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MULTIVIBRATOR CIRCUIT

Original Filed Dec. 27, 1945

FIG. 1

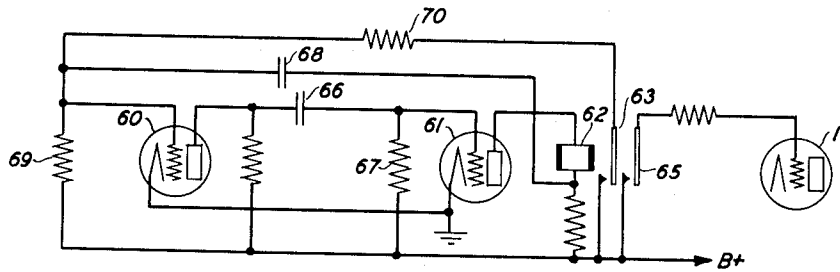
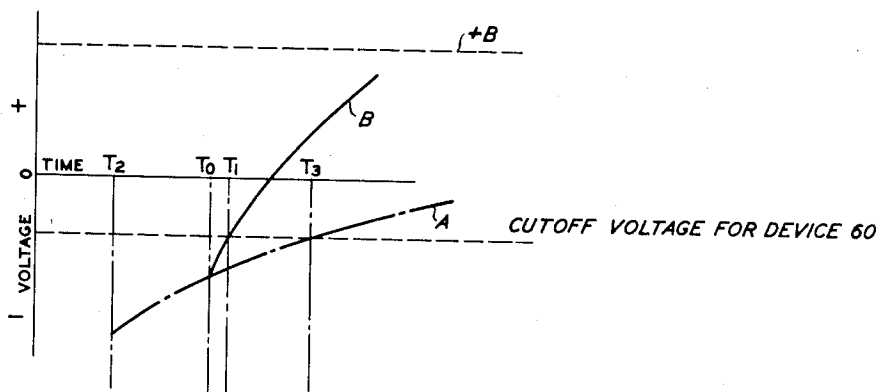


FIG. 2



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MULTIVIBRATOR CIRCUIT

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2 Claims. (Cl. 250—36)

This is a division of an application of the present inventor, Serial No. 637,411, filed December 27, 1945, for Signal Translating Systems.

The present invention, disclosed in the referenced application, relates to oscillation circuits, and more specifically to such circuits of the so-called multivibrator type.

The present invention is disclosed with particular reference to a multivibrator circuit, but it will be evident that the features thereof may find ready application to other types of circuits.

A feature of the invention comprises regulating the duration of a pulse generated by a multivibrator by abrupt, periodic or intermittent change in the time constant of a timing circuit of the multivibrator.

Another feature resides in effecting such time constant change responsive to a conduction condition of one of two electronic devices included in the multivibrator.

Still another feature involves constituting the timing circuit of an impedance network, in a specific instance, a resistor-capacitor network, and effecting the desired time constant change by introducing an additional impedance in the network, in the specific instance, an additional resistor.

Yet another feature comprises including electrical relay means in the multivibrator circuit for effecting the connection and disconnection of the means for changing the time constant of the timing circuit.

A further feature comprises establishing pulse generation by a multivibrator circuit at a preassigned recurrence rate, and periodically changing the constants of a timing circuit to establish a preassigned pulse duration.

Other features of the invention will be evident from the general and detailed descriptions which follow.

In accordance with the invention, a multivibrator circuit embodying the features of the invention may comprise a pair of electronic devices, in the disclosed embodiment, electron discharge devices each comprising an evacuated envelope containing an electron source or cathode, an electron target or anode, and a control electrode or grid member interposed in the electron path between cathode and anode for controlling or regulating electron flow therebetween. A timing circuit, comprising an impedance network and, in the disclosed embodiment, consisting of a resistance-capacitance combination, is interconnected between the control electrode of one device and the anode of the other device; and a second timing circuit, comprising an impedance network and which also may be a resistance-capacitance network, is interconnected between the control electrode of the such other device and the anode of the one device. The cathodes may be connected to a point of reference potential; and the anodes connected to a source of potential positive with respect to that of such point. An electrical relay means is connected in one of the anode connections; and is responsive to conduction conditions of such anode's device to connect and disconnect an impedance, specifically, a resistance, with respect to one impedance network to alter the time constant of the latter to a pre-

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assigned degree, whereby the duration of the pulse generated by the multivibrator circuit is determined.

A more complete understanding of the invention, and of its features and advantages, will be obtained from the detailed description that follows, taken in conjunction with the showing of the appended drawing, wherein:

Fig. 1 illustrates an embodiment of the invention; and Fig. 2 graphically illustrates operating features of the circuit of Fig. 1.

The oscillation or multivibrator circuit of the invention may be utilized, for example, to control an oscillator which may be an electronic oscillation generator of the class C type which is biased so that normally it is disabled. The multivibrator circuit and the oscillator, the latter designated 11, are illustrated in Fig. 1, the multivibrator comprising a pair of electron discharge devices 60 and 61, the anode circuit of the device 61 including a relay 62 having armatures 63 and 65 and associated contacts. The control grid of each device is coupled to the anode of the other by a resistance-capacity combination, one coupling including the condenser 66 and resistance 67 and the other including the condenser 68 and resistance 69 and, when the relay 62 operates, the resistance 70. The parameters of the first combination, i. e., that defined by the condenser 66 and resistance 67, are correlated in ways well known in the art, to determine the recurrence rate of the pulses produced by the multivibrator; the pulse length is determined primarily by the second coupling noted and is substantially independent of the relay operate time as will be understood from the following considerations.

In a conventional multivibrator of the configuration illustrated in Fig. 1, but not including the relay 62 or resistance 70, the duration of the period in which the device 61 is conductive would be fixed by the time constant of the resistance-capacitance combination 69, 68. That is, as illustrated in Fig. 2, if T_2 is the time at which the device 61 is rendered conducting, the voltage upon the control grid of the device 60 would vary as indicated by curve A, at a rate determined by the constants of condenser 68 and resistance 69, and the device 61 would remain conducting until a time T_3 at which this voltage reached the cut-off value for the device 60.

However, in a multivibrator of the construction illustrated in Fig. 1, when the relay 62 operates, at a time T_0 indicated in Fig. 2, the time T_0 — T_2 being the operate time of the relay, the resistance 70 is connected in parallel with the resistance 69. Consequently, the voltage upon the grid of device 60 varies as indicated by the curve B and the device 61 is rendered non-conducting at time T_1 . The time T_1 — T_0 can be fixed accurately, of course, by proper correlation of the constants of the condenser 68 and of the resistances 69 and 70. The release time of the relay is made small in comparison to the time T_1 — T_0 . The circuit configuration is conducive to realization of small relay release time inasmuch as the relay inductance is insufficient to prolong conduction in device 61 after device 60 becomes conductive. Thus, the period during which the armature 65 is in engagement with its contact, whereby a keying voltage is applied to the oscillator device 11 to render it operable, is T_1 — T_0 plus the release time of the relay 62.

Advantageously, in any particular multivibrator of the construction illustrated in Fig. 1, certain relations of the times should be observed. Specifically, the time constant for the curve A should be made such, by correlation of the condenser 68 and resistance 69, that the time T_3 — T_2 is long compared to T_1 — T_0 . The relay release time should be small as noted heretofore. In a typical system for producing 3-millisecond pulses, i. e., for enabling the oscillator 11 for 3 milliseconds, a relay having an operate time of 10 milliseconds and a release time of

1 millisecond and correlation of the circuit constants so that $T_1 - T_0$ equals 2 milliseconds have been found satisfactory.

Although a particular embodiment of the invention is illustrated and described, it will be understood that modifications may be made therein without departure from the scope and substance embraced by the invention.

What is claimed is:

1. A multivibrator circuit comprising a pair of electron discharge devices, each of said devices including a cathode, an anode and a control electrode, said cathodes being connected to a point of reference potential, said anodes being connected to a point of potential positive with respect to that of said point of reference potential, a timing circuit of preassigned time constant interconnecting the anode of one of said devices and the control electrode of the other of said devices, a timing circuit of preassigned time constant interconnecting the anode of said other device and the control electrode of said one device, and means for altering to a preassigned extent the time constant of one of said timing circuits, said timing circuits each including an impedance network, said means comprising electrical relay means connected in the connection of one of said anodes to said point of positive potential, and an impedance for connection with and disconnection from the impedance network of said one of said timing circuits responsive to the electrical condition of said relay means.

2. A multivibrator comprising a first and a second

electron discharge device each having a cathode, control electrode and anode, a cathode-anode circuit and a cathode-control electrode circuit for each device, a first resistance-capacitor timing means coupling the anode of said first device to the control electrode of said second device for determining the recurrence rate of the pulses generated by the multivibrator, a circuit including a second resistance-capacitor timing means coupling the anode of said second device to the control electrode of said first device and including a normally-open auxiliary resistance circuit, and an electromechanical relay including an operating winding connected in the cathode-anode circuit of said second device and a pair of normally-open contacts connected in said auxiliary circuit for closing said normally-open circuit upon energization of said operating winding.

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