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IMPROVEMENT OF THE QUALITY OF ELECTRONIC CONTACTS ON THE BASIS OF COMPLETE AND PARTIAL GROUP CONTROL

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Electronic switchboards, as one of the basic means in the field of information and communication technologies, find a wide application for transmission and distribution of information. Wide application of switchboards in many branches of engineering is the reason for imposing various requirements on them. Depending on requirements placed on switchboards they can operate in various modes with various switching elements [1]. To ensure a high quality of electronic contacts is one of the basic requirements placed on electronic switchboards. Decreasing capacity of a switchboard can be the basic line to upgrade the electronic contacts. The decrease in the capacity of a switchboard reduces the interrelation between electronic contacts, increases the level of the proofing against noises of input controlling circuits and, hence, the standard of electronic contacts improves. The increase in the capacity of switchboards leads to the degradation of standard of electronic contacts. It is especially appreciable with individual control of electronic contacts [2]. With individual control economical efficiency and reliability of an electronic switchboard also decrease.

It is especially important to develop the structure of an electronic switchboard which can ensure not only the improvement of standard of electronic contacts, but also high economical efficiency and reliability. Development of the structure of an electronic switchboard for the corresponding capacity with high standard of electronic contacts and with other high properties can be traded off for the complete and partial group control and use of decoders [3].

Complete group control is such method of controlling the electronic contacts of a switchboard, at which for the control of all electronic contacts applied on one vertical (or applied on one horizontal), one controlling circuit is used. Partial group control is the method of controlling the electronic contacts of the switchboard, at which for the control of a part of the electronic contacts applied on one vertical (or on one horizontal) one corresponding controlling circuit is used.

In the figure 1 is shown the circuit of an electronic switchboard constructed with application of the method of complete group control of the electronic contacts.

By this circuit a decoder and a circuit OR with group control of switching elements are used as each vertical of a switchboard. On an input of a decoder comes a code combination of input signals in the form of variables $X_0,\ldots, X_I$ with direct and inverse values. Let us notice, that the connection of input variables with inputs of all other elements of a decoder is shown on the circuit by dotted lines. Combinations of entrance variables meet the call connections which arise on the inputs of a switchboard.

Each vertical on the circuit of a switchboard contains H elements, and inputs of each element consist of two parts. The first part of inputs with the notations of $\overline{X}_{01}, \overline{X}_{p1}\ldots \overline{X}_{0м}, \overline{X}_{pм}$ and $X_{01},X_{p1}...X_{0м},X_{pм}$ are the inputs for decoders. The second part of inputs with the notations of $X_{и1}...X_{им}$ are the information inputs, and with the notations of $X_{г1}...X_{гм}$ are the inputs for group control of electronic contacts. With ingress of a code combination of signals X_pX_0 meeting call connections into an input of a decoder the choice is carried out, and with ingress of a signal of group control $X_г$ switches on the required electronic contact. When the required electronic contact on one of M-output poles of a switchboard turns on, produces the output signal, which meet an output information signal. Functioning of a switchboard with complete group control of electronic contacts can be described by means of expressions:

$$\mathbf{C_0}=\overline{X}_{p1}\ldots\overline{X}_{01}.\overline{X}_{г1}.\overline{X}_{и1}\ \ldots\ \mathbf{C_0}=\overline{X}_{pM}\ldots\overline{X}_{0M}.\overline{X}_{гM}.\mathbf{X_{и1}}$$

$$\mathbf{C_1}=\overline{X}_{p1}\ldots\overline{X}_{01}.\overline{X}_{г1}.\overline{X}_{и1}\ \ldots\ \mathbf{C_1}=\overline{X}_{pM}\ldots\overline{X}_{0M}.\overline{X}_{гM}.\mathbf{X_{и1}}$$

$$\overline{C}_H=\overline{X}_{p1}\ldots\overline{X}_{01}.\overline{X}_{г1}.\overline{X}_{иH}\ \ldots\ \overline{Ж}_H=\overline{X}_{pM}\ldots\overline{X}_{0M}.\overline{X}_{гM}.\overline{X}_{иH}$$

where $X_{и1}$, $X_{иН}$ are information signals; $X_{г1},\ldots,X_{гМ}$ are signals of complete group control; $X_{01},\ldots,X_{р1}$ are signals on inputs of a decoder.

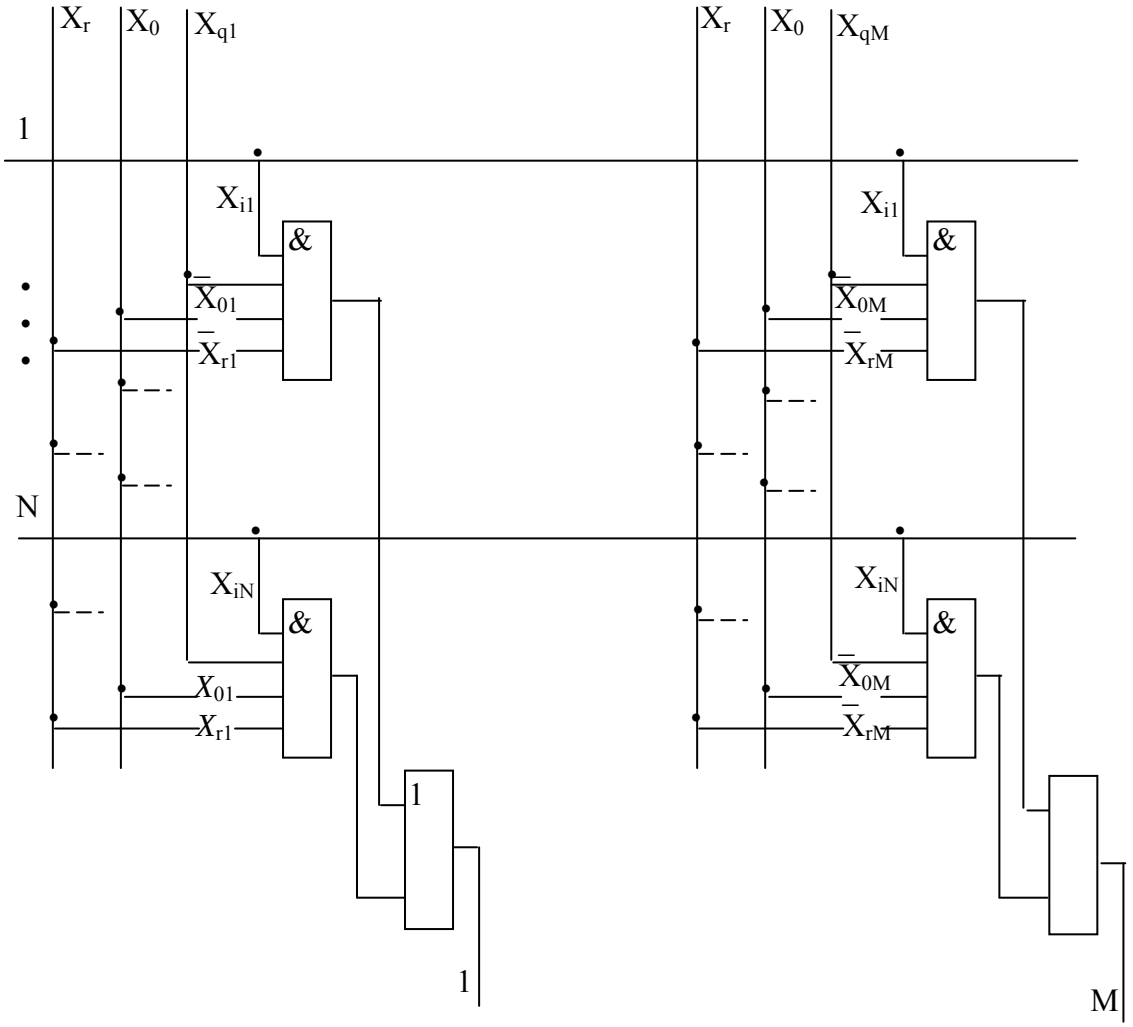

Fig.1. A circuit of a switchboard with full group control

The given expressions show, that each vertical of a switchboard represents an aggregate of circuits of electronic contacts and one input of each of them is an input of complete group control. Closing of the meeting electronic contact leaves the electronic contacts on the whole vertical H-1 unemployed. The increase in number of unemployed contacts can cause the degradation of standard of electronic contacts.

In order to reduce the number of unemployed contacts and ensure improvement of standard of electronic contacts the switchboard can be constructed with the use of partial group control; it is shown in the figure 2.

Thus the electronic contacts on each vertical are divided into separate parts, and for each part of contacts the separate controlling circuit of group control is used. On the given circuit each vertical is divided into separate parts, and in each part of a switchboard n of switching elements is used. The output element of each vertical is the common element, and the output of this element is connected to an output pole.

Unlike the circuit of a switchboard with the complete group control, shown in the figure 1, on the circuit of the switchboard, shown in the figure 2, for each part of a vertical the separate controlling circuit of group control is used. Thus the closing of required electronic contact is

traded off for the feed of signals on the meeting circuit of partial group control. Control on each part of a vertical of an electronic switchboard is carried out according to control of a vertical with complete group control. The use of the circuit of an electronic switchboard with partial group control maintains the decrease in the number of unemployed elements on each vertical that leads to improvement of standard of electronic contacts.

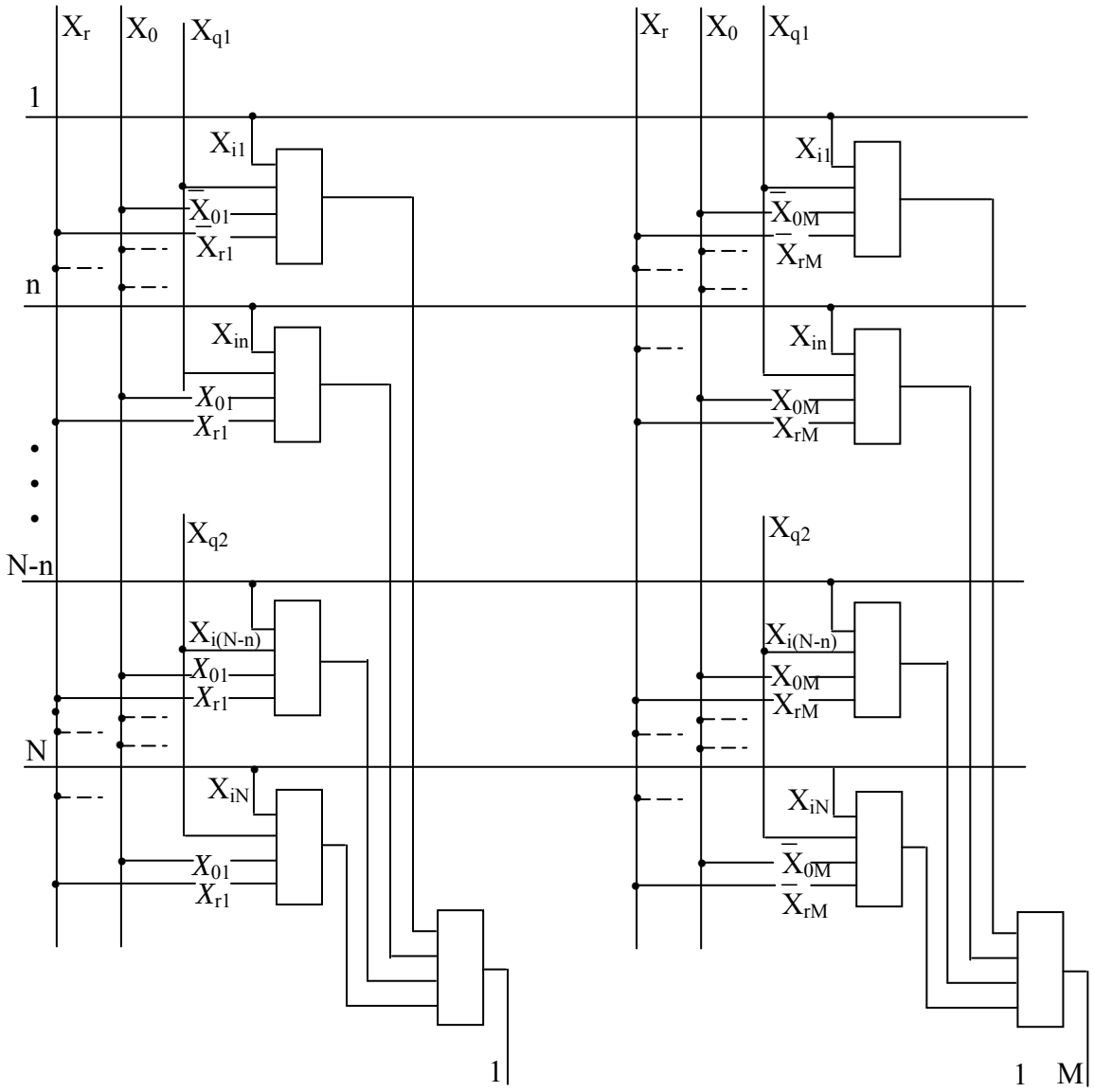

Fig.2. A circuit of a switchboard with partial group control

Literature

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