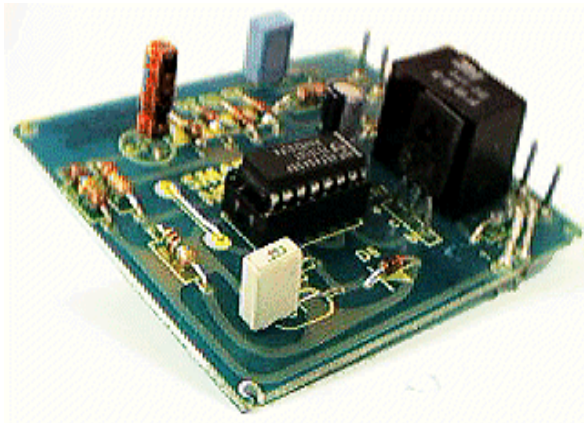


QUASAR ELECTRONICS KIT No. 1016 LOUDSPEAKER PROTECTION UNIT



General Description

This is an ideal accessory for your audio system. It works with any amplifier from 0.5 to 100 Watts and protects your speakers from peak signals and ...you from unpleasant and expensive surprises! The circuit will be activated from peak signals, high output power and also from the presence of DC voltages across its input when there is a fault in the output stage of the amplifier.

It is connected in the output of the amplifier and when it is activated it inserts a 56 ohm resistor in series with the speakers attenuating the output of the amplifier by -15 db.

Technical Specifications - Characteristics

Working voltage: 9-15V DC

Max. current: 50 mA

How it Works

The trimmer R7 adjusts the sensitivity of the circuit. The rectifier bridge converts the input signal to a DC voltage that is applied to the input of a series of inverters (IC1) which are used to drive the output transistor (TR1). When the output transistor is turned ON its collector current flows through the relay and activates it. When the relay is activated the resistor R6 is connected in series with the speaker attenuating the output signal by -15 db approximately. If instead of attenuating the output

signal you prefer to disconnect the speakers completely from the amplifier you can easily do it by simply removing R6 from the circuit. Bear in mind however that some power amplifiers should NOT be operated without a load in their output. The protection system needs a power supply voltage of 9 VDC and as the quiescent current that flows through the circuit is only 2 mA, it can be used for several months with a miniature 9 V battery. If you prefer to use a power supply the QUASAR ELECTRONICS KIT No.1061 is ideal. As you can see from the diagram the circuit is designed for MONO amplifiers. If a STEREO version is required then

you should build two separate 1016's and connect one to each channel of the power amplifier.

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 can not 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 the area around the hole evenly 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 let the solder 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 circuit of the speaker protection system is kept very simple thanks to the use of an integrated circuit the CD4049 and only a few other external components. The construction of the circuit should start from the pins and the IC socket, which are the least sensitive to heat components, and therefore should be soldered first on the PC board. Make the jumper connection which is marked

on the PC board and then continue with the resistors, the capacitors, making sure that the electrolytic are soldered the right way round and finally solder in their places the relay, the diodes and the output transistor. Make sure that the semiconductors are not overheated during the soldering process and as they are also polarised make sure that they are placed on the PCB correctly. When you finish soldering all the components make a careful inspection of the work you have done so far and then take the IC off its aluminium foil wrap and insert it in its socket.

The IC is of the CMOS family and is very sensitive to static electricity. You should not remove the aluminium foil before you are ready to insert the IC in its socket and during the insertion you should try not to touch its pins with your fingers. Make sure that you do not bend any pins while you insert the component in its socket and that you place it the right way round.

Connect the output of the power amplifier at points 4 & 5 of the PC board and the speaker at points 3 & 6. The power supply is connected at points 1 (-) and 2 (+) of the circuit and it must be 9 VDC as it has already been mentioned above. Set R7 for maximum sensitivity (minimum resistance) and turn the amplifier ON. Increase the volume up to the maximum level that you consider safe for your speakers and then adjust the trimmer so that the relay is just activated. The speaker protection system is now calibrated for your speakers and amplifier.

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.

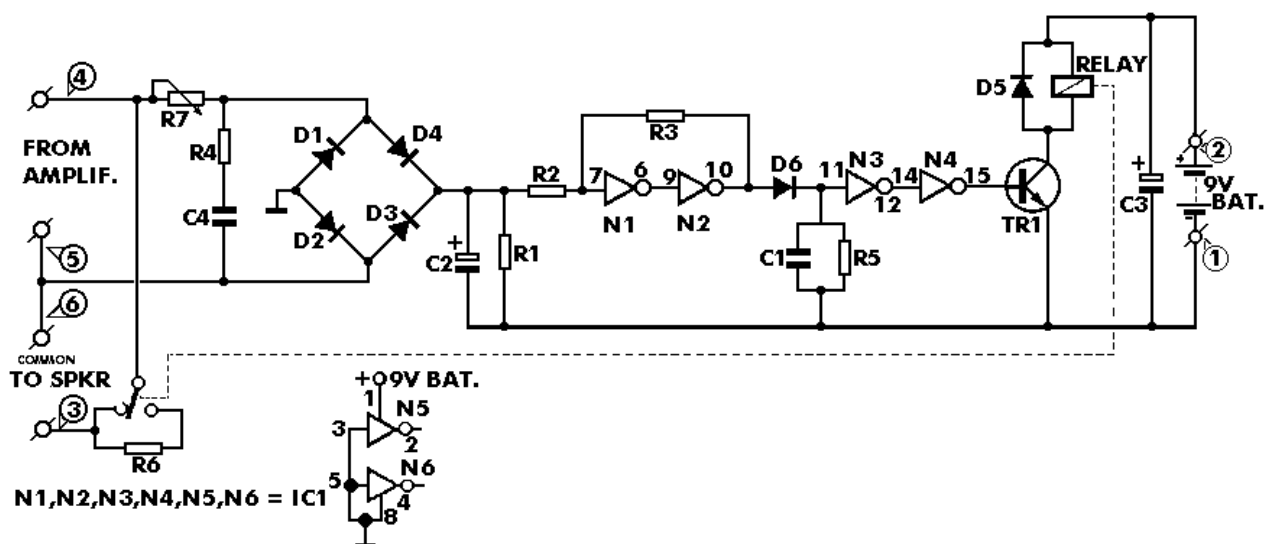
Make sure that all the polarised components have been soldered the right way round.

Make sure 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.

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/1016.htm>

For further info please contact us by e-mail:

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

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