Station Accessory

A Simple Audio PA

Simple Audio PA

Sample Implementation

18-04-2015/V1.1/hb9aik-vk6bqd
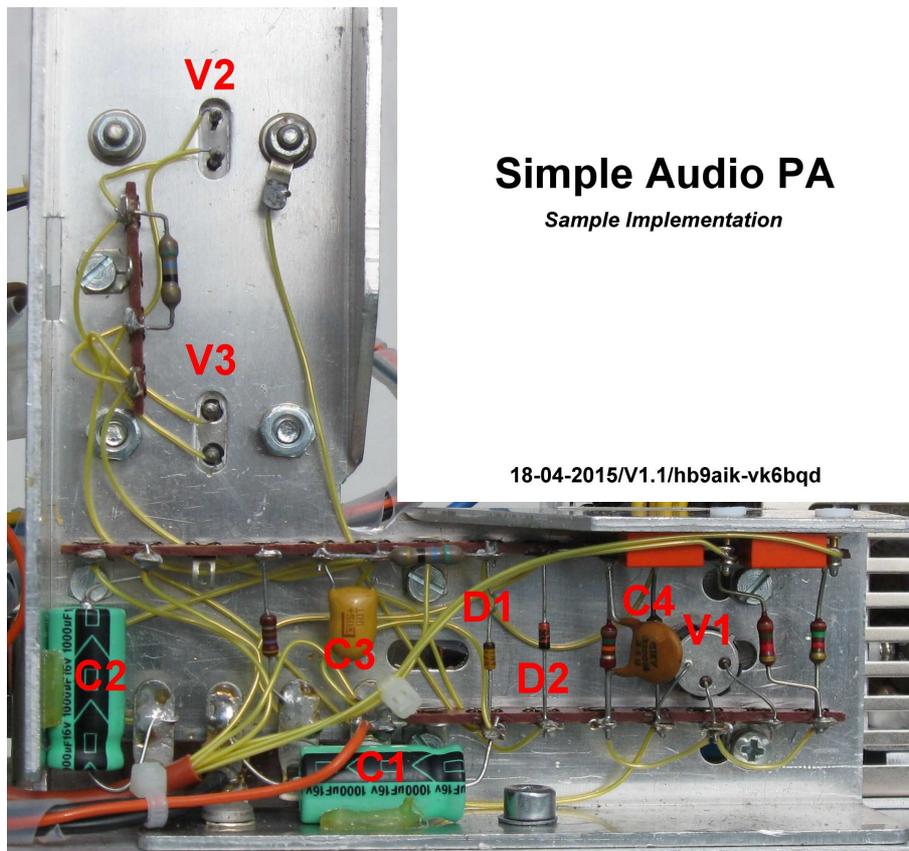
Preface: The Small Print

When using the information on these pages for your work please note the following terms and conditions. By using any of the information presented you accept these terms. Thank you!

Restoration Projects Philosophy

The purpose of many restoration projects described here is to bring the antique equipment back into working condition close to original specifications while generally preserving their historic electronic and mechanical design. This means that often new components (e.g. capacitors) need to be used - in many cases NOS will not do - which sometimes require small mechanical modifications to the set.

This treatment does not conform to "museum" standards that require everything to be left or restored to original. This is an entirely different approach. It is up to you to decide what you want to do.

Modifications and Homebrew Projects

The projects shown are for information only with the main goal to motivate fellow amateurs and hobbyists to start on similar projects. Comments for improvements are always welcome. They are always "prototypes" and not a kit. You'll have to find your own parts. No warranty is given nor implied that they actually work in your situation.

And please note that a modified piece of equipment looses its collector value - but brings joy to its successful operator!

Copyright

Some of the circuit diagrams, manual pages or software used and edited are covered by copyrights of their original publishers and intended here for personal use only. No complete manuals can be found, there are already many sources on the web for this purpose.

My personal designs are covered by the GNU licence agreements. Pictures and other documents may not be republished without indicating the source.

Regulations

Many of the described obsolete radios (or computers) no longer fulfill today's requirements for e.g. electrical safety, EMC, used bandwidth, levels of harmonics or spurs or intermodulation. While at times suitable corrective action is included in my descriptions, many times it is not. It is your responsibilty to make sure your equipment conforms to the requirements in your own country.

Safety while Working on the Projects

> *It is your own responsibility and all-important to always observe proper safety procedures in your work. Some of these projects - certainly almost all vacuum-tube circuits - involve high voltages, some lethal indeed. Make sure you understand what you are doing or else get some qualified help here. Just look at this page to see some tips on this one.*
>
> *Always "Switch to Safety" when you work on your equipment! Please pay attention to proper grounding of all metal chassis and enclosures and consider the use of GFCI breakers to your shack/workbench.*

This information and much more can be found on my website hb9aik.ch

1. Requirement

Frequently it is found that radios or computer sound cards have phones or 600 ohm outputs only and need an amplifier to drive a speaker with 4 or 8 ohms. Of course such stuff is commercially available, but you can also build one easily – even without a printed circuit board or integrated circuits! What is presented here can be used at your station or in a mobile application.

The power supply voltage is nominally +12 VDC (the usual mobile radio voltage range applies) and stand-by current is low. Available power output is over 2 W into a 4 ohm speaker. The design is based on the „ancient" BBC VHF/UHF mobile radio series RT21/22.

2. Circuit

The design uses complementary germanium power transistors in its output stage, making use of their unique bias properties. No special parts like transformers or NTC resistors are used, the circuit is very simple and survives a short on its output terminals. It provides low crossover distortion despite the minimal stand-by current. Make sure to use germanium transistors only in the output stage, as otherwise crossover distortion would not be acceptable.

The following *diagram on page 2* shows the circuit as built following a computer sound card output and combining the L+R channels to drive a LS-166/U station speaker.

The incoming audio signals go through R1 resp R2 to V1. R1 and R2 define the input impedance as well as the gain in combination with R3, the feedback resistor.

V1 and V2, V3 form a DC amplifier with D2 (5V1) providing the offset voltage so that the emitters of V2, V3 rest at approximately 5V. This value allows for low +B battery voltage operation. Should your minimum supply voltage remain higher, the value of D2 may be changed to 5V6 (for +B ≥+12V) or 6V2 (for +B ≥13.5V) thus providing slightly higher output power. If no transistor pair for V2, V3 is available, the NPN type V2 can be replaced with no ill effect by a NPN-PNP Sziklai pair where the NPN driver is a silicon transistor, but the PNP power transistor remains germanium of course (see also the Collins 76F-1 pictures).

C3 and C4 etc. are frequency compensating components providing stable operation. Please note that a speaker needs to be connected (DC path) for the amplifier to test and work properly.

3. Sample Implementation

The *picture on page 3* shows a possible implementation of this design using soldering strips and point to point wiring only. This amplifier was placed in a computer power supply plug-in to allow the sound card outputs to be heard on a speaker as mentioned above. Using an existing aluminum bracket the amplifier was built and tested in a few hours. Here it gets its power from the +12V rail of the computer system.

Please add an input fuse if operated directly from a battery or high current power supply. In a vehicle an input choke and an overvoltage protection (e.g. a 16V VDR) in addition to the fuse should be considered.

Another use of the circuit is described in the text on the refurbishment of the Collins Radio 76F-1 Amplified Speaker also on this web page.

4. The Circuit Diagram

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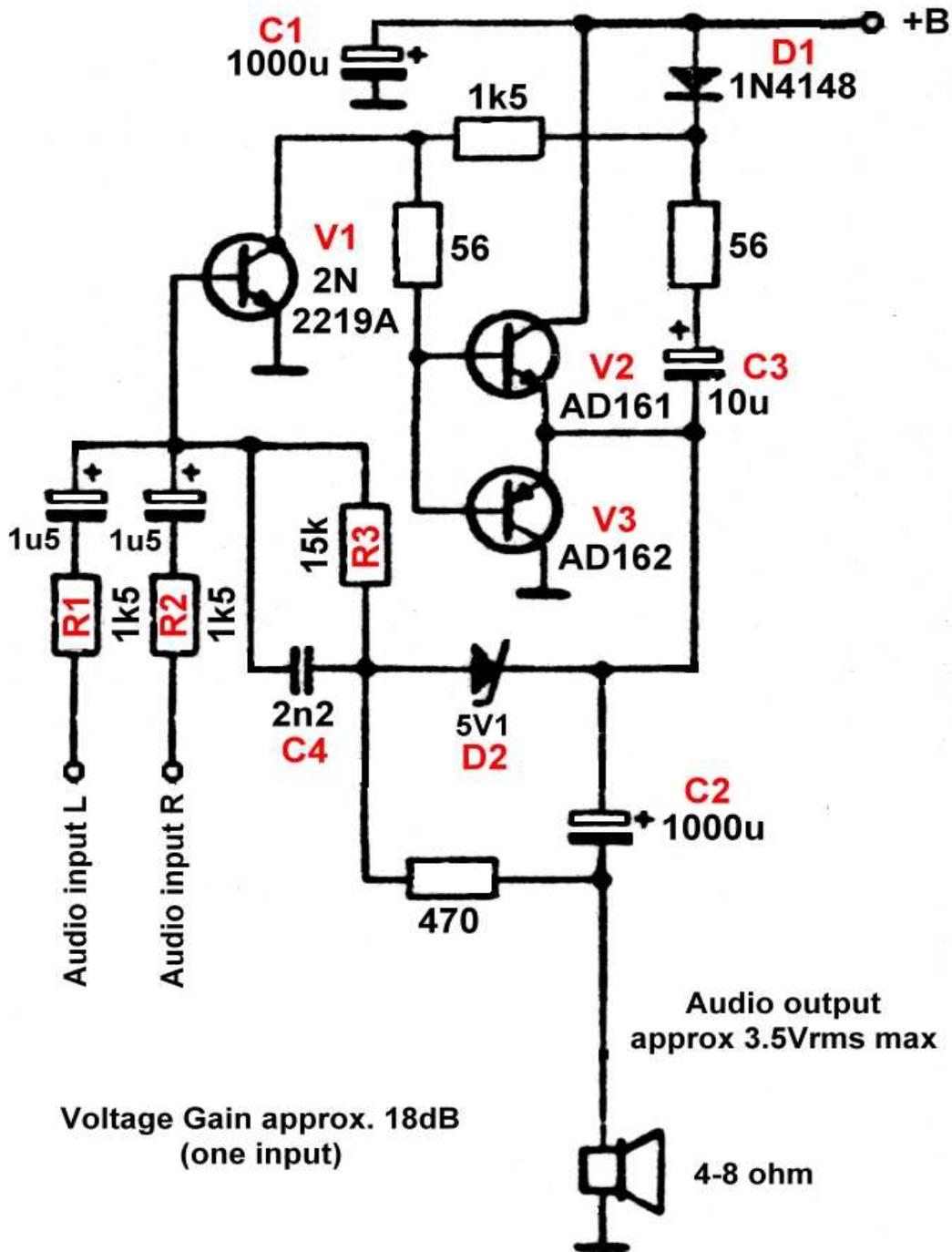
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5. Quickly Built and Useful

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