

## *QUASAR KIT No 1223*

### **5 CHANNEL CHASER WITH TRIAC OUTPUTS**

#### **DESCRIPTION**

A small but very impressive light effect, with many decorative applications such as Christmas lights, shop windows, parties, modelling and many other uses.

In the PCB, the well-known micro controller PIC12F675 drives five channels with an output to light emission diodes (LED's) and also to TRIAC's, through which standard lamps up to 500W per channel can be controlled. There are several programs that can create different lighting combinations such as sequential ON/OFF, front – back, one by one, etc. The selection of the desired program is done manually, with a small push button switch. The transformer regulator and filtering stage are on the board, together with the TRIAC's that drive the lamps.

#### **TECHNICAL CHARACTERISTICS**

Operation voltage :	230VAC
Power consumption :	50 mA (with all the LEDs on)
Power consumption with lamps:	2500W max
Combinations :	8

#### **OPERATION**

The use of the 12F675 micro controller -which contains only 8 pins- makes the circuit very simple. The pins 1(+) and 8(-) are used for its power supply. Pin 4 is programmed as an output, accepting commands from a button switch. The resistor R11 maintains the input at a low voltage until the switch is pushed. Every time the switch is pushed, the program advances to the next routine, changing the rhythm and the way the TRIAC are excited. The other five pins are used as outputs, connected to the five resistors (R6...R10) in order to curb the current in the diodes that are embedded in the optocoupler, protecting the transistors in the outputs of the PIC from any damage.

At the anodes of the TRIAC and the points 3 and 4, 5 and 6, 7 and 8, 9 and 10, 11 and 12, we can connect lamps up to 500W per channel.

The resistors R1...R5 drive the control signals from the output of the optocouplers to the ports of the TRIACs.

The circuit contains the optocouplers OC1...OC5 for better protection from power surges.

The resistors R12...R16 drive the LED's L1...L5 via the inverters in the IC3, so that we can monitor the outputs.

The board also contains the power supply circuit, comprised of the mains transformer T1, the rectifier bridge D1...D4, the filtering circuit C1, C2, C3 and C4, and the regulator IC2 .

## CONSTRUCTION

The construction of the circuit is very simple. First solder the smaller components, and next the larger ones. Start by placing the resistors and then the diodes, paying attention to their polarity. Next, solder the sockets of the integrated circuits, watching that the notch that signifies pin 1 corresponds to the drawing plan of the board. After that, solder the ceramic and then the polyester capacitors, and then the electrolytic capacitors - and pay attention to their polarity. The positive pin is longer than the negative one, and also the negative pin has a sign on capacitor's body. Now solder the pins, the 7805 regulator and the LEDs, watching again their correct polarity.

Finally, solder the optocouplers so that their polarity matches the polarity of the board, the TRIAC's after screwing them on their heatsinks, the fuse case and the transformer.

In order to avoid the continuous operation of the circuit after placing it in the box, it is a good idea to add a mains switch so that you can open and close the circuit without needing to disconnect it from the mains.

After thoroughly checking all the components and especially those with a polarity, place carefully the micro controller and the CD4050 on their sockets by paying attention so that the notch that indicates pin 1 will exactly correspond with the one which is printed on the board, because if you place them the other way around the circuit will not operate and it may also be damaged.

Now you can power the circuit (VERY CAREFULLY), and immediately you will see the LEDs blinking successively. Press the button, and see the change of the sequence of the lighted LEDs. There are 8 programs in the micro controller. The device is working properly, and now you can place it in a box of your choice.

If you CAREFULLY connect a 230V lamp to the points 3-4 or 5-6, or 7-8 or 9-10 or 11-12, it will blink according to the rhythm of the program.

***ATTENTION: The voltage of 230 V is dangerous. Do not touch the circuit when it is under power.***

## IF IT DOESN'T WORK

Have you soldered correctly all the components?

Turn the board on its other side and check all the solderings, one by one. If anyone of them seems to be cold, then reheat it with the soldering iron. The cold soldering does not shine, it seems dull, has knobs and causes lots of problems to the circuit.

Next, check carefully the position and the direction of every component by comparing it with the drawing plan, the table of the components and the theoretical circuit. Also, check if you have placed a component in the place of another.

During the repairs remove the micro controller from its base, check with the help of a voltammeter the voltage between the points 1(+) and 8(-). If it is 5V you must close the power supply, place it again on its base, and try again.

Are you sure that during the soldering you didn't short-circuit two adjacent areas of the printed circuit? Therefore, it is better to check very carefully all the solderings and the adjacent areas of the board. You could help this process by lighting the board from below, and carefully inspecting all the pads.

If you go through all the above possibilities, then the circuit will certainly work properly. In any case, if you have any problem with the device you can contact the Quasar Electronics service department, daily (09:00 - 16.00) Monday to Friday.

### THE COMPONENTS

R1... R5	150Ω – 1/2W – 5%	(brown, green, brown)
R6...R10	220Ω– 1/4W – 5%	(red, red, brown)
R11	10K– 1/4W – 5%	(brown, black, orange)
R12...R16	470Ω – 1/4W – 5%	(yellow, purple, brown)
C1	100μF /16Volt	electrolytic capacitor
C2	100nF (0.1μF or 104)	polyester capacitor
C3	10μF /16Volt	electrolytic capacitor
C4	100nF (0.1μF or 104)	polyester capacitor
C5	100nF (0.1μF or 104)	multilayer ceramic capacitor
D1...D4	1N4001...7	general purpose diodes
TRI1...TRI5	BT136	TRIAC 600V / 4A
IC1	PIC12F675	programmed controller
IC2	7805	regulator
IC3	CD4050	6 buffers
OC1...OC5	MOC3010	optocouplers
L1...L5	LED	red light emitting diode
S1	Button	push – on
T1	230V – 12V /100mA	transformer
F1	Fuse 5-10 A	(depending on the load)

Various: Quasar kit No 1223 PCB, solder wire, 12 pins, 8DIL socket, 16DIL socket, fuse holder, 5 small heatsinks of «Π» type for the TRIAC's, 5 nuts and bolts,

