

# QUASAR ELECTRONICS KIT No. 1091

## GUITAR PREAMPLIFIER WITH TONE CONTROLS

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### General Description

All those who play the guitar, amateurs and professionals alike, have at times come across the need to connect their instrument to an amplifier, a mixing console or a tape recorder. In all the above cases it is necessary to match the pick up of the guitar to the input of the preamplifier and this is not always easy. This circuit you are about to build does just that and more. It is a high sensitivity preamplifier designed around the TL082 FET OP-AMP which has high sensitivity, low distortion and a sufficiently high output level to drive almost any power amplifier. The preamplifier also incorporates a tone control circuit having an adjustment range of  $\pm 12$  dB/octave. The whole thing is small enough to fit in the guitar itself together with its battery.

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### Technical Specifications - Characteristics

Working voltage: 9-12 V DC  
Current: 50 mA

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### How it Works

The circuit is based on the well known from other audio applications dual op-amp IC the TL082. The input of this circuit has FET transistors and this gives it high input impedance, good linearity and high sensitivity. The signal from the pick-up of the guitar is applied through C1 and R2 to the input of the first op-amp (pin 2 of the IC) and is amplified up to a certain level. From the output of this amplifier (pin 1) the signal is taken through the passive tone control circuit, which is a classic BAX ANDALL filter with separate controls for bass and treble, and is fed to the input of the second half of the TL082 (pin 6) where it is amplified up to a level sufficiently high to drive the final amplifier. The output signal is taken from the pin 7 of the IC which is the output of the second op-amp.

The circuit requires 9 VDC for its operation, it draws very little current and therefore can be used for a quite long time off a small 9 V battery.

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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.

If you follow the above instructions and be careful to place the components correctly in their assigned places on the P.C.B. you should have no problems whatsoever with this little project. Follow the general instructions as they are outlined above and start soldering

first of all the pins and the IC socket following with the resistors and the capacitors. Watch the polarity of the electrolytics and be careful to align the IC socket correctly with its outline which is stencilled on the board. There is space on the board to fit the potentiometers directly on it, but this is up to you and will greatly depend on the kind of case that you plan to use for your project. If you have to place the potentiometers far from the board you should use shielded cable to make the connections to avoid picking up unwanted noise. When you finish all soldering work on the board clean it very well and inspect it carefully for bad joints and shorts across adjacent tracks. If everything seems to be OK place the IC in its socket, and make the following connections:

- 5 (+) and 6 (-) power supply 9 VDC
- 1 (signal) and 2 (earth) input.
- 3 (signal) and 4 (earth) output.

The connections that carry audio signals should be made with shielded cable to avoid picking up unwanted noise and interference.

The circuit's potentiometers will control the quality of the sound and the volume will be controlled by the volume control of your amplifier.

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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.

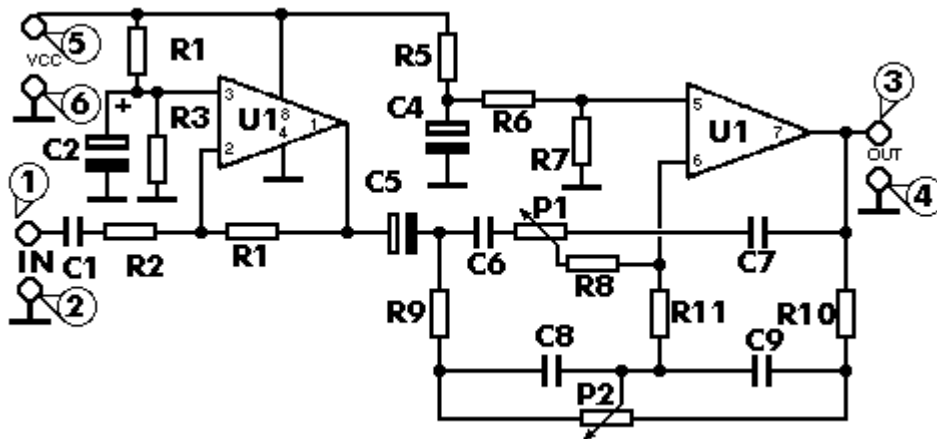
- See that there are no components missing or inserted in the wrong places.
- Make sure that all the polarised components have been soldered the right way round. - Make sure the supply has the correct voltage and is connected the right way round to your circuit.
- Check your project for faulty or damaged components.

If everything checks out and your project still fails to work, please contact us for

information on 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/1091.htm>

For further info please contact us by e-mail:

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

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