

QUASAR KIT No. 1131

ROBOT VOICE

General Description

Everyone must have heard at some time or another electronically simulated human speech. Although it is possible by modern electronic technology and computers to create an understandable simulacrum of the human voice it still lacks certain qualities and it sounds definitely artificial. The main problem with artificially created speech is that there is no inflection which is a very important characteristic of the human voice and that the different sounds seem to be separate while human speech has a continuous flow. In this project we are not proposing to you a complicated speech synthesis circuit, but something much simpler, economical, and almost equally effective. Our circuit simply processes the human voice to make it sound like a robot's. It is quite the other way round but the end effect is very close to the real thing and it will definitely impress the kids and will give you hours of fun in parties and family gatherings.

Technical Specifications – Characteristics

Working voltage: 12 V DC

Current: 100 mA

How it Works

You must have gathered by now that the circuit is some kind of distorted which processes the normal human voice to make it sound artificial. The circuit is built around two IC's the 4009 (IC1) and 4016 (IC2). The integrated circuit IC2 contains 4 bilateral switches of which one is used to control the passage of the audio signal through the circuit. The operation of the switch depends on the presence or not of a certain voltage on the control pin. In this application where only one of the four switches is used, pins 1 & 2 are the signal input and output respectively and No. 13 is the control pin. The control voltage can be DC or pulsed and the latter is used here. IC1 contains 6 inverters-isolators, of which three are used to form an RC square wave generator. The output frequency of the generator is controlled by the passive components C3, P1 and R2 and is variable between 200 Hz and 20 KHz. (The adjustment is made of course by means of P1). The fourth inverter within IC1 is used as an isolator between the square wave generator and IC2 which controls the audio signal. In the output of this last inverter there is a voltage divider which consists of R3 and R4 and from there the square wave is fed to the control input of the bilateral switch. During every high (logical «1») pulse of the control signal the audio signal is allowed to flow through the circuit. As you can see the output frequency of the square wave generator will affect the rate at which the audio signal will be allowed to pass through the circuit and the final effect will vary with the frequency.

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 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.

There are very few components in this circuit and there should be no problems in building it. As we always do, we advise you to solder first of all the sockets and the pins on the board and to follow with the resistors the trimmer and the capacitors. Taking all the necessary precautions to avoid damaging the IC's by static discharge, insert them in their sockets. Your ROBOT VOICE circuit is ready to be tested. Connect its input (points 1 - signal and 2 - common) to a suitable microphone preamplifier and its output (3 - signal, 4 - common) to a mixing console or an amplifier. Use shielded cable for these connections to prevent unwanted noise from affecting your signals. The supply which should be 12 VDC, preferably stabilised, must be connected at points 5 (+) and 6 (-) of the printed circuit. Turn everything ON and speak into the microphone. The voice should come out of the speakers distorted and similar to that of a robot. Try different settings of the trimmer P1 for different effects.

Adjustments

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

Warning

Quasar 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

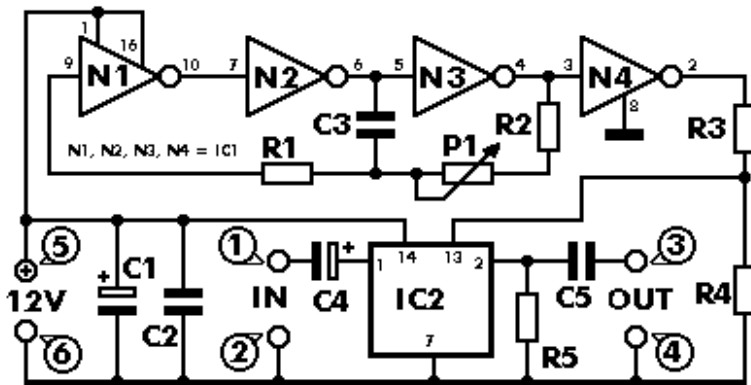
Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.

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.

Schematic 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/1131.htm>

For further info please contact us by e-mail:

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

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