

The plasma loudspeaker i.e. electric arc instead membrane

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1 Introduction

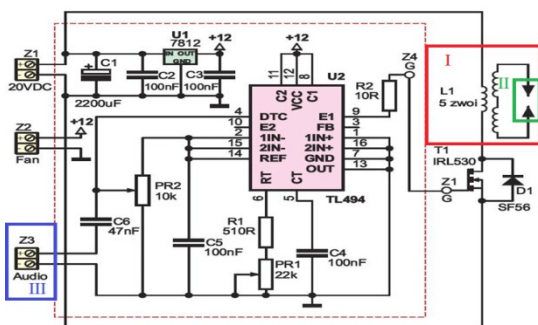
Plasma is a matter, which create stars. This space matter (in my case ionized air) has interesting abilities, one of the most amazing abilities is an abilities to recreate sounds. The purpose of my research was to build device which show this ability and comparing my Plasma loudspeaker with conventional tweeter which has restrictions related to the mass of the membrane.

2 Experimental setup

Sounds in my model are produced by electric arc which ionized the air and thus produce plasma. [As you know](#), temperature change causes pressure changes . The same phenomenon goes around the electric arc. Temperature (depends on power of electric arc) modulates pressure around arc and produces Sound wave. In the following points I have described my technical solution and signal flow in my model.

2.1 Outline of my model

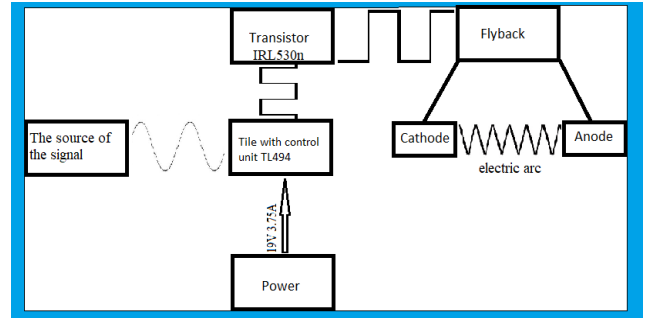
I have connect in my experimental setup with many solution thank to it I correct a few disadvantages and sounds quality. In [Fig.1] I show the area where I make corrections.



[Fig.1]

First amendment - I have used flyback instead of the transformer thanks to it I could better control electric arc. Second amendment – I have constructed special casing of electric arc. The solution helped me to stabilize the electric arc, electrodes and reduce the ozone and electric field which is produced by electric arc. Third amendment - I have modulated signal from source of signal by means of equalizer. This optimization has helped me improve sounds volume and quality.

2.2 Signal flow



[Fig.2]

At the beginning we have a sinusoidal signal, which is sent by laptop, phone, etc. The signal is modulated and converted by tl494 into rectangular signal. Next, the signal is given into the gate of transistor, which adjusts signal and this way controls the primary winding in flyback. In flyback the current is transformed, duplicated and demodulated and finally it is liberated in the form of electric arc.

3 Results

I have used for research: a microphone, a laptop, an audacity program. The research was conducted for electric arc length 1cm (it is optimal length). The chart shows proposal: the higher frequency is the more pure sounds are. Thanks to it plasma speaker is suitable for be loudspeaker.

4 Conclusions

Summarizing plasma speaker has many advantages which make it better than conventional loudspeaker thanks to the inert electric arc. My model can be use in school as teaching aid which show ability of plasma.

5 Reference

- [1] Ryszard Chybicki: Układy elektroniczne
- [2] <https://pl.wikipedia.org/wiki/Plazma>
- [3] <http://moje-laboratorium.pl/glosnik-plazmowy/>

