
PA Power Amplifier

PA-600

Attached is the schematic of a PA or subwoofer power amplifier capable of delivering about 650W RMS into 4Ω loads. The original design was called 'PA 600' and was first published in the German magazine 'Elrad' in 1990.

Towards the end of 1995, a scaled-down version of this circuit appeared in 'Elektor' as 'PA 300'. It is virtually the same circuit except for a less powerful output stage (now two complementary pairs instead of five with additional driver stage) and minor changes in component selection and values. However, as 'Elektor' is much more popular, many people built a 'PA 300' without knowing it was scaled down from a bigger amplifier.

Since there have been several requests for easy-to-build and simple high power amplifiers for DJing, subwoofers or PA on the forum recently, I tried to re-draw the schematic of the more powerful version from memory and from looking at some of my old boards in the junk box.

Note that this is a working circuit and not a simulated design. I've built several of these. There might be an error or two in the drawing or parts list, however. Although it is a comparatively simple circuit, it is not recommended for beginners. The power supply is capable of delivering high voltage at high currents, and if something goes wrong, it will seriously go wrong. Feed the input with a 60Hz sinewave and connect your toaster to the output to see what I mean.

Suggested rail voltage is $\pm 80V$, so a $2 \times 60V$ 1200VA transformer for each channel is what you need. Add a 35A bridge rectifier and at least 40mF / 100V worth of capacitance per rail. A soft start circuit for the transformer, primary and secondary fuses and last not least a protection circuit is needed. You may use the protection circuit published in the 'Elektor PA 300' article – it's simple and it works. You might have to change R42 and R43 because of the higher rail voltage.

There are 12 TO-3 devices that need to be cooled properly. In my opinion, the best way is to get 4 extrusions with vertical fins, mount 3 devices on each and mount them with L-shaped bars to form a tunnel. A (quiet but powerful) fan should be added to enforce airflow. The output devices and emitter resistors can be wired p2p on the heatsinks whereas the driver circuit should be built on a small board. Diodes D103..D106 are a temperature sensor and should be mounted on the heatsink (using a small board). Bias can be adjusted using VR118, recommended value is 250mA. R121 and R122 should be chosen to limit maximum output current to a safe value.

R114, R115, R119, R120, R123, R124	Metal Film or similar, 1.1W, 5%
R106, R109, R125..R137	Metal Oxide or similar, 5W, 5%
VR118	Variable Resistor, 0.25W
All other resistors	Metal Film, 0.5W, 1%
C101, C103..C105, C107, C109, C111..C115	Film 160V
C106, C110	Electrolytic, 25V
C116, C117	Electrolytic, 100V
D101, D102	Zener 15V, 1.5W
D103..D110	1N4002
D111, D112	BY500-4
T101, T105	MJE350
T103, T104	MJE340
T102	BD139
T106	TIP35F
T107	TIP36F
T108..T113	MJ15022
T114..T119	MJ15023
IC101	NE5534

No rants please. This is not high end – simplicity and power were primary goals. I did not design the circuit, but I built several and all are still working. There are better sounding designs now, but they are more complicated and much more expensive. Decide yourself.

Feel free to contact me with questions, but please do a search on the forums first. Probably someone else already asked the same question. I'm registered at www.diyaudio.com as 'AMT-Freak'.

If you find errors in this document, please drop me a note.

Have fun!

Oliver.

