

# QUASAR ELECTRONICS KIT No 1034

## CAR BATTERY CHECKER

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### General Description

This is a really useful instrument for your car. It uses three LED's to give a visual indication of the state of charge of your car battery. When the red LED is on the battery voltage is low, green is the OK signal and orange is a warning that the battery is overcharging. The whole circuit is accommodated on a small p.c. board and can be fitted easily anywhere in the dashboard.

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### Technical Specifications - Characteristics

Working voltage: 12 V DC

Max. current: 40 mA

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### How it Works

The principle behind the circuit is very simple. The first LED D1, is connected in series with R2 and D4 and will light when the battery voltage is below 11.5 V. If the voltage is above 12 V the zener Z3 will bias the transistor TR1 sufficiently to turn it on and this will light the second LED D2 which is green and indicates that the battery voltage is normal. As the collector to emitter voltage drop is less than the forward voltage drop of D4 the first LED does not get sufficient voltage across it to light and is turned off. If now the battery voltage rises above 13.5 volts then in a similar way the transistor TR2 is turned on and the third LED lights to indicate potential trouble. The zener diodes are used to provide the reference voltages for greater accuracy.

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### 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 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 project uses very few components and its construction is therefore very easy even for the most inexperienced constructors. However the simplicity of the circuit does not mean that it is going to work no matter how many mistakes you are going to make. Please follow the steps outlined above for good soldering and place the components on the p.c. board following a logical order. The pins should be soldered first followed by the resistors which can be identified from the colours on their bodies. Solder then carefully the diodes the transistors and the LED's taking care not to overheat them as they are easily damaged by heat. Take care not to insert the diodes the wrong way round. The cathode is the lead marked by a line printed on the diode body on its side and in the case of the LED's there is a notch on the side of the cathode and the lead is also slightly shorter.

When you finish soldering the components make a thorough visual inspection of the work done and if everything is OK connect the circuit across a variable power supply. At less than 12 VDC the red LED should glow indicating a low battery. Above 12 VDC the red LED

should turn off and the green one should light. At voltages above 13.5 V the green and the orange LED should glow to indicate an overcharging of the car battery.

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## Adjustments

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

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## 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.

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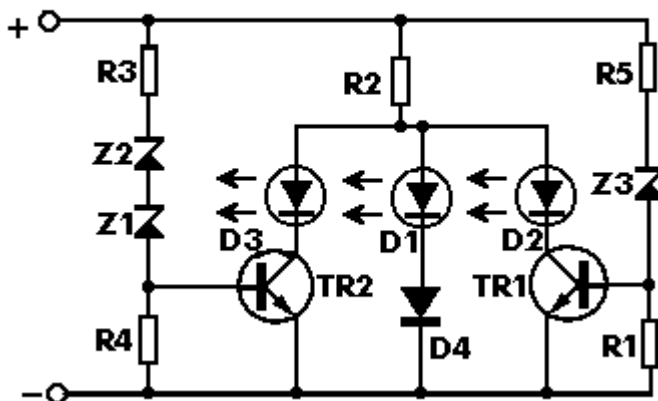
## If it does not work

- 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 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.

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## Electronic Diagram



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## **Parts List**

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

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## **Ordering**

For pricing info and online ordering please visit:

<http://www.quasarelectronics.com/1034.htm>

For further info please contact us by e-mail:

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

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