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HYBRID INVERTER USING SOLAR CHARGER

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Abstract: **Inverters are widely used in domestic as well as industrial environments to supply as second line of source in case of power cut from electricity grids. However, absent of power from electricity grids the battery of inverter dies out with the used of heavy load applications. This project is designed in such a way that is overcomes this limitation by the used of solar energy. Hybrid inverter using solar charger means battery charged by two sources, first being solar panel and second being main power supply from electricity grids. When solar power supply is not available battery charged by main power supply. This changeover through SPDT relay. Next invert DC to AC by inverter circuit. This circuit provided uninterrupted power supply.**

Keywords: **Meaning of Hybrid Inverter, working principle, component, Calculation of frequency.**

I. INTRODUCTION

Hybrid inverter using solar charger is combination of charger circuit and inverter circuit. In charger circuit, 12v battery charged by two source one being solar power supply and another being main power supply that reason this project is called hybrid. Our main motive is utilized the solar energy because our conventional energy is limited. Efficiency of charging through solar panel depend on weather condition. Usually the solar panel gets four to five hours of bright sunlight in a day. In cloudy or rainy weather condition, it affects the charging process and the battery does not attain full charge. This hybrid inverter using solar charger can overcomes this problem as it can charge the battery using both solar power as well as AC mains supply. If solar power supply not available battery charging by main power supply.

In our daily life most of all electrical equipment are AC (alternating current) loads. For that invert 12v DC which store in battery to upto 230v AC by inverting circuit.

II. SPECIAL FEATURES

- Automatically battery charging by two way (solar power supply/ main power supply). When solar power supply not available then battery charging by main power supply, otherwise battery charged by solar power supply.
- Optimizing solar energy.
- Uninterrupted power supply means when inverter power supply not available for battery dead or any other faults then load automatically connect with main power supply.

III. WORKING PRINCIPLE

Hybrid inverter using solar charger is combination of two circuits first charging circuit and another inverter circuit. In charging circuit ,when output from the solar panel is above 13 volts, the battery charges using the solar power. When the output of solar panel drops below 12 volts, the battery charges through AC mains power supply. This changeover doing through 12 volts SPDT (single pole double throw) relay.

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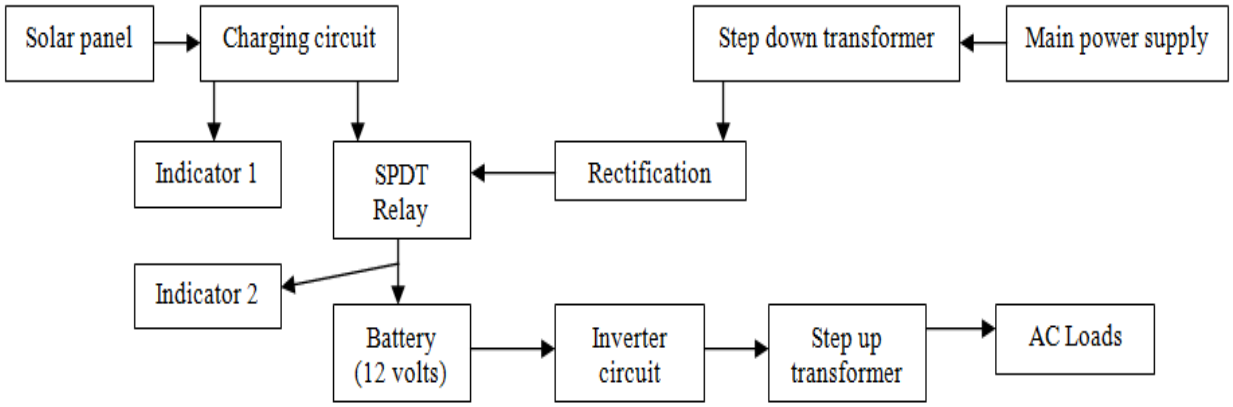

In bright sunlight solar panel output above 12 volts charging circuit give output and charging battery through relay. In charging circuit uses CA3130 op-amp. Battery charging through solar energy which indicate by glowing indicator 1. In cloudy or rainy weather solar panel output below 12 volts charging circuit don't give output and relay de energized then battery charging through main power supply. Battery charging by main power supply by 230v AC step down in 14v AC and rectify. Indicator 2 glowing when battery charging by any source (solar panel or main power supply).

In inverter circuit, the core of the circuit is CD4047 chip; this chip here acts as an astablemultivibrator. This chip generates clock pulses of frequency 50Hz.The frequency of oscillation is given by capacitor C2 and resistor R1. The time period for the signal is given as:

T = 4.71 R1*C2.

Now to get frequency (1/T) of 50Hz, we have to choose proper capacitance and resistance for appropriate frequency. By choosing capacitance as 4.7µf and resistance as 1KΩ it gives a frequency of 47Hz, which would do just fine for simple loads. For getting exact frequency you need to select the resistance accurately.

Clock pulses generated by the chip are taken to N-MOSFET to drive the transformer. The transformer step up the voltage from 12V to 230V. So every time a pulse reaches the MOSFET gate, it will have a 220V half cycle at the output. In the next pulse, the second MOSFET triggers for the second half cycle of 220V. So simultaneously two MOSFETS turning on and off at 50Hz frequency, it will have 50Hz 220V cycle output at the transformer end.

IV. PROBLEMS DESIRED AND SOLVING

For charging circuit, if circuit is not proper functioning, remove the solar panel from connector SP1 and connect a DC variable voltage source. Set some voltage below 12volts and slowly increase it. As the voltage reaches 12 volts and goes beyond, the logic at 6 pin of CA3130 changes from low to high.

For inverting circuit, when output not available check the output of CD4047 multivibrator at pin 10 and 11 compare with pin 7 and 14 respectively. Next check the output value in transformer primary side

V. ADVANTAGE

a) The daily output will be more stable- since the inverter is run by two sources. Both energy source may offset the variation in output mutually. The overall system will be more stable during the day and during the night, since main power supply is not limited by sunlight. Of course, the supply will be higher during the day but is does not drop to zero at night.

b) Providing uninterruptable power supply- when solar power supply not available load connect with main power supply and main power supply not available load connected with inverter power supply.

VI. DISADVATAGE

One of the main problems in Solar Inverter system is inefficient charging of Battery during cloudy weather condition. The high battery requires more than 1 Ampere current for proper charging. To solve this problem, we made a" Hybrid Solar charger" circuit. So the charger has two sides. One side gets power from Solar panel and the other side from a Step-down transformer. If the voltage from Solar panel reduces below 9 volts, the charger shifts to AC mode and battery charges via the current from transformer.

VII. CONCLUSION

Sun, being source of clean, pollution-free energy, we can have many devices powered by solar energy most of the times. Recent technological developments in thin-film photo voltaic (pvs), such as amorphous silicon and hybrid dye sensitized/PV cells are leading to new generations of consumer portable solar arrays. These new arrays are lightweight, durable, flexible, and have been reported to achieve power efficiencies of up to 10%.Yet are able to produce up to 50W of power at 12Volts. These new products make solar power available to hikers, campers, etc., since the arrays can now be easily carried in backpacks. Thus, the market place for portable solar power is beginning to broaden and implementation of this can be done in this solar charger. We get uninterrupted power supply from this project.

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