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Design and Verification of Pure Sine Wave Inverter

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Abstract— The purpose of this project is to design and verification of a 1000 Watts (1KW) 220 Volts inverter at a frequency of 50Hz. The inverter is one of the most important and most complex components in an independent energy system. It provides power supply when there is cut in government power supply. It plays very important role in areas where there is regular cuts in power supply. It works on the basic principal of charging and discharging of battery. This device is constructed with locally sourced components and materials of regulated standards. The basic principle of operation is a simple conversion of 12V DC into 220V AC from a battery using integrated circuits and semiconductors at a frequency of 50Hz, across the windings of a transformer. Our aim behind this project is to provide an additional power supply at an affordable price with the same power output.

Keywords— Inverter, integrated circuits, pure sine wave inverter, transformer, power supply, home inverter

I. INTRODUCTION

The inverter is one of the most important and most complex components in an independent energy system. An inverter converts direct current to alternating current, and also changes the voltage. In other words, we can say that it is a power adapter. It allows a battery-based system to run conventional home appliances like television, fan, computer, etc. through conventional home wiring. We can use direct current directly, but for a modern lifestyle, we need an inverter for the vast majority. It provides power supply when there is cut in government power supply. It plays very important role in areas where there is regular cuts in power supply. It works on the basic principal of charging and discharging of battery. [1] The harmonic content of pure sine wave inverter is very low with good power quality. Such type of inverter are mostly required for sensitive equipment, which cannot withstand fluctuations, inrush current and any other problems caused by high harmonic content. Our aim is to make an economical pure sine wave inverter so that it may be available at affordable price for home users, cottage industries, small-scale business, etc. For this purpose we will analyse the inverters on the basis of switching schemes, on the basis of levels and on the basis of transformer. From that analysis we designed an inverter which is used to run home appliances like fan, light, computer, television. [2]

II. LITERATURE SURVEY

Windy Dankoff, "How to Choose an Inverter for an Independent Energy System", Home Power #82, April-May 2001, PP 74-78 [1], in this document, author gave brief idea about choosing an inverter. He discussed different parameters like where it is to be used, what type of loads (appliances) you will be powering, the maximum power the inverter will need to handle, the quality of the power critical, size and weight of inverter, etc. Also he provides inverter selection table that will help to determine what type of inverter is best for design.

J. C. Osuwa and C. F. Peter, "Construction and Implementation of 1 KVA Inverter", in these research papers, authors give the brief idea about the production of solid state inverters which provides environmentally friendly alternative for uninterruptible power supply for the operation of different gadgets and for sustainable economy. This study is thus anchored on the production of 1 KVA inverter for provision of power using locally sourced 80 Ah 12 volts deep cycle battery, oscillator driven MOSFETs and a transformer along with other electronic components.

In building an inverter for the conversion of DC to AC at a normal frequency of 50 hertz, due consideration is given to the switching speed of the oscillator used to ensure that the MOSFETs in their two channels operate in their saturation and cut off states when appropriately driven by oscillator outputs in a way to complement each other.

Olusegun O. Omitola, Segun O. Olatinwo and Taiwo R. Oyedare, "Design and Construction of 1KW (1000VA) Power Inverter", in this paper researcher proposed in the modern society, electricity has great control over the most daily activities for instance in domestic and industrial utilization of electric power for operations. Electricity can be generated from public supply to consumers in different ways including the use of water, wind or steam energy to drive the turbine as well as more recently the use of gas.

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Generators, solar energy and nuclear energy are also source of electricity.

Hence the use of additional electric power source such as electric power generators and most recently the use of semiconductor power devices such as the Bipolar Transistor, Thyristors and particularly MOSFET to generate electric power in conjunction with a DC battery in few kilowatts. An Inverter offers a better additional power source to Generators as well as UPS considering its long duration, cost effectiveness and maintainability.

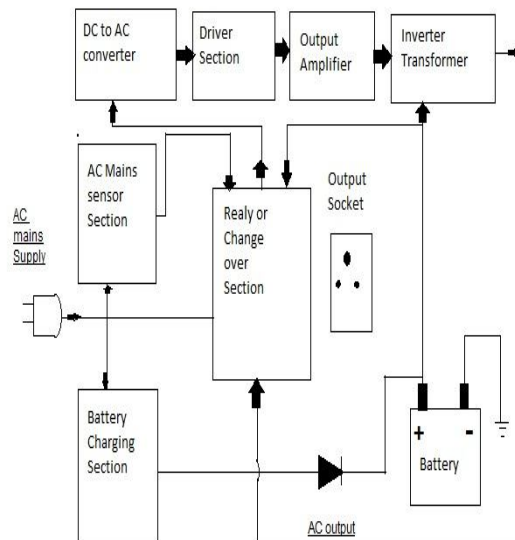


Fig 1: Block diagram of inverter

III. RESULT AND CONCLUSION

The construction of pure sine wave inverter 1000Watts (1KVA), 220Volts inverter at a 50Hz frequency was a gradual process from gathering of materials to testing of components. It is observe that the efficiency of this project depends on the power rating of the battery connected to the input and on the total power of the load connected to its output terminals. Thus, the inverter could deliver constant power for a calculated number of hours.

IV. ACKNOWLEDGEMENT

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