QUASAR ELECTRONICS KIT No. 1127
MASTER TONE CONTROLS
(FOR KIT 1126 OR PREAMPLIFIER, CASSETTE DECK, ETC)

General Description

In every sound system there is an indispensable stage, which is the tone control. It is impossible to imagine a preamplifier, a mixer or an integrated amplifier without some means of controlling the frequency response of the system, i.e. without TONE CONTROLS. This is because the conditions are very rarely ideal, and it is always necessary to make some adjustments, in order to achieve the best reproduction, no matter how good the system is. This is even more necessary in microphone mixers where the signal picked from the microphones is seldom good enough to be reproduced without corrections. The circuit at hand is designed with the needs of a microphone-mixing console in mind and is a preamplifier with VOLUME CONTROL and a TONE CONTROL stage based on a classic BAXANDALL CIRCUIT.

Technical Specifications - Characteristics

Supply voltage: 30VDC
Maximum Current:.....100 mA
Frequency response:...20 - 20.000 Hz
Input sensitivity:.....50 mV
Output level: .....20 V max
Distortion (THD):.....0.1% max
Bass/Treble adj.:.....12 dB
Signal to noise ratio:.....50 dB min

Besides that the circuit offers the following features to you:
Low cost.
- Simple construction which guarantees your success.
- Reliability and good performance.
- Independent adjustment of BASS and TREBLE.
- Low distortion even if the input is over loaded.
- Together with Quasar Electronics Kit 1126 it can be used as the basic building block of a microphone-mixing console.

How it Works

The circuit consists of three stages, each one of which is built around a BC548 NPN transistor. The first stage around Q1 is a basic preamplifier having a low input impedance designed to amplify the signals coming from a mixer or a microphone line amplifier. (For example the signals from the microphone preamplifier Quasar Electronics Kit 1126). The resistor R1 is there to attenuate the input signal to avoid overloading of the input stage which is driven through C1. The capacitor C3 and the resistor R4 connected in parallel with it, adjusts the operating parameters of the stage for maximum amplification with the minimum distortion possible. The resistor R2 is used to provide the correct bias voltage for the emitter of the transistor and R6 limits the current drawn by Q1. The signal from the collector of Q1 is taken, through C4, to a passive circuit, better known as a BAXANDALL

filter, which by means of its potentiometers controls the high and low (TREBLE and BASS) frequencies of the signal. The network C6, C8, P2 controls the high frequencies and P1, R8, R9 and C5 are used to adjust the low frequencies. The affected frequencies are adjusted in a quite broad range of about 12 dB, more than enough for all practical purposes. The resistor R3 and the two capacitors C2 and C6 are there to adjust the overall response of the circuit in order to improve performance and to keep distortion as low as possible. After the filter the signal is taken through C9 to the base of Q2 where is further amplified and then through C13 it is applied across the potentiometer P3 which is the volume control of the preamplifier. In this stage R12 provides the necessary feedback, C10 biases the base of Q2 and R15 similarly biases its emitter. The resistor R10 controls the maximum current that the stage can draw in operation. From the wiper of the potentiometer, the signal is taken through R19 and C14 to the final amplifier stage which consists of Q3. The resistor R16 between the base and the collector of the output transistor provides the necessary negative feedback to optimise the response characteristics of the stage. The resistor R14 controls the current which flows through Q2 and R5 does the same for the circuit as a whole. The resistors R17 and R18 bias the emitter and the base of Q3 respectively. The amplified signal is taken through the network consisting of C11, C12 and R13, at a level sufficiently high to drive a power amplifier or a monitor circuit. The power supply is connected across the free end of R5 (30 VDC) and the ground rail (-) of the circuit.

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.
- 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.

Although the printed circuit at a first glance seems to be too crowded and complicated, this is a simple project and you shouldn't have any problems in building the circuit. Start off with the least sensitive components and gradually build your circuit so that you place and solder the transistors in the very last stage of construction in order to avoid overheating them while you are soldering other components on the board. So, first of all solder the pins, then place the resistors, continue with the capacitors -paying particular attention to the polarity of the electrolytic- and finally, after checking that everything is OK so far, solder in place the three transistors. The potentiometers can be either soldered directly to the printed circuit board, or alternatively, they can be connected to the board with shielded cable, to avoid picking hum and other interference. The way of mounting the potentiometers will be dictated by the avail ability of space in the box in which you are going to house your preamplifier, as well as from your particular preferences for the design of the front panel of the case. (If you solder the potentiometers directly on the PCB then the distances between the potentiometers on the front panel should be exactly as they are on the board). When everything is in place, make a very careful final inspection and then connect the circuit's input (2 signal, 1 ground) to a suitable source (QUASAR ELECTRONICS KIT No. 1126, preamplifier, cassette deck, etc.), the output (5 signal, 4 ground) to a power amplifier and apply 30 VDC across the circuit at points 3 () and 4 (-). Turn the volume (P3) up and you should hear the signal clearly from the speaker of the amplifier. Turning P1 and P2 should affect BASS and TREBLE respectively. For best results and due to the high sensitivity of the circuit it is advisable to house the circuit in a metal box which will shield it from unwanted interference.

Adjustments

This kit does not need any adjustments, if you follow the building instructions.

Warning

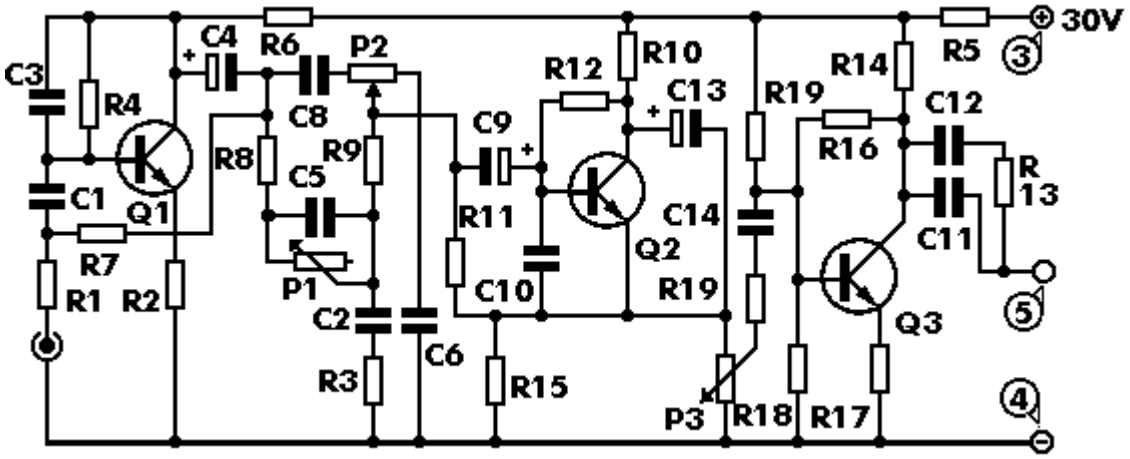
Quasar Electronics kits are sold as stand alone training kits.
If they are used as part of a larger assembly and any damage is caused, our company bears no responsibility.

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 everything checks out and your project still fails to work, please contact us for information on 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/1127.htm

For further info please contact us by e-mail:

mailto: sales@QuasarElectronics.com
