

DIY Kit 12 - MUSIC TO LIGHT MODULATOR

INTRODUCTION

A music-to-light modulator is a circuit which controls the intensity of one or more lights in response to an audio input. The problem in older circuits is that there was a direct electrical connection between the lights using mains voltages (110 to 250V AC) and the amplifier circuit low 9 to 12 voltage levels. Any fault in the high voltage circuit could completely destroy the low voltage section (and give a nasty shock to anyone holding it.)

This potential problem has been overcome using the optocoupler. There is no electrical link between the two parts of the circuit. This kit introduces the opto-triac (3021) which is a further development of the optocoupler. An audio input controls a LED. The light from the LED drives a phototriggered form of a silicon controlled rectifier (SCR) or triac. The LED and the triac are mounted within a single package. This triac is used as a driver to control a separate, slave triac capable of handling larger currents.

The kit is constructed on a single-sided printed circuit board (PCB). Protel Autotrax and Schematic were used to design the board.

WARNING: This kit uses mains supply. Treat it like crossing a busy road - with great care. It can kill you. Check everything you do. Ask someone to check your work if you are unsure.

ASSEMBLY INSTRUCTIONS

Assembly is straight forward. Start with the lowest height components first. Leave the triac and heatsink until last. Lightly secure the triac to the heatsink using the screw and nut then fit the whole assembly to the PCB. Once soldered into position tighten the screw and nut.

Note: The value of resistor R3 depends on the mains supply to be used. For 110V systems use the 2K7 resistor. For 220-240V systems use the 5K6 resistor.

It is suggested that in your first experiments with the kit you screw it onto a piece of wood (using a plastic spacer to keep it just off the surface) so that you do not grab it when it is connected to the mains. This will also stop it moving by accident and perhaps shorting out on some conducting surface (or dropping into your lap!)

Remember that the heatsink is at mains potential!

Terminal blocks are provided to attach the mains supply and the load to be modulated. Check that you put the 3021 in the correct way around.

CIRCUIT DESCRIPTION

The diagram shows how simple the circuit is. The audio signal is applied across the LED of the opto-triac. The potentiometer adjusts the input sensitivity while the resistor is used as protection from high signal peaks. The LED emits infra-red light in response to the input signal.

The triac driver inside the 3021 package is sensitive to this IR light which activates a slave triac and load.

SPECIFICATIONS

Input trigger voltage	2.3 - 2.5V (min)
AC input voltage.....	110V - 250V AC
Load (max)	500W @ 250V
	220W @ 110V

WHAT TO DO IF IT DOES NOT WORK

First disconnect the board from the mains supply. Unplug it completely.

Poor soldering is the most likely reason for the problem. Check all solder joints carefully under a good light. Next check that all components are in their correct position on the PCB. Is the optocoupler chip in the correct way? Is the potentiometer wound around too far?

Reconnect the AC mains supply. Carefully use a voltmeter, follow around the tracks to check the potential differences at various parts of the circuit. Maybe the input signal is not enough to drive the optocoupler. It needs 1.2V and a current of 5mA (approx). A small tape recorder or radio will need an amplifier stage to amplify the signal before supplying it to the audio input.

WHAT TO LEARN FROM THIS KIT

The Kit introduces the optocoupler-triac and shows how to get signal connection but electrical isolation between a low voltage input audio signal and a high voltage mains supply.

PARTS LIST - KIT 12

Resistors

1K potentiometer	R1	1
PCB mounting		
330 1/2W carbon	R2	1
2K7 1W carbon.....	R3	1
5K6 1W carbon.....	R3	1

Semiconductors

MOC3021	IC1	1
Opto-triac		
2N6075 or BT136.....	Q1	1
Triac		

Miscellaneous

2.5mm audio jack.....	X1	1
2 way screw terminal	X2,3	2
connectors		
IC socket, 6 pin, for IC1		1
Heatsink, vertical mounting		1
3mm screw and nut		1
PCB, K12.....		1

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