HYBRID STABILIZER

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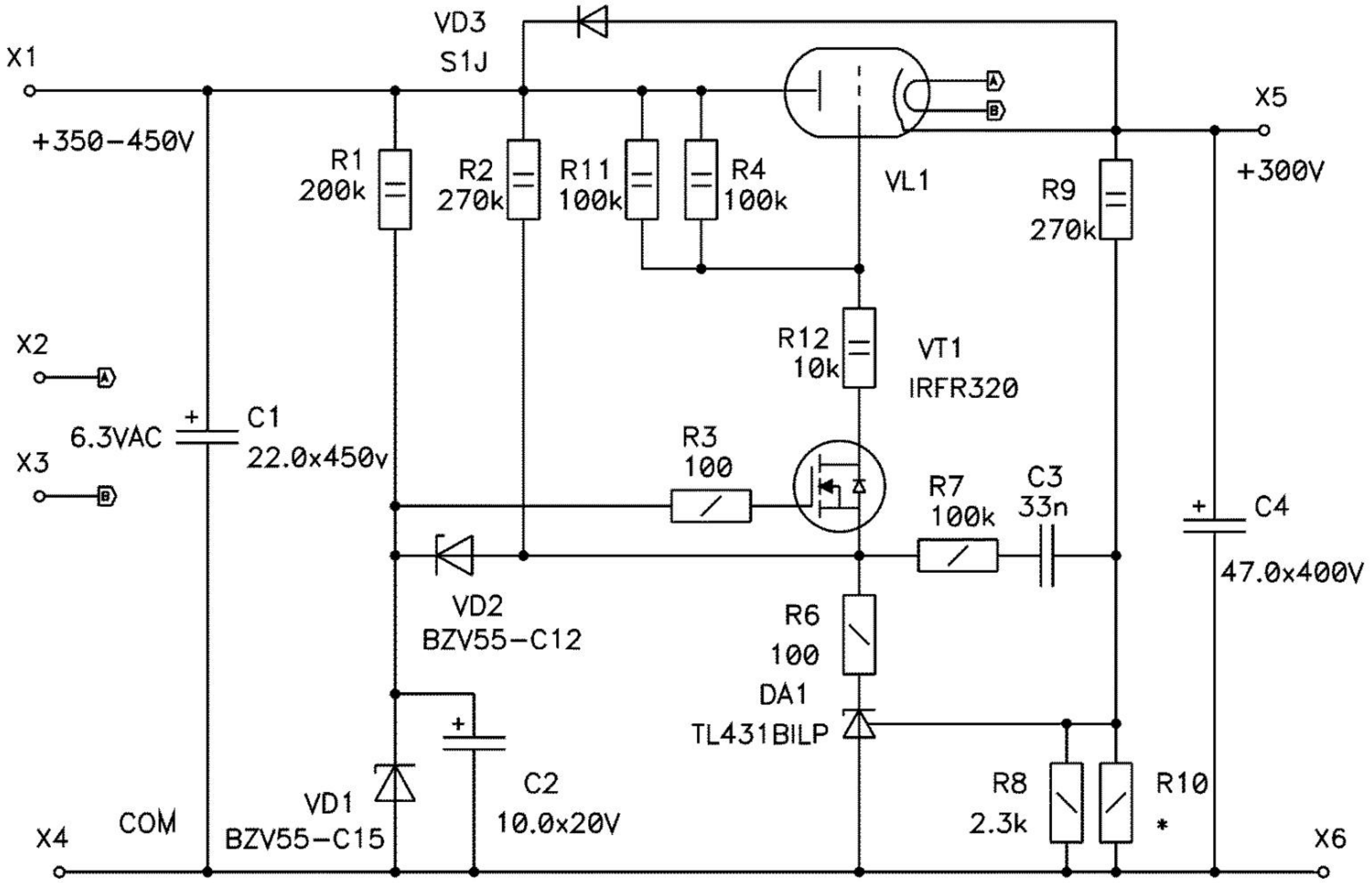
The article provides a diagram and recommendations for the implementation of a high-voltage stabilizer with a through lamp.

The basis for this stabilizer was the circuit from the article "SIMPLE HIGH VOLTAGE STABILIZER". Such a structure has proven itself well in terms of repeatability, parameters, ease of scaling - and has been repeated many times in different designs in different versions.

We can say that the next modification of the circuit was the replacement of the pass transistor with a powerful triode. In general, such a modification is a rather controversial issue, since the general parameters have deteriorated - the minimum required voltage drop across the stabilizer has increased significantly, the dynamic parameters have also deteriorated slightly due to the lower loop gain in the upper frequency region, and there is a need for an additional “floating » filament winding. So, from a technical point of view, the use of such a stabilizer is justified only in case of an urgent need to get rid of the cooler of the pass transistor. But there are various other motives - esoteric, marketing, just personal preferences. So to use this scheme or not - the choice is yours.

The undoubted advantage of the stabilizer is the automatic smooth increase in output voltage and greater tolerance to overloads and short circuits without the use of additional circuits.

The stabilizer circuit is shown in Figure 1.



Picture 1

It has the following main parameters:

Output voltage Maximum	300V
load current Input voltage	70mA
Ripple suppression (100Hz)	350÷450V
	53dB

The static characteristics of the stabilizer are almost completely determined by the stability of the divider resistors R8, R9 and the parameters of the TL431 microcircuit and differ little from their solid counterpart.

A 6S19P triode is used as a passing lamp, the maximum output current of the stabilizer is determined by the allowable dissipation power at its anode. Without any changes in the circuit, the output current can be increased by using a different type of lamp, for example, 6S41S.

The stabilizer is not critical to the types of components used. Due to the peculiarities of use, some of the components of the circuit are intended for surface mounting. Without any harm, they can be replaced by output analogues or components with similar parameters. Mounting, of course, is desirable compact on a printed circuit board, but mounting by surface mounting is not forbidden. Capacities C1 and C4 must be

be placed next to the rest of the circuit components.

With proper assembly and serviceable components, the circuit does not require adjustment, it may be necessary to adjust the output voltage. Resistor R10 is intended for these purposes; it is undesirable to use a trimming resistor in this circuit. The divider parameters are chosen so that the output voltage is slightly less than the nominal voltage. In the presence of an oscilloscope, it is desirable to check the absence of self-excitation (which is theoretically possible with very, very unsuccessful installation).

A few words about changing the output voltage and choosing the input.

If it is necessary to change the output voltage within ± 20 ÷ 30 volts, then you can limit yourself only to recalculating the value of the resistor R8.

$$R8= \frac{2.495\times 270}{Uout-2.495-4-3\times 270} \text{ (kÿ)}$$

Where Uout is the output voltage.

If it is necessary to change the output voltage over a wide range, then it is necessary to recalculate not only the divider resistors, but also the resistors that set the mode currents of the VD1 stabilizer and the DA1 microcircuit. With a minimum input voltage, the current through VD1 must be at least 1÷2mA, and the total current through the microcircuit should be 2.5÷3mA.

Naturally, we must not forget to control the power dissipated by the resistors when recalculating their ratings. Such significant changes also require appropriate knowledge; less experienced readers should take this into account and correctly assess their strength.

In the general case, the minimum input voltage (taking into account the amplitude of ripples) can be estimated based on the internal resistance of the lamp and the maximum operating current of the stabilizer. For calculations, we can take the average internal resistance of 6S19P equal to 430ÿ. The maximum input voltage is determined by the operating current of the stabilizer and the power dissipation at the anode of the lamp.

$$\text{Uinmaxÿ} \frac{pamax}{I}$$

Where: Uinmax is the maximum input voltage.
pamax - the maximum power dissipated by the anode of the lamp.
I - average current consumption from the stabilizer

The second limiting factor is the allowable maximum voltage at the cold lamp anode. For 6S19P, this is 500 volts.

The main scope of the stabilizer, given its limited energy tic features: pre-amp stages, pre-amplifiers and RIAA equalizers.

Forewarning possible questions, I want to say right away that the printed circuit board for the stabilizer was not developed separately. Two channels of the stabilizer were immediately integrated onto a common printed circuit board of the power system (Fig. 2). From the figure, you can approximately estimate the area of the board occupied by one channel, which is approximately 30 cm2

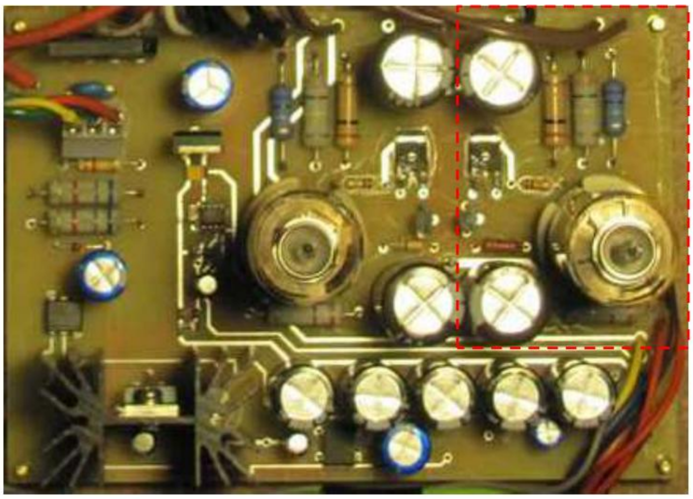


Figure 2