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TELEVISION RECEIVER

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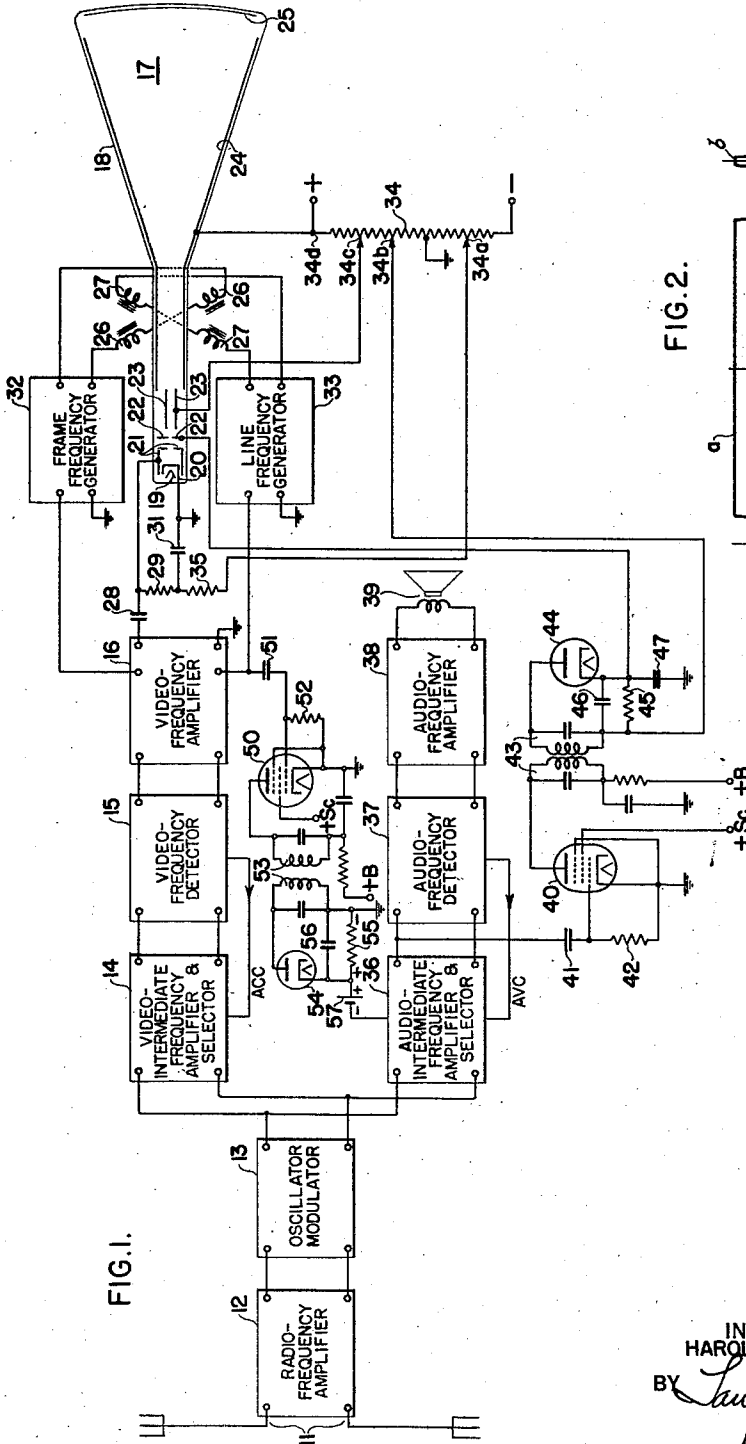
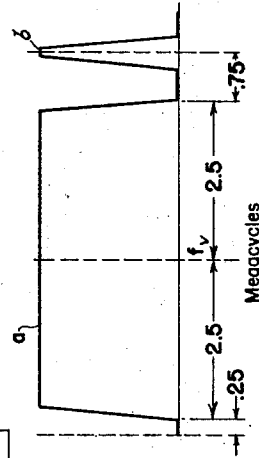


FIG. 2.



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TELEVISION RECEIVER

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This invention relates to program receivers for use in carrier-frequency program broadcasting systems and in particular in systems, such as television systems, in which each station transmits a plurality of components of a unified program on separate but related carrier waves, one component, for example the vision component, being transmitted as a broad band of modulation frequencies, and the other component, such as a sound component, being transmitted as a relatively narrow band of modulation frequencies.

In the transmission of television programs by radio broadcast, it has been proposed that each program should comprise a broad band of modulation frequencies of the order of three megacycles representing the vision component and centered about its carrier frequency and a narrow band of modulation frequencies of the order of one-quarter megacycle or less representing the sound component and centered about a carrier frequency adjacent that of the vision component and spaced only sufficiently to avoid interference between the two signal components. The exacting requirements for accurate definition of the television image, leading to the use of such an extremely wide band of modulation frequencies, increases the difficulties in the design of the selecting, amplifying, and transmitting circuits of the vision-signal channel of the receiver. Therefore, these circuits are designed to transmit uniformly a frequency band as wide, but only as wide, as is necessary to obtain reasonably accurate definition of the television image and it is important that the vision-signal channel of the receiver shall be tuned as accurately as possible to avoid cutting or attenuating any of the sideband frequencies essential for an accurate reproduction of the image. On the other hand, since the signal-selecting circuits of the vision-signal channel pass a wide band of frequencies, there is little or no variation in the intensity of the carrier frequency output of the selector for mistuning of the vision channel of the receiver up to at least a one-half of the band width. Since the intensity of the carrier-frequency output of the signal selector is usually used, directly or indirectly, to control or give an indication of the tuning of the receiver, there is provided by the system just described no ready means for indicating an accurate tuning of the vision channel of the receiver to ensure reasonably accurate reproductions of the television image.

Further, with certain frequency spacings of the carriers of the two signal components it is possible that a receiver may be tuned so that a

vision signal is transmitted through the sound-signal channel, resulting in harsh noises, while a sound signal is transmitted through the vision-signal channel, resulting in objectionable flashes of light on, or damage to, the screen of the vision-signal reproducer.

It is an object of the invention, therefore, to provide an improved program receiver for use in a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and a second component is transmitted as a narrow band of modulation frequencies on a related carrier wave, including means for accurately indicating the correct tuning of the receiver, that is, the condition in which the broad-band signal component is accurately centered with respect to its broad-band selector, thereby ensuring optimum definition of the reproduced signal.

It is another object of the invention to provide an improved program receiver, for use in a system of the type described, in which the broad-band signal-reproducing means is operative only when the broad-band signal component is accurately centered with respect to its broad-band selector.

It is a further object of the invention to provide an improved program receiver, for use in a system of the type described, in which the narrow-band signal channel is maintained in an inoperative condition except when a signal having a predetermined component characteristic of the desired broad-band signal is received by the broad-band signal channel.

In accordance with the invention, an improved program receiver, for use in a system of the type described, comprises a first signal-translating channel including a broad-band selector for a first program component and a first signal-reproducing means coupled thereto; a second signal-translating channel including a narrow-band selector for the second program component and a second signal-reproducing means coupled thereto. The receiver includes also means responsive solely to the signal output of the narrow-band selector for controlling the signal-transmission efficiency of the signal channel for the broad-band program component and means for maintaining said narrow-band signal channel inoperative except when a signal having a predetermined characteristic is being received by the broad-band signal channel.

In a preferred embodiment of the invention, for use in a television broadcasting system in which

the vision signal component includes a characteristic component such as a synchronizing-signal component or other periodically recurrent modulation-signal component and in which the sound-signal component comprises only non-current signal components, the broad-band signal-reproducing means comprises a cathode-ray tube including one or more control electrodes normally biased to suppress the cathode ray. Coupled to the output of the narrow-band selector is the sound-reproducing means and means for deriving a bias voltage proportional to the amplitude of the carrier-frequency output of the narrow-band selector, the range of proportionality being limited by a tube operating beyond its upper and lower saturation points for signals above a predetermined value, and impressing it positively upon an electrode of the cathode-ray tube to initiate a ray therein. By means of this arrangement, the vision-signal channel is normally maintained inoperative until the sound-signal channel has been accurately tuned, as evidenced by the developing of a bias voltage of sufficient value to initiate and maintain the cathode ray. By virtue of the relatively extreme selectivity of the narrow-band selector, whenever the receiver is tuned sufficiently accurately to obtain a substantial signal output from the narrow-band selector, it will be tuned to center the vision signal with respect to the broad-band selector with sufficient accuracy to ensure the transmission of the essential modulation frequencies for an accurate reproduction of the image, so that an indication of the proper tuning of the receiver is given in accordance with the illumination of the cathode-ray tube.

In order to ensure that the receiver will be maintained inoperative except when each signal channel is receiving its characteristic type of signal, there is coupled to the output of the broad-band selector, means for deriving a bias voltage dependent upon a predetermined characteristic thereof, such as the synchronizing impulses of a vision signal or other periodically recurrent modulation-signal component. This bias is impressed positively on an electrode of a tube of the sound-signal channel preceding the point from which the first-mentioned bias is developed, thereby overcoming a normal negative bias supplied such electrode and rendering the channel operative.

It is understood that the term "carrier frequency", as used herein, refers either to a radio frequency or an intermediate frequency and that the selectors of the receiver may operate at either radio frequencies or intermediate frequencies in accordance with whether the receiver is of the tuned radio frequency or superheterodyne type. Also, the expression "tuning of the receiver" as used herein refers to the adjustment of the resonant frequencies of the radio-frequency selectors or the local oscillator, or both.

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 drawing, Fig. 1 is a schematic diagram of a complete television receiving system embodying the invention, while Fig. 2 is a chart illustrating the relation between the program components in a television system of the type which the system of Fig. 1 is designed to receive.

Referring now more particularly to Fig. 1 of the drawing, there is illustrated, partially sche-

matically, a complete television receiver of the superheterodyne type embodying the invention and including an antenna circuit 11 coupled to a radio-frequency amplifier 12, which is connected, in cascade, with an oscillator-modulator 13, a video-intermediate-frequency amplifier and selector 14, a video-frequency detector 15, a video-frequency amplifier and selector 14, as indicated. 17, constituting the vision-signal channel of the receiver. An automatic amplification or contrast control (A. C. C.) may be connected from the output of the detector 15 to the control electrodes of one or more of the tubes of the intermediate-frequency amplifier and selector 14, as indicated. The elements described may be of conventional construction, so that a detailed illustration and description is considered unnecessary herein.

The cathode-ray tube 17 comprises the usual envelope 18 containing an electron gun comprising a cathode heater 19, a cathode 20, a main or video control grid 21, an accelerating anode 22 for generating and accelerating an electron stream, and a focusing anode 23 for focusing it into a beam. The envelope is also provided with a second anode 24 usually comprising a conductive coating on the interior surface and the usual fluorescent screen 25 formed on the end of the tube. Line-frequency and frame-frequency scanning or deflecting coils 27 and 28, respectively, are disposed about the neck of the tube 17 for developing a field normal to the axis of the tube, for deflecting the cathode ray.

The video-frequency amplifier 16 is coupled to the control grid 21 of the tube 17 by means of a coupling condenser 28, a blocking resistor 29, and a by-pass condenser 31, while the scanning coils 27 and 28 are energized from the line-frequency generator 33 and frame-frequency generator 32, respectively, also coupled to the video-frequency amplifier to receive therefrom synchronizing impulses transmitted with the video signal, thus synchronizing the scanning of the cathode-ray tube with the scanning of the image at the transmitting station. For supplying operating potentials to the various electrodes of the tube 17, there is provided a voltage divider 34 adapted for connection to a suitable direct current source (not shown) and having a tap 34a for supplying a bias to the control grid 21 through an isolating resistor 35 and taps 34b, 34c, and 34d connected to the anodes 22, 23, and 24, respectively. Certain of these taps may be manually adjustable for regulating the initial bias voltages applied to the tube electrodes and for controlling the operation of the system.

The sound-signal channel comprises the antenna circuit 11, the radio-frequency amplifier 12, and the oscillator-modulator 13 in common with the vision-signal channel and, coupled thereto in cascade, an audio-intermediate-frequency amplifier and selector 36, an audio-frequency detector 37, an audio-frequency amplifier 38, and a sound reproducer 39. An automatic amplification or volume control (A. V. C.) may be connected from the output of the detector 37 to the control electrodes of one or more of the tubes of the intermediate-frequency amplifier and selector 36, as shown.

The system of Fig. 1, as thus far described, is conventional in construction and operation so that a detailed explanation of its operation is deemed unnecessary. Briefly however, the vision- and sound-modulated carrier waves intercepted by the antenna circuit 11 are selected and amplified in the radio-frequency amplifier 12 and sup-

plied to the oscillator-modulator 13 where the signals are converted into intermediate frequencies in the usual manner. The intermediate-frequency amplifier and selector 14 selectively amplifies the vision-modulated intermediate-frequency carrier and supplies it to the detector 15 where the video-frequencies of modulation are derived and subsequently amplified by the amplifier 16 and supplied in the conventional manner to the control grid 21 of the cathode-ray tube 17 and to the scanning generators 32 and 33. With proper operating potentials supplied to the electrodes of the tube 17, a stream of electrons is generated, accelerated, and focused by the electron gun comprising the elements 19, 20, 21, 22, and 23, which strikes the fluorescent screen 25 of the tube. The line-frequency and frame-frequency generators 33 and 32, respectively, generate periodic currents of saw-tooth wave form synchronized with the scanning circuits of the transmitter and supply them to the deflecting coils 27 and 26. The magnetic fields produced by the coils 26 and 27 of saw-tooth wave form are effective to cause the cathode ray to scan the screen 25 rectilinearly to reproduce the transmitted image.

Simultaneously, the intermediate-frequency amplifier and selector 36 selectively amplifies the sound-modulated intermediate-frequency carrier and transmits it to the detector 37 where the audio frequencies of modulation are derived and subsequently amplified in the amplifier 38 and reproduced by the loud-speaker 39.

In order to ensure that the vision-modulated carrier is accurately centered with respect to the intermediate-frequency selector and amplifier 14, there is provided an arrangement for controlling the operation of the cathode-ray tube 17 in accordance with the accuracy of tuning of the sound-signal channel, the selector of which, as stated above, passes a band which is extremely narrow relative to that of the vision-signal channel. The arrangement includes a vacuum-tube repeater 40 coupled to the output of the intermediate-frequency amplifier 36 by means of a coupling condenser 41 and a grid leak 42. The output circuit of the repeater 40 is coupled by means of an intermediate-frequency selector 43 to a diode rectifier 44. The selector 43 has a selectivity of the same order as, or sharper than, that of the selector 36. Suitable operating potentials are provided for the tube 40, as indicated by +Sc and +B. The rectifier 44 is provided with a load circuit comprising a resistor 45 bypassed by a condenser 46, while its cathode is effectively grounded for intermediate frequencies by condenser 47. The load resistor 45 of the rectifier 44 is included in series in the connection from the tap 34b of the power source to the accelerating anode 22 of the tube 17 with such a polarity that the unidirectional voltage developed by the rectifier is impressed positively on the electrode 22, and thus acts cumulatively with that supplied by the voltage divider 34.

In the operation of the above described control arrangement, the accelerating anode 22 is normally maintained at such a potential, usually positive, that it is insufficient to initiate, or actually suppresses, the cathode ray of the tube 17, so that the screen 25 is not illuminated. When the receiver is accurately tuned, that is, when the sound-modulated carrier is approximately centered with respect to the selector 36 and a signal is being received, the signal output of the selector 36 is of substantial amplitude and a substantial

bias voltage is developed across the resistor 45 which is superimposed upon that supplied by the tap 34b, the sum of the two voltages being of sufficient magnitude to initiate and maintain the cathode ray in the tube 17 to reproduce the transmitted image in the conventional manner. In order to minimize the effect of normal variations in the signal output of the selector 36, due either to an inexact tuning of the sound-signal channel or to variations in the strength of the signal input, the characteristics of the repeater 40 are so selected with reference to the magnitude of its input voltage and its circuit constants that it becomes saturated for signal inputs of a predetermined value somewhat less than the normal signal output of the selector 36. With such an arrangement, the bias voltage developed by the rectifier 44, for values of signal output of the selector 36 substantially less than normal, is proportional to the signal input to repeater 40 but is insufficient to initiate the cathode ray in the tube 17, while increases in the signal output of the selector 36 substantially beyond this normal value do not effect appreciable increases in the bias voltage developed by the rectifier 44, which might affect the intensity of the cathode-ray beam and thus the average background illumination of the reproduced image.

In order to prevent the occurrence of disturbing light flashes on, or damage to, the screen of the cathode-ray tube 17 upon the reception of signals other than television signals and the vision-signal channel, there is provided an arrangement for maintaining the sound signal channel inoperative except when a signal having a component characteristic of a television signal is received by the vision-signal channel. This arrangement includes a vacuum-tube repeater 50 coupled to the output of the video-frequency amplifier 16 by means of a coupling condenser 51 and a grid leak 52. The output circuit of the repeater 50 is coupled to a diode rectifier 54 by means of a selector 53 sharply tuned to one of the characteristic modulation components of a television signal, preferably, a periodically recurrent signal component such as the line-frequency synchronizing component. Suitable operating potentials are provided for the tube 50, as indicated by +Sc and +B. The rectifier 54 is provided with a load circuit comprising a resistor 55 bypassed by a condenser 56. A control circuit is provided for one or more of the tubes of the audio-intermediate-frequency amplifier 36, including a source of negative-bias potential 57 and the load resistor 55 of the rectifier 54 connected with such polarity as to oppose the bias source 57.

In the operation of the last described control arrangement, the audio-intermediate-frequency amplifier 36 is normally biased to an inoperative condition by the battery 57 which action, in turn, removes the signal input to the auxiliary control circuit for the tube 17 and maintains the vision-signal channel inoperative, as described above. When a television signal including a predetermined characteristic component, such as line-frequency synchronizing impulses, is received by the vision-signal channel, this signal is repeated by the tube 50 and the predetermined component is selected by the selector 53. A bias voltage dependent upon the amplitude of this predetermined component is derived by the rectifier 54 and appears across the load resistor 55, this voltage, for normal received signals, being sufficient to overcome the negative bias of the battery 57

and render conductive the tube or tubes of the audio-intermediate-frequency amplifier 36. In order to minimize the effect of the normal variations in the amplitude of the predetermined signal component in the output of the video-frequency amplifier 16, due to variations in the strength of the signal input or other causes, the characteristics of the repeater tube 50 are so selected with reference to the magnitude of its input voltage and its circuit constants that it becomes saturated for signal inputs of a predetermined value somewhat less than the normal amplitude of the predetermined component of the signal output of the amplifier 16. With such an arrangement, the bias voltage developed by the rectifier 54 for all values of signal output of the amplifier 15 substantially less than normal is insufficient to overcome the bias 57 and render the sound-signal channel operative, while increases in the signal output of the amplifier 16 substantially beyond this normal value do not effect appreciable increases in the bias voltage developed by the rectifier 54, which might affect the transmission efficiency of the sound-signal channel and, thus, the level of the sound output thereof.

Fig. 2 is a chart of the relation between the vision modulation band, the sound modulation band and the radio-frequency or intermediate-frequency carriers as it has been proposed to relate them for each television broadcast station. It will be noted that the vision modulation band *a* is a band approximately 5 megacycles in width centered about a carrier frequency f_v , which is spaced by 2.75 megacycles from one edge of the allotted signal channel, while the sound modulation band *b* comprises an extremely narrow band centered about a carrier frequency at the other edge of the signal channel. The band *b* may be extremely narrow and still provide adequate transmission of the sound modulation frequencies. As a maximum width this band may be of the order of 0.25 megacycle in order to allow for reasonable drift of the local oscillator or the carrier frequency. Thus, whenever the receiver is tuned sufficiently accurately that the sound signal is even approximately centered with respect to the pass band of the selector 36 so as to produce a substantial control voltage on the accelerating anode 22 of the tube 17, the vision modulation band must necessarily be centered with respect to the pass band of the selector 14 with such accuracy as to transmit and reproduce the essential modulation frequencies for an accurate reproduction of the transmitted scene. There is thus given an indication of the proper tuning of the receiver in accordance with the illumination of the cathode-ray tube 17. At the same time, the entire receiver is rendered inoperative except when a television signal including proper synchronizing-frequency components is being received by the vision-signal channel, thereby preventing disturbing flashes on the screen and damage to the cathode-ray tube.

While there has been described what is at present considered to be the preferred embodiment of this 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. In a carrier-frequency program broadcasting system in which a first component of each pro-

gram is transmitted as a broad band of modulation frequencies on one carrier wave and a second component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said first program component and a cathode-ray signal-reproducing tube coupled thereto, said cathode-ray tube having a control electrode normally biased to suppress the cathode ray, a second signal-translating channel including a narrow-band selector for said second program component and a second signal-reproducing means coupled thereto, and means for giving an indication of the tuning of the receiver in accordance with the illumination of said cathode-ray tube comprising a repeater tube coupled to the output circuit of said narrow-band selector, said tube being so designed relative to the constants of its associated circuit that it saturates for input voltages above a predetermined value, rectifier means coupled to said repeater tube for deriving a bias voltage proportional to the input to said repeater tube for inputs below said predetermined value, and means for impressing said bias voltage positively on said control electrode to initiate and maintain the cathode ray only when the signal input to said repeater approximates said predetermined value.

2. In a carrier-frequency television broadcasting system in which the vision-signal component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and the sound-signal component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said vision-signal component and a cathode-ray signal-reproducing tube coupled thereto and provided with a control electrode normally biased to suppress the cathode ray, a second signal-translating channel including a narrow-band selector for said sound-signal component and a loud-speaker coupled thereto, and control means coupled to, and responsive solely to, the signal output of said narrow-band selector for modifying the bias of said control electrode to initiate and maintain the cathode ray, said control means including means for limiting the controlling effect on said control electrode to a substantially constant value for outputs of said narrow-band selector above a predetermined value, whereby the illumination of said cathode ray tube affords an indication of the tuning of said sound-signal channel and is unaffected by said control means during normal operation.

3. In a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and a second component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said first program component and a first signal-reproducing means coupled thereto, a second signal-translating channel including a narrow-band selector for said second program component and a second signal-reproducing means coupled thereto, means responsive solely to the signal output of said narrow-

band selector for controlling the signal transmission efficiency of said first signal channel, and means responsive to the reception by said first signal-translating channel of a signal having a predetermined characteristic component for controlling the transmission efficiency of said second signal-translating channel at a point preceding the output of said narrow-band selector.

4. In a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and a second component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said first program component and a first signal-reproducing means coupled thereto, a second signal-translating channel including a narrow-band selector for said second program component and a second signal-reproducing means coupled thereto, means responsive solely to the signal output of said narrow-band selector for preventing operation of said first signal-reproducing means whenever said signal output is less than a predetermined magnitude, means for biasing said second signal-translating channel to an inoperative condition, and means responsive to the reception by said first signal-translating channel of a signal having a predetermined characteristic component for overcoming said biasing means to render said second signal-translating channel operative.

5. In a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and a second component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said first program component and a first signal-reproducing means coupled thereto, a second signal-translating channel including a narrow-band selector for said second program component and a second signal-reproducing means coupled thereto, means responsive solely to the signal output of said narrow-band selector for controlling the signal transmission efficiency of said first signal channel, control means coupled to the output of said broad-band selector and including a selector sharply responsive at the frequency of a predetermined characteristic component of a desired broad-band signal, and means responsive to the output of said last-named selector for controlling the transmission efficiency of said second signal-translating channel at a point preceding the output of said narrow-band selector.

6. In a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and a second component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said first program component and a first signal-reproducing means coupled thereto, a second signal-translating channel including a narrow-band selector for said second program component and a second signal-

reproducing means coupled thereto, means responsive solely to the signal output of said narrow-band selector for controlling the signal transmission efficiency of said first signal channel, a repeater tube coupled to the output circuit of said broad-band selector, said tube being so designed relative to the constants of its associated circuit that it saturates for input voltages above a predetermined value, a selector circuit coupled to the output of said repeater tube and sharply responsive at the frequency of a predetermined characteristic component of a desired broad-band signal, rectifier means for deriving from the output of said selector circuit a bias voltage variable in accordance with the amplitude of said predetermined signal component, and means for utilizing said bias voltage to render said second signal-translating channel operative only when the signal input to said repeater approximates said predetermined value.

7. In a carrier-frequency television broadcasting system in which the vision-signal component of each program is transmitted as a broad band of modulation frequencies on one carrier wave and the sound-signal component of each program is transmitted as a narrow band of modulation frequencies on another carrier wave related in frequency to said first carrier wave, a program receiver comprising a first signal-translating channel including a broad-band selector for said vision-signal component and a cathode-ray signal-reproducing tube coupled thereto and provided with a control electrode normally biased to suppress the cathode ray, a second signal-translating channel including a narrow band selector for said sound-signal component and a loud-speaker coupled thereto, means responsive solely to the signal output of said narrow-band selector for modifying the bias of said control electrode to initiate and maintain the cathode ray when said signal output exceeds a predetermined value, whereby the illumination of said cathode ray affords an indication of the tuning of said sound signal channel, means for biasing said second signal-translating channel to an inoperative condition at a point preceding the output of said narrow-band selector, and means responsive to the reception by said first signal-translating channel of a vision signal including a synchronizing-frequency component for overcoming said biasing means to restore said second signal-translating channel to normal operating condition.

8. In a carrier-frequency program broadcasting system in which each of a pair of components of each program is transmitted as a band of modulation frequencies on a carrier wave having a predetermined frequency relation to the carrier wave of the other component of the same program, one of said program components having a characteristic modulation component, a program receiver comprising a pair of signal channels, each of said channels including signal-selecting, -amplifying and -detecting means and a signal-translating device coupled thereto, the signal-selecting means of said channels being individually responsive to frequencies having said predetermined relation to each other, and means for determining the allocation of each program component to its proper channel comprising means selectively responsive to said characteristic modulation component coupled to its corresponding signal channel for controlling the signal-transmission efficiency of the other signal channel, and means responsive to the signal am-

plifude at a point in said other signal channel subsequent to the point at which it is controlled for controlling the signal-transmission efficiency of said first-named signal channel at a point subsequent to the point to which said selectively responsive means is coupled.

9. In a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a carrier wave modulated with a recurrent periodic signal component and a second component of each program is transmitted as a carrier wave modulated with a non-recurrent signal component and having a predetermined frequency relation to said first-named carrier, a program receiver comprising a pair of signal channels, each of said channels including signal-selecting, -amplifying and -detecting means and a signal-transmitting device coupled thereto, the signal-selecting means of said channels being individually responsive to frequencies having said predetermined relation to each other, and means for determining the allocation of each program component to its proper channel comprising means selectively responsive to said recurrent signal component coupled to its corresponding signal channel for controlling the signal-transmission efficiency of the other signal channel, and means responsive to the signal amplitude at a point in said other signal channel subsequent to the point at which it is controlled for controlling the signal-transmission efficiency of said first-named signal channel at a point subsequent to the point to which said selectively responsive means is coupled.

10. In a carrier-frequency program broadcasting system in which a first component of each program is transmitted as a carrier wave modulated with a recurrent periodic signal component and a second component of each program is transmitted as a carrier wave modulated with a non-recurrent signal component and having a predetermined frequency relation to said first-named carrier, a program receiver comprising a pair of signal channels, each of said channels including signal-selecting, -amplifying and -detecting means and a signal-translating device coupled thereto, the signal-selecting means of said channels being individually responsive to frequencies having said predetermined relation to each other, means for normally biasing to cut off a portion of the signal channel for said first program component subsequent to its detecting means, means for normally biasing to cut off a portion of the other signal channel, and means for determining the allocation of each program component to its proper channel comprising means for deriving from the detecting means of said first-named channel a bias voltage dependent upon said recurrent signal component and applying it to overcome the cut-off bias of the other signal channel, and means for deriving from said other signal channel a bias voltage dependent upon the signal amplitude therein subsequent to the biased portion and applying it to overcome the bias of said first-named channel.

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