

ON THE APPLICATION OF VARIOUS SWITCHING ELEMENTS FOR INFORMATION TRANSMISSION AND DISTRIBUTION

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Peculiarities of the switching elements use in switching systems are being observed. Electromagnetic and electron elements may be used as switching elements in switching points. Two separated electric circuits are used for the fulfillment of the switching system function at application of electromagnetic relay as the switching element. If electron elements are used in the switching system, then they may be divided into 2 groups on the operating principle: elements with and without memory property.

Electron elements, having the memory property in the state of the stable balance, don't consume the energy. Diodes on the base of compound semiconductors, which don't consume the energy from the source in the balance state, may be used as non-contact switching elements with 2 stable states. Schemes of logic elements, whose work is based on the signals coincidence on the entry, may be used in switching systems in switching points. Then the controlling circuit and the informational circuit are joined in a single element in each switching point.

In switching systems, providing information transmission and distribution, switching elements are used for closing and opening of electric circuits. Various switching elements may be used versus the application region and claims, raised to switching systems, respectively. Electromagnetic and electron elements are usually used in switching systems for the closing and opening of electric circuits [1,2].

Neutral electromagnetic relays of the direct current, named usually as electromagnetic relays with opened and sealed contacts, are most widely used in the technology of the automatic switching as electromagnetic elements.

In switching systems respective switching elements are set in the open state for the closing of electric circuits. If electromagnetic relay is used as the switching element, then the respective relay responses for the closing of the necessary electric circuit.

The response of the respective relay is realized by the special control signal. Respective contacts, forming the transmission section for information signals, are closed at the relay response. Thus, at the application of the electromagnetic relay as the switching element in switching systems two separated electric circuits are used for the fulfillment of the switching system function. One of these circuits is controlling, the other is informational. The relay is switched on and off by means of the controlling circuit, and information transmission is realized by means of the informational circuit, i.e functions, fulfilled by these electric circuits, are different. It is necessary to take into account this peculiarity at the switching nodes formation with the interconnection mechanism of the controlling device with the switching system.

Such interconnection device must provide the output of respective control signals for the response of electromagnetic switching elements. As the control circuit and the information circuit are separated at the use of the electromagnetic relay as the switching element in the switching system, then all controllable relays are joined in one matrix for the control of switching elements.

The selection and the switching of respective switching elements are realized by means of control signals, i.e. the control signal is used only for the controlling circuit of the switching system, but this signal isn't connected with the informational circuit.

It allows to use the signal of the necessary shape and force for the control of electromagnetic elements. Various non-contact elements, having two stable states, are used as electron elements in switching systems. Non-linear dependence between physical values, giving the opportunity of jump-shaped transition of the element from one state into another, is used at the work of these elements.

On the operating principle, electron elements may be with and without memory. In any case the element changes its state under the influence of the external controlling signal, but in one case the element conserves this state up to next appearance of the controlling signal, and in another case it is only temporary, until the controlling signal exists. Electron switching elements, with the memory property, acquire the especial importance, because these elements don't consume the energy from the feed source in the state of the stable balance.

Diodes on the base of compound semiconductors, specifically diodes on the base of copper selenide (Cu₂Se) may be used as non-contact switching elements with 2 stable states [3,4,5].

The scheme of the memory element with the diode on the base of compound semiconductors, worked out by researches of Institute of Physics of Azerbaijan AS, is shown on fig.1.

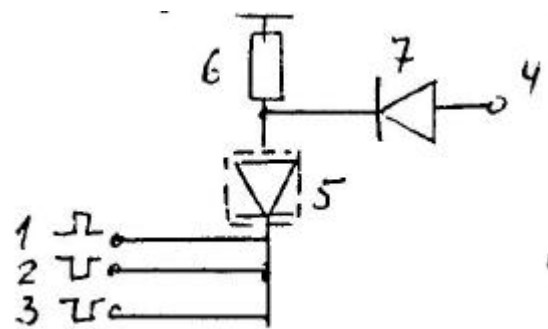


Fig.1. The scheme of the memory element on the base of Cu₂Se.

Element contains the controlling entry (1), informational entry (2), limiting resistor (3), exit (4) and the diode on the base of compound semiconductors (5). The information transmission from the entry 2 to the exit 4 is provided at the receipt of the controlling signal to the entry 1. The switching peculiarity at the use of diodes on the base of compound

semiconductors in switching systems is concluded in the fact, that controlling signals and informational signals are separated in the time and space. Such peculiarity of diodes on the base of compound semiconductors allows to construct switching systems of high reliability.

Schemes of logic elements, for example, the scheme of the logic element "I", whose work is based on the signals coincidence on the entry, are used at the contemporary stage of electron technology development in switching systems. Then both the control circuit and the informational circuit are

joined in a single element in each switching point. The controlling signal and informational signal fulfill identical functions. The signal on the exit of the scheme of the logic element is respective output signal of the switching system.

The indicated peculiarity of logic elements allows to construct switching schemes on the matrix principle.

It should be noted, that the use of the same or another elements as the switching element depends on the region of the switching system application and on claims, raised to them.

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- [1] *O.N. Ivanova*. "Automatic switching", "Radio and communication", Moscow, 1988.
- [2] *K.P. Kulikovskiy, V.Y. Kupe.r* "Methods and means of measurements", Moscow, electroatom issue, 1986.
- [3] *G.B. Abdullayev, Z.A. Aliyarov, G.A. Abbasov*. "Analytic calculation and the construction of equivalent schemes with the use of diodes on the base of compound semiconductors", For technical progress, 19, Baku, 1974.
- [4] *G.B. Abdullayev, Z.A. Aliyarova, G.A. Abbasov and etc.* " Author certificate ¹ 82581, Priority from the 28th of January, 1972.
- [5] *G.B. Abdullayev, E.N. Zamanova, G.A. Abbasov, Z.A. Aliyarova*. "The semiconductive switch", Author certificate ¹ 664419, priority from the 7th of December, 1979.

Received: 07.06.02