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12 to 120 Volt Inverter

SANJAY KUMAR

An inverter is an electrical device that converts direct current (DC) to alternating current (AC); the converted AC can be at any required voltage and frequency with the use of appropriate transformers, switching, and control circuits. The inverter performs the opposite function of a rectifier. This Inverter takes 12 volt dc and steps it up to 120 volt ac. These are generally used in mobile appliances where 120V AC is required. The wattage depends on which transistors you use for Q1 and Q2, as well as the "Amp Rating" of the transformer you use for T1. This inverter can be constructed to supply anywhere from 1 to 1000 (1 KW) watts. Q1 and Q2, as well as T1, determine how much wattage the inverter can supply. With Q1,Q2=2N3055 and T1= 15 A, the inverter can supply about 300 watts. Larger transformers and more powerful transistors can be substituted for T1, Q1 and Q2 for more power. 120V ac power source is built with a simple 120V : 24V center-tapped control transformer and four additional component. This circuit outputs a clean 200-V pk-pk square wave at 60 Hz and can supply up to 20W. The circuit is self-starting and free-running. The circuit will convert 12V DC to 120V AC. This circuit can handle up to 1000Watts.

If Q1 is faster and has a higher gain than Q2 is will turn on first when you apply the input power and will hold Q2 off. The 2N3055's in the parts list can only handle 15 amps each. Load current and transformer magnetizing current then flows in the upper half of the primary winding, and auto transformer action supplies the base drive until the transformer saturates. When that action occurs, Q1 loses its base drive. As it turns off, the transformer voltage reverse, turning Q2 on and repeating the cycle. The output frequency depends on the transformer iron and input voltage but not on the load. The frequency range between 50 to 60 Hz with a 60-Hz transformer and car battery or equivalent source. The output voltage depends on turns ratio and the difference between input voltage and transistor saturation voltage. For higher power, use larger transformers and transistors. You must use tantalum capacitors for C1 and C2 of 68uF. Regular electrolytic will overheat and explode. R1 and R2 are 10Ohm 5 Watt resistor.R3 and R4 are 18Ohm 1 Watt resistor. There are no substitutions.

This circuit can be tricky to get going. Differences in transformers, transistors, parts substitutions or anything else not on this page may cause it to not function.

If you want to make 220/240 VAC instead of 120 VAC, you need a transformer with a 220/240 primary (used as the secondary in this circuit as the transformer is backwards) instead of the 120V unit specified here. The rest of the circuit stays the same. But it takes twice the current at 12V to produce 240V as it does 120V.

This type of inverter normally is used in radios, phonographs, hand tools, shavers and small fluorescent lamps. It will not work with reactive loads (motors) or loads with inrush currents, such as coffee pots, frying pans and heaters.