Automatic inverter

Project Stage-II
Report submitted
in
partial fulfillment of requirement
for the award of degree of

Bachelor of Engineeringin Electrical Engineering

Submitted by

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Under The Guidance Of

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Department of Electrical Engineering

Anjuman-I-Islam's Kalsekar Technical Campus,
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CERTIFICATE

This is to certify that the dissertation titled "**Dual Channel Marx Generator**", which is being submitted herewith for the award of the, **'Bachelor of Engineering'** in **Electrical Engineering** of Anjuman-I-Islam's Kalsekar Technical Campus, New Panvel (M.S., India). This is the result of the original research work and contribution by **'Mr. Baig Tahir, Mr. Godme Adnan, Mr. Shaikh Azim, Mr. Shaikh Arbaz'** under my supervision and guidance. The work embodied in this dissertation has not formed earlier for the basis of award of any degree or compatible certificate or similar title of this for any other diploma/examining body or university to the best of knowledge and belief.

Place-Panvel
Date-

Name of Guide
Prof. Ankur Upadhyay

H.O.D
Prof. Rizwan Faraday

Name of Director
Abdul Razzak Honnutagi

DECLARATION

I hereby declare that I have formed, completed and written the dissertation entitled "**Automatic Invertor**". It has not previously submitted for the basis of the award of any degree or diploma or either similar title of this for any other diploma/examining body/university.

Place- Panvel
Date-

Baig Tahir
Godme Adnan
Shaikh Mohd Azim
Shaikh Arbaz

ACKNOWLEDGEMENT

It is a matter of great pleasure and proud privilege to be able to present this project 'AUTOMATIC INVERTOR".

We would like to express our deep regards and gratitude to the Head of the department
Mr. Rizwan Faraday.

The completion of this project work is a milestone in student life and its execution is inevitable in the hands of a guide. We are highly indebted to our project guide **Prof. Ankur Upadhyay**, for his invaluable guidance and appreciation for giving form and substance to thisreport. It is due to his enduring efforts, patience, and enthusiasm which has given this project a sense of direction and purposefulness to this project and ultimately made it in success.

We would also like to tender our sincere thanks to the staff members for their co- operation.

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Abstract

With the advancement in technology as well as rapid industrial growth has been a great urge in the mind of innovators to design and develop Various machines which try to reduce human efforts to a great extent. In this project we are proposing a model of an automatic inverter, Which will reduce human time to start a conventional inverter when Power shuts off. Here,in this project we are trying to establish a direct link between power supply (Down) and automatic inverter (Start) which will further Lessen human effort.

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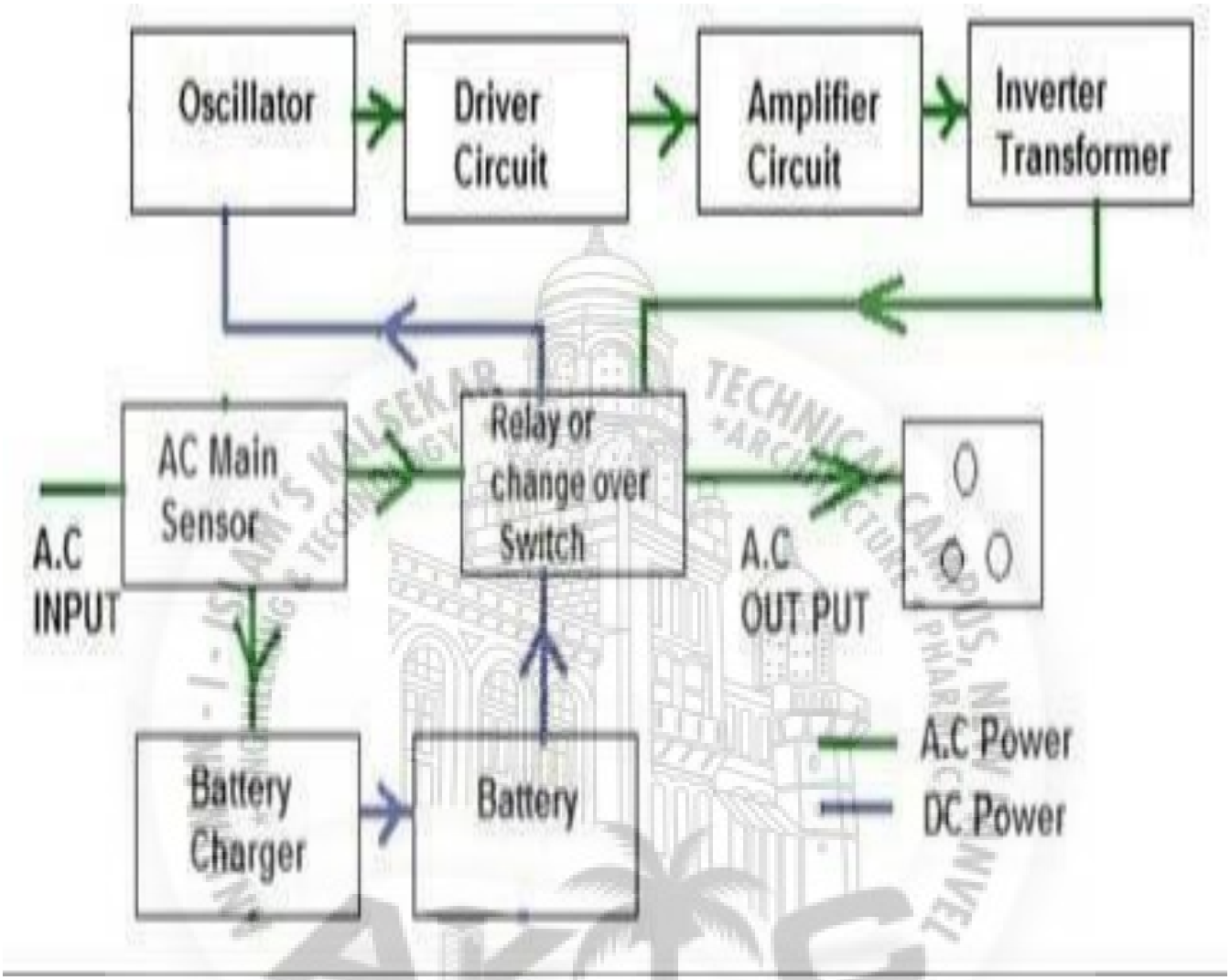
Introduction

Automatic inverter

It is a type of power converter that changes direct current (DC) into Alternate current (AC) Inverters take DC From a Battery(etc) and convert it electronically to AC Power. It does not “create” or “make” electricity,just changes it from one form to another. Dc in is changed To Ac Out. Output is usually 120 or 240 volts at 50-cycle alternating current to match line power. An Inverter is an electrical device that converts direct current (DC) to alternate current (AC).The converted AC can be at any required Voltage and frequency with the use of appropriate switching and control circuits. The Inverter Converts the DC Electricity From sources such as Batteries,Solar panel,or Fuel cells to AC electricity.

Block Diagram



Classification of Inverter

The Inverters can be classified in to following types based on output Waveform and according to charging process:-

✓ According to charging process:-

1. Power inverter – A power inverter converts DC power or direct current to standard AC power or alternating current

2. Solar inverter – A Solar inverter is A type of electrical Inverter that is made to change the direct current electricity from a photovoltaic array into alternating current

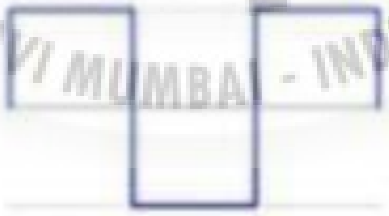
✓ According to wave form

- Square wave Inverter
- Sine wave Inverter
- modified Sine wave Inverter

Square wave Inverter

1) This is one of the simplest waveform an inverter design can produce and is best suited to low-sensitivity application such as lighting and heating

2) Square wave output can produce “humming”when connected to audio equipment and it generally unsuitable for high sensitive electronics



Sine wave Inverter

A power inverter device that produces a multiple steps sinusoidal. AC waveform is referred to as a sine wave inverter. To more clearly distinguish the inverters with outputs of much less distortion than the "modified sine wave" (three-step) inverter designs, the manufacturers often use the phrase pure sine wave inverter. Inverter

The modified sine wave output of such an inverter is the sum of two square waves one of which is phase shifted 90 degrees relative to the other. The result is a three level waveform with equal intervals of zero volts; peak positive volts; zero volts; peak negative volts and then zero volts. This sequence is repeated. The resultant wave very roughly resembles the shape of a sine wave. Most inexpensive consumer power inverters produce a modified sine wave rather than a pure sine wave.

Specification

1.12 volt/2 amp transformer

2.1k resistance

3.TTC 5200 IC

4.1 uf/63 volt capacitor

5.diod 5408

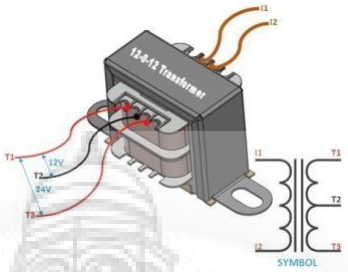
6.2200uf/16 volt capacitor

7.12 volt relay

8.1N 4007 diode

9 battery 12volt/7amp

12 volt/2 amp transformer



12-0-12 5Amp Center Tapped Step Down Transformer is a general purpose chassis mounting mains transformer. Transformer has 230V primary winding and center tapped secondary winding. The transformer has flying colored insulated connecting leads (Approx 100 mm long). The Transformer acts as a step down transformer reducing AC - 230V to AC - 12V.

The Transformer gives outputs of 12V, 12V and 0V. The Transformer's construction is written below with details of Solid Core and Winding.

The transformer is a static electrical device that transfers energy by inductive coupling between its winding circuits. A varying current in the primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic flux through the secondary winding. This varying magnetic flux induces a varying electromotive force (E.M.F) or voltage in the secondary winding. The transformer has cores made of high permeability silicon steel. The steel has a permeability many times that of free space and the core thus serves to greatly reduce the magnetizing current and confine the flux to a path which closely couples the winding.

Specifications of 12-0-12 5 Ampere Center Tapped Transformer:-

- Input Voltage: 230V AC
- Output Voltage: 12V, 12V or 0V
- Output Current: 5 Amp
- Mounting: Vertical mount type
- Winding: Copper

Features of 12-0-12 5 Ampere Center Tapped Transformer:-

- Soft Iron Core.
- 5 Amp Current Drain.
- 100% Copper Winding

Applications of 12-0-12 5 Ampere Center Tapped Transformer:-

- DIY projects Requiring In-Application High current drain.
- On chassis AC/AC converter.
- Designing a battery Charger.

1k resistance

The resistance is obviously the key resistor specification. The value of the resistance is required by the calculations for the particular application in which it is to be used.

It is always best to use preferred values as these are easier to obtain. There are several series of resistor values that are used. These are referred to as the E-series. E3 has three values in a decade, i.e. 1.0, 2.2 and 4.7. Values of 10Ω 22Ω 47Ω are available in the tens of Ohms decade, 100Ω 202Ω 470Ω are available in the hundreds of Ohms decade and so forth.

It is always preferable to use as few values in a circuit design as possible as this reduces the number of different types required for any one design. Other series are also available, E6 with six values in each decade: 1.0, 1.5, 2.2, 3.3, 4.7, 6.8. There are also E12, E24, E48 and E96 etc values available, although their costs can increase marginally and they mean that many more component types are needed in a given design.

Temperature coefficient

In certain circumstances the resistor specification for temperature coefficient is of importance.

The temperature coefficient specification is the parameter that indicates the change in resistance with changing temperature. The resistor specification for the temperature coefficient will be very dependent upon the type of resistor, and it may also vary from one manufacturer to another. IT is therefore important to check the resistor specification for the temperature coefficient to ensure the particular resistor is suitable for the given application.

The temperature coefficient is the change in value of the resistance over a given temperature change. Normally it is expressed in term of parts per million, ppm, per degree Celsius, i.e. ppm/°C.In other words a 100kΩ resistor with temperature coefficient specification of 1000ppm/°C for a 10 °C temperature rise would change would change by 1000 /1 000000 * 100 * 100 000 Ω = &10Ω. This could be quite significant in some circumstances.

Maximum temperature

The resistor specification for temperature needs to be adhered to. Above certain temperatures the resistor may function outside its specified operating parameters. Also under extreme conditions damage could result and the overall circuit may cease to function.

If resistors are operated well above their rated temperatures for extended periods, the value of the resistance can permanently increase, and this could cause the overall circuit to malfunction.

A further reason for operating below the rated temperature is overall reliability. Resistors, and all other components are more likely to fail if operated outside their specified ranges. Often components are operated inside their specification with a good margin to ensure that the reliability is maximised.

Resistor specification for maximum voltage

Resistors are designed to operate up to a certain voltage. Above this voltage there is the possibility of breakdown as a result of the electrical stress applied to the component.

As a result of this resistor datasheets will contain a resistor specification for the maximum voltage that should be applied.

The actual value will depend on a variety of factors including the physical size of the resistor, its structure, the technology used, and a variety of other factors.

Typically it is not good practice to run a resistor close to its rated voltage specification. Often design standards recommend running a resistor at a maximum of 60% or even les of the maximum rated voltage to ensure reliability is maintained.

TTC 5200 IC

TTC5200 pinout

1. Base
2. Collector
3. Emitter

Power Amplifier Applications

- **High collector voltage: VCEO = 230 V (min)**
- **Complementary to TTA1943**
- **Recommended for 100-W high-fidelity audio frequency amplifier output stage.**

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	230	V
Collector-emitter voltage	V_{CEO}	230	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	15	A
Base current	I_B	1.5	A
Collector power dissipation (Tc=25°C)	P_C	150	W
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Note 1 : Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

1 uf/63 volt capacitor

1uF 63V Electrolytic Capacitor is a high quality electrolytic capacitor which offers long life and high reliability. Electrolytic Capacitors are the most commonly used type of capacitor in Electronic Circuits.

Electrolytic Capacitors have 2 Polars - Positive and Negative.

Specifications of 1uF 63V Electrolytic Capacitor:-

Capacitance: 1uF

Voltage: 63V

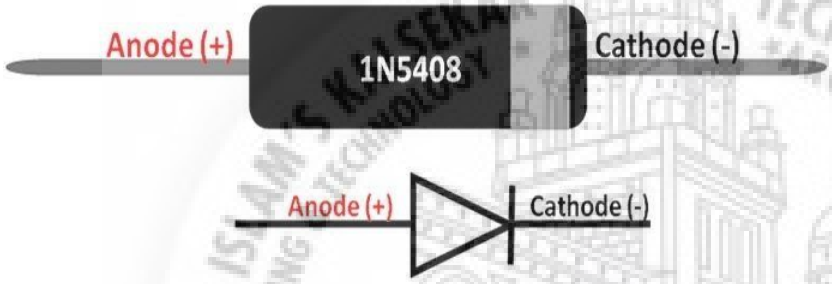
Capacitor Type: Electrolytic

Electrolytic capacitors are polarized components due to their asymmetrical construction and must be operated with a higher voltage (ie, more positive) on the anode than on the cathode at all times. For this reason the anode terminal is marked with a plus sign and the cathode with a minus sign. Applying a reverse polarity voltage, or a voltage exceeding the maximum rated working voltage of as little as 1 or 1.5 volts, can destroy the dielectric and thus the capacitor. The failure of electrolytic capacitors can be hazardous, resulting in an explosion or fire. Bipolar electrolytic capacitors which may be operated with either polarity are also made, using special constructions with two anodes connected in series. A Bipolar electrolytic capacitor can also be made by connecting two normal electrolytic capacitors anode to anode or cathode to cathode.

Diode 5408

Features

- Average forward current is 3A
- Forward Voltage drop is 1V @3A
- Non-repetitive Peak current is 200A
- Peak Reverse current is 10uA.
- Repetitive reverse voltage is 1000V
- Available in DO-201 Package



Description

A diode is a device which allows current flow through only one direction. That is the current should always flow from the Anode to the cathode. The cathode terminal can be identified by using a grey bar as shown in the picture above.

The b is called a power diode because of its **high forward current** and **reverse voltage** with a power dissipation of 6.25W. For **1N5408 Diode**, the maximum current carrying capacity is 3A it can withstand peaks up to 200A. Hence we can use this in circuits that are designed for less than 3A. The reverse current is 10uA which is negligible. These diodes have a slow recovery time so in modern electronics it is being replaced by other advanced diodes.

Applications of Diode

- Can be used to prevent reverse polarity problem
- HV supplies
- Half Wave and Full Wave rectifiers
- Used as a protection device
- Current flow regulators

2200uf/16 volt capacitor

200uF 16V Electrolytic Capacitor is a high quality electrolytic capacitor which offers long life and high reliability. Electrolytic Capacitors are the most commonly used type of capacitors in Electronic Circuits. Electrolytic Capacitors have 2 Polars - Positive and Negative.

Specifications of 2200uF 16V Electrolytic Capacitor:-

Capacitance: 2200uF

Voltage: 16V

Capacitor Type: Electrolytic

12 volt relay

The **12v relay** is an **electromechanical switching device** which controls the AC devices through the DC power.

Features of Relay 12V:

- Max Current: 5A AC/DC (max).
- Max Voltage: 250V AC/30V DC.
- Nominal Voltage: 12V.
- Coil resistance: 270Ω.
- Coil Current: 44.4Ma.
- Operating Voltage: 8.6 to 21.6V.

Applications of Relay 12V:

- DIY projects.
- Electrical/Electronic major or mini projects.

Relays are the most commonly used switching device in electronics. There are two important parameters of relay, first is the Trigger Voltage, this is the voltage required to turn on the relay that is to change the contact from Common → NC to Common → NO. The other parameter is your Load Voltage & Current, this is the amount of voltage or current that the NC, NO or Common terminal of the relay could withstand, in our case for DC it is maximum of 30V and 10A. Make sure the load you are using falls into this range.

1N 4007 diode

Pin No.	Pin Name	Description
1	Anode	Current always Enters through Anode
2	Cathode	Current always Exits through Cathode

Features:

- Average forward current is 1A
- Non-repetitive Peak current is 30A
- Reverse current is 5uA.
- Peak repetitive Reverse voltage is 1000V
- Power dissipation 3W
- Available in DO-41 Package

Battery 12volt/7amp

Once you fully charge your battery ,it can supply a maximum of 12 v and 7 amperes for **about one hour**,after **1 hour** your battery will be completely drained. If you need only 1 amp your fully charged battery can last more than **one hour**(for around **7 hours**).

A twelve-volt **battery** has six single cells in series producing a fully charged output voltage of 12.6 volts. A **battery** cell consists of two lead plates, a positive plate covered with a paste of lead dioxide and a negative made of sponge lead, with an insulating material (separator) in between.

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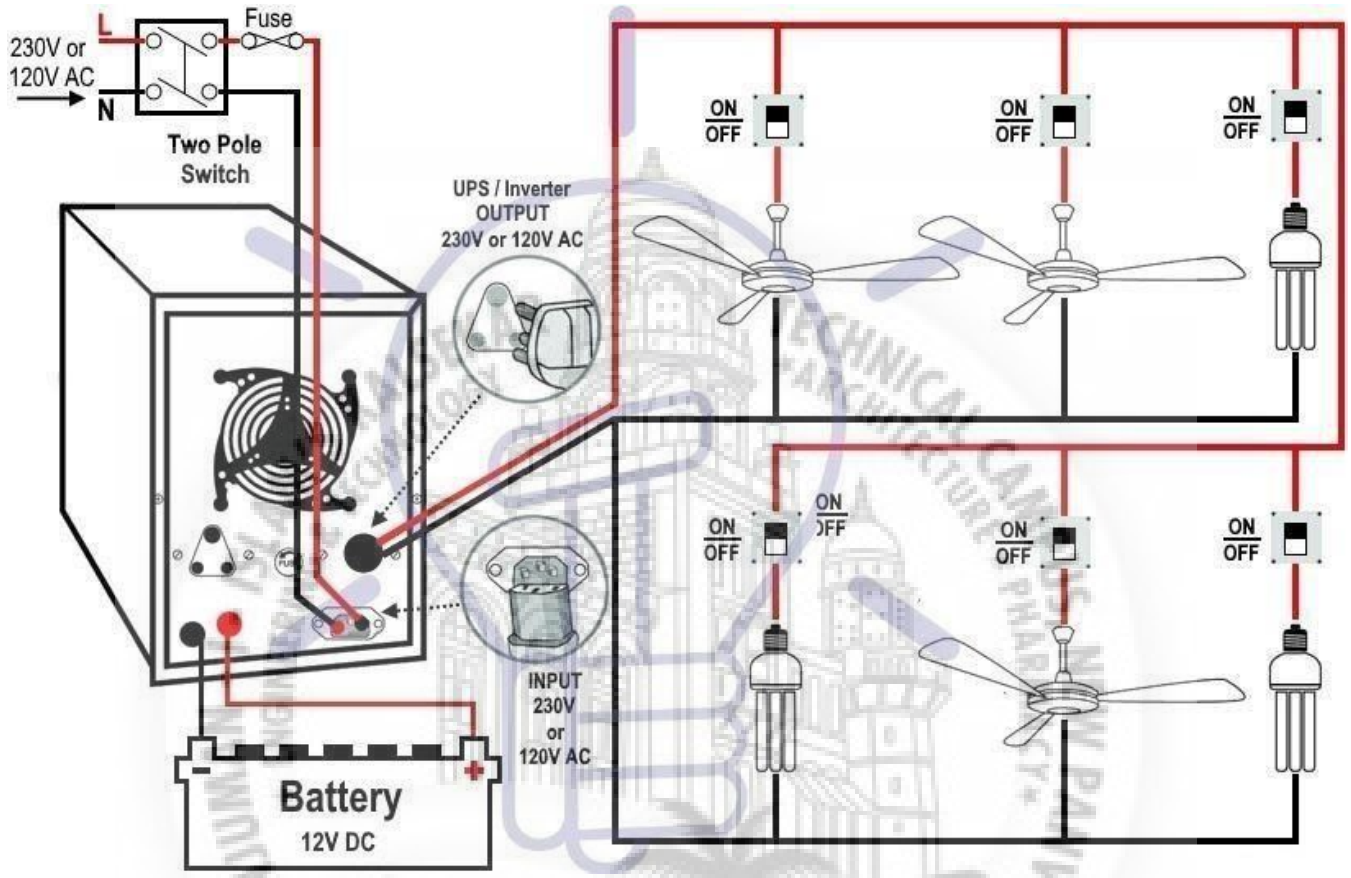
Using a battery with a higher Ah will improve the device's running time on a single charge. This feature is important if the power frequently goes out or is out for long periods of time. However, the higher the Ah is on a battery the bigger (physically) it will be.

Thread: what is the battery life of a 12v 9 ah battery

12V*9ah = 108 watt hours, so 108/20w = **5.4 hours**. You probably want to test it if it's important though, since battery specs can be dependent on certain conditions.

Circuit Diagram



Applications

1. Used in UPS with batteries
2. Used in solar panels
3. Used in HVDC transmission
4. Used in bacup purpose

Benefits or Advantages of Automatic inverter

• The price is very cheap; can work with ordinary light bulbs, fans, etc.(Square Sine wave inverter)

• High quality and inexpensive; using modified square wave; output correction waveform; relatively stable; suitable for ordinary personal users with TV, fan, lamp, computer, hot pot, etc.(Modified Sine Wave Inverters)

• Full power output; protection functions; improved modified sine wave output steady; low-power machines also a built-in fan, you can keep your machine to use for a long time; no similar products on the market; can bring printers, rice cookers, vacuum cleaners, small refrigerators and a lot of small appliances (Sine Wave Inverters)

• Pure sine wave inverter output waveform is good; low distortion; low interference to radio and equipment; low noise. In addition, protective functions; high efficiency; suitable for use in the communications, industrial electricity by enterprises and other users.

Drawbacks or Disadvantages of Automatic Inverter

• Square wave output waveform and not stable enough. (Square

• Lack of power, cannot run the appliances with the same power labeled; it's easy to damage the machine if customers are not familiar with the operation, the user needs to strictly follow the manufacturers' instructions. (Modified Sine wave Inverters)

• Higher prices, the domestic customers know less about it. (Sine wave Inverters)

• line is relatively complex; high technically demanding for maintenance; more expensive.(Pure sine wave inverter)

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Conclusion

By our model project we have conclude that automatic inverter is the need of present and future a past from being automatic it has also many benefits

1. it does not consume much power
2. it has low installation cost
3. easy in operation

when properly designed it serves as a great source of power due to load shedding issues. It can help a lot in rural areas as it is affordable.