CONSTRUCTION AND APPLICATION OF A DIMMER CIRCUIT TO CONTROL THE ELECTRIC VOLTAGE FLOW

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1. INTRODUCTION

With the availability of semiconductor devices in the family of thyristors capable of controlling high powers, there are a lot of power controls on the market today. Used to control lamp brightness, engine speed and power showers. And these devices are simple to understand, assemble and install.

The older dimmers basically use an Ohm law in their operation, using a potentiometer, also known as the adjustable resistor. The resistors are elements consisting of a material that is not electrically driven. As its name suggests, this element has a resistance to the movement of electric charges. Potentiometers are variable resistors are obtained from an amount of resistance to a transfer of electric charges, are many resistors or few, they have in their constitution a fixed contact arm and a mobile. The energy passing through this resistive material in the form of heat is dissipated. The energy consumption that the resistor causes the voltage to drop is like the low voltage that passes through a lamp in a dim light.

Therefore, this paper presents how to construct a circuit in a simple and efficient way for several domestic and engineering applications.

2. METHODOLOGY

A phenolite plate with an area of 16 cm² was used for the electric voltage flow control circuit. It was used overhead projector pen to make the schematic diagram manually, as shown in Fig. (1). Iron perchloride was used as acid to corrode only the part that was not protected by the paint. Then, using a soldering iron, the soldering of the electronic components in the phenolite plate was made.

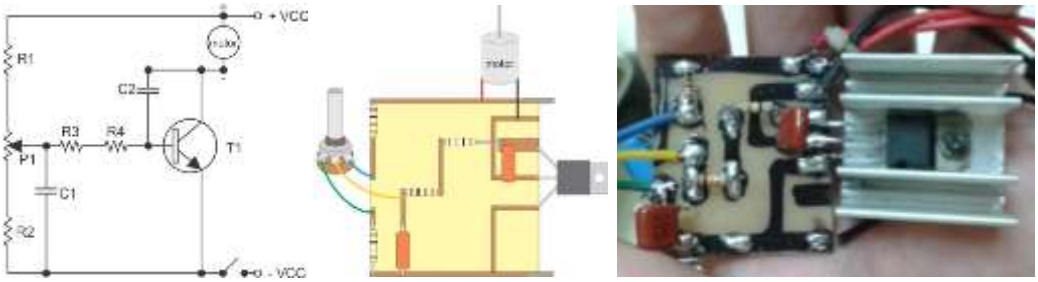

Figure 1. Electronic diagram of the voltage flow control circuit.

The circuit was constituted containing a resistor R1 of 10 kΩ, with ± 5% of tolerance; By a potentiometer P1 of 50 kΩ; By the resistor R2 of 390 Ω of ± 5% tolerance. Two capacitors, C1 and C2, both of 68 nF were also used. The resistors R3 of 10 kΩ and R4 of 390 Ω, both with ± 5% of tolerance, that feed the control base of the power transistor of type NPN, T1, passing the voltage and current properly controlled for the load, having the C2, also 68 nF, as the second stabilization link. The circuit is powered by a 12 V source adapted with a transformer and a 110 V and 220 V voltage switch. For testing the test feature was a 12 V DC micromotor extracted from a micro system for audio playback.

Figure 2. Micromotor used for testing.

3. RESULTS

The electronic components used in this work are accessible on the market and simple identification, such as the colors of the resistors. The potentiometer used is responsible for changing the voltage flow by changing the speed of rotation of the motor. The use of C1, which stabilizes the current and maintains the voltage stable and avoids possible oscillations. A digital tachometer with sensor was used to cap the six-speed micromotor. Table 1 shows the velocities obtained in rpm as a function of voltage, varying from 1.12 to 11.93 volts.

Table 1. Measures of speeds (rpm) in tachometer with sensor

Measures of voltage and speeds				
Voltage (V)	1st measure (rpm)	2nd measure (rpm)	3rd measure (rpm)	Average (rpm)
0	0	0	0	0
1,12	1065	1071	1067	1067,67
3,09	1456	1453	1458	1455,67
5,10	3267	3260	3267	3264,67
8,07	5007	5011	5006	5008,00
10,11	6787	6789	6787	6787,67
11,93	6989	6987	6989	6988,33

4. CONCLUSION

From the tab data (1), it was possible to plot the rotation plot as a function of the voltage in which the visual perception is that the system has a linear behavior, except for the lower voltages and as higher for the limits of micromotor operation. All equipment is responsible for the operation of the equipment (power supply transformer, electronic components, phenolite board, power cable, screws, adapted substrate, circuit connection cables, potentiometer and micromotor, teflon pan and protection box). easy access. The exact speeds of the rotation speeds of the substrate are to be obtained as a function of the voltage and position of the potentiometer.

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