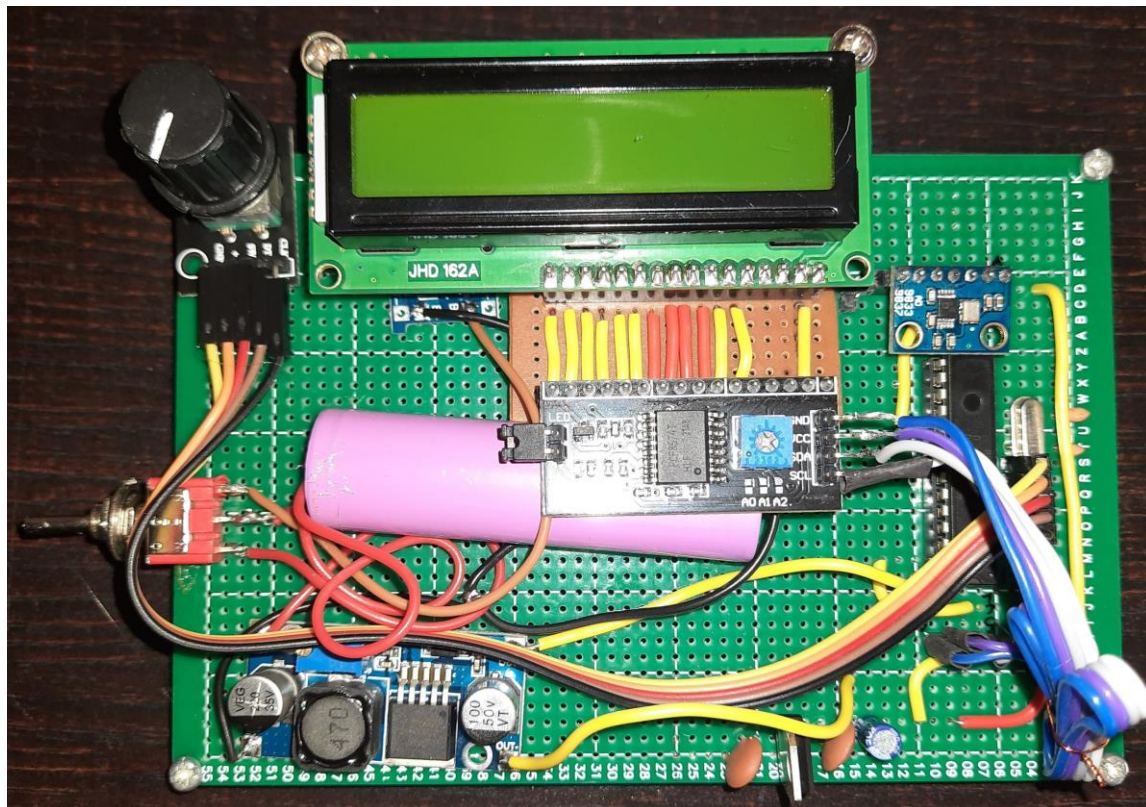


Fig.1.Waveform generator block diagram

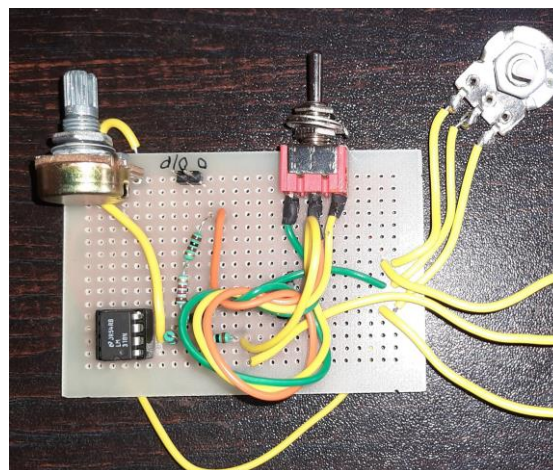
## Methodology:

We're utilizing a rotary encoder to modify the settings. The rotary encoder modification will provide input to the Atmega328P. AD9833 will collect data from atmega328P and atmega328P will supply information so that AD9833 can produce the needed waveform and frequency range. The output of the AD9833 is sent into the op-amp, which acts as an inverting amplifier. We may alter the amplitude of the waveform by connecting a potentiometer to an inverting op-amp.

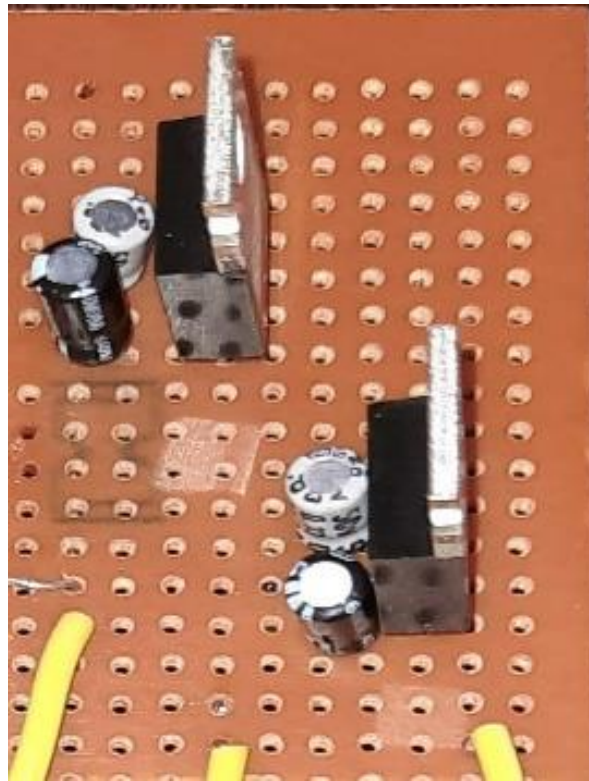
## Result:



**Fig.2. Main circuit**



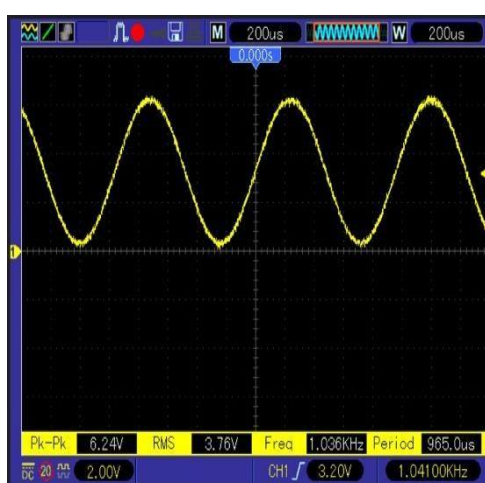
**Fig.3. Amplitude Variation circuit**



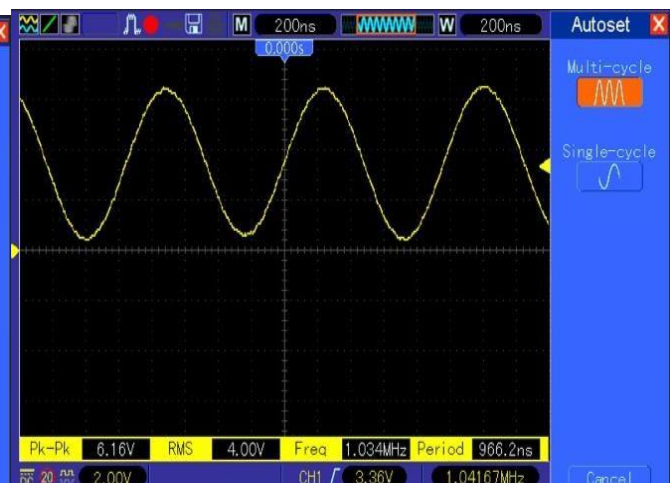
**Fig.4 Voltage regulator circuit**

## OUTPUT WAVEFORM:

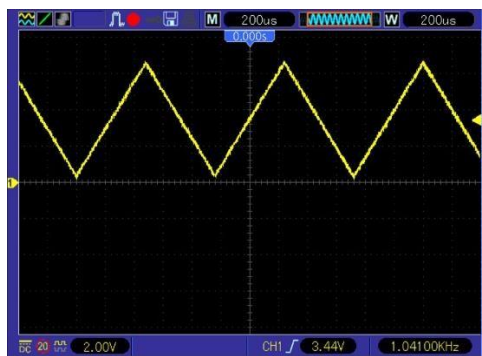
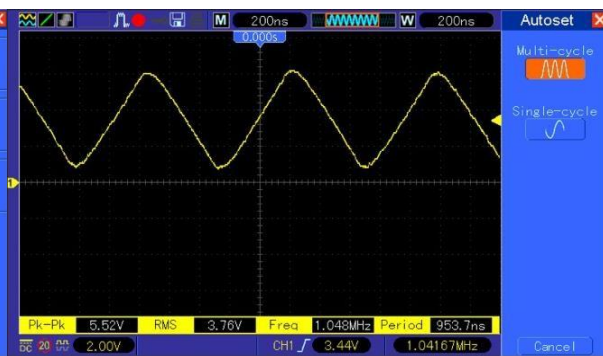
**Sin wave:**



**Figure3: 1.036KHz**



**Figure4: 1.034MHz**

**Triangle wave:****Figure5: 1.041 KHz****Figure6: 1.048MHz****Conclusion:**

In present work, we have successfully designed Portable waveform. Here we can generate sine wave and Triangular wave. We can also change the parameter of amplitude and frequency manually.

**Reference:**

- [1] Vishnu S Nair, Achu S Nair, *Portable Wireless Multipurpose Signal Viewer, Analyzer and Generator Using ATMEGA328P MCU and Android*, 3rd International Conference for Convergence in Technology (I2CT), IEEE, 6 April 2018.
- [2] Li Su, Aiguo Shang, Jin Qin, Jingjing Yang, *Design and Implementation of High Precision Digital Frequency Meter Based on C8051F020 Microcontroller*, atlantis-press, October 2017.
- [3] Hitesh Mandaliya, Parthesh Mankodi, Bhumika Makwana, *Microcontroller Based DDS Function Generator*, International Journal of Engineering Science and Innovative Technology (IJESIT), Volume 2, Issue 1, January 2013.
- [4] S.Roy, D.Kumar, A. Dandapat, P.Saha, *Discretized Sinusoidal Waveform Generators for Signal Processing Applications*, 2nd International Conference on Trends in Electronics and Informatics IEEE, 11-12 May 2018.
- [5] Yu-Kang Lo, Hung-Chun Chien, *Switch-Controllable OTRA-Based Square/Triangular Waveform Generator*, IEEE Transactions on Circuits and Systems II: Express Briefs, IEEE, Volume: 54, Issue: 12, Dec. 2007.