

# QUASAR ELECTRONICS KIT No. 1090

## STRESS METER

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### General Description

A simple circuit that can form the basis for a game which apart from giving you many hours of fun it will also show how nervous the player is, or has become in the course of the game !!!

The idea of the game is old and well known to most people.

There is an irregularly shaped wire connected to one end of a circuit and a small metal ring, attached to a handle, which is connected electrically to the other pole. The player is required to move the ring over the full length of the irregularly shaped wire (the wire passes through the hole of the ring) without closing the circuit. The circuit here is in fact a very sensitive electronic switch which whenever it is activated will trigger a multivibrator which in turn is connected to a loudspeaker. The multivibrator will stay on for a predetermined time, even if the player brakes the contact, just to increase the players irritation and to make it certain that everybody knows he has lost !!!

It may be not a meter as such but if you try it you will realise that there is a close relationship between the players calmness and his ability to play well. It is quite obvious that as the shape of the wire becomes more irregular and the ring becomes smaller the game is becoming more and more difficult.

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### Technical Specifications - Characteristics

Working voltage: 9-12 V DC

Current: 60 mA

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### How it Works

The circuit consists of six transistors five of which are NPN and the last one is PNP. The three first transistors T1,2 & 3, are connected as a switch. When the base of T1 becomes positive, when the circuit 4 and 6 closes, then T1 is turned on and turns also on T2 and T3. The capacitor C1 charges as soon as the contact between 4 and 6 is closed and maintains the electronic switch activated for as long as it is charged even if the 4 - 6 contact is broken. As the capacitors are discharged through the base - emitter junction of the transistor the switch will stay on for some time. The electronic switch drives the PNP transistor T6 which is also connected as a switch and when it is activated it triggers the multivibrator which consists of T4 and T5. The output of the multivibrator is connected to the loudspeaker.

The circuit works off a 9 V battery, and draws 1 mA when it is idle and about 60 mA when the speaker sounds.

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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 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.

This project is a very easy one and there is nothing to worry about while you build it. The pins and the resistors should be soldered first of all in their places, followed by the capacitors taking care to insert the electrolytic the right way round. The transistors are soldered in place last taking care to avoid subjecting them to excess heat from the soldering iron.

Please make sure that you do not swap by mistake the PNP type with one of the NPN's as their casings are identical. If you make such a mistake the circuit will not work at all.

The battery clip is connected across points 5 (+) and 3 (-) of the circuit, the speaker, which is a common 8 ohm/0.3 W type, is connected at points 1 and 2 and the switch contacts are points 4 and 6.

Apart from being a toy the circuit can have practical uses as well. It can be used as a buzzer in connection with alarms or other warning devices.

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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. -

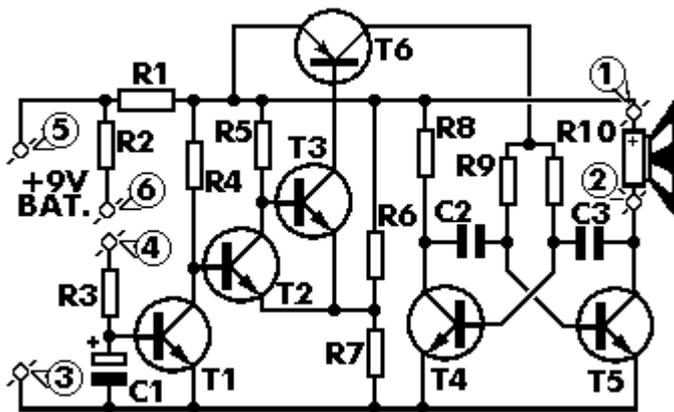
Make sure the supply has the correct voltage and is connected the right way round to your circuit.

- 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/1090.htm>

For further info please contact us by e-mail:

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

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