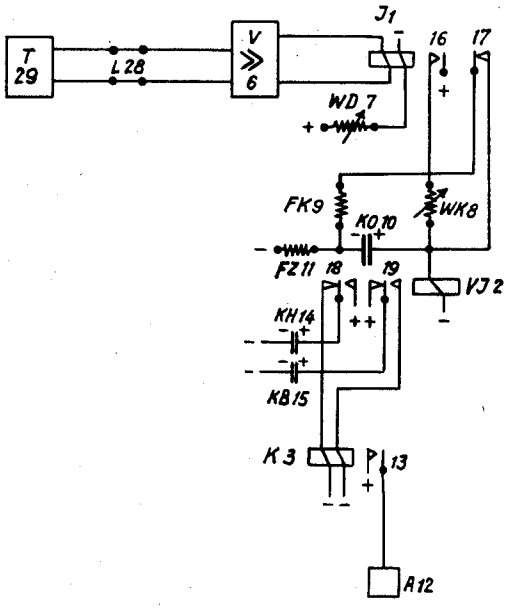
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ELECTRICAL RELAY SYSTEM

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ELECTRICAL RELAY SYSTEM

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It is customary today in the most varied fields of application of message-transmission technics to use impulses or series of impulses of a certain length, either for the purpose of switching on devices, for example remote measuring devices as water-level tele-indicators, etc., or in telephonographs for switching on recording or reproduction devices, or in other applications of similar construction.

It is a well-known phenomenon that in signalling systems disturbing impulses of both very short and very long duration are unavoidable. It is one of the primary objects of the present invention to provide means eliminating the influence of such disturbing signals in electric control systems.

One feature of the present invention relates to the provision of a monitoring device in which a relay is kept actuated as long as electric impulses which are generated by electric currents of audiofrequency, and which have a length ranging between predetermined limits, are transmitted to the device. Conversely, the relay will be de-energized if the duration of the impulses transmitted to the device lies outside these limits.

In accordance with a preferred embodiment of the present invention there is provided a sensitive relay which can be excited by impulses of any length and when energized, closes the circuit of a second relay, provided with means to delay its actuation by a predetermined amount. In this way this second relay will not be energized unless the time, during which the first relay is actuated, exceeds this predetermined amount. The second relay controls by two of its contacts the actuation of a third relay, provided with two windings, each of which lies in a circuit comprising a condenser serving as a source of potential. Each of the two contacts of said second relay is arranged in such a manner that in its one position it connects one winding of the third relay with one of said condensers, while in its other position it connects this condenser to a circuit serving to charge it. The second relay actuates the third relay each time it is energized or de-energized, and every actuation of the latter lasts for a time period which is in relation to the capacity of the condensers. In this way the third relay will be kept actuated, if the second relay is being continuously energized and deenergized on a frequency not falling below a predetermined limit. The third relay may advantageously be used together with a telephonograph for disconnecting it in cases where no speech is transmitted to it, as well as in cases

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where impulses of unusual length, such as permanent signals, are given to it.

The arrangement according to the invention is explained below in greater detail by means of a constructional embodiment exemplified in the accompanying drawing.

Let us assume that the subscriber T29, forming part of a telephone system, is connected in the usual manner over the line L28 to the amplifier V6 of a telephonograph. In this way all impulses emitted by the subscriber T29, or occurring on the line L28 as disturbing impulses, will excite the quick pick-up and quick release or time pulse relay J1.

In order to obtain a very sensitive adjustment of the relay J1 it is equipped with two windings, the first being connected to the amplifier V6 and the second over a resistance WD7 to the positive pole of a source of electrical energy (not shown). By virtue of this sensitivity the relay J1 is excited by impulses of very short duration, e. g. 30 milliseconds, which are for the most part disturbing impulses.

These short impulses are, however, not sufficient to excite the slow operating relay VJ2 over the resistance WK8, the condenser KO10 or the resistance FZ11, the two later being connected in parallel to the winding.

In order to cause this delay in the actuation of the relay VJ2, independent of the sequence of impulses arriving at the relay J1, the condenser KO10 is quickly discharged in a circuit comprising the contact 17 which is closed when the relay J1 is de-energized, said circuit further comprising a small resistance FK9.

If the relay J1 is, for example, excited by an impulse of 200 milliseconds the relay VJ2 is also excited and changes over its contacts 18 and 19.

For the relay J1 the following circuit is formed: (1) Subscriber T29, line 28, amplifier V6, relay J1 back to amplifier V6, line 28, subscriber T29.

The relay VJ2 is excited in the circuit: (2) Positive pole, contact 16, resistance WK8, relay VJ2 and condenser KO10 and resistance FZ11 connected in parallel thereto, negative pole of battery.

The condenser KB15 charged in the position of rest of relay VJ2 is discharged on the excitation of the relay VJ2 through the third relay K3 in the circuit: (3) Positive pole of condenser KB15, contact 19, relay K3, first winding, negative pole of battery, negative pole of condenser KB15.

By the reversal of the contact 18 the condenser KH14 is now recharged in order again to excite, on the de-energization of the relay

VJ2, the second winding of relay K3 in the circuit: (4) Positive pole of condenser KH14, contact 18, second winding of relay K3, negative pole of battery, negative pole of condenser KH14.

If the relay VJ2 is alternately energized and de-energized at a frequency not falling below an amount fixed by both the capacity of the condensers KH14 and KH15 and the resistances of the two windings of relay K3, this latter 3 remains excited by the discharges of the condensers KB15 and KH14 and the contact 13 is closed, thus switching on, for example, the device A12.

The mode of operation of the arrangement is, in brief, as follows:

Every impulse received, no matter of what length, will excite the relay J1. The relay VJ2, on the other hand, which is connected with the contact 16 of the relay J1 over a resistance WK3 can only be excited by an impulse whose length is above a certain minimum length. Thus all impulses which are too short are prevented from effecting an undesired actuation of the relay VJ2.

The relay K3, which effects, for example, the switching on of a device A12 by means of the contact 13, is now connected to the relay VJ2 only through the condensers KH14 and KB15. Every time the relay VJ2 is closed, the relay K3 is actuated by one of the two condensers, but only until the condenser in question is discharged. If the impulse is too long, the relay K3 will be de-energized. If the impulse is of a length not exceeding a predetermined time, however, the relay VJ2 will open in good time before the discharge of the condenser is terminated, whereby the relay K3 is switched to the second condenser and thereby locked. The arrangement must, of course, be so designed that the contact 13 closes before the contact 19 opens.

If impulses of a length ranging between two predetermined limits follow each other, the relay K3 remains locked, the contact 13 closed and the device A12 switched on. In all other cases, however, that is in the case of impulses which are too short or too long, and also in the case of the interruption of a series of impulses of the correct length, the relay K3 opens and the device A12 is switched off.

I claim:

1. In an electrical control system, a quick response relay having a winding and contacts, a slow-to-pick-up relay having a winding and contacts, a circuit including the contacts of the first-mentioned relay, the winding of the second-mentioned relay, whereby the second-mentioned relay is excited by impulses exceeding a predetermined minimum duration, which are transmitted by the first-mentioned relay, a third relay having a winding, a second circuit including a condenser, the contacts of the second-mentioned relay and the winding of the third relay, a source of direct current, and means connecting said source through the contacts of the second-mentioned relay with said condenser when the second-mentioned relay is inoperative for charging the condenser, said second circuit being closed by the closing of the contacts of the second-mentioned relay to energize the third relay for the duration of the discharge of said condenser, whereby the third relay is de-energized when the impulse exceeds a predetermined maximum duration.

2. In an electrical control system operating with audio frequencies, a fast-operating relay responsive to audio signals and having a winding and contacts, a second relay having a winding and contacts, a circuit including the contacts of the first-mentioned relay, the winding of the second-mentioned relay and means delaying the actuation of the second-mentioned relay, whereby the second-mentioned relay is controlled by the contacts of the first-mentioned relay and whereby the second-mentioned relay is actuated only by signals exceeding a predetermined minimum duration, a third relay having a winding, a second circuit including a condenser, the contacts of the second-mentioned relay and the winding of the third relay, a source of direct current, and means connecting said source through the contacts of the second-mentioned relay with said condenser when the second-mentioned relay is inoperative for charging the condenser, said second circuit being closed by the closing of the contacts of the second-mentioned relay to energize the third relay for the duration of the discharge of said condenser, whereby the third relay is de-energized when the signal exceeds a predetermined maximum duration.

3. In a control system, two switches, each of which comprises a movable contact part and two immovable contact parts constituting an inoperative contact and an operative contact, two condensers which are connected to different movable contact parts of said switches, a relay having an operative winding connected to that immovable contact part of one of said two switches which constitutes a part of the operative contact thereof, said relay further having a holding winding connected to that immovable contact part of the other one of said two switches which constitutes a part of the inoperative contact of said other switch, electrical charging means connected to said two condensers and also connected to that immovable contact part of said one switch which constitutes a part of the inoperative contact thereof and to that immovable contact part of said other switch which constitutes a part of the operative contact thereof whereby charging circuits are formed for said two condensers, two discharging circuits for said condensers, each of said discharging circuits including one of said condensers and the movable contact part of said one switch connected therewith, and each of said discharging circuits further including a winding of said relay and the immovable contact part of said one switch connected therewith, whereby in the course of simultaneous and consecutive actuations of the movable contact parts between the immovable contact parts of the two switches during time intervals the duration of which does not exceed a predetermined value, a continuous actuation of the relay by alternating charging and discharging of said condensers takes place and whereby the relay is rendered inoperative during said actuations when the duration of said time intervals exceeds said predetermined value.

4. In a control system operating with audio frequencies, a slow-to-pick-up relay actuated by audio signals and having a winding and two change over switches, each of said change over switches comprising a movable contact part and two immovable contact parts constituting an inoperative contact and an operative contact, two condensers which are connected to different movable contact parts of said switches, a second relay having an operative winding connected to that immovable contact part of one of said two switches which constitutes a part of the operative contact thereof, said second relay further having a holding winding connected to that immovable

contact part of the other one of said two switches which constitutes a part of the inoperative contact of said other switch, electrical charging means connected to said two condensers and also connected to that immovable contact part of said one switch which constitutes a part of the inoperative contact thereof and to that immovable contact part of said other switch which constitutes a part of the operative contact thereof, whereby charging circuits are formed for said two condensers, two discharging circuits for said condensers, each of said discharging circuits including one of said condensers and the movable contact part of said one switch connected therewith, and each of said discharging circuits further including a winding of the second relay and the immovable contact part of said one switch, whereby the operation of both relays is prevented in the case of audio signals the duration of which is less than a predetermined minimum value, and whereby when the switches are actuated consecutively by audio signals the duration of which exceeds said predetermined minimum value but does not exceed a predetermined maximum value, the second relay is actuated continuously by alternating charging and discharging of said condensers, and whereby when the slow-to-pick-up action relay is actuated by audio signals the duration of which exceeds said predetermined maximum value the second relay is released.

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