

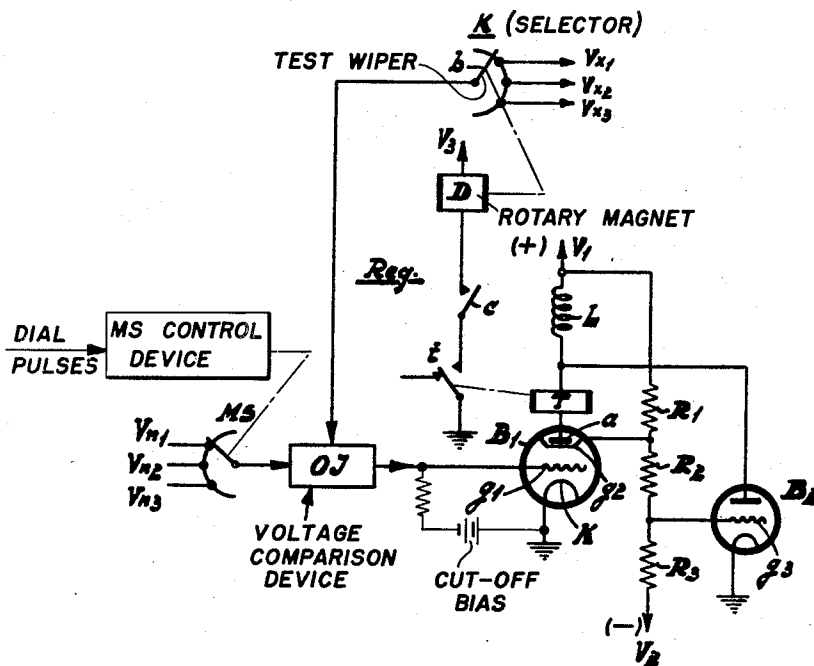
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CIRCUIT-ARRANGEMENT FOR ENERGIZING RELAYS

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CIRCUIT-ARRANGEMENT FOR
ENERGIZING RELAYS

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3 Claims. (Cl. 317-149)

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The invention relates to a circuit-arrangement for energizing a relay, whose winding is included in an output circuit of a discharge tube.

Such circuit-arrangements are used, for example, in a device for numerical adjustment of a selector by a method in which voltages or currents are tested by electronic means and in which, for example, the relay controls the movement of the selector. It is, in general, desirable for the relay to be energized very rapidly when the tube becomes conductive.

In known circuit-arrangements of this kind, the relay exhibits a delayed energization, since, when the tube becomes conductive, a self-inductance voltage is produced across the winding of the relay, which strongly reduces the anode voltage of the tube and thus opposes the rapid increase in energizing current.

The invention provides a circuit-arrangement in which the relay is considerably more rapidly energized than in the known circuit-arrangements.

In the circuit-arrangement according to the invention an inductor is connected in series with the winding of the relay and is also inducted in the output circuit of a second tube whose control-electrode is coupled with the output circuit of the first tube in a manner such that when the first tube becomes conductive, the second tube is cut-off.

Tests have proved that by the measure proposed the magnetisation time of a relay may be reduced, for example, from 1.5 msecs. to 0.2 msec.

In order that the invention may be more clearly understood and readily carried into effect, it will now be described more fully with reference to the accompanying drawing, in which one embodiment is shown.

In a diagrammatical and simplified from the figure shows a circuit-arrangement for the numerical adjustment of a selector K by a voltage-comparison method under the control of a register Reg. The marking contacts brushed by the test wiper *b* of the selector are marked by direct voltages V_{x1} , V_{x2} , V_{x3} , and so on, the values of which are characteristic of the number or digit, which is associated with the corresponding outlet. The register Reg receives the dial pulses, which may be emitted, for example, by a subscriber and adjusts the marking switch MS correspondingly in a manner known per se and not further described. The outlet contacts of the switch MS are marked by direct voltages, the values of which correspond to the various marking voltages of the marking contacts of the selector K. After the

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dial signals have been received, the contact *c* is closed by means (not shown), so that the rotary magnet D of the selector is magnetized in series with the contact *c* and the make contact *t* of the testing relay T, which is normally energized, and the selector begins to move. During the movement of the switch, the device OI which may be of a kind known per se compares the voltage of the test wiper *b* of the selector in the register with the voltage of the wiper of the marking switch. As long as the test wiper *b* is in contact with marking contacts of unwanted outlets, the voltages are unequal and the device OI supplies a comparatively high voltage to the control-grid g_1 of the tube B₁, so that the tube B₁ is conductive. The testing relay T, of which a winding is included in the anode circuit of the tube B₁, is then energized and the making contact *t* is closed in the energizing circuit of the rotary magnet D. As soon as a wanted outlet is found, the voltages of the wiper *b* of the selector and of the wiper of the marking switch MS are equal and device OI supplies a voltage to the control grid g_1 of tube B₁ to reduce the voltage of this control grid to an extent at which the tube B₁ is cut-off and the relay T is deenergized. The make contact *t* breaks the energizing circuit of the rotary magnet D and the selector is halted.

In practice it may occur that during the testing movement of the selector the device OI accidentally finds voltage equality for a short time, for example, during the transition of the wiper *b* to a next following contact or owing to bad contact between the test wiper and the marking contact, due to a leap of the selector wiper. The tube B₁ is then cut-off and the relay T is deenergized, so that the make contact *t* opens the energizing circuit of the rotary magnet D. The next instant, however, the voltages are again unequal and the device increases the voltage of the control-grid g_1 again to such a value that the tube B₁ becomes conductive. It is desirable for the relay T to respond again rapidly and to close the energizing circuit of the rotary magnet D before the rotary magnet D has been demagnetized to such an extent that the selector stops. However, with an increase in current passing through the winding of the relay T an inductance voltage is produced therein, so that the anode voltage of the tube B₁ decreases strongly and the current passing through the relay cannot increase rapidly enough to energize this relay before the rotary magnet has been deenergized.

In order to obviate this disadvantage particu-

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lar measures are taken in the circuit-arrangement, so that the relay T can be energized rapidly. An inductor L is connected in series with the relay winding and is furthermore included in the anode circuit of an auxiliary tube B₂. The screen grid g₂ of the tube B₁ is connected to a first tap of the potentiometer R₁, R₂, R₃, connected between the supply points V₁ and V₂. The control-grid g₃ of the tube B₂ is connected to a second tap of this potentiometer positioned below the first tap thereon. If the tube B₁ is cut-off, the screen grid g₂ is at a comparatively low potential, so that the control-grid g₃ of the tube B₂ has such a low voltage that the tube B₂ is conductive. Then a certain current passes through the inductor L and the tube B₂, but not through the tube B₁ and the winding of the relay T. If the tube B₁ is opened, an inductance voltage is produced across the winding of the relay T, decreasing the voltage of the anode; at the same time, an inductance voltage is produced at the inductor L, since because of the reduction of the voltage of the screen grid g₂ and the associated drop of the voltage of the control-grid g₃, the tube B₂ is cut-off and the current passing through the inductor L cannot flow through the tube B₂. The inductance voltage of the inductor L opposes that across the winding of the relay T and increases the voltage of the anode of the tube B₁, so that the relay T is energized rapidly.

What I claim is:

1. Apparatus for actuating a relay provided with a winding in accordance with an applied control voltage comprising first and second electron discharge tubes each having a cathode, a control grid and an anode, an inductance connected in series with the winding of said relay, the end of the winding remote from said inductance being coupled to the anode of the first tube, the junction of said winding and said inductance being coupled to the anode of said second tube, means to apply positive potential relative to the cathodes of both tubes to the end of said inductance remote from said relay means normally to maintain said first tube non-conduc-

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tive, means to apply said control voltage to the control grid of said first tube whereby said first tube is rendered conductive when said control voltage attains a predetermined value and said relay is energized, and means coupling the anode of said first tube to the control grid of said second tube to render said second tube non-conductive when said first tube conducts whereby the self-inductance voltages produced across said inductance and said relay oppose each other and said relay is rapidly energized.

2. Apparatus as set forth in claim 1 wherein the inductance and the relay winding have reactive values at which the self-inductance voltages of said inductance and said relay winding cancel each other.

3. Apparatus for actuating a relay provided with a winding in accordance with an applied control voltage comprising first and second electron discharge tubes each having a cathode, a control grid and an anode, said first tube also having a screen grid, an inductance connected in series with the winding of said relay, the end of the winding remote from said inductance being coupled to the anode of said first tube, the junction of said winding and said inductance being coupled to the anode of said second tube, means to apply a positive potential relative to said cathodes to the end of said inductance remote from said relay and to said screen grid, means normally to maintain said first tube non-conductive means to apply said control voltage to the control grid of said first tube whereby said first tube is rendered conductive when said control voltage attains a predetermined value and said relay is energized, and means coupling the screen grid of said first tube to the control grid of said second tube to render said second tube non-conductive when said first tube conducts whereby the self-inductance voltages produced across said inductance and said relay oppose each other and said relay is rapidly energized.

No references cited.