

QUASAR KIT No 1221

GAS LEAKAGE SENSOR

DESCRIPTION

The use of natural gas has the advantages of the lower cost as compared to the growing price of oil, and the greater respect to the environment. However, as in the case of the electrical power, the natural gas has its own risks.

The main danger from its use is the leakage into a closed space such as a house or a shop, something that could cause tragic consequences. Indeed, all the modern appliances that use natural gas are equipped with automatic security systems that stop the supply of the gas as soon a leakage is detected. However, there are many older appliances that used to work with gas tanks and now are converted in order to be used with natural gas. For these, and also for areas that operate without security systems, a gas leakage detector is necessary. This detector will not cut the gas supply as soon as a leakage takes place, but it will warn us via a red LED and a buzzer that sounds as long as the leakage occurs. The device is constructed on a small board that also contains its own power supply. The sensor is a renown and well tested device, manufactured by FIGARO, a company which is an expert in manufacturing gas leakage sensors.

TECHNICAL CHARACTERISTICS

Operation voltage :	5VDC
Power consumption:	50 mA
Detectable gases:	Propane, butane (LPG), natural gas

OPERATION

Due to the use of the PIC 12F675 micro controller -which contains only 8 pins- the circuit is extremely simple.

The pins no. 1(+) and 8(-) of the PIC are used for the power supply. The pins 6 and 7 are programmed as outputs, accepting commands from the network comprised of the sensor GS1, the resistors R2, R3, R4, R5 and the thermistor R1 that is used for the terminal balance and the proper operation of the sensor.

Under conditions of rest at the points Sense (+) and Sense (-) there is no difference potential, and the micro controller is simply at waiting state. However, when a leakage occurs at these points the difference changes, the micro controller is set at alarm state, and then it excites the transistor

TR1 via the output (pin 2) and the resistor R6, thus forcing the buzzer to sound.

The buzzer sounds for as long as the leakage occurs, stopping only when the problem disappears. In the same time a red LED (D6) is on, warning us as an optical indicator. The capacitors C1 and C2, the regulator IC2, the transformer T1 and the diodes D1...D4 comprise the power supply of the device. The green LED (D5) is an operation indicator. The resistor R8 protects the LED from high current.

CONSTRUCTION

The construction of the circuit is easy, provided that you will follow our instructions.

First, you solder the smaller parts and next the larger ones. You will begin by placing the resistors and then the diodes, paying attention to their polarity. R1 is a NTC thermistor and must be near the gas sensor. The gas sensor and the NTC must be in the same height. Next, solder the socket (8DIL) of the integrated circuit, after checking that its notch corresponds exactly to the plan of the board. After that you solder the ceramic (multilayer) capacitors, and next the electrolytic capacitors by giving attention to their polarity. The positive pin is longer than the negative one. Next you solder the pins, the 78L05 regulator by also paying attention to its polarity, and after that remove the self-adhesive label from its upper side, because otherwise you will not be able to hear it. Next, solder the transformer.

Finally, solder the LED by paying attention to its polarity (the long pin indicates the anode, while the notch on its body indicates the cathode).

In order to avoid the continuous operation of the circuit after placing it in the box, it is a good idea to add a small switch so that you can open and close the circuit without needing to disconnect the battery.

After thoroughly checking all the components and especially those with a polarity, place carefully the micro controller on its base by giving attention so that the notch that indicates pin 1 will exactly correspond with the one which is printed on the board, because if you place them the other way around the circuit will not operate and it may also be damaged.

Attention: *The device is powered with 230VAC, and this voltage is dangerous. Under no circumstances **do not touch the circuit** when is under power. If you want to make any changes or repairs you must **first disconnect the power**, do whatever repairs are necessary, and then power again the circuit by keeping your hands away from it.*

If everything works properly the green LED will be lighted immediately, showing that the circuit is under voltage and the power supply is working. In the same time the buzzer will sound for some seconds, until the

operation parameters of the sensor get stabilized, and then it will stop. The circuit is now at waiting state, continuously monitoring the output points of the grid around the sensor. In order to check the device, take a small camping gas canister, bring it close to the circuit and open the cock. After some seconds the red LED will light and the buzzer will start sounding, showing that the device has detected the leakage. Finally, you can place the device in a box of your choice.

IF IT DOESN'T WORK

Have you soldered correctly all the components? Did you make any mistake in soldering the sensor? Remember that the notch indicates pin 1 and the numbering is to the right, when looking at its pins from downside. Turn the board on its other side and check all the solderings, one by one. If anyone of them seems to be cold, then reheat it with the soldering iron. The cold soldering does not shine, it seems dull, has knobs and causes lots of problems to the circuit.

Next, check carefully the position and the direction of every component by comparing it with the drawing plan, the table of the components and the theoretical circuit. Also, check if you have placed a component in the place of another.

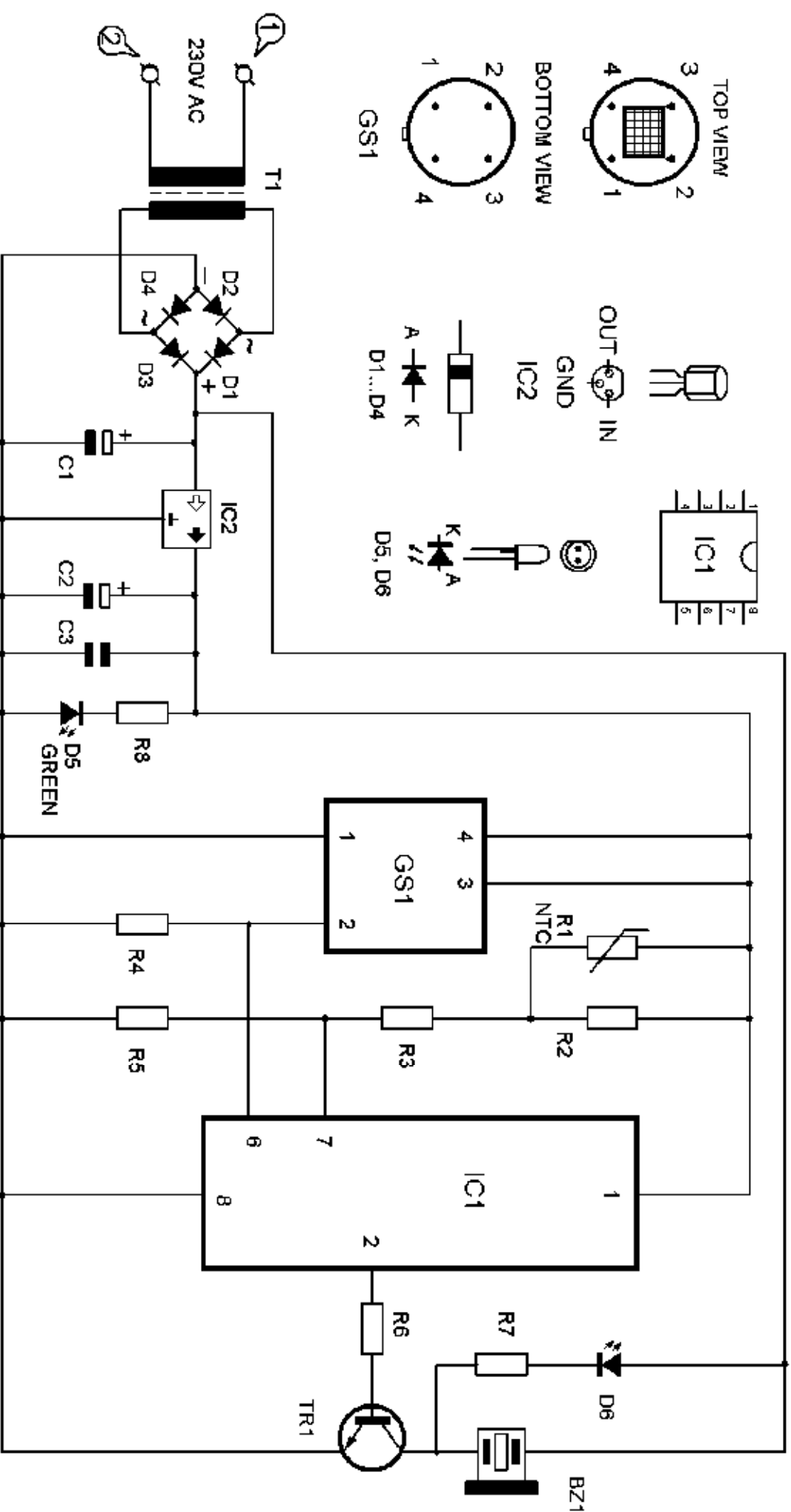
During the repairs remove the micro controller from its socket, check with the help of a voltmeter the voltage between the points 1(+) and 8(-). If it is 5V you must close the power supply, place it again on its socket, and try again.

Are you sure that during the soldering you didn't short-circuit two adjacent areas of the printed circuit? Is it possible that you have soldered the thermistor in the place of a resistor and vice versa? Therefore, it is better to check very carefully all the solderings and the adjacent areas of the board. You could help this process by lighting the board from below, and carefully inspecting all the pads.

If you go through all the above possibilities, then the circuit will certainly work properly. In any case, if you have any problem with the device you can contact the Quasar Electronics service department, daily (09:00 - 16.00) Monday - Friday.

PARTS LIST

Full parts list is supplied with product



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