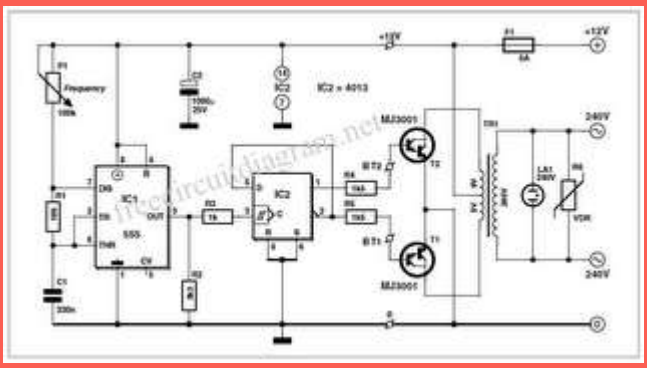
12V Inverter Circuit Using 4013

This circuit is a circuit diagram 12V inverter is very easy to build, cheap components that many electronics hobbyists may even already have. Though it is possible to build a more powerful circuit, the complexity caused by the very heavy currents to be handled on the low-voltage side leads to circuits. The circuit diagram of 12v inverter is easy to follow. A classic 555 timer chip, identified as IC1, is configured as an astable multivibrator at a frequency close to 100 Hz, which can be adjusted accurately by means of potentiometer P1. It is used to drive a D type flip-flop produced using a CMOS type 4013 IC. This produces perfect complementary squarewave signals (in antiphase) on its Q and Q outputs suitable for driving the output power transistors. The following is a schematic drawing:



As the output current available from the CMOS 4013 is very small, Darlington power transistors are used to arrive at the necessary output current. We have chosen MJ3001s from the now defunct Motorola (only as a semi-conductor manufacturer, of course!) which are cheap and readily available, but any equivalent powerDarlington could be used.

These drive a 230 V to 2 × 9 V centre tapped transformer used ‘backwards’ to produce the 230 V output. The presence of the 230 VAC voltage is indicated by a neon light, while a VDR (voltage dependent resistor) type S10K250 or S07K250 clips off the spikes and surges that may appear at the transistor switching points.

12 Inverter Parts List

Resistors

R1 = 18k?
R2 = 3k?3
R3 = 1k?
R4,R5 = 1k?5
R6 = VDR S10K250 (or S07K250)
P1 = 100 k? potentiometer

Capacitors

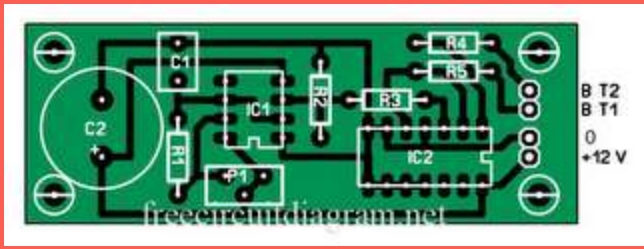
C1 = 330nF
C2 = 1000 ?F 25V

Semiconductor

T1,T2 = MJ3001
IC1 = 555
IC2 = 4013

Miscellaneous

LA1 = neon light 230 V
F1 = fuse, 5A
TR1 = mains transformer, 2×9V 40VA (see text)



The Darlington transistors should be fitted onto a finned anodized aluminium heat-sink using the standard insulating accessories of mica washers and shouldered washers, as their collectors are connected to the metal cans and would otherwise be short-circuited. An output power of 30 VA implies a current consumption of the order of 3 A from the 12 V battery at the ‘primary side’. So the wires connecting the collectors of the MJ3001s [1] T1 and T2 to the transformer primary, the emitters of T1 and T2 to the battery negative terminal, and the battery positive terminal to the transformer primary will need to have a minimum crosssectional area of 2 mm2 so as to minimize voltage drop. The transformer can be any 230 V to 2 × 9 V type, with an E/I iron core or toroidal, rated at around 40 VA.

Properly constructed on the board shown here, the 12 inverter circuit should work at once, the only adjustment being to set the output to a frequency of 50 Hz with P1. The circuit should not be too difficult to adapt to other mains voltages or frequencies, for example 110 V, 115 V or 127 V, 60 Hz. The AC voltage requires a transformer with a different primary voltage (which here becomes the secondary), and the frequency, some adjusting of P1 and possibly minor changes to the values of timing components R1 and C1 on the 555.