

QUASAR ELECTRONICS KIT No. 1082 CAR VOLTMETER WITH LED's

General Description

This is a very useful voltmeter that will give you a continuous indication of the charge state of the battery in your car. This way if something is going wrong you will get a warning before it is too late avoiding this way the inconvenience of having to push the car because it refuses to start or the cost of getting a replacement battery because it was damaged by inadequate charging.

As an indicator is used a display of 16 LED's and only one LED is lit at a time, keeping the dashboard of your car uncluttered. The accuracy of the instrument is 0.5 V and is not affected by vibration as most mechanical instruments are.

Technical Specifications - Characteristics

Working voltage: 12 V DC

Current: 50 mA

How it Works

The circuit is very simple as we have taken advantage of the features built in the IC UAA170, which is a DC voltmeter designed to drive an array of 16 LED's in bar or dot display. For the reasons already mentioned we have preferred the dot display and we have arranged the LED's in such a way as to give an instant indication of the state of the battery. The LED's are of three different colours, red, orange and green. The outermost three in either extreme of the row are red, the ones placed immediately next to them are orange and the ones in the middle are green. As long as the dot is green everything is OK and there is nothing to worry about. If the dot is orange towards the lower side (LED's 12 & 13) then the battery is getting low and this could be because is undercharged or is not getting any charge at all. This is a serious fault and steps must be taken to maintain it.

If the dot is orange but from the other side of the row (LED's 4, 5 and 6), then the battery is getting too much charge and there is probably something wrong with the automatic switch of the charging circuit. A red LED in the low voltage region of the display is an indication of a low battery and in the high voltage opposite is a warning that the battery is getting too much charge.

If a lead-acid battery is overcharged for long periods of time is running the risk of getting damaged.

The circuit is protected by the diode D1 from being damaged if it is inadvertently connected the wrong way round to the car's electric circuit. The trimmer P1 is used to adjust the circuit so that the last green LED (L7) is turned ON when the voltage at the input of the circuit is 13.8 V.

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 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 still remain on it.

The voltmeter consists of very few components apart from the LED's that form the display and the UAA170.

Solder the socket of the IC in its place first, taking care not to insert it the wrong way round, continue with the pins, the resistors the trimmer and the capacitors. The electrolytic should be connected as it is marked on the p.c. board because it has a positive and a negative pole. Continue with the diode and the LED's which must also be inserted correctly if you want the circuit to work properly. The cathodes of the LED's should all be facing away from the rest of the circuit.

Make a final visual inspection of your work and if you are satisfied that there are no mistakes, clean the board from any flux residues and insert the IC in its socket aligning the component correctly.

Connect the voltmeter across a variable power supply and if its possible in parallel with an accurate digital voltmeter. Turn the supply on and set its output to 13.8 V. Adjust then the trimmer P1 of the circuit so that only the last green LED (L7) is on. Your voltmeter is ready and is now correctly adjusted for your car battery.

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

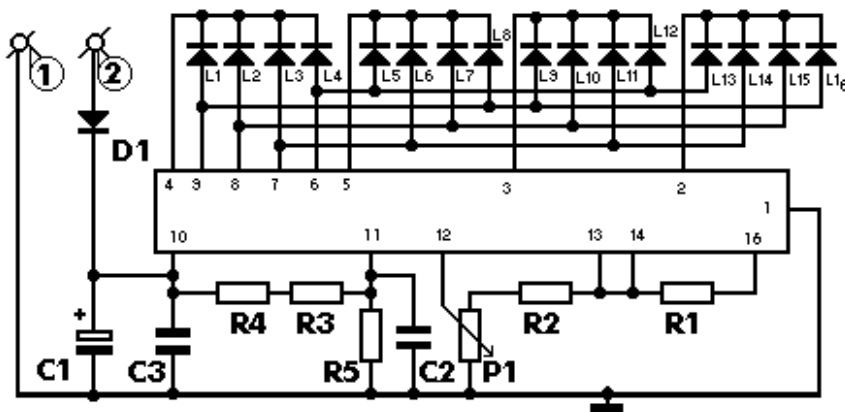
Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.

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.
 - 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.

Electronic 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/1082.htm>

For further info please contact us by e-mail:

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

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