QUASAR ELECTRONICS KIT No. 1018
GUITAR TREMOLO

General Description

This is a TREMOLO with professional specifications. It has a variable TREMOLO frequency (1-12 Hz) and adjustable modulation level from 0 to 90 % which makes it very versatile and suitable even for professional guitarists. It operates off a miniature 9 V battery which, as the circuit has very low consumption (5 mA) will last for a quite long time.

Technical Specifications - Characteristics

Working voltage: 9V DC
Current: 20 mA

How it Works

The tremolo effect is nothing more than the amplitude modulation of the signal coming from the pick-up of the guitar by a very low frequency obtained from a suitable oscillator. This oscillator should produce a frequency in the range of 1 to 12 Hz which is not audible but creates the best effects when it modulates the signals from the guitar.
The circuit consists of a VLFO (Very Low Frequency Oscillator) a mixer and an amplifier. As a VLFO is used the first half of dual Op-Amp IC the TL082 or its equivalent the LF353. The output frequency of the oscillator is controlled by means of the twin potentiometer marked in the circuit as R3 and R4. The two LED's D2 and D3 connected in parallel but in opposite directions are used as a simple limiter for the output signal of the oscillator keeping it at a maximum level of 4V p-p (1.4V effective). (The LED's will NOT glow at ANY moment no matter what you do to the circuit. They are used here as two Zener diodes which control one semi-period of the signal each).
The VLF signal will appear on the wiper of the potentiometer R10 and its amplitude will be, naturally, proportional to the setting of the potentiometer. As you have most probably realised by now this control adjusts the modulation level of the output signal. The VLF signal is applied to the gate of the FET (FT1) the drain of which drives the inverting input of the second Op-Amp within IC1. The non inverting input of the same amplifier is driven directly through C10 by the signal coming from the pick-up coil of the guitar. Thanks to the action of the FET which works like a variable resistor in the output of the differential amplifier will appear the signal from the pick-up coil of the guitar modulated in amplitude by the VLF signal of the oscillator. It is then taken through C6 to the input of the power amplifier. As you can see in the circuit diagram there is also a two position switch (S1) which in one position lets the input signal pass through the differential amplifier, therefore enabling the TREMOLO effect, and in the other bypasses the differential amplifier rendering the TREMOLO inactive.
The power supply is 9 VDC and as the consumption is approximately 5 mA it is possible to use the circuit with a common miniature 9 V battery which will last for a long time even with

continuous use. The diode D1 which is connected in series with the positive supply rail it is there to protect the circuit in case the battery is connected the wrong way round.

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 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.
- After 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.

Solder first of all in their places the pins and the IC socket making sure that the latter is inserted correctly. Continue the construction of the project by soldering the resistors and the capacitors. Leave the electrolytics last and take care to insert them properly as they are polarised and if they are inserted the wrong way round the TREMOLO will not function properly. Use short pieces of cable to connect the potentiometers and the switch S1 with the P.C. board. Follow the practical diagram for the correct wiring of the potentiometers as it is very important for the correct operation of the circuit that they are wired properly. Insert and solder carefully the two LED's and the small diode D1 and finally solder in its place the FET trying to avoid as much as possible overheating it because it is very sensitive to heat. At this point check the work done so far very carefully and if you are satisfied with what you see clean the P.C. board thoroughly and insert the IC in its socket taking care not to bend any pins during insertion and making sure it is inserted the right way round.
Connect your guitar to the input of the TREMOLO and use its output to drive the power amplifier. Use only screened audio cables for these connections to avoid unwanted noise pick-up. Turn everything on and if you start playing you should hear the TREMOLO effect provided that the switch is in the correct position. With a bit of practice you will get the hang of the new device and you will be able to produce interesting effects with a minimum of fiddling.

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.

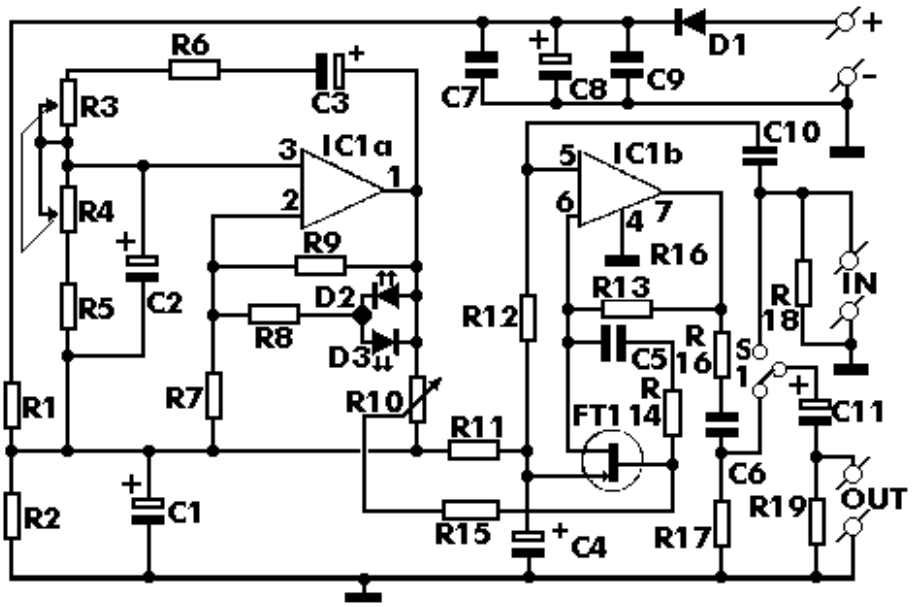
While using electrical parts, handle power supply and equipment with great care, following safety standards as described by international specs and regulations.

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 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/1018.htm

For further info please contact us by e-mail:

mailto: sales@QuasarElectronics.com