

Circle 520

An Inverter For Compact Fluorescent Lamps

R. Anilkumar

No. 510/C, First "C" Cross, Mathikere, Bangalore-560054, Karnataka State, India; phone: +91 80-3313246; e-mail: ranil@isac.ernet.in

The inverter circuit shown produces a low-voltage dc supply suitable for use with compact fluorescent lamps (CFLs). The main feature of this inverter is the inclusion of a pre-heating circuit, with high-voltage ignition and steady-state current-limiting. The incorporation of a pre-heating feature helps to prevent blackening of the bulb, while improving both the efficiency and the voltage and current wave shapes across the bulb. This, in turn, lengthens bulb life. The circuit is applicable to solar-powered lanterns, solar street-lighting systems, automobile interior lighting, and emergency lighting systems.

The inverter configuration is a self-oscillating push-pull arrangement. Transistor Q3, along with the relay (RLY), resistor R6, and capacitor C4, forms the preheating circuit with a preheat time of approximately 400 ms. The relay opens and C3 is connected across the bulb, which improves the shape of the voltage and current waveforms and the bulb's power factor. Diode D1 and a fuse

have been included to provide reverse-polarity protection.

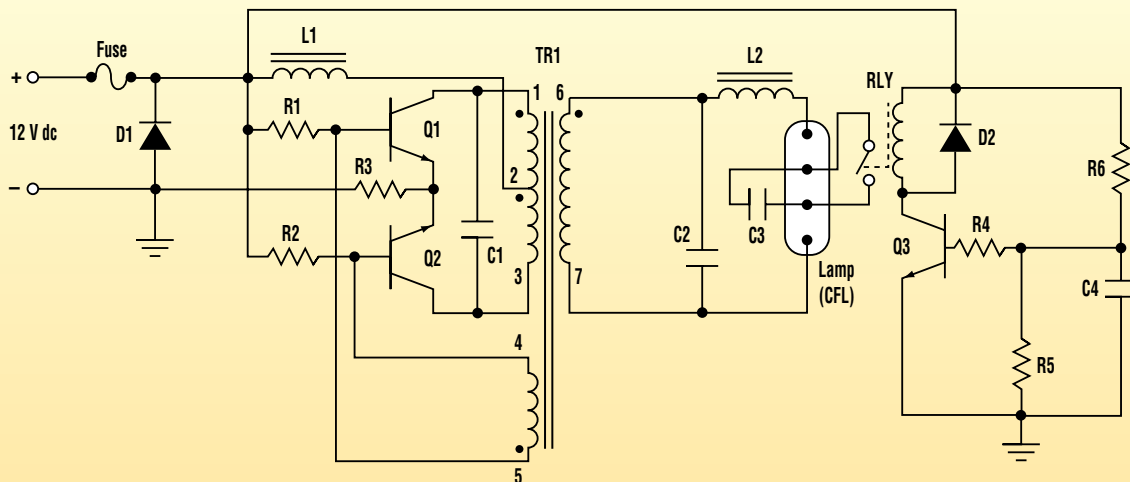
This circuit has been built and tested using a 12-V dc input, resulting in a light output of 370 lumens when used with a 4-pin, 7-W compact fluorescent lamp. The circuit's efficiency was measured at better than 75% with a switching frequency of approximately 25 kHz.

COMPONENT LIST

Reference	Part No.	Comments
D1, D2	1N4001	
Q1, Q2	MJE3055	TO-220 w/heatsink
Q3	BC107	
C1	0.22 μ F @ 1500 V	Boxcap
C2	2.2 nF @1500 V	Boxcap
C3	1 nF @ 1500 V	Boxcap
RLY	12 V normally open	
L1	5 mm ferrite core	25 mm long; 25SWG-40 turns
L2	8.5 mH, core EE 25/13/7	27SWG-215 turns
TR1*	Core EE 25/13/7	(See details below)
Fuse	20 mm, 1 A	
Lamp	Compact fluorescent lamp	4 pin, 7 W
R1, R2	820 Ω , 1/4 W	
R3	0.1 Ω , 1 W	
R4	10 Ω , 1/4 W	
R5, R6	1.2k, 1/4 W	

*TRANSFORMER DETAILS

Pin No.	Pin No.	Turns	Wire	L
1	2	12T	25SWG	28 μ H
2	3	12T	25SWG	28 μ H
5	4	6T	33SWG	8 μ H
6	7	300T	33SWG	17 mH



The addition of a preheating feature helps to prevent blackening of the fluorescent bulb. It also improves both the efficiency and the wave shape across the bulb. Improvements in the voltage and current waveforms enhance the bulb's power factor, resulting in longer bulb life.