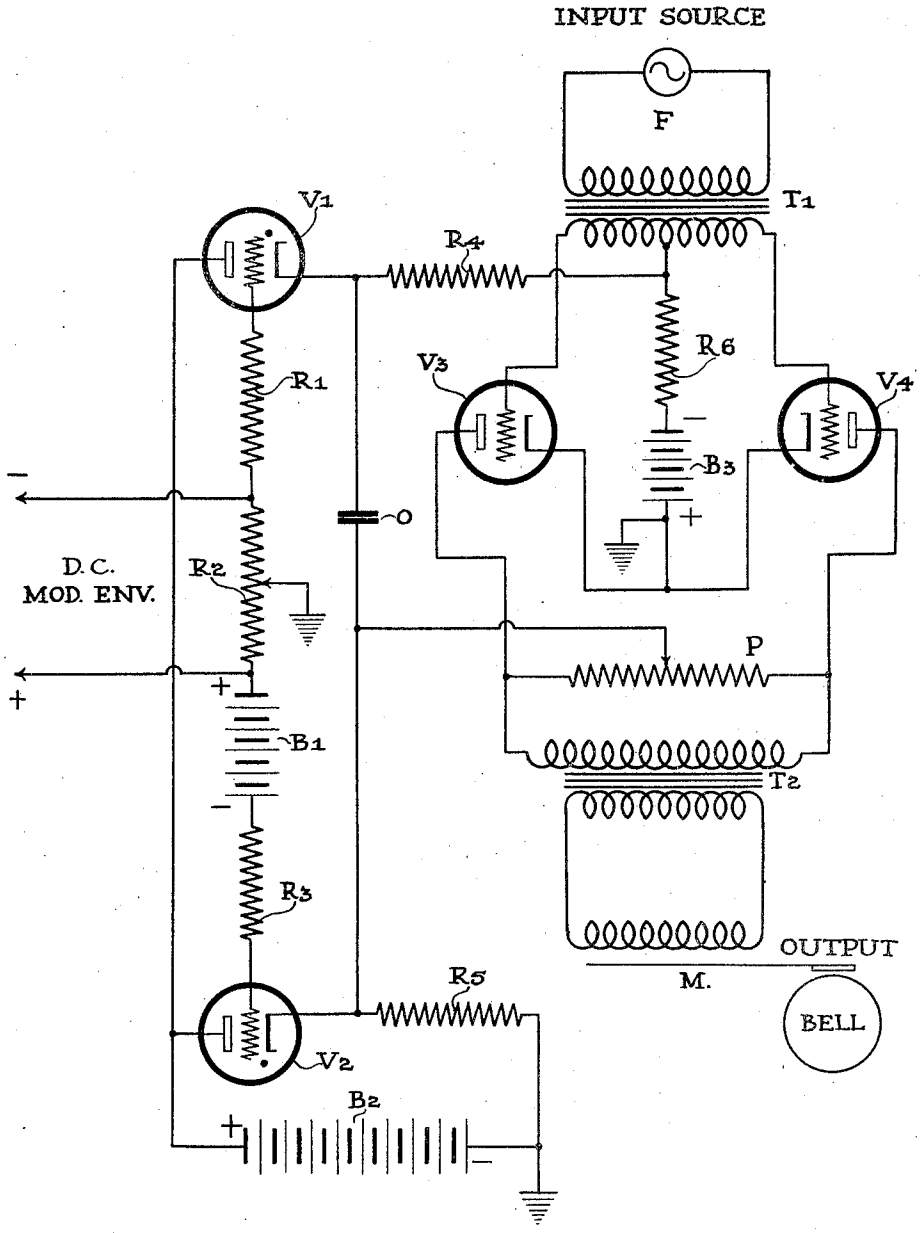
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OVERMODULATION ALARM

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OVERMODULATION ALARM

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This invention relates to a new and useful simple type of audible or visible overmodulation alarm indicator system, and is particularly adapted to indicate an overmodulation condition of ultra high frequency transmitters.

An object of this invention is to simplify and improve audible or visible overmodulation alarm indicators.

Another object of this invention is to provide an improved modulation system for use with an ultra high frequency remote control transmitter.

A feature of this invention is the arrangement of an alarm system in which a pair of gas filled triodes are connected to the modulation circuit such that one tube is normally conductive and the other tube is non-conductive, and in case of overmodulation the conductive state of the tubes is altered by a change of the bias voltage which in turn stops the normal conduction of one of the tubes and causes the other tube to conduct. At the same time an amplifier stage operates to actuate the alarm.

In any modulated signal, the modulation should not be over 100% as it is well known that if the carrier is overmodulated by more than 100% the modulated wave will then be distorted.

The purpose of this invention is to sound an alarm to indicate immediately any overmodulation condition of the signal carrier.

This invention will best be understood by referring to the accompanying drawing in which the direct current modulated envelope is connected to the outer ends of a resistance or potentiometer R_2 having a variable tap which is connected to ground. The upper end of resistance R_2 is connected to a fixed resistor R_1 which is connected in series with the grid of a gas filled triode V_1. The lower end of resistance R_2 is connected to the positive side of a bias battery B_1. The negative side of battery B_1 is connected to a fixed resistor R_3 which connects to the grid of a second gas filled triode V_2. The gas filled triodes V_1 and V_2 are of the trigger action type known in the trade as "Thyratrons." These gas filled tubes are constructed so that they do not conduct a current until a certain critical potential is obtained. A sufficient negative charge on the grid prevents the electron flow from the cathode to the anode, so as to maintain a high impedance in the anode cathode circuit, but when the negative charge on the grid is altered by a change of charge, such as a positive charge, the electron flow from cathode to anode reduces the tube impedance such that the positive charge then placed on the anode causes current to flow from anode

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to cathode regardless of the then potential of the grid. Therefore, it will be seen that the grid only controls the starting of the current flow through the anode cathode circuit.

The anodes of the tubes V_1 and V_2 are connected together in parallel to the positive side of a voltage supply or battery B_2. The negative side of the battery B_2 is connected to ground. The cathode of the gas filled thyratron V_2 connects to one terminal of commutating condenser O, to the variable arm of potentiometer P, and to ground through resistor R_5. The cathode of thyratron V_1 connects to the other terminal of commutating condenser O, to the center tap of transformer T_1 through resistor R_4, thence to ground and the cathodes of amplified tubes V_3 and V_4 through resistor R_6 and bias battery B_3. It will be seen that transformers T_1 and T_2 together with amplifier tubes V_3 and V_4 form a conventional push-pull amplifier. The input source F is connected to the primary of input transformer T_1. The secondary of input transformer T_1 has its outer ends connected to the grids of the amplified tubes V_3 and V_4. The anodes of amplifier tubes V_3 and V_4 are connected to the primary of output transformer T_2. The potentiometer P is connected across the primary winding of output transformer T_2.

In the normal operation of the device, that is, when the modulation of the direct current modulating envelope is not more than 100%, the gas filled triode V_1 is conducting and triode V_2 is cut off or non-conducting due to the biasing voltage of battery B_1. The current flowing through V_1, resistor R_4 and resistor R_6 produces an IR drop in the resistor R_6 such that the grids of the amplifier tubes would be maintained positive with respect to their cathodes if it were not for the bias potential of battery B_3. The value of R_6 is chosen so that the grids are still maintained below cutoff and thus no current flows through tubes V_3 and V_4. Now when the modulation current flowing through resistor R_2 exceeds 100% or a predetermined level, depending upon the value of B_1, sufficient potential will be developed across R_2 to overcome the normal bias on the battery B_1 thus causing gas triode V_2 to strike or conduct. At the same instant condenser O (which now has a voltage across it equal to the potential of battery B_2 less the drop in tube V_1) discharges, which extinguishes tube V_1 and increases the IR drop in R_6 thus raising the grids of V_3 and V_4 above cutoff and allowing the amplifier tubes to conduct and operate as a class A amplifier. The output of this amplifier can then actuate any

suitable alarm device such as a standard buzzer or bell. If desired, the bell could as well be replaced with a relay to operate any desired alarm indicator. The alarm will continue to sound so long as the modulation current exceeds 100%, because the amplified tube bias permits a current flow through the output transformer T_2. When the modulation current returns to normal, the current through R_2 drops and the grids of amplifier tubes V_3 and V_4 are again biased below cut off and the alarm stops as the current then ceases to flow in the amplified output transformer T_2. At the same time the discharge from condenser O extinguishes tube V_2 and causes tube V_1 to conduct again.

While I have indicated and described a system of my invention, it will be apparent to one skilled in the art that my invention is by no means limited to the particular system shown and described, but that many modifications may be made without departing from the scope of my invention.

What I claim is:

1. In an overmodulation indicator, a source of modulated energy, an amplifier stage tube having a control grid and cathode coupled to a source of voltage and having an anode and cathode coupled to an indicator, a resistor wherein a potential drop is developed which changes when the magnitude of the modulated energy changes, a first gas tube of the control grid type having output electrodes in circuit with a resistor for biasing the control grid of said amplifier, the arrangement being such that when the gas tube is conductive the amplifier tube is biased to cut off, a coupling between the control grid of said first gas tube and said first resistor such that said gas tube is conductive in the absence of overmodulation of said energy, a second gas tube of the control grid type having output electrodes including a resistor in a potential supply circuit for the anode of said amplifier, the arrangement being such that the potential on said anode is low when said last named gas tube is non-conductive, a coupling between the control grid of the last named gas tube and said first resistor such that said last named gas tube is non-conductive in the absence of overmodulation of said energy, and a charging capacitor intercoupling said gas tubes to help extinguish said first gas tube when said second gas tube is made conductive.

2. In apparatus for producing indications of alterations of an alternating current voltage which exceeds a predetermined magnitude in combination, a resistor across which said voltages are impressed; two electron discharge devices of the gaseous type each having electrodes including an anode, cathode and control grid; an amplifier stage including an electron discharge device having a control grid and having an input excited by energy and having an anode coupled to an alarm to be operated by amplified energy; a biasing circuit for said last named control grid including a resistor in the output circuit of one gas tube; a potential supply circuit for said last named anode including a resistor in the output circuit of the other gas tube; a storage condenser coupled to said resistors; means including a connection between said first named resistor and the control grid of said one gas tube for biasing said one gas tube to be conductive when said alternating current is of a magnitude less than said predetermined magnitude; and means including a connection between the said first named resistor and the control grid of said other gas tube for biasing the same to cut off when said alternating current is of a magnitude less than said predetermined magnitude.

3. In a device of the class described, a source of modulated energy, an amplifier stage tube having a control grid and cathode coupled to a source of voltage and having an anode and cathode coupled to an alarm device, a resistor wherein a potential drop is developed which changes when the magnitude of the modulated energy changes, a first gas tube of the control grid type having output electrodes in circuit with a resistor for biasing the control grid of said amplifier, the arrangement being such that when the gas tube is conductive the amplifier tube is biased to cut off, a coupling between the control grid of said first gas tube and said first resistor such that said gas tube is conductive in the absence of overmodulation of said energy, a second gas tube of the control grid type having output electrodes including a resistor in a potential supply circuit for the anode of said amplifier, the arrangement being such that the potential on said anode is low when said last named gas tube is nonconductive, a coupling between the control grid of the last named gas tube and said first resistor such that said last named gas tube is nonconductive in the absence of overmodulation of said energy, and a charging capacitor intercoupling said gas tubes and arranged to discharge when the source of modulated energy is overmodulated and to help extinguish said first gas tube when said second gas tube is made conductive, whereby a change of bias is made in the control grid of the amplifier and permits its output circuit to become active and actuate said alarm device.

4. In an overmodulation alarm device, a source of modulated energy; a resistance connected across said source of modulated energy having a variable tap connected to ground; a push-pull amplifier having a pair of electron discharge devices, each electron discharge device having a control grid, an anode, and a cathode; a first gas filled tube having at least a grid, anode and cathode, said first gas filled tube having its grid in series with a second resistor and one end of said first mentioned resistor and its grid normally biased to conduct; a second gas filled tube having at least a grid, anode and cathode, said second gas filled tube having its grid normally biased to be nonconducting and having its anode connected to the anode of said first mentioned gas filled tube; a first source of bias potential connected at one end through a third resistor to the grid of said second gas filled tube and the other end to the other end of said first mentioned resistor, a second source of bias potential connected at one end to ground and to the cathodes of said electron discharge devices, the other end of said second source of bias potential being connected through a fourth resistor to the center connection of an input transformer winding, said input transformer winding having ends connected to the grids of said electron discharge devices; a condenser having its terminals connected between the cathodes of said first and second mentioned gas filled tubes; a fifth resistor having one terminal connected to the cathode of said second gas filled tube, the other terminal of said fifth resistor being connected to ground and one side of a source of potential for said anodes of said gas filled tubes; a sixth resistance connected between the cathode of said first gas filled tube and a junction point of said fourth resistor and the center connection of said input transformer winding to normally bias the electron discharge

devices below cut off to prevent conduction therethrough; an output transformer, including primary and secondary windings, having its primary winding connected to the anodes of said electron discharge device; an alarm device connected in circuit with the secondary of said output transformer; a potentiometer across the primary of said output transformer and a connection from a tap on said potentiometer to the cathode of said second gas filled tube, and one side of said fifth resistance, whereby the grids of said electron discharge devices of said push-pull amplifier are normally biased below cut off when there is normal modulation in said source of modulated energy, and the electron discharge devices are made

conductive to operate said alarm device when there is overmodulation in said source of modulated energy.

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