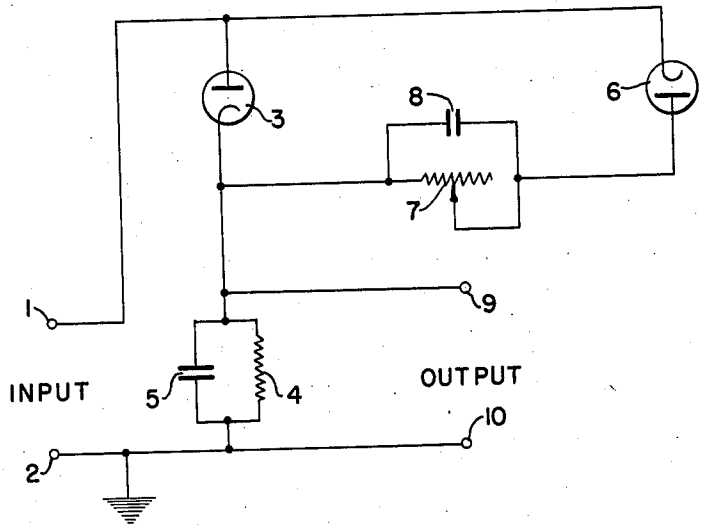
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DEMODULATION SYSTEM

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DEMODULATION SYSTEM

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This invention relates to a demodulation system and particularly to a demodulation system having a controllable output.

Demodulation systems conventionally used in modern receivers of modulated carrier waves generally comprise a diode rectifier tube connected in series relation with a load circuit comprising a fixed resistor shunted by a fixed condenser. Since the intensity of received carrier waves can vary greatly, the intensity of the demodulated signal developed across the load circuit of the diode rectifier also varies accordingly. However, as the reproducing device, to which the demodulated signal is finally applied, sometimes after amplification thereof, operates best within a limited range of input signal intensities, it is necessary to provide a control between the demodulation system and the reproducing device in order to apply to the reproducing device an input signal extending over a desired range only.

In television receivers, it has been customary heretofore to provide a potentiometer between the demodulation system and the cathode ray picture reproducing tube, by means of which the intensity of the control signal applied to the cathode ray tube can be adjusted for the purpose of controlling the contrast of the reproduced television image. Such a potentiometer is usually connected in the load circuit of the diode rectifier tube or in the load circuit of an amplifier tube coupled to the diode rectifier and has its sliding contact connected to the control grid of an amplifier tube or of the cathode ray picture reproducing tube. Since there always exists a certain amount of distributed capacity across the resistance winding of such a potentiometer, a varying amount thereof according to the potentiometer adjustment is connected in shunt relation to the control grid-cathode space of the tube, to whose control grid the sliding contact is connected. For different settings of the sliding contact of the potentiometer therefore, the input admittance of the tube following the potentiometer is varied, which gives rise to changes in the frequency response characteristics of the channel transmitting the demodulated signal. Such changes are highly undesirable, particularly in a television signal channel which is usually corrected for substantially uniform frequency response over a very wide band of frequencies, because any changes in circuit constants in the channel tend to impair the frequency response characteristics.

It is an object of the present invention, therefore, to provide a new and improved controllable demodulation system, free from the disadvantages of the arrangements hitherto used.

In accordance with the present invention, there is provided a controllable demodulation system having a pair of input terminals adapted to have a modulated carrier signal applied thereto, having half-waves of opposite polarities. A first circuit is provided comprising a first unilateral impedance means and a load impedance connected between the input terminals. The first unilateral impedance means is responsive to signal half-waves of one polarity only, thereby to develop a demodulated signal of one polarity across the load impedance. There is also provided a second circuit comprising a second unilateral impedance means, a variable impedance means, and the load circuit, connected between the input terminals. The second unilateral impedance means is responsive to signal half waves of the opposite polarity only, thereby to develop across the load impedance a demodulated signal of opposite polarity and of an intensity depending upon the value of the variable impedance. Finally, there is provided a pair of output terminals coupled to the load impedance for deriving a demodulated signal of controllable intensity therefrom.

For a better understanding of the invention, together with other and further objects thereof, reference is had to the following description, taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the accompanying drawing, the single figure shows a controllable demodulation system embodying the present invention.

Referring now more particularly to the single figure of the drawing, there is shown a controllable demodulation system comprising a pair of input terminals 1 and 2. Connected betwen the input terminals 1 and 2 is a first circuit comprising a unilateral impedance means, such as the diode rectifier tube 3, and a load impedance comprising a resistor 4, connected in shunt relation with a condenser 5. A second circuit is also connected between the input terminals 1 and 2 comprising a second unilateral impedance means, such as the diode 6, connected in series relation with a variable impedance comprising a variable resistor 7 shunted by a condenser 8, and also including the load impedance comprising resistor 4 and condenser 5. A pair of output terminals 9 and 10 are coupled to the load impedance comprising a resistor 4 and condenser

5 for deriving a demodulated signal of controllable intensity therefrom.

In operation, a modulated carrier signal of radio frequency or of intermediate frequency, in the case of a superheterodyne receiver, having positive and negative half-waves, is applied to the input terminals 1 and 2. The diode 3 is responsive to positive half-waves of the applied carrier signal only, so that current flows through the condenser 5 during the positive half-waves of the applied carrier signal only. The voltage developed across the condenser 5 is of such polarity that the cathode of the diode 3 tends to become increasingly positive. The rate at which this voltage increases is determined by the impedance of the charging circuit of the condenser 5, which comprises the signal source (not shown) connected to the input terminals 1 and 2 and the diode 3. Obviously, the voltage developed across the condenser 5 at the end of each positive half-wave of the carrier signal depends on the impedance of its charging circuit. During the negative half-waves, the condenser 5 discharges across the resistor 4, as is well known to those skilled in the art. In this manner a demodulated signal corresponding to the modulation envelope of the positive carrier half-waves is developed across the load impedance comprising condenser 5 and resistor 4.

The diode 6 is not responsive to positive carrier half-waves since it is connected with a polarity opposite to that of the diode 3, and it conducts only during the negative half-waves of the carrier signal and closes a second circuit between the input terminals 1 and 2, which, also, includes the condenser 5. Again, a current is caused to flow through the condenser 5, whose direction, however, is opposite to the condenser current flowing through the diode 3 during positive half-waves.

The voltage developed across the condenser 5 by the current flowing through the diode 6 is of opposite polarity to the voltage developed by the positive carrier signal half-waves and tends to make the anode of the diode 6 negative. The condenser current and the voltage developed across condenser 5 during each negative half-wave again depends on the impedance of the condenser charging circuit which now includes the source of carrier signal (not shown), the diode 6 and the variable impedance element comprising the variable resistor 7 shunted by the condenser 8. If the resistor 7 is completely short circuited, the voltage developed across the condenser 5, due to the negative half-waves, will be equal and opposite to the voltage developed thereacross by the positive half-waves. If, however, the resistor 7 has a finite value, the charging current, during the negative half-waves and, therefore, the voltage developed across the condenser 5, is decreased. Again, obviously, the condenser charges, due to the negative half-waves, leak off through shunt resistor 4 during the positive half-waves. It is evident, therefore, that a demodulated signal is developed across the load impedance comprising resistor 4 and condenser 5. The polarity of this signal is opposite to that of the demodulated signal produced by the positive carrier half-waves, whereby the resulting demodulated signal is of controllable intensity ranging between zero and a value determined by the value of the resistor 7. The condenser 8 has been provided for by-passing the carrier frequency but is not essential for satisfactory operation of the arrangement.

The resulting demodulated signal of controllable intensity is developed across the output terminals 9 and 10 which can be coupled to the control grid and cathode, respectively, of an amplifier tube or a reproducing device, such as a cathode ray picture reproducing tube. Since the output of the demodulation system is controllable, it is obvious that no other controls are required between the demodulation system and a reproducing device, so that the circuit constants of the modulation signal frequency channel remain unchanged when the magnitude of the demodulated signal is changed.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A controllable demodulation system adapted to have a modulated carrier signal applied thereto having half waves of different polarities comprising rectifying means and a fixed time constant circuit connected in series therewith for developing a demodulated signal of one polarity across said fixed time constant circuit, a second rectifying means and a variable impedance means connected in series with each other across said first rectifying means for normally developing a demodulated signal of opposite polarity across said time constant circuit of an intensity depending upon the value of said variable impedance means and controlling the intensity of the whole demodulated signal.

2. A controllable demodulation system comprising a pair of input terminals adapted to have a modulated carrier signal applied thereto having half-waves of opposite polarity, a pair of output terminals, a load impedance connected between said output terminals and a demodulation circuit connected between the input terminals and the output terminals comprising a means responsive to signal half-waves of one polarity only for developing across said load impedance a demodulated signal of one polarity, and means connected to said input terminals and said load impedance responsive to signal half-waves of the opposite polarity only for developing a demodulated signal across said load impedance of opposite polarity and of an intensity dependent upon the value of said variable impedance means to thereby control the intensity of the whole demodulated signal.

3. A controllable demodulation system comprising a pair of input terminals adapted to have a modulated carrier signal applied thereto having half-waves of opposite polarity, a pair of output terminals, a load impedance connected between said output terminals and a demodulation circuit connected between one of said input terminals and one of said output terminals comprising a first unilateral impedance means responsive to signal half-waves of one polarity only for developing across said load impedance a demodulated signal of one polarity, and a series circuit including a second unilateral impedance means responsive to signal half-waves of the opposite polarity only and a variable impedance means connected across said first unilateral impedance means for developing a demodulated signal across said load impedance of opposite

polarity and of an intensity dependent upon the value of said variable impedance means thereby to control the amplitude of the whole demodulated signal.

4. A controllable demodulation system comprising a pair of input terminals adapted to have a modulated carrier signal applied thereto having half-waves of opposite polarity, an output terminal connected to one of said input terminals, another output terminal, a load impedance connected between said output terminals and a demodulation circuit connected between the other of said input terminals and the other of said output terminals comprising a first unilateral impedance means responsive to signal half-waves of one polarity only for developing across said load impedance a demodulated signal of one polarity, and a series circuit including a second unilateral impedance means responsive to signal half-waves of the opposite polarity only and a variable impedance means connected across said first unilateral impedance means for developing a demodulated signal across said load impedance of opposite polarity and of an intensity dependent upon the value of said variable impedance means thereby to control the amplitude of the whole demodulated signal.

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