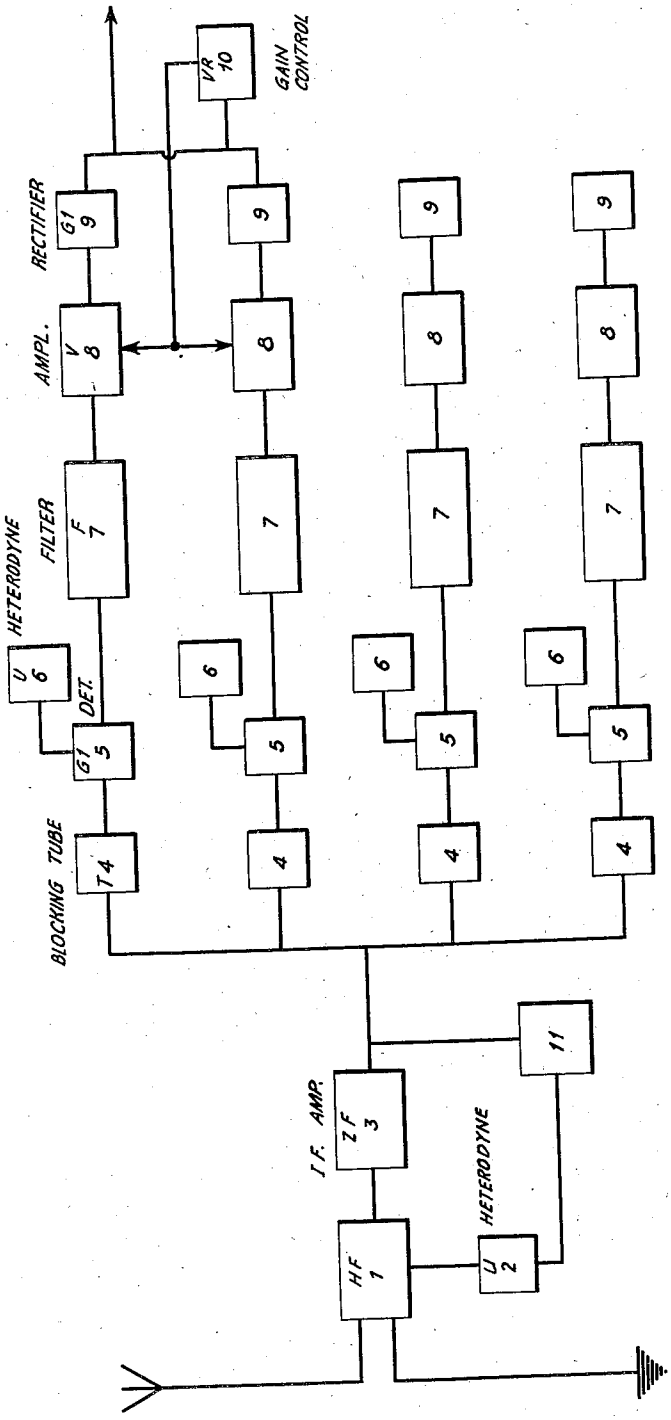
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MULTIPLEX RECEIVING SYSTEM

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INVENTOR
WILHELM RUNGE
BY
ATTORNEY

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## MULTIPLEX RECEIVING SYSTEM

Wilhelm Runge, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

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3 Claims. (Cl. 250—9)

In a multiplex radio communication system of the type wherein a plurality of messages are simultaneously transmitted over different channels it has been found that difficulty is experienced in efficiently receiving the transmitted waves when automatic gain control is employed in the receiver equipment. This difficulty may manifest itself in cross-talk between the different channels, particularly so when the carrier wave fades, at which time, due to the high amplification of the higher frequencies in some of the channels in the receiver, harmonics of the lower frequencies in the other channels become perceptible.

It is an object of this invention to avoid this occurrence and this is accomplished by providing a receiver for the simultaneous reception of many messages on different frequencies with means for separating the different frequencies prior to their rectification.

In a receiver in accordance with the present invention it is proposed to prevent "over modulation" of any sort in that part which is common to all of the received frequencies. This is effected by limiting the amplification in this common portion of the receiver to a small amount so that the maximum voltage fluctuation is less than one volt. An important feature resides in controlling the amplification by means of automatic gain control only after the several oscillations have each been separated.

If in each channel there are two frequencies or oscillations which are separately amplified, separately rectified and then subsequently combined, automatic gain control could be provided for each individual frequency. Such an arrangement, however, would be unsuitable inasmuch as one frequency may contain large amplitudes at the time another would contain little or no amplitude, a condition which may cause considerable amplification of the level of disturbance and so upset the signal to noise ratio.

Hence, for all oscillations of a given channel (or "key outfit") a joint amplifier regulation must be provided in such a way that all of the amplifiers of a channel are regulated down by the strongest oscillation. This method closely resembles the joint gain regulation of several receivers which pick up the same signals from different antennæ and then assemble them.

For effective separation of the different oscillations, it is possible, fundamentally speaking, to proceed along two ways: A single and last heterodyne could be so placed that all oscillations or frequencies are widely spaced apart in order to be able to separate them by selective means of acceptable size. There thus results for each oscillation to be picked up a filter which must be tuned to this oscillation. However, it is also possible to provide a series of filters of perfectly identical construction, and to furnish a heterodyne for each oscillation or wave so arranged that the oscillation to be received by its corresponding filter falls in the middle of the channel of the filter. There will thus result filters that are all of the same kind, and the heterodyne frequencies differ from one another. In this way a fundamental form of construction as shown in the drawing is attained.

Referring to the drawing, 1 denotes a radio frequency amplifier at the output end of which an intermediate frequency results by beat action produced by heterodyne 2 and which is amplified by the selective intermediate-frequency amplifier 3. The latter and the radio frequency amplifier must be so dimensioned that in the rear of the intermediate-frequency amplifier reception becomes clear (unequivocal). Inside this assembly which is common to all frequencies the voltage fluctuation should nowhere go beyond 1 volt in order that "overmodulation" may be precluded.

Subsequent to the intermediate-frequency amplification the intermediate frequency is fed to as many devices as there are oscillations, four being shown in the scheme illustrated in the drawing, the assumption being made that pairs of oscillations pertain to a channel. Each device first contains a separator tube 4 designed so as to prevent heterodyne oscillations of the heterodyne or local oscillator next following from reaching any other one of the apparatus. Next there follow a rectifier 5 and a heterodyne 6. The heterodyne frequency is so chosen that the oscillation to be received with this apparatus comes to be placed in the middle of the channel of filter 7. Connected to filter 7 are an amplifier 8 and a rectifier 9. This selector arrangement is the same for each of the oscillations. Since the filters are identical in construction only the heterodyne wave differs for each frequency receiver selector arrangement as regards length. The two rectifiers 9 belonging to one channel work conjointly upon gain control means 10 which reacts upon the amplifiers 8. In addition both rectifiers conjointly operate upon a recorder device.

At some suitable place, say, in the rear of the intermediate-frequency amplifier 3 one of the oscillations is filtered out and fed to a device 11 in which the frequency of this oscillation is com-

pared with a standard so that in case of a discrepancy, a corrective detuning action can be brought upon the heterodyne 2. In this manner conditions are made so that, in the presence of slight detuning of the transmitter or of the local oscillator 2 not all of the oscillations will fall out of the filters 7.

I claim:

1. In a multiplex receiver circuit adapted to receive a plurality of simultaneously transmitted messages of different frequencies, the method of overcoming fading which includes separating the received frequencies, individually rectifying the same, and selectively controlling by means of the received signal the volumes thereof.

2. A multiplex receiver circuit adapted to receive a plurality of messages of different frequencies which are simultaneously transmitted over a plurality of channels, on each channel of which a plurality of frequencies are transmitted for each message, comprising a plurality of frequency selector circuits corresponding to the number of transmitted frequencies, said selector circuits being separated into groups and each group being adapted to receive the frequencies constituting a common message, and a plurality of automatic gain control devices connected to the selector circuits and responsive to variations in signal intensity for controlling the volumes of the oscillations only in the selector circuits, each gain control device of said plurality being common to a single group of said selector circuits.

3. In a radio multiplex communication system utilizing a plurality of channels wherein there are simultaneously transmitted two different frequencies over each channel, a receiver circuit adapted to receive the simultaneously transmitted different frequencies comprising means for beating the received frequencies with a local oscillator which is common to the received channels for producing intermediate frequencies, means for amplifying the intermediate frequencies, a frequency selector circuit individual to each intermediate frequency connected to said last means, a heterodyne oscillator for each selector circuit, a filter and an amplifier in each selector circuit, and automatic gain control devices connected only in said selector circuits, said devices being in circuit with said amplifiers for controlling the volume of the oscillations only in the selector circuits, a single automatic gain control device being common to the two selector circuits comprising each channel in the receiver.

WILHELM RUNGE.