

## "National" equalizer.

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Every time my friends asked me to recommend to them a preamp-equalizer circuit for replication or to comment on an existing circuit, I was in a certain confusion, because I did not like any circuit. Either because of complexity for replication or because of its circuitry.

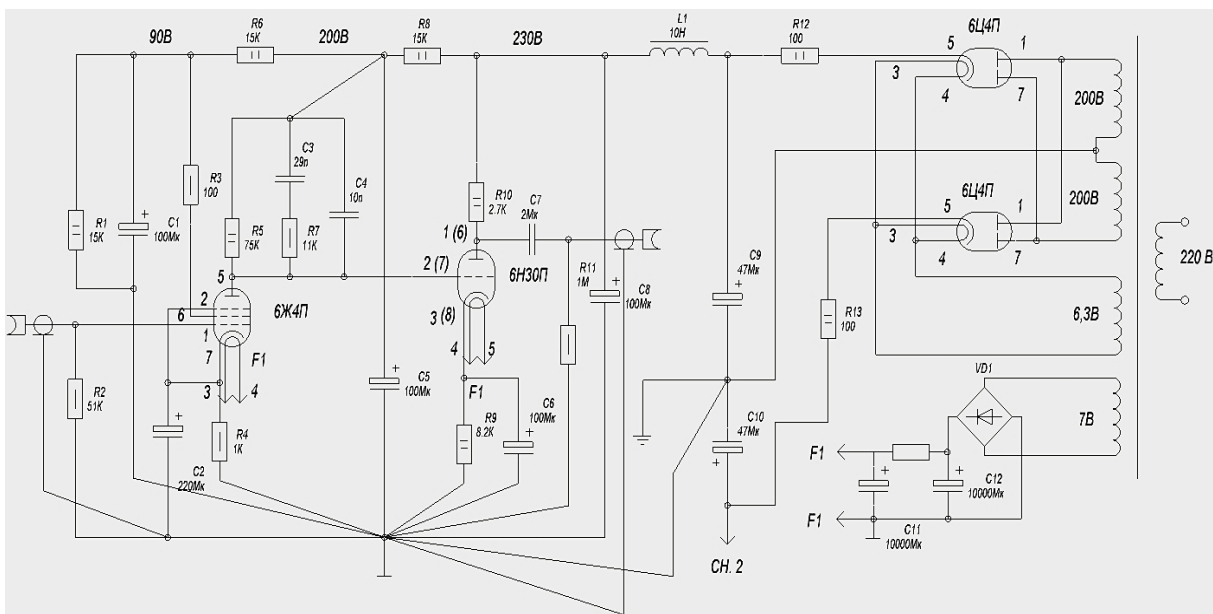
Therefore, the task was to create a simple, well-repeatable setup, that has great potential for development in terms of achieving the highest possible sound quality. I personally make special demands on this parameter.

This task was successfully completed, and one of the options most suitable for replication is offered for your attention.

### Features of the design.

The device is made according to traditional circuitry for me - without an OS [?, Ed.], with a direct interconnection between the stages, the minimum possible values of active resistances and the minimum possible number of elements in the signal path.

### Full size circuit



I obtained the following technical parameters:

- Nominal Input Level 5mV
- Nominal Output Level (1kHz, 5mV) 0.75V
- Output impedance <math><1\text{k}\Omega</math>
- Signal to noise ratio (unweighted) > 70dB
- Nonlinear Distortion + Noise (1-10KHz, 5mV) <math><0.3\%</math>
- Deviation from RIAA in the range of 100-16000Hz + -0.5dB
- Deviation from RIAA at frequencies of 20 and 20,000 Hz -1dB

Parameters can be improved if one attempts this goal.

RIAA correction is carried out by the entire input stage, this should be discussed in more detail: The pentode 6AU6 (domestic analogue 6Ж4П/6SH4P) was selected as the input tube in the pentode amplifier configuration.

The fact is, that when loaded with a resistive load, the pentode is a controlled current source and the stage gain is completely dependent on and proportional to the anode load resistance. Therefore, by making the anode load resistance frequency-dependent, we can very elegantly perform RIAA correction. This is implemented in this circuit.

The gain of the input stage at a frequency of 20 Hz is 130, at 1 KHz 13, at 20 KHz it drops to 1.3. The calculation of the RIAA chain is standard, based on the value of the series resistor equal to the anode load (the internal resistance of the tube is at least an order of magnitude higher and does not have to be taken into account in practice).

#### **More details about the circuit.**

The input stage operates at an anode voltage of 80V, the second grid voltage is 90V, and the stage current is 1.6mA.

In the output stage, a double triode 6H30П-ДР/6N30P-DR [longlife MIL quality version, Ed.], common for two channels, is used, which has a low internal resistance and good sound properties. In this circuit, it provides a gain of 11 and an acceptable output impedance for the circuit. The current through the triode is set by the resistor R9 and is 10 mA.

Kenotron power rectifiers, there are two of them according to the number of channels, common to the channels is only a power transformer.

Tube filaments are powered by a rectified and filtered voltage. The resistance of the series resistor must be selected experimentally.

#### **About the design and the elements used.**

Needless to say, all elements, without exception, affect the sound. There are no short-cuts in the sound. Any resistor and any piece of wire contributes to the formation of the "voice" of the amplifier. However, unfortunately, it is not always possible to apply the best elements in view of their unavailability and high price.

Therefore, my recommendations are as follows:

First of all, you need to think about the sound quality of the capacitors of the cathode circuits C2 and C6, as well as the quality of the elements of the equalizer circuit (these should be mica or paper-oil capacitors [no longer available, use industrial quality foil capacitors, Ed.]).

The resistors in the anodes and the correction circuit are best of all tantalum or Richen Ohm [alternative untranslatable, use metal film resistors, Ed.].

The C7 capacitor is very important, this is the only "pass-through" capacitor in the circuit.

Next come the power capacitors. As to these, apart from electrolytic ones, MBGOs [MIL grade aluminum-paper, Ed.] can be used, taken out of metal cases and filled in plastic boxes. The size, however, will turn out quite large, but the sound will be good.

Allowable denomination:

C2 up to 50uF, C5 up to 50uF, C6 up to 20uF.

#### **Construction.**

It must be borne in mind, that the construction of the device affects the sound no less than its circuitry, so approach the construction as carefully as possible, try to avoid compromises!

Do not forget that every detail (especially input pentodes) has a microphonic effect and all mechanical influences, in the end, are in the sound.

The operation of the equalizer on spikes is required.

Experiment more, try different options, do not forget that the circuit is not final, this is just an excuse to think and come up with something of your own, to create your own sound, unlike any other!

Good luck

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**Editor's notes:**

Original text in Russian downloaded from <http://www.audioworld.ru/> and translated by Google Translate before editing. Not everything was smoothed out, but technical terms and descriptions adapted to English use. If you find errors or have comments please e-mail to hb9aik ® hb9aik.ch.

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