ity it is designated only structurally. We'll notice that positive and negative working cycles can be displaced depending on the character of loading 12: at inductive loading the transition point of a current sinusoid through zero is displaced to the right and, accordingly, the unlocking moment of logic keys 15 and 16 is displaced as well. Condenser serves for compensation of input inductance.

If the network voltage exceeds the rating value, relays 14 and 8 will be on. Contacts 5 and 6 will open and contacts 4, 7 will close. Winding 11 of transformer 2 becomes voltage adding. Thus, the stabilizer carries out its function at fluctuations at network voltage both downwards and upwards from the nominal value. As the modulation frequency can be high enough, e.g. 1–12 kc, voltage pulses filtration of voltage adding does not represent a problem and is carried out by means of condenser of a small capacity and also due to dispersion inductance of transformer 2 designed for 50–60 cycles, i.e. is a typical stepping down transformer. However, it is necessary to note that in this case the transformer has alternatively two modes: the mode of an autotransformer when it is connected for a network and the mode of a current transformer when primary winding 3 is short-circuited by transistor. In the first mode the current in transistors and in a primary winding is equal to the magnetization current which is an additional advantage of the scheme and high frequency of modulation allows us to get rid of distortions. Semiconductor relay 14 is necessary to provide the high factor of return, i.e., the necessary accuracy of operation of relay 8.

Thus, the device offered provides high frequency of modulations with filtration of impulses of voltage adding by means of a condenser of small capacity and also due to dispersion inductance of a transformer. It allows us to exclude voltage distortion in a network.

References

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A SMALL-SIZED VOLTAGE STABILIZER WITHOUT SWITCHING CONDENSERS

Magazinnik L.T., Kalabanovsky I.A.

The Ulyanovsk State Technical University, Ulyanovsk, e-mail: kicickp@mail.ru

A small-sized voltage stabilizer without switching condensers in comparison with widely known analogue provides smaller mass parameters due to the application of a minimum quantity of semiconductor devices and more effective current loading of the device and a network as a whole.

It is necessary to recognize as a lack of many stabilizers comparative complexity and big mass parameters connection with the necessity of application of switching condensers.

In comparison with widely known analogues the offered voltage stabilizer [1] provides smaller mass parameters due to the application of a minimum quantity of semiconductor devices and more effective current loading of the device and a network as a whole. The device provides a combination of voltage adding transformer functions and functions of a compulsory locking thyristor device.

Let's consider the stabilizer operation (Figure) the network and loading voltage are smaller than a nominal level, i.e. at $U_s < 220$ V. It is assumed that in this case relay 6 is initially switched on and its contacts 5 shunt a primary winding of transformer 1, accordingly, the voltage at its secondary winding is also equal to zero. When thymistor 4 is off, the loading forms a series circuit with a secondary winding of transformer 2, which in this case acts as a reactor. Thus the most part of the mains voltage will be applied to a winding and loading voltage can be practically equal to zero. However it takes place only on the initial site of a mains voltage half-wave the duration of which is determined by the «breakdown» voltage of stabilitron 9

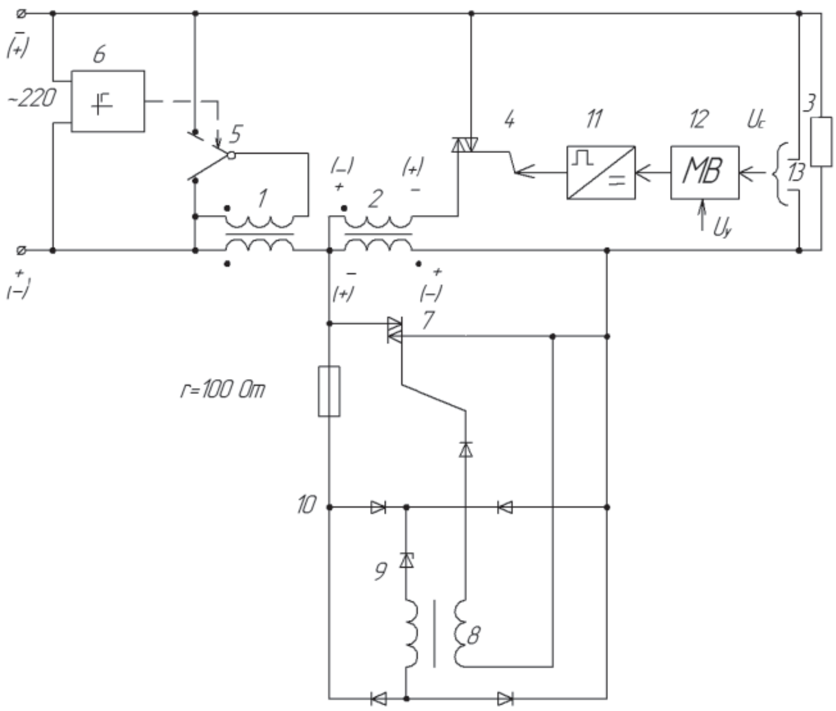
$$\gamma = \arcsin\frac{U}{220\sqrt{2}} \approx 10\ el.\deg rees.,$$

$$at\ U_{cm} \approx 50\ V.$$

When the voltage reaches the specified level and stabilitron 9 in transformer 8 primary winding of galvanic outcome starts to conduct current, the in thymistor 7 control circuit will be increased and the latter will be on. Shunting of transformer 2 secondary winding by means of thymister 7 will result in spasmodic change of the loading instant voltage up to the level of the network U_s voltage.

It is assumed that the automatic control and output voltage stabilization system functions according to the principle of output coordinate (U_c) deviation from a present value (U_y). The signal of a regulation mistage from an output of regulator 12 enters the input of pulse phase control device 11 which develops unlocking pulses for thymistor 4. The smaller the stabilizer output voltage, the smaller the phase angle of thymistor a control, the more the voltage adding which is delivered to the loading circuit by transformer 2 primary winding is connected to the mains voltage source, the e. m. being induced in the secondary winding, the phase of which due to the way of primary and secondary winding connection specified in the scheme coincides with the network voltage phase. As a result thymistor 7 is under the influence of the specified winding indirect voltage and is locked. Thymistor 7 locking out results in the fact that the loading instant voltage from the moment a up to the end of a half -cycle is determined by the sum of the mains voltage and voltage adding transformer 2 secondary winding voltage. Thus the effective value of voltage adding provided by transformer 2 during the period is in direct dependence on a regulation mistake and it provides a stabilization effect of an output voltage. Thymistor 4 at the considered half-cycle is switched off naturally after the mains voltage reduction and then the current in transformer 2 primary winding is decreased up to zero. It is necessary to note that the repeated switching of thymistor 7 and shunting of the specified transformer secondary winding is possible only when thymistor 4 is switched off. During the following mains voltage the circuit will function similarly.

If the network voltage exceeds the nominal level $U_s > 220$ V relay 6 will be switched and deliver the mains voltage to the transformer 1 primary winding via contacts 5. The winding of the specified transformer are connected in such way that the induced in the secondary winding e.m.f. is opposite to the network voltage in phase, therefore the resulting loading voltage will be determined by the difference of the mains voltage and the e.m.f. of stepping down transformer 1 secondary winding. If the output voltage reduction is excessive, the stabilization system with stepping up transformer 2 begins its functions.



A small-sized stabilized without switching condensers

Thus, the considered stabilizer provides constant maintenance of output voltage at the mains voltage fluctuations in both nominal value directions employing a minimum quantity of semiconductor devices. Additional thymistor 7 provides shunting of a stepping up transformer winding at the moments when voltage adding is not necessary and it promotes more effective current device loading and loading of a network as a whole.

Combing voltage adding transformer functions and thyristors artificial switching device functions allowed us to exclude switching condensers, it being an advantage of the technical decision offered.

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