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DEVELOPMENT OF AN INVERTER 12V DC TO 220V AC

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ABSTRACT

We all face power cuts in our houses or offices sometimes or another. Inverters are often needed at places where it is not possible to get AC supply from the mains. An inverter circuit is used to convert the DC power to AC power. Inverters can be of two types True/Pure sine wave inverters and quasi and modified inverters. These True/Pure sine wave inverters are costly, while modified or quasi inverters are inexpensive. The power electronics device which converts DC power to AC power at required output voltage and frequency level is known as inverter. Inverters can be broadly classified into single level inverter and multilevel inverter. Multilevel inverters as compared to single level inverters have advantages like minimum harmonic distortion and can operate on several voltage levels. Inverters are used for many applications, as in situations where low voltage DC sources such as batteries, solar panels or fuel cells must be converted so that devices can run off of AC power. One example of such a situation would be converting electrical power from a car battery to run a laptop, TV or cell phone. This report focuses on design and simulation of single phase, three phase and pulse width modulated inverter and use of pulse width modulated inverter in the speed control of Induction motor

Keywords: Center taped *Transformer, DC battery, MOSFET IRF 540N.*

I. INTRODUCTION

A device that converts DC power into AC power at desired output voltage and frequency is called an Inverter. Phase controlled converters when operated in the inverter mode are called line commutated inverters. But line commutated inverters require at the output terminals an existing AC supply which is used for their commutation. This means that line commutated inverters can't function as isolated AC voltage sources or as variable frequency generators with DC power at the input. Therefore, voltage level, frequency and waveform on the AC side of the line commutated inverters can't be changed. On the other hand, force commutated inverters provide an independent AC output voltage of adjustable voltage and adjustable frequency and have therefore much wider application. Inverters can be broadly classified into two types based on their operation: • Voltage Source Inverters (VSI) • Current Source Inverters (CSI) Voltage Source Inverters is one in which the DC source has small or negligible impedance. In other words VSI has stiff DC voltage source at its input terminals. A current source inverter is fed with adjustable current from a DC source of high impedance, i.e., from Development Of An Inverter a stiff DC current source.

II. METHODOLOGY

When choosing a specific inverter, the inverter's output capacity must be matched to the size of the electrical loads it will run. By choosing which electrical circuits the inverter will power , the power draw of all electrical loads on each circuit can be added together to arrive at a minimum necessary inverter capacity. Extremely power hungry appliances such as electric water heaters and electric clothing dryers should either be replaced with gas-powered energy efficient models, or be run on non-inverter supplied power. Inverters have two different capacity ratings. One is the inverter's continuous output rating. This is the maximum wattage the inverter can output on a long-term basis. The second rating is the inverter's surge capacity rating. This is the maximum wattage the inverter can output on a momentary basis. Surge capacity will often be 2x or more in excess of the continuous rating. All appliances require more power to start than they use while running. Many appliances, such as refrigerators and water pumps, will require up to three times as much power to start as they require while running. The combined starting power required by all inverter powered appliances must be within the inverter's surge capacity rating. For home or office (permanent) installation, the inverter is connected between the circuit breaker panel and the power source. If the inverter is only running certain loads in the system, those specific circuits will need to be wired to the inverter through a sub-panel. Different wiring layouts are used depending on whether the inverter is in a remote power system, a grid backup system or a grid intertie system. Many inverters include built-in battery charging functions, which is especially useful in grid backup systems. Most modern inverters are configured to automatically switch between functions and electrical sources as needed. In a grid backup system, the inverter will switch to providing battery power within milliseconds of grid power failure. When grid power returns, it will switch to recharging the batteries until the next time they are needed. In a stand-alone alternative energy system, the inverter can start the generator automatically whenever the batteries fall below a set voltage level, and switch back to battery power when they are recharged. In a utility sellback system, the inverter can be set to send power to the grid during specific times of day. The basic idea behind every circuit is to produce oscillations using the given DC and apply these oscillations across the primary of the transformer by amplifying the current. This primary voltage is then stepped up to a higher voltage depending upon the number of turns in primary and secondary coils.

Block Diagram

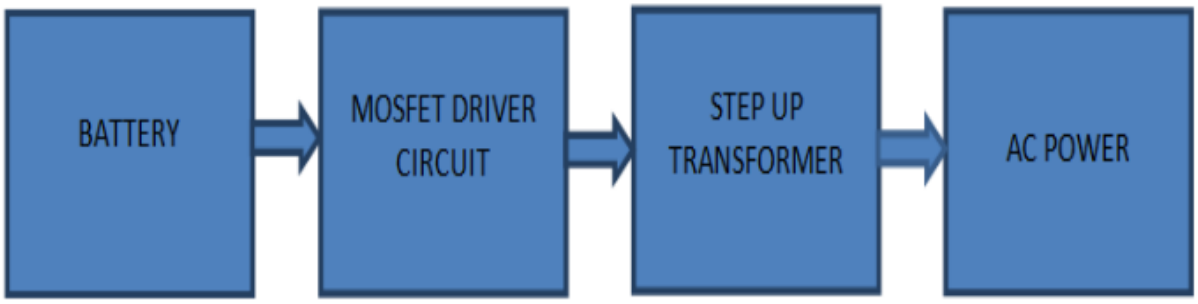

Fig. 2.1 Block Diagram of Inverter

III.CONCLUSION

Advantages and Disadvantages

- **Advantages**

1) Better waveform quality of output voltage (more sinusoidal).
2) Reduced dv/dt, leading to reduction in EMI.
3) Lower voltage rating devices can be used.

- **Disadvantages:**

1) Some configurations need more than one isolated DC supply.

Future Scope

In the future we would like to be able to invert high power(over 100watts).

Eventually being able to power all the workings of a house, in a cost effective manner.

Application

1. This circuit can be used in cars and other vehicles to charge small batteries.
2. This circuit can be used to drive low power ac motors.
3. It can be used in solar power system.

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