MODULATING ARRANGEMENT FOR TRANSMITTER TUBES

The present invention is concerned with a modulation system in which a so-called modulator tube is made to control a transmitter circuit.

The main object of the invention is to dispense with the separate potential sources usually employed in such circuits.

Other objects of the invention will appear from time to time in the following detailed description of the invention when read in connection with the drawing in which

Figure 1 illustrates diagrammatically a modulating arrangement utilizing a grid battery;

Figure 2 shows a similar system except that in accordance with the invention a resistance device replaces the grid battery;

Figure 3 shows diagrammatically a means of replacing the filament current source;

Figure 4 further illustrates means for furnishing the necessary negative bias for the modulator tube; and

Figure 5 illustrates all the above steps and also the means for obtaining the necessary potential for the microphone circuit.

In the drawing, Figures 1 to 5, inclusive, 2 represents a modulator tube connected across the grid filament circuit of a transmitter tube 1 which circuit also includes the resistance 3 and grid condenser 4 in parallel. Coil 10 is arranged in series with the parallel branches named said coil serving to prevent the high frequency energy from the high frequency transmitter from affecting the modulation circuit. It is seen therefore, that in said arrangement a supplementary direct current flows through the grid resistance 3 of the transmitter tube 1. In the case of Figure 1 the direct current is obtained through the agency of battery 5.

The purpose of tube 2 is for modulating the carrier wave according to the signals desired to be transmitted; that is, when the tube 2 is acted upon by the voice or any other agency, a variation of the direct current takes place with the result that there occurs a fall of potential across resistance 3 which in turn, will affect the transmitter tube to a sufficient extent that the carrier is modulated. Resistance 8 also serves the purpose of furnishing the biasing means for the transmitter tube 1. Tube 2 and source 5 in Figure 1 are usually connected in the opposite sequence in order that the filaments of the transmitter valve and the tube 2 may be supplied from one and the same source of current.

In Figure 2, battery 5 is eliminated, the necessary voltage being obtained by utilizing the drop across a resistance 6, and including the resistance 8 as part of the plate filament circuit of tube 1 as shown. In Figure 2 it is still necessary to use a separate battery to obtain the necessary heating current for tube 2. According to this invention Figure 3, the necessary heating current is obtained by passing the plate current through the filament of tube 2. Rheostat 7 is utilized for regulating the intensity of the filament current.

In Figure 4, a further fall of potential across a resistance 8 is employed to obtain a negative bias for the modulator tube 2. In said figure the circuit has been shown as including a portion of the microphone circuit 12.

Figure 5 illustrates the completed diagram; 18 is the microphone, 9 a resistance for obtaining the necessary potential required for the microphone circuit.

As is evident from the drawing, the different resistances 6, 7, 8 and 9 may be combined into one large resistance with the necessary portions tapped off as shown. It is a good plan to have all the taps variable so that each section may be individually adjusted to any desired value.

The idea here disclosed while not limited to any particular use is particularly advantageous in the case of small transmitter circuits inasmuch as the absence of batteries of any kind for the modulator device more than compensates for the extra expenditure of plate power.

I claim:

1. In a radio device, a thermionic discharge device having grid and anode circuits, a modulator space discharge device connected in said grid circuit and adapted to control the transmitter tube grid bias, said space discharge device having input and output circuits, said anode circuit comprising a current source and a plurality of resistances,
all connected electrically in series, one of said resistances being variably shunted across the cathode of said space discharge device, another thereof comprising a portion of said input circuit, and another a portion of said output circuit, and means comprising a translating device shunted across another of said resistances and coupled to said space discharge device input for varying the impedance of said modulator space discharge device.

2. A radio system comprising a vacuum tube transmitter having grid and anode circuits, said anode circuit including a potential source and a resistance in series, a modulator tube connected in said grid circuit and adapted to control the transmitter tube grid bias, means comprising a microphone circuit shunted across a portion of said resistance for varying the impedance of said modulator tube and means for connecting the cathode of said modulator tube across another portion of said resistance.

3. A thermionic discharge device comprising a cathode, an anode and a control electrode, a circuit connecting said anode and cathode including a source of current and a resistance in series, a second circuit connecting said control electrode and cathode, said second named circuit comprising a space current device and a portion of said resistance in series and means shunted across another portion of said resistance for controlling the value of the space current through said space current device.

4. A thermionic discharge device comprising a cathode, an anode and a control electrode, a circuit connecting said anode and cathode including a source of current and a resistance in series, a second circuit connecting said control electrode and cathode, comprising a space discharge device, having a cathode, and a portion of said resistance in series, said last named cathode being shunted across another portion of said resistance and means shunted across still another portion of said resistance for varying the impedance of said space discharge device.

5. A thermionic discharge device comprising a cathode, an anode and a control electrode, a circuit connecting said anode and cathode including a source of current and a resistance in series, a second circuit connecting said control electrode and cathode comprising a space discharge device, having an input circuit and a cathode, and a portion of said resistance in series, said cathode being shunted across a portion of said first named resistance, said input circuit being shunted across another portion of said resistance and means shunted across still another portion of said resistance for varying the impedance of said space discharge device.

6. In a transmitter circuit, an electron discharge device having an anode, a cathode and a control electrode, said cathode and control electrode being subjected to high frequency undulatory electrical potentials, a modulation circuit comprising a space discharge device connected across the control electrode and cathode of said electron discharge device, said last mentioned space discharge device having an anode, a cathode and a control electrode, a source of potential, an impedance in series with said source, means for establishing connections between said impedance and said control electrode cathode and anode of said space discharge device whereby said space discharge device is completely energized from said impedance, and, means for varying the potential on the control electrode of said space discharge device in order to vary the high frequency output of said first mentioned electron discharge device.

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