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DESIGN OF THE OPTOPAIR SWITCH SCHEME IN "PROTEUS" SOFTWARE

***Anotation:** In this paper presents the schematic design of the optocoupler electronic switch circuit in the virtual modeling program "Proteus", the stages of transferring the circuit to the printed circuit board, as well as the methods of simulating the created circuit.*

***Keywords:** inverter, virtual modeling, printed circuit board, simulation.*

Introduction

Today, the rapid development of the electronics industry puts tasks such as designing and simulating electronic devices in computer programs on the agenda. When modeling electronic circuits of devices, first its principle scheme is created and analyzed with the help of virtual programs. The element library of virtual modeling programs contains a virtual model of any measuring instrument, and special laboratory equipment is not required to check a device. After the electronic circuit of the device is created, the printed circuit board and design of the created device can be designed in the next step [1-4].

This article shows the stages of designing an optocoupler electronic switch circuit in the "Proteus" virtual modeling program.

It is convenient to design different key schemes in Proteus software. Because the element library of the Proteus program includes real and virtual models of key elements provided by many manufacturers. Examples of such models are optoelectronic switch elements. Optoelectronic switch circuits are

widely used in industrial electronics. The most commonly used optoelectronic switches include optrons or optocouplers consisting of a photo transmitting and receiving element [5, 6]. According to the design of optocouplers, both elements are placed in one housing and are made so that light does not enter from the outside environment. A transmitting element converts electrical energy into light when an electrical signal (current) is applied to it. In the receiving element, the light energy is converted back into an electrical signal. In this case, the stability of the output voltage is achieved by changing the input voltage without electrical contact between the high-voltage part and the low-voltage part of the electrical device [7]. This feature of optocouplers is widely used to ensure stable operation of pulsed power supplies. Optocouplers are also widely used as switching elements in digital and analog electronic circuits. "LED" (light-emitting diode) is used as a transmitting element in optocouplers. Photoresistor, photodiode, phototransistor, photothyristors can be used as a receiving element, depending on where it is used and its function. Phototransistor optocouplers are widely used in electronic circuits [8]. To study the principle of operation of optoelectronic switch circuits, the following circuit is assembled in the Proteus program (Fig1).

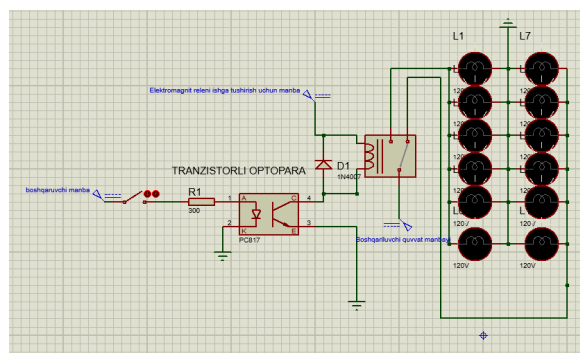


Figure 2. A simple scheme of controlling a high-power circuit using a low-voltage circuit using an optoelectronic switch

In the scheme shown in Fig. 2, an electrical signal is given to the input element of the transistor optocoupler - the photodiode by means of a switch using a 5V DC source. The coil of the electromagnetic relay is connected in

series to the collector of the receiving element of the optocoupler (contact 4 in the case) [9]. The operating voltage of the relay is 24V. There are three working contacts of the relay:

1. The common contact is connected to the positive pole of the main source.
2. Normally open contact.
3. Normally closed contact.

In the power circuit of the electromagnetic relay, a group of high-voltage incandescent lamps is connected in parallel to the normally open contact as a consumer. A group of such consumers is also connected to a normal open contact. When a 5V voltage signal is applied to the control contact, the electromagnetic relay connects the main power supply to the normally open contact. When the control switch is not connected, the transistor, which is the receiving element of the optocoupler, is closed, and current does not pass through the coil of the electromagnetic relay [10].

The Proteus program can also be used to design the printed circuit board and 3D view of the device [7]. The printed circuit board and 3D view of the device are shown in pictures 2-3

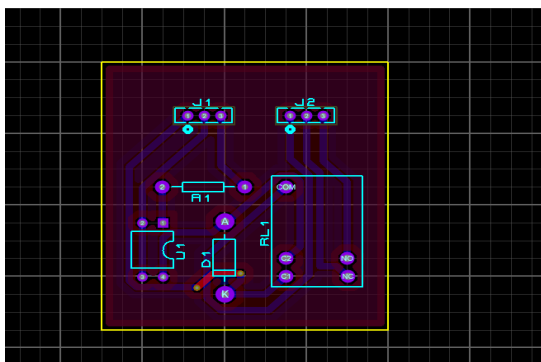


Figure 2. Optocoupler switch circuit printed circuit board

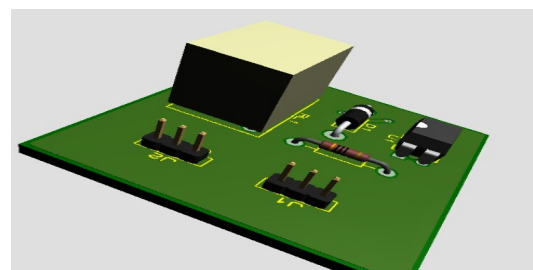


Figure 3. 3D view of the building

In conclusion, it is possible to design devices and place orders for their printed circuit boards by modeling analog and digital electronic circuits at various levels in Proteus software. Learning the stages of designing electronic

devices with the help of various virtual programs and acquiring the skills to apply it in practice is an important task facing future industrial electronics engineers today [11].

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