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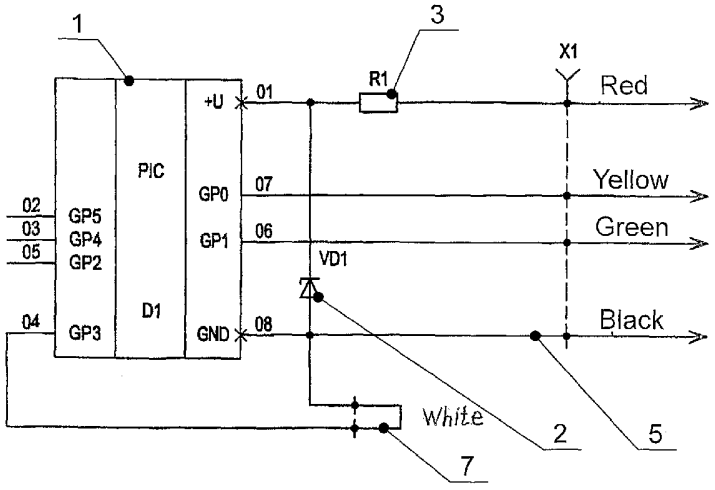
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(54) **Title:** ADDRESS MICROMODULE (VARIANTS)



(57) **Abstract:** The address micromodule comprises a microprocessor, stabilizer diode and resistor, a circuit board with the microprocessor and voltage converter, for example, the stabilizer diode and resistor mounted thereon is potted with compound and covered with an isolation film. Two flexible leads are made capable of connecting to the sensor and address communication line and are connected to respective input/output channels of microprocessor, one flexible lead is made capable of connecting to the neutral wire and is connected to the common input of microprocessor and the first lead of the stabilizer diode, which second lead is coupled with resistor connected to the supply input of microprocessor, and the second lead of the resistor is the second flexible lead of the address micromodule and is made capable of connecting to the power supply, wherein a relay could be included between the fifth flexible lead and the neutral wire. In so doing, the functionality is broadened for transmitting signals of detectors (sensors) of various types, sizes are reduced, the reliability and operation accuracy are increased in noise condition.

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ADDRESS MICROMODULE (VARIANTS)

Field of the Invention

The invention relates to automatic means for transmitting over communication lines the information on conditions of "dry contacts" of detectors (sensors), to which those contacts are connected, as well as for providing the integration of those detectors to a controller, mainly in systems related to the address type and having a module distributed structure united with the digital interface (address bus).

The address micromodule could be employed, for example, in security and fire alarm or fire-fighting systems, access monitoring and control systems (turnstiles, gates, latches, turnpikes, doors), engineer equipment monitoring and control systems (air conditioning and ventilation, water supply, electric-power supply with regard to the water and/or electric power consumption), light control systems, and also in many other systems including the combined ones.

Background of the Invention

Known is the address micromodule comprising a circuit board with a microprocessor and flexible leads for connecting to communication lines and power supply disposed thereon.

Disadvantage of the known device is a narrow functionality that does not permit to use this device together with various kinds of sensors having normally closed and normally open contacts, and does not permit to use this device for operation with actuators, as well as great size of this device.

The technical problem for the present group of inventions having the same purpose and united by the single technical plan is to provide an effective

compact address micromodule and to broaden a store of address micromodules.

Summary of the Invention

The technical result ensuring the solution of the raised problem in all variants of invention is in broadening the functionality for transmitting signals and determining the locations of detectors (sensors) of various types differing in structure implementation and monitored parameters, and also for operating along with actuators, for reducing size, increasing the reliability and operation accuracy in noise condition.

The essence of the invention in accordance with the first variant is in that the address micromodule comprising a circuit board with a microprocessor and flexible leads disposed thereon is provided with a direct current (DC) voltage converter and configured having at least four flexible leads, and the circuit board with the microprocessor and voltage converter mounted thereon is potted with compound and covered with an isolation film, at least two flexible leads being made capable of connecting to the detector and address communication line and being connected to respective input/output channels of microprocessor, one flexible lead being made capable of connecting to the neutral wire and being connected to the common input of microprocessor, the voltage converter output is connected to the supply input of microprocessor, one voltage converter input is connected to the neutral wire and another voltage converter input is made capable of connecting to the power supply.

The DC voltage converter could be made in the form of the stabilizer diode and resistor, the flexible lead connected to the common input of microprocessor being connected to the first lead of the stabilizer diode, which second lead being coupled to the resistor and connected to the supply input of microprocessor, and the second lead of the resistor being the second flexible

lead of the address micromodule and being made capable of connecting to the DC power supply; in other cases, the DC voltage converter could be made in the form of voltage stabilizer.

Preferably, the micromodule is made having a jumper between an additionally made fifth flexible lead and the neutral wire, the micromodule is made packageless and having overall dimensions in the ratio 3:2:1, and the microprocessor is made having a firmware and individual number recorded while manufacture.

The essence of the invention in accordance with the second variant is in that the address micromodule comprising a circuit board with a microprocessor and flexible leads disposed thereon is provided with a DC voltage converter and configured having at least five flexible leads, and the circuit board with the microprocessor and voltage converter mounted thereon is potted with compound and covered with an isolation film, at least two flexible leads being made capable of connecting to the detector and address communication line and being connected to respective input/output channels of microprocessor, one flexible lead being made capable of connecting to the neutral wire and connected to the common input of microprocessor, the voltage converter output is connected to the supply input of microprocessor, one voltage converter input is connected to the neutral wire and another voltage converter input is made capable of connecting to the power supply, a relay being included between the fifth flexible lead and the neutral wire, which relay being made capable of connecting to actuators and/or signaling devices.

The DC voltage converter could be made in the form of the stabilizer diode and resistor, the flexible lead connected to the common input of microprocessor being connected to the first lead of the stabilizer diode, which second lead being coupled to the resistor and connected to the supply input of microprocessor, and the second lead of the resistor being the second flexible

lead of the address micromodule and being made capable of connecting to the DC power supply; in other cases, the DC voltage converter could be made in the form of voltage stabilizer.

Preferably, the micromodule is made having a jumper between an additionally made sixth flexible lead and the neutral wire, the micromodule is made packageless, and the microprocessor is made having a firmware and individual number recorded while manufacture (according to Claim 10).

Brief Description of Drawings

Fig. 1 depicts the address micromodule in perspective;

Fig. 2 is the diagram of the address micromodule (according to the first variant of the invention and Claim 2;

Fig. 3 is the diagram of the address micromodule (according to the first variant of the invention and Claim 3;

Fig. 4 is the diagram of the address micromodule having a relay (according to the second variant of the invention;

Fig. 5 illustrates the example of connection to the detector and address bus.

Detailed Description of the Invention

An address micromodule (see Fig. 2) in accordance with the first variant comprises a circuit board (not marked) on which there are disposed a microprocessor 1 and flexible leads as well as a DC voltage converter in the form of stabilizer diode 2 and resistor 3. The circuit board is made with at least four flexible leads (not shown). The circuit board along with the microprocessor 1, stabilizer diode 2 and resistor 3 disposed thereon is potted with compound and covered with an isolation film, which are transparent in Fig. 1 so that the circuit board with the microprocessor 1 could be seen. At least two

flexible leads are made capable of connecting to a detector 4 and to a communication line and are connected to respective input/output channels of the microprocessor 1, one flexible lead being made capable of connecting to the neutral wire 5 and being connected to the common input of the microprocessor 1 and to the first lead of the stabilizer diode 2 which second lead is coupled with the resistor 3 and connected to the supply input of the microprocessor 1, and the second lead of the resistor 3 is the second flexible lead of the address micromodule and is made capable of connecting to the DC power supply (not shown). The address micromodule (see Fig. 3) in accordance with the first variant comprises a circuit board (not marked) on which there are disposed a microprocessor 1 and flexible leads, and is provided with a DC voltage converter in the form of voltage stabilizer 6.

Preferably, the micromodule is made having a jumper 7 between an additionally made fifth flexible lead and the neutral wire 5. The resistor 3 is, for example, made with the resistance of 5.1±0.5 kOhm. The micromodule is made packageless, having, in accordance with the first variant, overall dimensions in the ratio 3:2:1. The microprocessor 1 is made having a firmware and individual number recorded while manufacture.

An address micromodule (see Fig. 2) in accordance with the second variant comprises a circuit board (not marked) on which there are disposed a microprocessor 1 and flexible leads, and is provided with a DC voltage converter in the form of stabilizer diode 2 and resistor 3, and is made with at least five flexible leads (not shown). In the micromodule according to the second variant, the DC voltage converter could be made in other cases in form of voltage stabilizer (not shown). The circuit board along with the microprocessor 1, stabilizer diode 2 and resistor 3 disposed thereon is potted with compound and covered with an isolation film. At least two flexible leads are made capable of connecting to a detector 4 and to a communication line and are

connected to respective input/output channels of the microprocessor 1. One flexible lead is made capable of connecting to the neutral wire 5 and is connected to the common input of the microprocessor 1 and to the first lead of the stabilizer diode 2 which second lead is coupled with the resistor 3 and connected to the supply input of the microprocessor 1. The second lead of the resistor 3 is the second flexible lead of the address micromodule and is made capable of connecting to the DC power supply (not shown). A relay 8 is included between the fifth flexible lead and the neutral wire 5, which relay 8 is made capable of connecting to actuators and/or signaling devices (not shown).

Preferably, the micromodule is made having a jumper 7 between an additionally made fifth flexible lead and the neutral wire 5. The resistor 3 is, for example, made with the resistance of 5.1±0.5 kOhm, and the microprocessor 1 is made packageless and having a firmware and individual number recorded while manufacture.

Preferably, as the microprocessor 1 are used the serially produced microcircuits, namely, the one-chip microcontrollers of the type PIC12C5, PIC12C6 according to the catalogue ["Microcontrollers. Issue 2. One-chip microcontrollers" (in Russian)], Moscow: DODEKA, 2000.

As the relay 8, a solid-state optoelectronic relay 5П14.9А could be used, according to the catalogue «Каталог электронные компоненты и приборы» ["Electronic components and devices catalogue" (in Russian)], 2002.

The mentioned lines and the neutral wire as well as the mentioned standard elements and their inputs/outputs (channels) have graphic and alphabetic designations in Fig. 2-5 in accordance with the State Standard 2.743-91 "Schematic graphic designations for diagrams. Digital technique elements" (in Russian) and in State Standard 2.709-89 "Schematic designations of wires and contact couplings of electric elements, equipment and circuit sections in electric diagrams" (in Russian).

The address micromodule operates as follows.

The address micromodule performs the transmission of information on condition of "dry contacts" of detectors (sensors), to which those contacts are connected, to the controller.

The microprocessor 1 of the address micromodule is interrogated by the controller in a predetermined time intervals and transmits its number and the obtained information on the operation of sensor 4 to the controller. The sensor 4 could be in conditions normal/abnormal, and the controller, using the address micromodule, could receive, over the input/output channels and communication line to the controller, the following information on the sensor condition:

1. The sensor is ready for a work – normal, the operating contacts of the sensor 4 are closed (in the case of employing the sensor 4 having normally closed contacts).

2. The sensor 4 has been tripped – abnormal (alarm), the operating contacts of the sensor 4 are open.

3. No response of the micromodule while interrogating – failure, an intentional or accidental break on the line (the contacts of sensor supply circuit are open), or a short circuit.

In necessary cases, the sensor 4 can produce an analogue signal (temperature, voltage, humidity, turning angle, etc.). in that way, the microprocessor 1 of the address micromodule makes the conversion of input signal into a digital form.

The final processing of signals from the address micromodule is performed by the controller. Besides the information on a condition of the sensor 4, the micromodule transmits its number to the controller, which allows to recognize precisely a place of origination of alarm situation.

Moreover, in the variant with including the optoelectronic relay 8 into the address micromodule, said relay 8 could carry out the processing of instructions of the microprocessor 1 to switch on immediately the actuators, for example, for unlocking a door, and/or releasing a passage through a turnstile, and/or opening a gate, and/or switching on fire-fighting equipment, and/or switching on/off a ventilator or air-conditioner, as well as to employ prohibitive or allowing signaling devices, for example, sirens, indicator at guard panel, transparent or colour light emitting diode blinking.

The stabilizer diode 2 limits static positive voltage deviations exceeding 5 V, transferring the excessive energy to the power network. As a result, the address micromodule transmits, and the controller receives over a communication line having a length up to 1 km the signals normalized in voltage regardless of presence and duration of noise, without any overload and distortions. Similar functions are carried out by the voltage stabilizer 6 in the case of its use. The microprocessor 1, in accordance with its program, forms a signal in such a form which is compatible with the controller, does not depend on a physical parameter sensed by the sensor 4, and on its design implementation.

The program of the microprocessor 1 is synthesized using known rules and techniques.

Thus, the controller and, in the case of his connection, the computer operator receives, besides data on system operation and communication line condition, an information on the place of monitoring sensor 4 giving an alarm signal. For this purpose, a data exchange between the sensor 4 and controller occurs via the microprocessor 1 of the present address micromodule having, in the framework of the whole system, an individual number (a registration) recorded while manufacture.

The technical characteristics of the address micromodule:

Voltage: 10-14 V;

Current: 2 mA;

Overall dimensions according to the first variant of the invention: 15×10×5 mm, mass 5 g (without considering the relay, jumper and connection wires);

Overall dimensions according to the second variant of the invention: 18×15×10 mm, mass 5 g (without considering the relay, jumper and connection wires);

The address micromodule, due to an appropriate ratio of its overall dimensions, could be structurally built in standard, for example, fire-alarm or security sensors, pressure sensors, position sensors, level sensors, etc.

Thus, a compact address micromodule is provided, as well as a store of address micromodules is broadened.

In so doing: the functionality is broadened for transmitting signals and determining a location of detectors (sensors) of various types differing in structure implementation and monitored parameters, and also for operating along with actuators; sizes are reduced; the reliability and operation accuracy are increased in noise condition and elongated communication lines.

Information source:

1. US 6661213 B1, 2003.

Claims

1. An address micromodule comprising a circuit board with a microprocessor and flexible leads disposed thereon, *characterized* in that the address micromodule is provided with a DC voltage converter and configured having at least four flexible leads, and the circuit board with the microprocessor and voltage converter mounted thereon is potted with compound and covered with an isolation film, at least two flexible leads being made capable of connecting to the detector and address communication line and being connected to respective input/output channels of microprocessor, one flexible lead being made capable of connecting to the neutral wire and being connected to the common input of microprocessor, the voltage converter output is connected to the supply input of microprocessor, one voltage converter input is connected to the neutral wire and another voltage converter input is made capable of connecting to the power supply.

2. The micromodule according to Claim 1, *characterized* in that the DC voltage converter is made in the form of the stabilizer diode and resistor, the flexible lead connected to the common input of microprocessor being connected to the first lead of the stabilizer diode, which second lead being coupled to the resistor and connected to the supply input of microprocessor, and the second lead of the resistor being the second flexible lead of the address micromodule and being made capable of connecting to the DC power supply.

3. The micromodule according to Claim 1, *characterized* in that the DC voltage converter is made in the form of the voltage stabilizer.

4. The micromodule according to any of Claims 1 to 3, *characterized* in that the micromodule is made having a jumper between an additionally made fifth flexible lead and the neutral wire.

5. The micromodule according to any of Claims 1 to 3, *characterized* in that the micromodule is made packageless and having overall dimensions in the ratio 3:2:1.

6. The micromodule according to any of Claims 1 to 3, *characterized* in that the microprocessor is made having a firmware and individual number recorded while manufacture.

7. An address micromodule comprising a circuit board with a microprocessor and flexible leads disposed thereon, *characterized* in that the address micromodule is provided with a DC voltage converter and configured having at least five flexible leads, and the circuit board with the microprocessor and voltage converter mounted thereon is potted with compound and covered with an isolation film, at least two flexible leads being made capable of connecting to the detector and address communication line and being connected to respective input/output channels of microprocessor, one flexible lead being made capable of connecting to the neutral wire and connected to the common input of microprocessor, the voltage converter output is connected to the supply input of microprocessor, one voltage converter input is connected to the neutral wire and another voltage converter input is made capable of connecting to the power supply, a relay being included between the fifth flexible lead and the neutral wire, which relay being made capable of connecting to actuators and/or signaling devices.

8. The micromodule according to Claim 1, *characterized* in that the DC voltage converter is made in the form of the stabilizer diode and resistor, the flexible lead connected to the common input of microprocessor being connected to the first lead of the stabilizer diode, which second lead being coupled to the resistor and connected to the supply input of microprocessor, and the second lead of the resistor being the second flexible lead of the address micromodule and being made capable of connecting to the DC power supply.

9. The micromodule according to Claim 1, *characterized* in that the DC voltage converter is made in the form of voltage stabilizer.

10. The micromodule according to any of Claim 7 to 9, *characterized* in that the micromodule is made having a jumper between an additionally made sixth flexible lead and the neutral wire.

11. The micromodule according to any of Claim 7 to 9, *characterized* in that the micromodule is made packageless.

12. The micromodule according to any of Claim 7 to 9, *characterized* in that the microprocessor is made having a firmware and individual number recorded while manufacture.

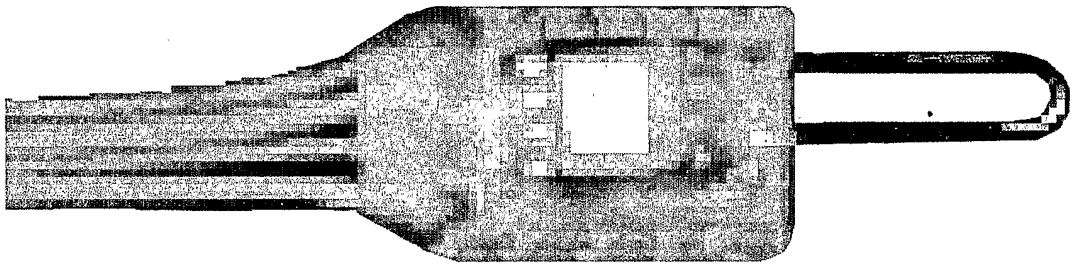


Fig.1

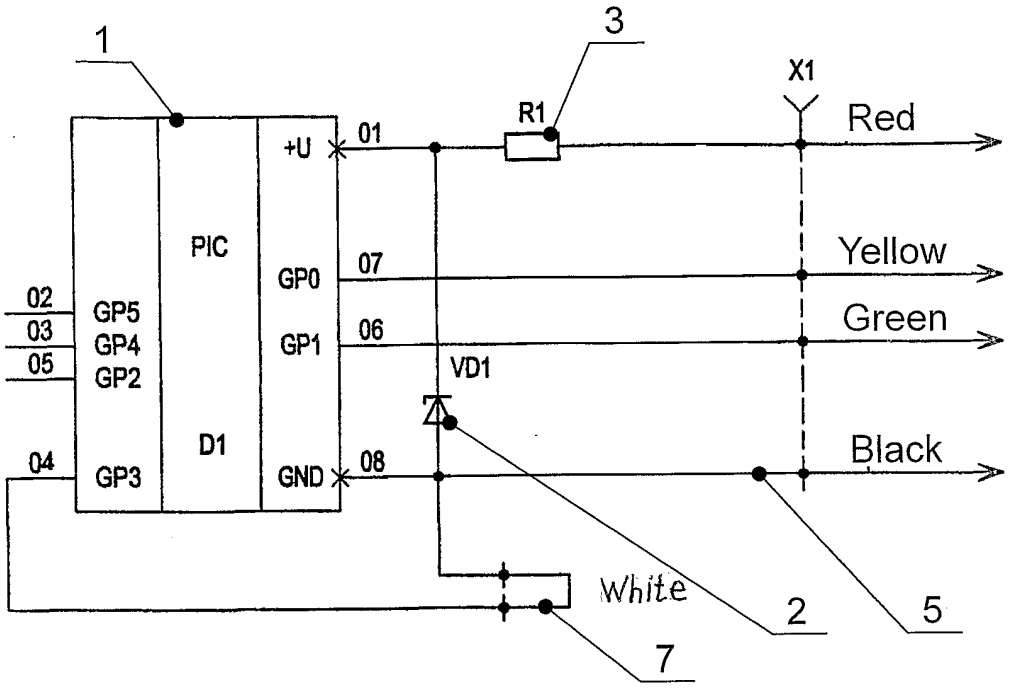

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Fig.2

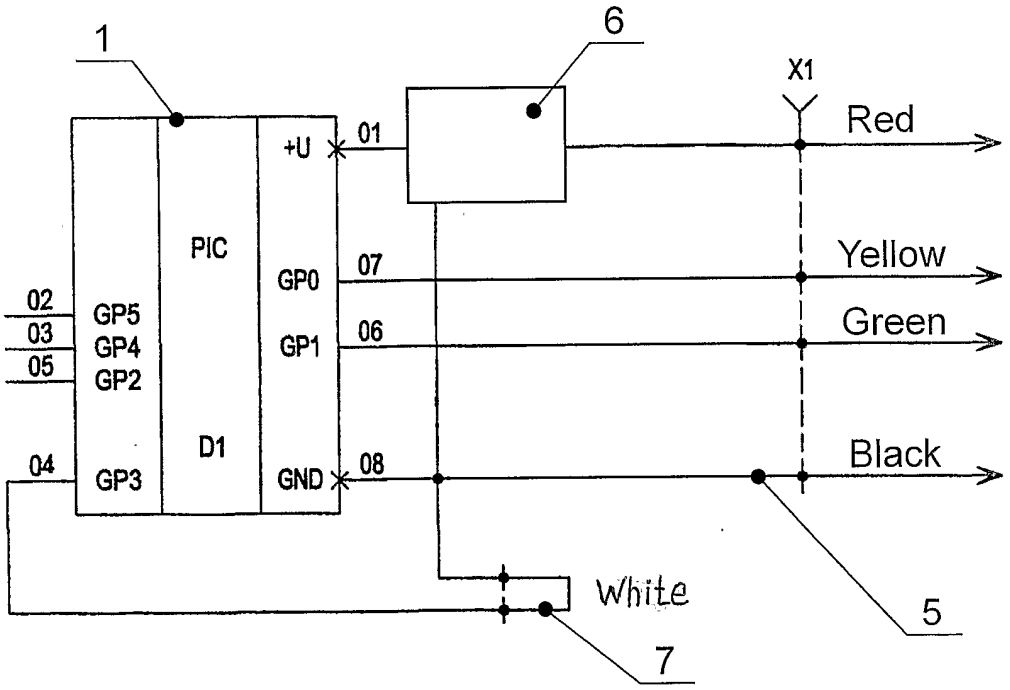

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Fig.3

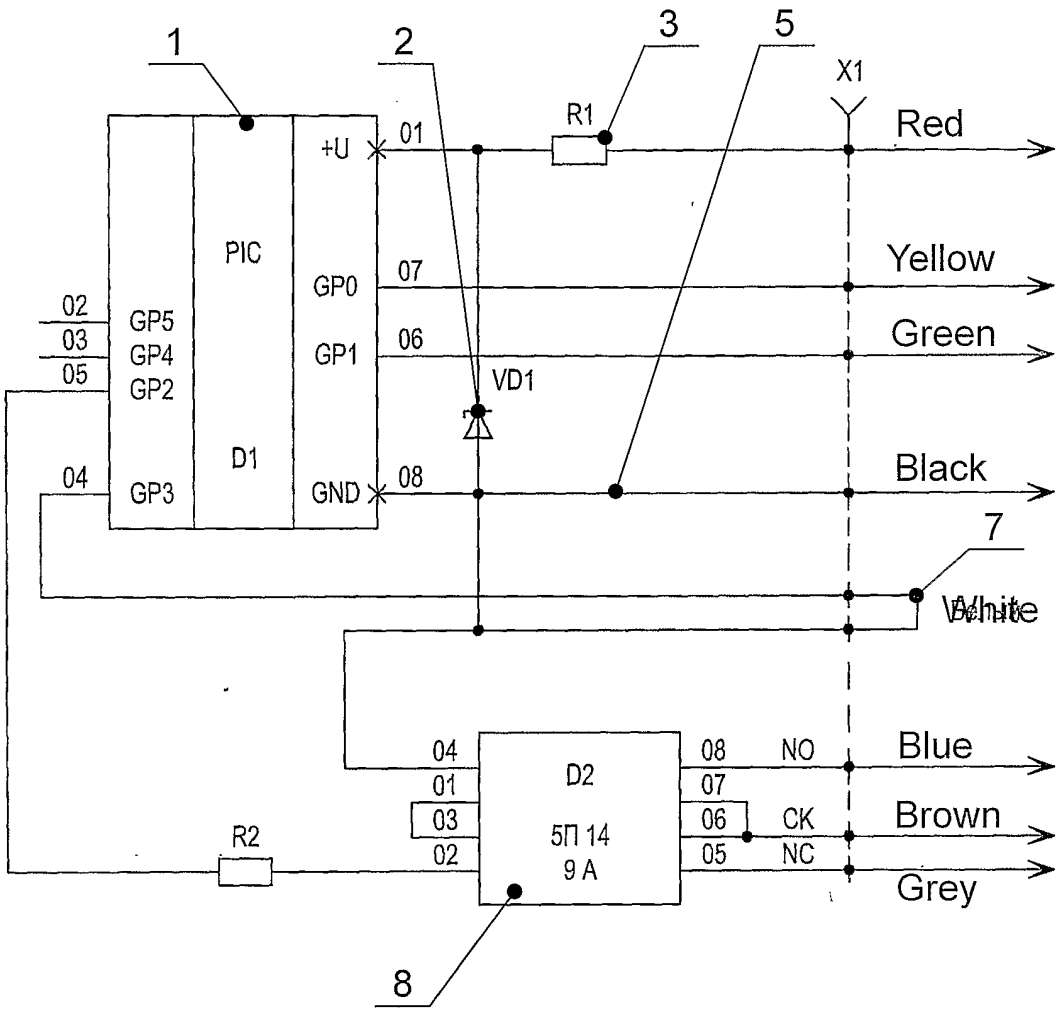

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Fig.4

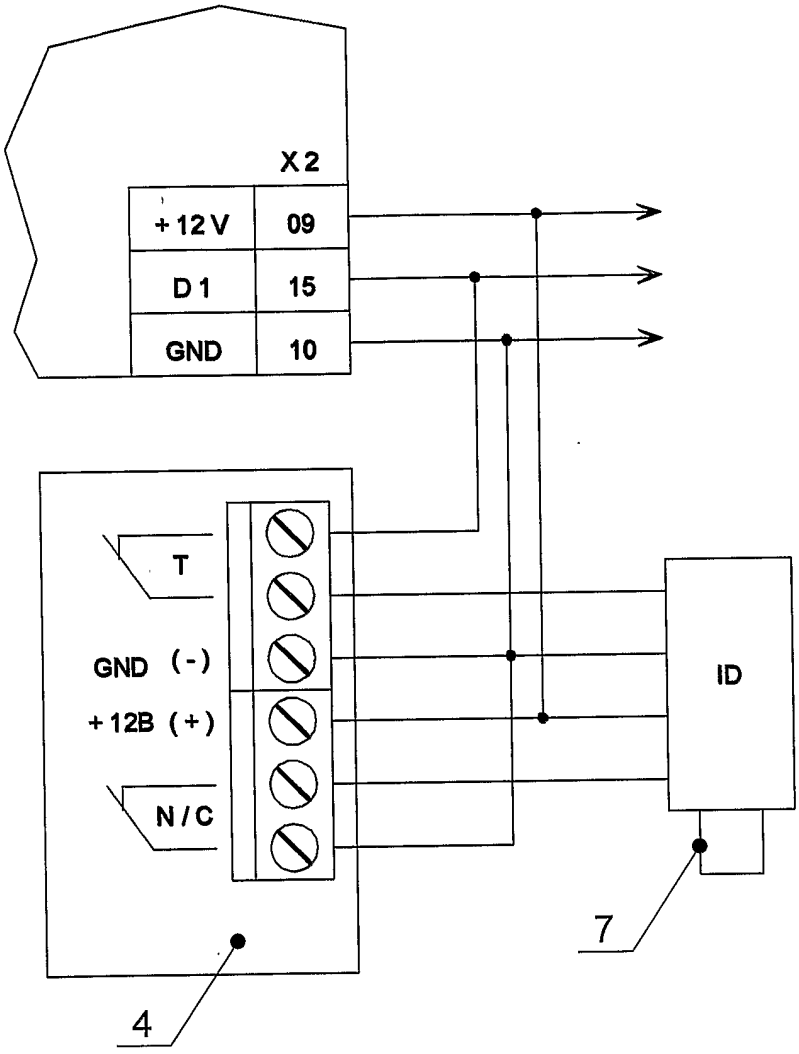


Fig.5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2004/000465

A. CLASSIFICATION OF SUBJECT MATTER
G06F 9/00, H05K 7/02, G08B 25/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G05B 19/00, 19/02, 19/18, G06F 9/00, G08B 25/00, G08C 19/00, 19/30, 19/32, A62C 35/00, H01L 31/00, 31/04, 31/042, 31/048, H05K 7/00, 7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched:

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	RU 36548 U1 (ОТКРЫТОЕ АКЦИОНЕРНОЕ ОБЩЕСТВО ТВЕРСКОЙ ЗАВОД ЭЛЕКТРОАППАРАТУРЫ "ЭЛТОР") 10. 03. 2004, p. 3, lines 21-23, claim 2, fig. 3	1-12
Y	Компоновка и конструкции микроэлектронной аппаратуры. под ред. Высоцкого Б. Ф. и др., Москва, Радио и связь, 1982, p. 9, 35	1-12
Y	Китаев В. Е. и др. Проектирование стабилизаторов постоянных напряжений. Москва, Редакционно-издательский отдел ВЗЭИС, 1968, p. 10, fig. 1-3	2, 8
Y	Конструирование микромодульной аппаратуры. под ред. Барканова Н. А., Москва, Советское радио, 1968, p. 317-319, 321, fig. VIII.5 a	1-12
Y	RU 2008749 C1 (НАУЧНО-ПРОИЗВОДСТВЕННОЕ ОБЪЕДИНЕНИЕ "КВАНТ") 28. 02. 1994, col. 5, lines 34-35, fig. 1	1-12
Y	Отраслевой стандарт. Микросхемы интегральные полупроводниковые серий 130, 133, 136. Руководство по применению. ОСТ 11 340.902-78, p. 96-97	4, 10

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search report	Date of mailing of the international search report
16 March 2005 (16. 03. 2005)	14 April 2005 (14. 04. 2005)

Name and mailing address of the ISA/ FIPS	Authorized officer
Russia, 123995, Moskva, G-59, GSP-5 Berezhkovskaya nab., 30-1	I. Shelipova
Facsimile No.	Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2004/000465

C. (Continuation), DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	Полупроводниковые БИС запоминающих устройств. Справочник. под ред. Гордонова А. Ю. и др., Москва, Радио и связь, 1987, p. 84-85	6, 12
Y	RU 2058170 C1 (МОСКОВСКОЕ ОПЫТНОЕ КОНСТРУКТОРСКОЕ БЮРО "ГОРИЗОНТ") 20. 04. 1996, col. 6, lines 16-34, fig. 2	7-12