ISSN: 2350-0328
International Journal of AdvancedResearch in Science, Engineering and Technology
Vol. 6, Issue 3, March 2019

Developing of microelectronic block HCC

Azizov Asadulla Raximovich, Ametova Elnara Kuandikovna

Assistant professor, Tashkent institute of railway engineering. Republic of Uzbekistan.
Senior lecturer, Tashkent institute of railway engineering. Republic of Uzbekistan.

ABSTRACT: The issue of developing a microelectronic block of a block route-relay centralization of railway automation and telemechanics is discussed in the article. A large number of electromagnetic relays are used in the railways of "UTY" JSC, in accordance with the technical policy of the railways of Uzbekistan, aimed at refusing to use a large number of electromagnetic relays with a mechanical contact system, by replacing the latter with microelectronic devices, in particular microcontrollers and optical-relays. The control block of paired arrows the HCC is discussed in the article, which contains code relays. The analysis of the block circuit concept is carried out and it is determined which elements are to be replaced and on which microelectronic devices. Electric circuits are considered that provide automatic recruitment of a train route that contains four circuits. The analysis of the block operation in the circuit of push-button relays, which receive power from the block HCC, was carried out, the calculation of the assumed current strength showed the need to use an optical-relay type Pvg-612 in this circuit. The second circuit of the automatic route set is the circuit of the automatic button relays AKH. The analysis of this circuit determine the object which is the proposed opto-relay. The magnitude of the calculated current, taking into account the additional resistance in the beginning and end of the route blocks, where the total ohmic resistance is 10 Ohms, indicates the need to use in this circuit also the Pvg-612 optical-relay. The circuit of positive control relays (ПУ) and negative control relays (МУ) is considered for the cases when different routes are used. When setting the route by the positive or negative position of the arrows, power is supplied to the electrical circuits of the ПУ and МУ relays via the Pvg-612 optical relay, as well as the Pc-817 optical relay. The analysis of the circuit of the correspondence circuit showed that it is possible to replace the mechanical contacts in this circuit with the microelectronic device of the Pvg-612 optical-relay. The article contains all the basic electrical diagrams of push-button relays, automatic push-button relays, control relays and correspondence circuits using an optical-relay.

KEYWORDS: railway automatics and telemechanics, electromagnetic relays, mechanical contacts, block electrical relay centralization, optical-relays, electrical circuits, button press fixation relays (push-button relays), automatic push-button relays, control relays, correspondence circuit.

I.INTRODUCTION

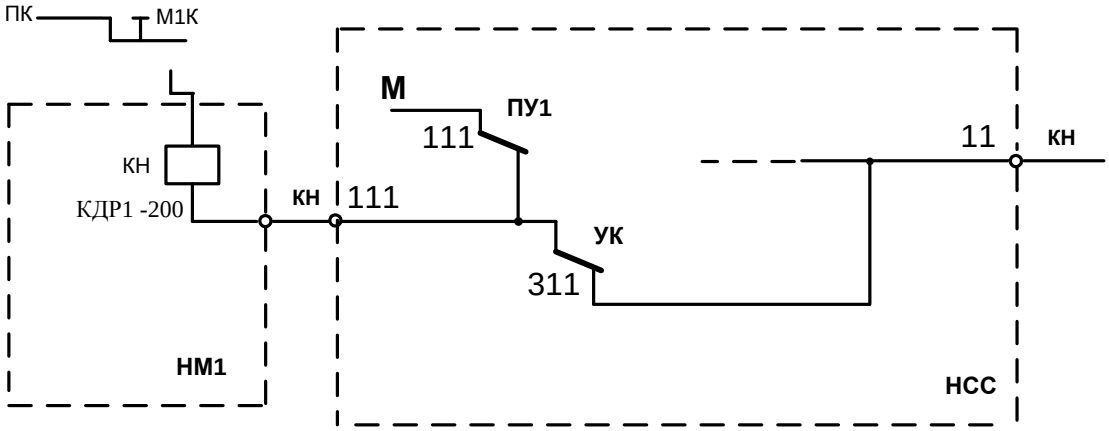
Relevance of work. A large number of electromagnetic relays are used in the railways of the "UTY" JSC. The device of the block electric centralization system is discussed in this article, which is exactly the block dial-up group HCC. In connection with the active refusal to use these relays and replacing them with microelectronic devices, it becomes urgent to consider the possibility of using microelectronic devices instead of electromechanical devices in route-relay centralized blocks [1].

The purpose of this article is to consider the question of replacing the existing КДР relays of the HCC block with microelectronic devices, in particular the use of an optical relay. Refusal of electromagnetic relays with mechanical contacts, involves the solution of a technical issue on replacing its windings and contacts with an optical-relay.

We will analyze the block concept and determine which elements should be replaced. It is most logical to consider the chains of a dial-up group separately.

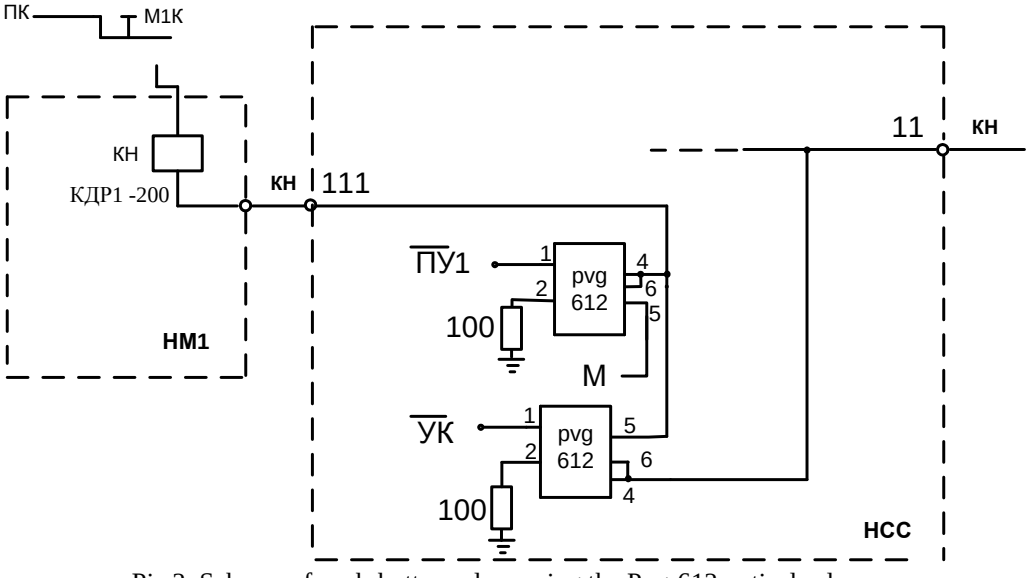
The circuit of the push-button relays starts from the terminals 21, 211, 11 and 111, with the help of which the minus of the power supply from the HCC block is supplied, in this case this circuit is strictly polarized pic.1.

ISSN: 2350-0328
International Journal of AdvancedResearch in Science, Engineering and Technology
Vol. 6, Issue 3, March 2019



Pic.1. Electrical circuit of push-button relays

In the electrical excitation circuit of a button relay includes the rear contacts of the relay ПУ1, ПУ2, УК and МУ. These mechanical contacts should be replaced with an optical-relay. To determine the type of optical-relay used, we determine the maximum possible switching current of this optocoupler. The final element of the chain of button relays is the winding of the relay КДР1 -200. According to the reference data [2], the relay coil has a resistance of 200 Ohm, and the response current is 120 mA. In the circuit of these relays, there is only one winding of the relay; therefore, for switching the circuits of push-button relays, an optocoupler relay with a switching current of at least 200 mA is necessary. The circuit diagram of push-button relays using an optical-relay is shown in pic.2. The circuit works as follows, when the M1K plus button is pressed, the ПК power is supplied to the winding of the КН relay and to terminal 111 of the НСС block, to feet 4 and 6 of the Pvg-612 optical-relay. A signal is sent to the input 1 of the optical-relay, from the output of the microcontroller, confirming the de-energized state of the ПУ1 relay. The optical-relay worked, connects its pins 4.6 and 5 with each other and thereby supplies the minus to the КН relay operation circuit.



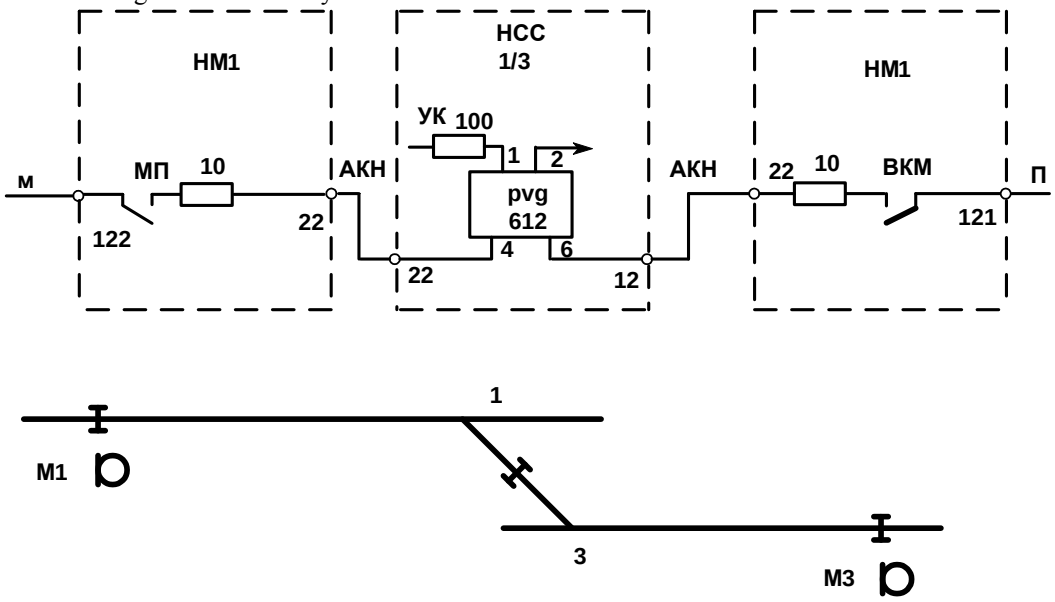
Pic.2. Scheme of push-button relays using the Pvg-612 optical-relay.

Consider the chain of automatic pushbutton relays АКН. The НСС block commutes this circuit through short-circuited terminals 22 with 212 and 112 with 12. When setting the route for the deviation, the АКН circuit passes through the terminals 22 of the contacts of the angular УК relay and terminal 12. To determine the parameters of the optical-relay, consider the entire АКН circuit when installing the longest route. In this case, the АКН circuits are series-connected АКН relays of the НМ1 and НМ2АП blocks. The relay of АКН, blocks listed above, according to [2], is КДР1М-3,8, i.e. relay with 3.8 ohm winding resistance. At the beginning of the АКН circuit, additional load resistances of 10 ohms are included at its end. Since the relay is current, it is necessary to consider the variant containing the smallest number of relay windings in the circuit, which is the route uses only one intermediate dialing

ISSN: 2350-0328
International Journal of AdvancedResearch in Science, Engineering and Technology
Vol. 6, Issue 3, March 2019

block. Then in the AKH circuit there is a total ohmic resistance of 10 Ohms in the block of the beginning of the route, the intermediate block of the HCC when setting the route on the minus of the paired arrow and plus 10 Ohms in the block of the end of the route. Thus, the maximum switching current of the Pvg-612 optical-relay circuit of an automatic push-button relay is 1 A. and less than it. Pvg-612 pins 4 and 6 provide electrical current switching regardless of polarity. The electrical circuit of the AKH circuit when installing the shortest route with an optical-relay is shown in picture 3.

Consider the circuit of control relays ПУ and МУ. When installing the route according to the plus position of the arrows, the power supply of the ПУ and МУ circuits in one case through terminals 23 and 213, the rear contacts of the МУ relay and the winding of the ПУ2 relay with a resistance of 3.8 Ohms.

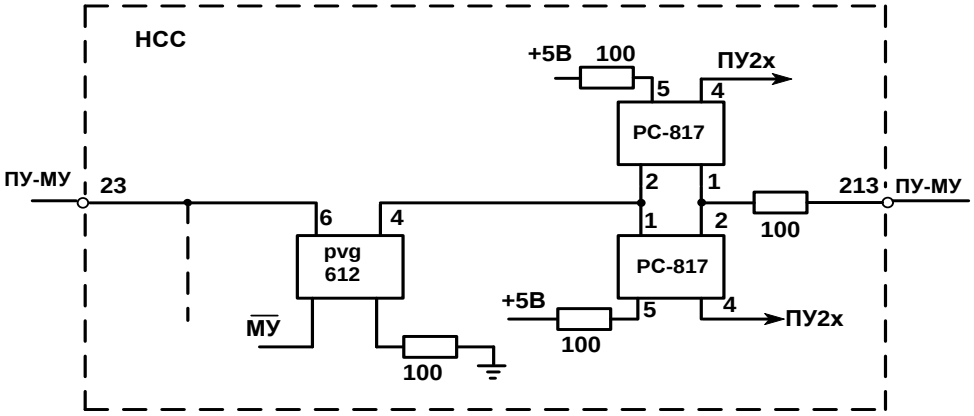


Pic.3. Circuit AKH circuit when installing the route for minus arrows using optical-relay

It should be borne in mind that the polarity of the circuit is equivalent, as for the plus, i.e. power is supplied to terminal 23, and to terminal 213 minus power, and vice versa, which must be borne in mind when choosing and connecting an optical-relay. In pic .3, taking into account the above, two optical-relays of the RS-817 type are used. Information about the presence of an electrical circuit between terminals 23 and 213, is sent to the microcontroller by the signal ПУ2х, which corresponds to the operation of the relay ПУ2.

A similar scheme for terminals 113 and 13 with the replacement of $\overline{МУ}$ on $\overline{УК}$ and ПУ2 on ПУ1.

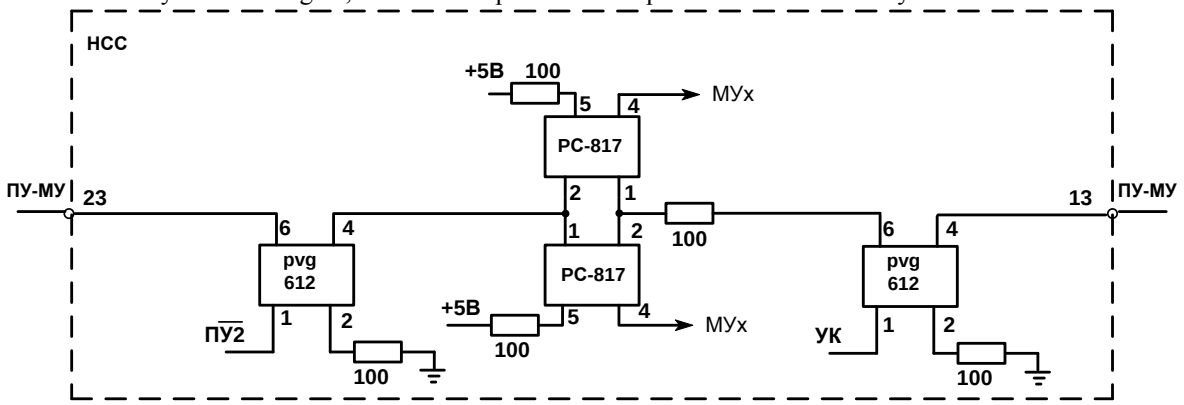
When setting the route by the minus position of the arrow, consider the electrical circuit passing through the terminals 23, 13 of the de-energized relay ПУ2 contacts ($\overline{ПУ2}$) the winding of the relay МУ and the actuated contacts of the control relay УК of the type КДР1М-3.8.



Pic.4. Circuit diagram of the ПУ-МУ using an opto-relay

ISSN: 2350-0328
International Journal of AdvancedResearch in Science, Engineering and Technology
Vol. 6, Issue 3, March 2019

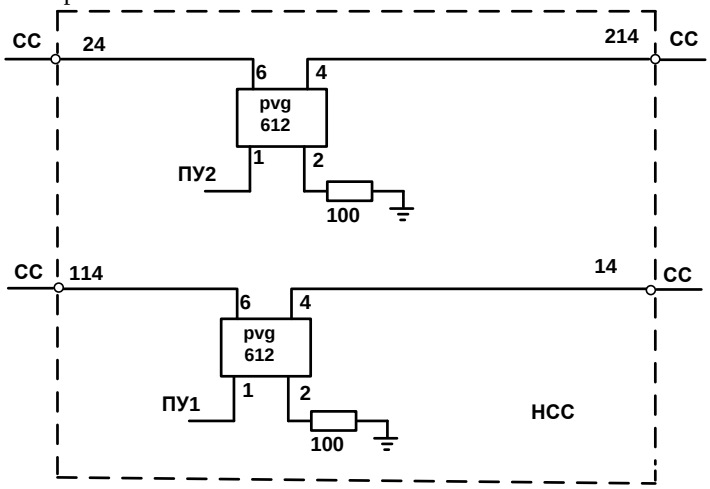
The current requirements for this circuit are similar to the АКН circuit. The circuit of ПУ, МУ at the minus position of the arrow using an optical-relay is shown in pic.4, where instead of the winding of the relay МУ an optical-relay of the type PC-817 is turned on. A distinctive feature of this device is the possibility of switching the 24 V circuit. On pins 1 and 2, with the generation of a control signal in a circuit of microcontrollers operating with + 5V voltage, taken from legs 5 and 4. In this case, information on the presence of an electrical circuit between terminals 23 and 13, is fed to the microcontroller by the МУх signal, which corresponds to the operation of the МУ relay.



Pic.5 Circuit of ПУ and МУ when installing a route by minus arrows

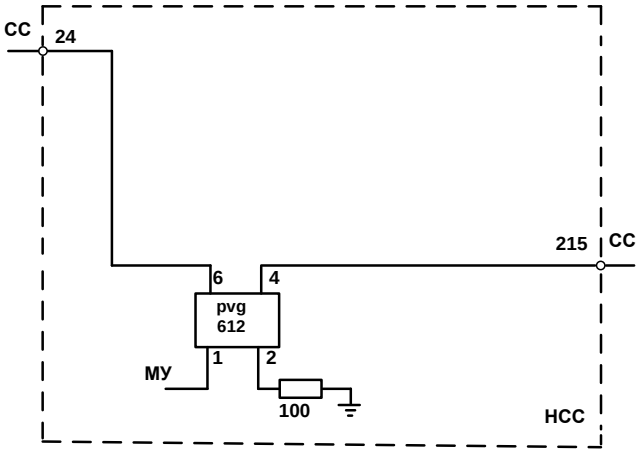
Consider the circuit of the correspondence circuit, checking the correspondence between the control relays of the position of the arrow and the starting relay. When installing the route according to the positive position of the arrows, the electrical circuits passing through terminals 24, 214, the contacts of the ПУ2 relay, terminals 114, 14 and the contacts of the ПУ1 relay work. In this case, it is the contacts of the ПУ2 and ПУ1 relays that need to be replaced. Since the electrical circuit in this case does not have a certain polarity, it makes sense to use an PVG 612 type optical-relay, with terminals 4 and 6, which pass a current of any polarity. The electrical circuit of these circuits is shown in pic.5.

In the case of installing the route by the minus position of the arrows, the electrical circuit of the correspondence circuit passes through terminals 24, 215 and the front contacts of the relay МУ, the schematic diagram of such a connection is shown in pic.6



Pic.6. Compliance diagram when setting the route for the plus arrows

ISSN: 2350-0328
International Journal of AdvancedResearch in Science, Engineering and Technology
Vol. 6, Issue 3, March 2019



Pic.7. Matching scheme when setting a route for minus arrows

Analysis of the correspondence scheme when replacing the windings of electromagnetic relays and its contacts on an optical-relay showed that this circuit does not contain the relay windings in the dialing blocks, but at the end of the circuit, an HMM1-700 was installed in the MI, MII, MIII and VD executive group blocks which is type guiding H relay.

This circuit allows current to flow in both directions, therefore, the Pvg 612 device is selected as the opto-relay, which allows a switching current of up to 1 A. When using pins 4 and 6, it allows current of any polarity to pass (pic. 7).

From the above it should be concluded that in electric circuits of push-button relays, automatic push-button relays, comparison circuits it is possible to use only an optical-relay of the Pvg612 type. In the electrical circuit of the ПУ-МУ, it is supposed to use in addition to the Pvg612 and optical-relay of the Pc-817 type.

REFERENCES

1. Никитин, А. Б. Основы проектирования электрической централизации промежуточных станций: учеб. пособие для специалистов / В. А. Кононов, А. А. Лыков, А. Б. Никитин; под ред. А. Б. Никитина. – 2-е изд., доп. и перераб. М.: ФГБОУ «Учебно-методический центр по образованию на железнодорожном транспорте», 2013. – 348 с.

2. Сороко, В. И. Аппаратура железнодорожной автоматики и телемеханики: справ.: в 2 кн., Кн. 2. – 3-е изд. / В.И. Сороко, Е.Н. Розенберг– М.: НПФ «Планета», 2000. – 1008 с.