

QUASAR ELECTRONICS KIT No. 1088

«KITT» SCANNER

General Description

This fantastic effect from Quasar Electronics Kit will make your car look like the fantastic computerised car in the «Knight Rider» TV series, the famous «KITT». It is a light display which imitates the light dot in «KITT's» hood, which is supposed to be the scanner of the on board computer. The speed of the effect is variable to suit your particular tastes and to make it look more realistic.

Technical Specifications - Characteristics

Working voltage: 12 V DC
Current: 500 mA

How it Works

The circuit consists of an oscillator the frequency of which can be varied by means of the trimmer R3 and a counter which counts the pulses produced by the oscillator and its output drives an array of six transistors which control in turn a series of LED's for a small display in the car, and a series of 12 V lamps for the scanner display which is fitted in the radiator's grille or in the rear windscreen of the car. The counter is connected in such a way as to light one lamp for each number it receives. When the lamp in one of the extremes gets lit the circuit is designed in such a way as to reverse the direction of the counting. This gives the impression that the light makes consecutive sweeps, reversing the direction of its movement every time it completes its travel in one direction. The scanner works with 12 VDC of the car's electric circuit and the lamps used for the display that imitates the Knight Rider's mask are 5 W each.

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 Electronics 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 leave 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 may still remain on it.

The construction of the circuit should present no difficulties even to the most inexperienced beginners. The components are few and everything is clearly marked on the component side of the p.c. board. Solder first of all the pins and the IC sockets, continue with the resistors and the capacitors and finally solder in place very carefully the LED's, the diode and the transistors. The capacitors used in this circuit are electrolytic and must be soldered the right way round, and the semiconductors should not be overheated during soldering.

Inspect your work up to this point and if you see no mistakes, clean the p.c. board with a solvent to remove all the traces of soldering flux that may have remained on the board, and insert the integrated circuits in their sockets. The NE555 is an analogue device and

does not require any special care when it is handled. The CD4017 is a CMOS circuit and it can be damaged very easily by static electricity. It should be handled with care and it is advisable not to touch its pins with your hands. Try to keep the p.c. board and everything you touch while you are handling the IC earthen to discharge all unwanted static. Leave the p.c. board alone for the time being and start assembling the part of the circuit that concerns the lamps. In the moulded plastic mask supplied with the kit you will find a long piece of board covered with copper on one side. You will also find five much smaller pieces of board which you will solder perpendicularly to the surface of the long piece in order to divide it in six equal parts. Solder then one lamp in each space as it is shown in the diagram and make the connections with the flat ribbon wire as it is also shown. The copper surface of the board will be the common line for all the lamps which must be connected with the positive rail of the power supply at point 2 of the board. The remaining six wires of the ribbon are soldered one to each lamp and the other side to its corresponding pin from 4 to 9 on the p.c. board. The whole assembly with the lamps will be inserted in the specially designed for this purpose translucent mask, and will be closed from behind with the lid provided for extra protection. Your scanner is ready and you can connect it to the battery of your car connecting point 1 of the board to the positive pole and point 3 to the negative. If you have made everything right the lamps should start lighting in sequence reversing their direction after each full sweep across the display's width. The LED's duplicate the effect in a smaller scale and should be conveniently placed in the interior of the car to give an indication of the circuits operation.

Adjustments

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

Warning

Quasar Electronics 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.

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 the supply has the correct voltage and is connected the right way round to your circuit.

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