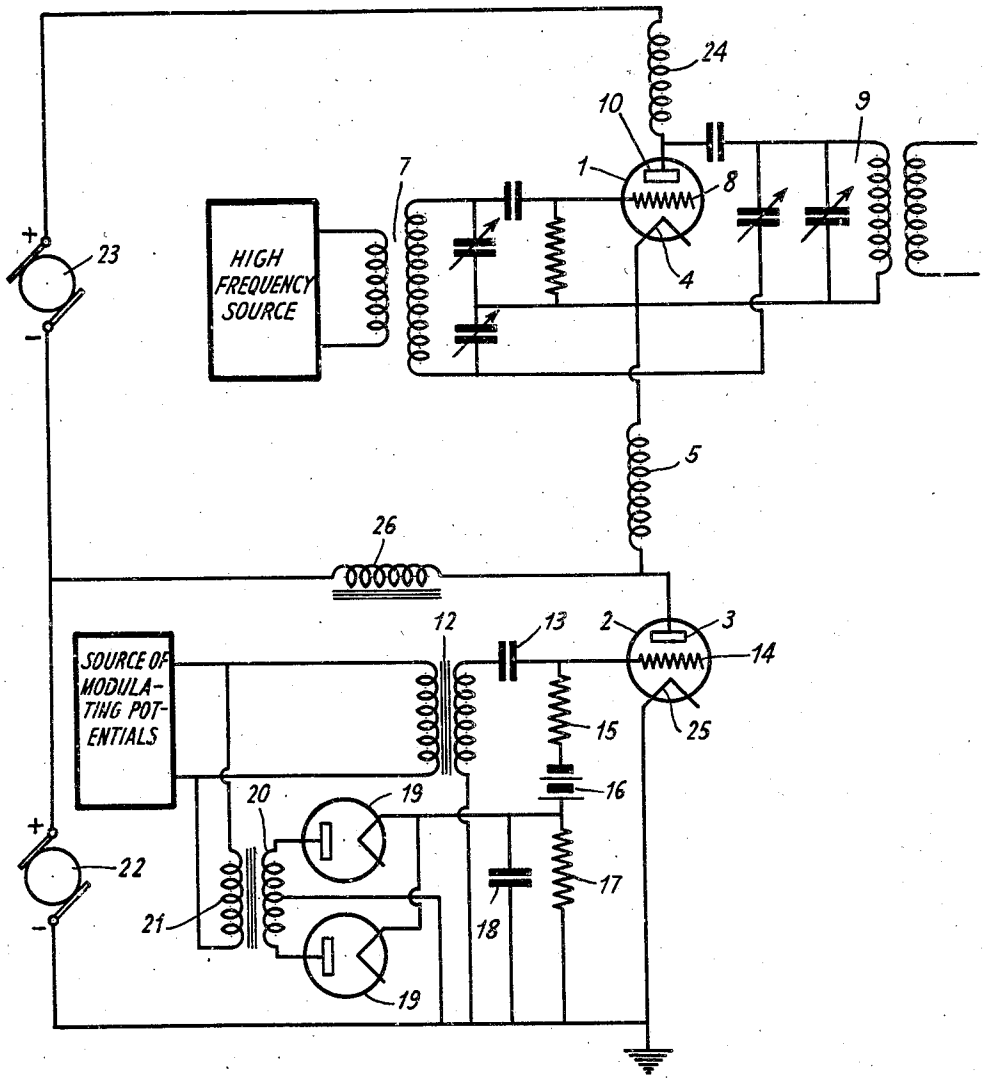
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MODULATED WAVE TRANSMITTER

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MODULATED WAVE TRANSMITTER

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This invention relates to modulated carrier wave transmitters and more particularly to modulator arrangements therefor.

The main object of the invention is to provide an improved modulated carrier wave transmitter wherein the consumption of power is substantially reduced during periods of zero or low intensity modulation and wherein such reduction of consumption of power is effected without appreciably varying the normal carrier power or introducing appreciable distortion.

According to this invention, a modulated carrier wave transmitter arrangement comprises a modulating stage and a carrier frequency stage having their impedances connected in series, means for applying to the modulating stage an anode potential which is intermediate the values of potential applied at the two ends of the series connected stages, impedance means inserted in series in the circuit for applying said intermediate potential, means for applying modulating signals as input to the modulating tube and means for controlling the said modulating tube in dependence upon the modulation input thereto.

The invention is illustrated in the accompanying drawing which shows diagrammatically one embodiment thereof.

Referring to the drawing, a high frequency (carrier frequency) amplifier tube 1 has its anode-to-cathode space connected with the anode-to-cathode space of a modulating tube 2 the anode 3 of which is connected to the cathode 4 of the tube 1 through a suitable high frequency choke 5. High frequency input from any suitable generator or source is applied to the primary winding of a transformer 7 and from the secondary winding of said transformer between grid 8 and cathode 4 of the high frequency tube 1 in the usual way and the usual tuned output circuit 9 is connected or (as shown) coupled between anode 10 and cathode 4 of the said high frequency valve 1. Modulating potentials are applied from any source to the primary winding of a transformer 12 and from the secondary winding of said transformer 12 by way of coupling condenser 13 to the grid 14 of the modulating tube 2. The grid circuit of the said modulating tube 2 contains in series with the usual grid resistance 15 and bias battery 16 a further resistance 17 which is shunted by a suitable bypass condenser 18. Across resistance 17 is connected a circuit comprising a rectifier, shown as a full wave rectifier consisting of diodes 19, in effective series with the secondary 20 of a transformer to whose primary 21 modulating potentials are applied from the source of modulating potentials. Two sources of direct current potential, e. g., two generators 22, 23, are provided in series with one another, the positive end of the two series connected sources being connected through a suitable high frequency choke 24 to the anode 10 of the high frequency tube 1 and the negative end of the two series sources being connected to the cathode 25 of the modulating tube 2. The anode 3 of the modulating tube 2 is connected through a low frequency choke 26 to the junction point of the two series connected sources 22, 23.

It will be seen that with this arrangement, the modulating tube 2 is in effect a floating series modulator and the bias thereof will be automatically varied to suit the instantaneous amplitudes of the modulating potentials applied to its grid 14. The arrangement is made such that the "sweep" of the modulating potentials always takes place over a substantially rectilinear portion of the tube characteristic and is also made such that the power taken by the modulating tube is kept at the minimum value consistent with the obtaining of substantially distortionless modulation having regard to the instantaneous values of the modulating input signals.

Accordingly it will be seen that with the illustrated and described arrangement the power taken by the modulating tube 2 will be automatically varied to suit the changing levels of modulation input and without substantially altering the mean carrier power taken by the high frequency tube 1.

Although in the above described embodiments, there is only a single high frequency valve 1 and only a single modulating tube 2, obviously each may be replaced by a bank of tubes, if required.

What is claimed is:

1. In a modulating system, an electron discharge device having a control grid and a cathode on which wave energy to be modulated may be impressed, said device having output electrodes from which modulated wave energy may be derived, a modulation frequency amplifier tube having a control grid and cathode electrodes on which modulating potentials may be impressed, said modulation frequency amplifier tube having output electrodes, a source of direct current potential, a circuit connecting the anode of said tube to the cathode of said device, the anode of said device to the positive terminal of said source and the cathode of said tube to the negative terminal of said source, a modulating potential reactor connecting the anode of said tube to a point on said source of direct current potential, means for

biasing the control grid of said modulating potential amplifier tube to a value at which said tube operates on a rectilinear portion of its characteristic curve, and means responsive to said modulating potentials for applying a supplemental bias to said control grid of said modulating potential amplifier tube to maintain its operation on a rectilinear portion of its characteristic curve irrespective of instantaneous amplitudes of said modulating potential.

2. A modulated carrier wave transmitter arrangement comprising a modulator tube and a carrier frequency tube each having a controlling grid, an anode, and a cathode, a reactance connecting the anode of the modulator tube to the cathode of the other tube, a source of potential, means connecting the negative terminal of said source of potential to the cathode of said modulator tube and the positive terminal of said source to the anode of the other tube, circuit means for applying to the anode of said modulator tube an anode potential which is intermediate the values of potential applied to the anode of said other tube and cathode of said modulator tube, impedance means inserted in series in the circuit for applying said intermediate potential, a source of modulating potentials, means connected with said source of modulating potentials for applying modulating potentials as input to electrodes of the modulator tube and supplemental means connecting said source of modulating potentials to the electrodes of said modulator tube for controlling said modulator tube in dependence upon the modulating potentials amplitude.

3. In a modulated carrier wave transmitter arrangement a modulating tube and a carrier frequency stage tube each having an anode, a cathode, and a control grid, a carrier frequency choke connecting the anode of the modulating tube to the cathode of the other tube, two sources of anode potential in series with one another, a connection between the positive terminal of the series connected sources and the anode of the carrier frequency tube, a connection between the negative terminal of the series connected sources and the cathode of the modulating tube, a carrier frequency choke in one of said connections, a connection including a modulating frequency choke between the junction point of the series connected sources and a point between the cathode of the carrier frequency tube and the anode of the modulating tube, means for applying carrier frequency energy to the control grid and cathode of the carrier frequency tube, means for applying modulating potentials between the control grid and cathode of the modulating tube, means for controlling the bias between the control grid and cathode of said modulating tube in dependence upon the amplitude of the modulating potentials, and an output circuit coupled with the anode and cathode of said carrier frequency stage tube.

4. A transmitter as claimed in claim 2 wherein said last named means is a rectifier for the modulating potentials and the rectified resultant is superimposed upon input modulating potentials applied as input to the modulating tube.

5. In a signalling system, a modulator tube and an amplifier tube, each of said tubes having an anode, a cathode, and a control grid, a source of direct current potential, a source of modulating potentials, a source of carrier waves, and a rectifier having input and output electrodes, a circuit connecting the anode of said modulator tube to the cathode of said amplifier tube, an impedance in said circuit, a connection between the cathode of said modulator tube and the negative terminal of said source of direct current potential, an impedance connecting the anode of said amplifier tube to the positive terminal of said source of direct current potential, a modulating potential reactor connecting the anode of said modulator tube to a point on said source of direct current potential, a load circuit coupled to the anode and cathode of said amplifier tube, a circuit connecting said source of carrier waves to the control grid and cathode of said amplifier tube, a circuit coupling said source of modulating potential to the control grid and cathode of said modulator tube, a connection between said rectifier input electrodes and said source of modulating potentials, and a connection between the output electrodes of said rectifier and the control grid and cathode of said modulator tube.

6. A transmitter as recited in claim 3 in which said last named means is a rectifier for the modulating potentials and in which the rectified resultant is superimposed upon the modulating energy applied between the control grid and cathode of the modulating tube.

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