

QUASAR KIT No. 1037

DISCO STROBE LIGHT

General Description One of the most impressive lighting effects in use is the stroboscopic xenon light. As it flashes rapidly it creates the illusion of interrupted motion, a very interesting effect especially when there are people dancing or making gestures. It is a very easy project to build, relatively inexpensive, compact and yet powerful and leaves nothing to be desired when it is compared with commercially available strobe lights, at a much higher price.

Technical Specifications - Characteristics

Working voltage: 220VAC

Max. current: 100 mA

How it Works

The operation of the circuit is very simple. First of all there is a power supply section which consists of a simple half wave rectifier that is directly connected to the mains. The output of the power supply is applied across the xenon lamp. The DC voltage from the power supply is not high enough to trigger a gas discharge in the lamp. There is another circuit that provides the necessary high voltage which triggers the gas discharge. This circuit consists of a potential divider the mid point of which is the pointer of the potentiometer P1. The voltage from the divider starts charging the capacitor C1 and when the voltage across it reaches a certain level the little neon lamp L becomes conductive, the voltage across R4 rises and the thyristor is triggered. As soon as this happens the capacitor is discharged through the primary of T1 which is a trigger transformer for the xenon lamp. The discharge in the primary of T1 produces a high voltage pulse in its secondary (typically 5-6 kV) which is taken to a special external electrode of L2. When this high voltage pulse appears on the surface of the xenon lamp the gas in it becomes ionised and the discharge occurs. The discharge is very short and leaves the filter capacitor of the power supply C2 completely drained. C1 has also been completely discharged and the circuit stays inactive till the next peak of the power supply which will charge the filter capacitor and will start charging C1. However C1 may take more than a period to reach the necessary voltage as this part of the circuit behaves as a simple timer the delay of which depends upon the setting of P1. When C1 charges again the cycle is repeated. The circuit can be adjusted to flash from about 60 times a second down to once every several seconds.

Construction

First of all let us consider a few basics in building electronic circuits on a printed circuit board. The board is made of a thin insulating material clad with a thin layer of conductive copper that is shaped in such a way as to form the necessary conductors between the various components of the circuit. The use of a properly designed printed circuit board is very desirable as it speeds construction up considerably and reduces the possibility of making errors. Quasar Kit boards also come pre-drilled and with the outline of the components and their identification printed on the component side to make construction

easier. To protect the board during storage from oxidation and assure it gets to you in perfect condition the copper is tinned during manufacturing and covered with a special varnish that protects it from getting oxidised and also makes soldering easier.

Soldering the components to the board is the only way to build your circuit and from the way you do it depends greatly your success or failure. This work is not very difficult and if you stick to a few rules you should have no problems. The soldering iron that you use must be light and its power should not exceed the 25 Watts. The tip should be fine and must be kept clean at all times. For this purpose come very handy specially made sponges that are kept wet and from time to time you can wipe the hot tip on them to remove all the residues that tend to accumulate on it.

DO NOT file or sandpaper a dirty or worn out tip. If the tip cannot be cleaned, replace it.

There are many different types of solder in the market and you should choose a good quality one that contains the necessary flux in its core, to assure a perfect joint every time.

DO NOT use soldering flux apart from that which is already included in your solder. Too much flux can cause many problems and is one of the main causes of circuit malfunction.

If nevertheless you have to use extra flux, as it is the case when you have to tin copper wires, clean it very thoroughly after you finish your work.

In order to solder a component correctly you should do the following:

- Clean the component leads with a small piece of emery paper.
- Bend them at the correct distance from the component's body and insert the component in its place on the board.
- You may find sometimes a component with heavier gauge leads than usual, that are too thick to enter in the holes of the p.c. board. In this case use a mini drill to enlarge the holes slightly. Do not make the holes too large as this is going to make soldering difficult afterwards.
- Take the hot iron and place its tip on the component lead while holding the end of the solder wire at the point where the lead emerges from the board. The iron tip must touch the lead slightly above the p.c. board.
- When the solder starts to melt and flow wait till it covers evenly the area around the hole and the flux boils and gets out from underneath the solder. The whole operation should not take more than 5 seconds. Remove the iron and allow the solder to cool naturally without blowing on it or moving the component. If everything was done properly the surface of the joint must have a bright metallic finish and its edges should be smoothly ended on the component lead and the board track. If the solder looks dull, cracked, or has the shape of a blob then you have made a dry joint and you should remove the solder (with a pump, or a solder wick) and redo it.
- Take care not to overheat the tracks as it is very easy to lift them from the board and break them.
- When you are soldering a sensitive component it is good practice to hold the lead from the component side of the board with a pair of long-nose pliers to divert any heat that could possibly damage the component.
- Make sure that you do not use more solder than it is necessary as you are running the risk of short-circuiting adjacent tracks on the board, especially if they are very close together.
- When you finish your work cut off the excess of the component leads and clean the board thoroughly with a suitable solvent to remove all flux residues that still remain on it.

As you see this circuit is operated directly from the mains and there are quite high voltages present in most of its parts. This calls for extra care during construction if you want to avoid serious problems in operation. The components are very few and the p.c. board is quite large making construction easier. Solder the pins first, and then the resistors. R1 should be soldered slightly separated from the surface of the board to allow air to circulate

around it as it gets quite hot during operation especially at high flashing rates. Solder the electrolytic capacitor in its place making sure that it is inserted the right way round and then solder C1, the diode and the thyristor trying to avoid heating them excessively and following the diagrams on the board for their orientation. Solder carefully the little neon lamp and the trigger transformer. The trigger transformer has a little white mark next to one of its leads. This lead is connected to the thyristor the one next to it is the common point between the two windings and should be connected to the earth and the third lead which is alone on the other side of the cylinder must go to point 4 of the p.c. board (trigger electrode of the lamp).

Mount the potentiometer on the p.c. board and using short leads or preferably the lamps own, connect the xenon lamp to the circuit. Make a very careful inspection and if everything seems to be all right you can connect the strobe light to the mains. Use a mains lead with a proper plug in one end and solder it across the input of the circuit at points 1 and 2. Turn the potentiometer somewhere in the middle of its travel, put the board on a non conductive surface and connect the circuit to the mains. The lamp should start flashing. The rate as we have already explained depends on the setting of the potentiometer. As long as the circuit is connected to the mains

DO NOT TOUCH ANY PART OF IT. Mains voltages are very dangerous and the circuit during its operation is at mains potential.

To increase the efficiency of the lamp you can use a reflector from a car light, a torch or any other reflector that can accommodate the lamp in its focal point.

Avoid looking directly at the xenon lamp as it can cause retinal damage because of the very high intensity of the flash and also avoid using the device at flashing rates of about nine flashes per second which can cause epileptic persons to suffer convulsive seizures. People prone to grand mall, petite mall, or psychomotor attacks should be kept away from areas where strobe lights are used. If during the operation of the flasher you see that a person is affected turn the strobe light off **IMMEDIATELY**.

Adjustments

This kit does not need any adjustments, if you follow the building instructions.

Warning

Quasar kits are sold as stand alone training kits.

If they are used as part of a larger assembly and any damage is caused, our company bears no responsibility.

While using electrical parts, handle power supply and equipment with great care, following safety standards as described by international specs and regulations.

CAUTION

This circuit works from the mains and there are 220 VAC pre sent in some of its parts.

Voltages above 50 V are **DANGEROUS** and could even be **LETHAL**.

In order to avoid accidents that could be fatal to you or members of your family please observe the following rules:

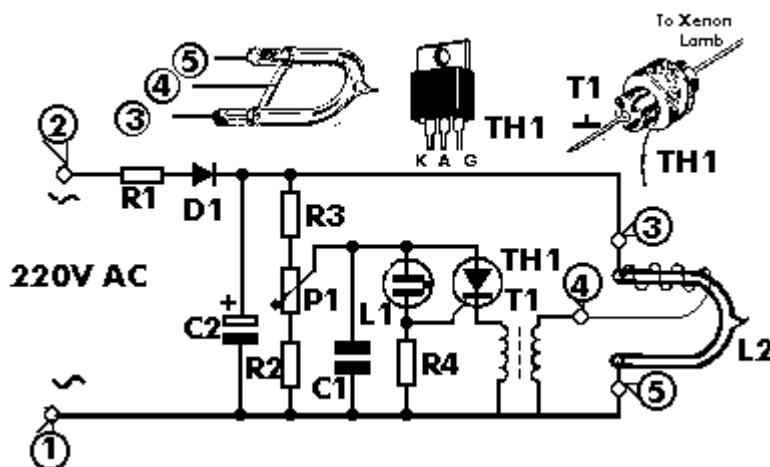
- **DO NOT** work if you are tired or in a hurry, double check everything before connecting your circuit to the mains and be ready to disconnect it if something looks wrong.
- **DO NOT** touch any part of the circuit when it is under power.
- **DO NOT** leave mains leads exposed. All mains leads should be well insulated.

- DO NOT change the fuses with others of higher rating or replace them with wire or aluminium foil.
 - DO NOT work with wet hands.
 - If you are wearing a chain, necklace or anything that may be hanging and touch an exposed part of the circuit, BE CAREFUL.
 - ALWAYS USE a proper mains lead with the correct plug and earth your circuit properly.
 - If the case of your project is made of metal make sure that it is properly earthed.
 - If it is possible use a mains transformer with a 1:1 ratio to isolate your circuit from the mains.
 - When you are testing a circuit that works off the mains wear shoes with rubber soles, stand on dry non conductive floor and keep one hand in your pocket or behind your back.
- If you take all the above precautions you are reducing the risks you are taking to a minimum and this way you are protecting yourself and those around you.
- A carefully built and well insulated device does not constitute any danger for its user.
- BEWARE: ELECTRICITY CAN KILL IF YOU ARE NOT CAREFUL.**
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If it does not work

- Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.
 - Check again all the external connections to and from the circuit to see if there is a mistake there.
 - See that there are no components missing or inserted in the wrong places.
 - Make sure that all the polarised components have been soldered the right way round.
 - Make sure that the mains supply has the correct voltage (220 V).
 - Check your project for faulty or damaged components.
- If your project still fails to work, please contact us for information about our Get-You-Going service.
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Schematic Diagram



Parts List

All components including printed circuit board, assembly instructions including schematics and detailed parts list are supplied when you purchase the kit.

Ordering

For pricing info and online ordering please visit:

<http://www.quasarelectronics.com/1037.htm>

For further info please contact us by e-mail:

[mailto: sales@QuasarElectronics.com](mailto:sales@QuasarElectronics.com)

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