

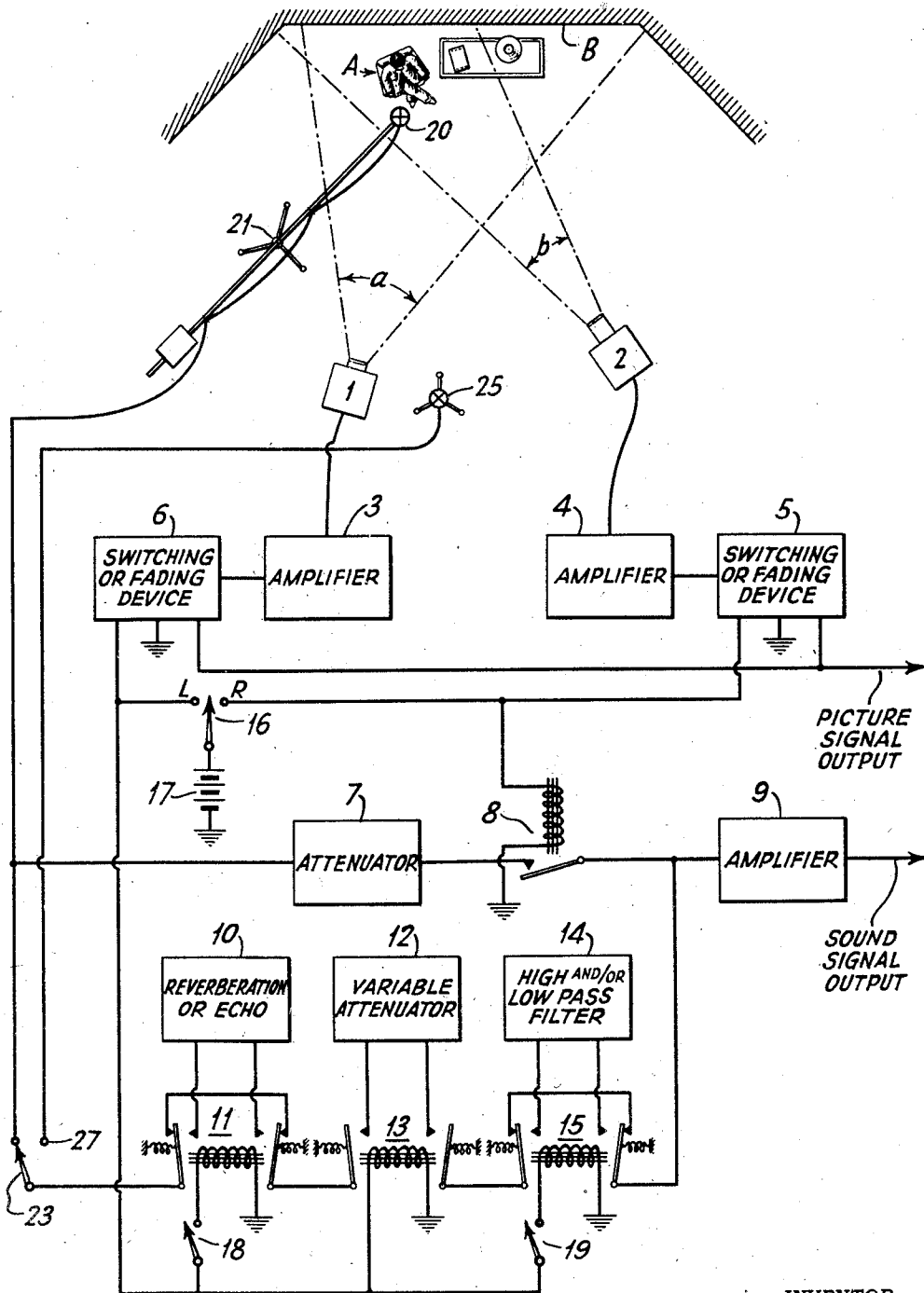
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TELEVISION SYSTEM

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TELEVISION SYSTEM

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This invention relates to a new and improved system for the transmission of television signals, and more particularly to a system and means whereby proper relationship and perspective between the audio signals or the sound accompanying television pictures may be produced.

In the transmission of studio presentations by television ordinarily at least two television cameras are used, one of which is normally used for the transmission of small image areas for close-ups and the other of which is used for distant scenes in which a larger image area is transmitted. The two cameras are frequently located at substantially the same distance from the set, and each are equipped with different focal length lenses so that the one having the shorter focal length will cover a greater area on the set than the one having the longer focal length lens. When two or more such cameras are used, it has been more or less conventional practice to use a single microphone positioned on a boom, the single microphone operating to pick up all of the sound which is desired to be transmitted simultaneously with the picture. In such systems, frequently the sound intensity, character or quality does not bear the proper relationship or perspective to the picture being transmitted at the particular instant, since the single microphone must, under usual circumstances, remain relatively fixed with respect to the actor or sound source and in certain instances the sound level should be altered in accordance with variations in the apparent distance of the object or actor from the observer, whereas in other instances a certain amount of reverberation, echo, or attenuation of particular frequencies is desirable in order that the sound may appear natural and may properly relate to the particular accompanying picture and the particular circumstances associated with the picture or scene.

It is, therefore, a purpose of the present invention to provide a television system wherein the sound signals as derived from a single microphone in a television studio may be so treated or affected during their transmission as to introduce the necessary changes in the quality of the sound signals to cause the sound to bear the proper relationship or perspective to the particular picture being simultaneously transmitted.

A still further purpose of the present invention resides in the provision of means whereby when one or another of a plurality of television cameras is used in a television studio to selec-

tively transmit different scenes or image areas, the accompanying sound signals are caused to be transmitted through one or another of various circuits for producing the appropriate attenuation of the sound signals or for introducing the effect of reverberation or echo to the sound.

Still another purpose of the present invention resides in the provision of means in a television system wherein a plurality of cameras are used in the studio whereby the absorption or attenuation of predetermined frequencies of the accompanying audio signals may be controlled in accordance with the particular camera selected or the particular scene transmitted.

Still another purpose of the present invention resides in the provision of means in a television system whereby the amount of attenuation, apparent reverberation or the amplification of selected frequency ranges of the sound frequencies may be variably controlled to produce certain desired results in order that the sound and picture will relate properly.

Still another purpose of the present invention resides in the provision of means in a television system wherein a plurality of television cameras and sound microphones are used, whereby the selection of the particular microphone in use at any one instant may be determined by the particular selection of the camera simultaneously used.

Still another purpose of the present invention resides in the provision, in a television system, of means whereby the selective transmission of the sound signals from a plurality of microphones may be so controlled as to produce various synthetic effects in the volume, character or quality of the sound in accordance with the particular television camera in use at the particular instant.

Various other advantages and purposes of the present invention will become more apparent to those skilled in the art from a reading of the following specification and claims, particularly when considered with the drawing, wherein the single figure represents one form of the present invention.

Referring now to the drawing, an actor A is shown seated on the television set B. For transmitting images of the actor or of the set as a whole, two television cameras 1 and 2 are provided, each of which may be provided with lenses having different focal lengths. The camera 1 is equipped with a short focal length lens which admits light subtended by the angle α , and camera 2 is equipped with a long focal length lens

and admits the light subtended by the angle *b*. It will be noticed from the drawing that the camera 1, together with the particular lens associated therewith, will transmit images of substantially the entire television set or scene, whereas the camera 2, together with the longer focal length lens associated therewith, will transmit a much smaller area and will in effect assimilate a close-up of the particular actor or subject within the range of the camera. The video signals as developed by the one or the other of the two cameras 1 and 2, are amplified respectively by the amplifiers 3 and 4, and the amplified video signals are then supplied to switching or fading devices 6 and 5 which are associated respectively with the amplifiers 3 and 4. These switching and fading devices then supply amplified video signals to the picture signal output of the system shown, the picture signals being ultimately used to modulate a picture carrier frequency for subsequent transmission.

Normally, both of the cameras are not in use simultaneously, except where a fading from one scene to another is desired, and in order that the desired selection of the two cameras may be brought about, appropriate switching means are included in the switching and fading devices 5 and 6. Such switching means may be in the form of relays for permitting or preventing the transmission of the video signals, or the transmission of the signals through the devices 5 and 6 may be controlled through the application of different potentials to the control electrodes of the discharge tubes contained therein. Furthermore, the transmission of the signals through the fading devices may be by way of a variably controlled device in order that a fading from one scene to another may be produced. For controlling the transmission of the video signals through the one or the other of the switching devices 5 and 6, a switch 16 is provided which is connected to a source of current 17. When the switch 16 is placed in the position L, the video signals developed by the camera 1 are permitted to be transmitted through the amplifier 3 and switching device 6 in order that these signals may appear in the picture output circuit of the system. If it is desired to transmit signals from the camera 2 a switch 16 is placed in the position R, the video signals developed by the camera 1 are permitted to be transmitted through the amplifier 3 and switching device 6 in order that these signals may appear in the picture output circuit of the system. If it is desired to transmit signals from the camera 2 a switch 16 is placed in the position R, and accordingly, the transmission of the video signals through the switching device 5 to the picture signal output circuit is permitted, whereas the simultaneous transmission of the video signals through the switching device 6 is prevented.

For producing the sound signals for accompanying the television pictures, a single microphone 20 may be used. This microphone is shown positioned on a microphone boom, which is supported by a tripod arrangement or other suitable stand 21. According to conventional practices, the microphone is generally located above the set or action by a distance sufficient to prevent its being included in the scene transmitted by the television cameras, or the microphone may be hidden in some part of the furnishings of the set.

Sound signals from the microphone 20 may be transmitted over one or another of a plurality of

circuits. One of these circuits includes the attenuator 7 and the contacts of the relay 8. The signals from the microphone 20 may also traverse the path through the switch 23, the relay 11, the relay 13 and the associated variable attenuator 12, as well as the relay 15. After the sound signals have traversed the one or the other of these paths, they are then applied to the amplifier 9 and the output from this amplifier is then supplied to further amplifying stages in order to be of the proper intensity to be used to modulate a sound carrier for subsequent transmission.

The relays 8, 11, 13 and 15 are energized from the source of current 17, and their energization is determined by the position of the switch 16. If the switch is placed in the position R, the relay 8 is energized to provide a circuit for the sound signals through the attenuator 7. This circuit is traversed by the sound signals, therefore, when the picture signals from the television camera 2 are being used, as determined by the position of the switch 16. The adjustment of the attenuator may then be so set as to provide proper signal level or intensity for the sound signals in accordance with the proximity or position of the television camera 2 with respect to the subject. When the switch 16 is placed in the position L, and the picture signals from the television camera 1 are permitted to be transmitted as explained above, and the relay 13 is energized to provide a circuit for the sound signals through the variable attenuator 12. This attenuator may be so set as to give the proper intensity or volume level to the sound signals when the television camera 1 is in use. It may be seen, therefore, that the sound signals may be subjected to different degrees of attenuation in accordance with the television camera selected through the operation of the switch 16. By this means, the volume level of the sound accompanying the transmitted television images may be controlled in accordance with the apparent proximity of the camera to the actor or subject being televised, as determined by the particular camera selected.

In order to further control the character of the sound signals, additional means are provided to simulate proper sound effects and perspective so that the sound produced may properly correspond and relate the image being transmitted. Such devices may include, for example, a reverberation or echo device 10 and a high and low pass filter 14. When the switch 18 is left open, as shown in the drawing, the sound signals are by-passed around the reverberation or echo device 10 through the back contacts of the relay 11, but when the switch 18 is closed, the relay 11 is energized simultaneously with the energization of the relay 13 so that the sound signals may be transmitted through the reverberation or echo system 10 for causing the audio frequency signals to assume a certain degree of synthetic reverberation. Such a system might be conventionally used, for instance, if the actor were positioned in a long corridor having sound reflecting walls such as tile material or hard plaster. In a close-up scene, when the camera 2 is used, little or no reverberation should be apparent, and, accordingly, the sound signals would be transmitted through the attenuator 7 and the relay 8. When the television camera 1 is used, however, and the actor appears a considerable distance away, the corridor walls would normally induce a considerable amount of reverberation and echo and accordingly, when this television camera is in use the audio frequency

signals would be transmitted through the reverberation or echo device 10, as well as the variable conductor 12. Through the introduction of the reverberation or echo circuit 10, a single microphone may be used, positioned relatively adjacent the actor, and a certain degree of synthetic reverberation may be introduced in the audio frequency circuit by the device 10 when a simulation of such reverberation or echo is desirable.

In other instances it might be desirable to suppress a portion of either the high or the low frequencies (or both) of the audio frequency signals in order to simulate various particular conditions. Suppose, for instance, that the actor is positioned in a room adjacent a closed window. The camera 2 could remain in the room, whereas the camera 1 could be positioned outside the room or at least apparently on the other side of the window. When the camera 2 is in use, the sound signals would be transmitted through the attenuator 7 for proper volume level, but when the camera 1 is in use, it would be desirable to have the sound appear as though it were being transmitted through the glass of the window and in which case the switch 19 is closed in order that the audio frequency signals may be transmitted through the high (and/or low) pass filter 14 when the video frequency signals from the camera 1 are being transmitted. By proper adjustment of the filter arrangement 14 various frequencies of the sound signals can be suppressed in order that the proper quality or character of sound can be produced to simulate the proper and desired sound effects even though the sound signals are actually received from a single microphone 20 positioned near the actor. When the picture signals are so controlled to produce a fading from one scene to another, the settings of the devices for controlling the sound signals may also be variably controlled in order to produce proper sound perspective.

Through the provision of the switches 18 and 19 the use of the reverberation or echo circuit, as well as the high and low pass filter, may be made selective so that these devices may be used in accordance with the particular conditions existing at the studio or in accordance with the particular sound quality or character desired to be transmitted.

The present invention may also be advantageously employed when a plurality of microphones are used, in which case the sound signals from each microphone may be individually supplied to the separate circuits including the relay 8 or the relays 11, 13 and 15 respectively. In such instances, a second microphone 25 may be positioned relatively adjacent the television camera 1 and when this microphone is used with microphone 20, the switch 23 is moved to contact the terminal 27 in order that audio frequency signals from the microphone 25 may be supplied to the circuit including the contacts of relays 11, 13 and 15. The sound signals from the microphone 20 are then applied only to the circuit including the attenuator 7 and the relay 8. By reason of the inclusion of the relays in these circuits, the transmission of the audio frequency signals through the circuits is dependent upon the energization or de-energization of the relays in accordance with the particular selection of the video frequency signals from the various television cameras as determined by the position of the switch 16.

It is sometimes desirable to use an additional

microphone (such as 25) and to associate that microphone with the television camera 1 which transmits distant scenes, since this camera is frequently moved about the studio. In order to obviate the necessity of changing the attenuation of the device 12 in accordance with the movements of the television camera 1, the microphone may be moved with the camera and occupy a position close to that occupied by the camera. Under these conditions, less frequent adjustment of the variable attenuator 12 may be necessary. Furthermore, the circuit is in condition for the immediate use of either the reverberation or echo device 10 or of the high and/or low pass filter 14.

Since the selective use of the various television cameras by means of the switch 16 is under the control of the monitor who is normally positioned outside the studio but within sight thereof, the switches 18, 19 and 23, would, of course, be correspondingly located in order that the monitor may have full control of the introduction of reverberation or echo device or of the suppression of various frequencies in the audio frequency signals. When a change in the intensity, quality or character of the sound is apparent or undesirable, the monitor may then close the one or the other (or both) of the switches 18 and 19 and accordingly synthetically produce the proper desired results. Furthermore, the switch 23 for permitting the use of the single microphone 20 or of the two microphones 20 and 25, would also be under the control of the monitor.

The present invention, although described with respect to television studio work, could readily be applied to outdoor use as, for instance, at a football game where cameras having lenses of different focal lengths may be used for showing the various plays in detail or for showing substantially the entire playing field. When making changes in the subject matter of the picture transmitted and when switching from the one camera to the other, changes in the sound perspective are also desirable and such changes may be introduced by means of the present invention even though only a single strategically positioned microphone is used. Under such conditions the single microphone may be positioned within a parabolic sound reflector in order that sounds originating from various relatively restricted areas of the stadium may be selected and transmitted.

It may readily be seen, therefore, that through the use of the present invention the proper quality, character or volume may be applied to the sound which accompanies a television transmission in accordance with the particular television camera in use or in accordance with the particular scene transmitted at the particular instant.

Although the present invention is described more or less in detail, it is obvious that various alterations and modifications may be made therein without departing from the spirit and scope thereof, and it is desired that any and all such modifications be considered within the purview of the present invention except as limited by the hereinafter appended claims.

I claim:

1. In a television system wherein related sound and picture signals are transmitted simultaneously, a first and a second television camera for individually producing picture signals of a common scene, a single microphone for producing related sound signals, a first and a second sound

signal channel, and means for selectively utilizing the picture signals from the first or the second television camera and for simultaneously transmitting the sound signals from the single microphone over the first or the second sound signal channel respectively, said first sound signal channel including sound reverberation or echo simulating means, a variable attenuator and a high and low pass filter device.

2. In a television system wherein related sound and picture signals are transmitted simultaneously, a first and a second television camera for individually producing picture signals, a single microphone for producing sound signals, a first and a second sound signal channel associated with the first and second television camera, respectively, and means for selectively utilizing the picture signals from the first or the second television camera, said means positively operating to simultaneously transmit the related sound signals from the single microphone over the associated sound signal channel, one of said sound signal channels including means for altering the quality or character of the sound signals transmitted thereover.

3. In a television system wherein related sound and picture signals are transmitted simultaneously, a first and a second television camera for individually producing picture signals representing different perspectives of the same scene, a single microphone for producing sound signals, a first and a second sound signal channel associated with the first and second television camera, respectively, switching means for selectively utilizing the picture signals from the first or the second television camera, said switching means causing the related sound signals to be simultaneously transmitted from the single microphone over the associated sound signal channel, said sound signal channels including means for altering the quality or character of the sound signals transmitted thereover, and means for varying the effects of said last named means.

4. In a television system wherein related sound and picture signals are transmitted simultaneously, a plurality of television cameras for individually producing picture signals of substantially a common scene, a single sound responsive device for producing sound signals, a plurality of sound signal channels, means in each of the said channels for altering the character or quality of the sound signals transmitted thereover, and means for selectively utilizing the picture signals from the individual television cameras, said last named means simultaneously operating to selectively transmit the related sound signals from the single sound responsive device over a different sound signal channel for each individual television camera selected.

5. In a television system wherein related sound and picture signals are transmitted simultaneously, a plurality of television cameras for individually producing picture signals of a common scene, a single sound responsive device for producing sound signals, a number of sound signal channels corresponding to the plurality of television cameras, means in each of the said channels for altering the character or quality of the sound signals transmitted thereover, and a single manually operable means for selectively and individually utilizing the picture signals from the plurality of television cameras and for

concurrently and selectively transmitting the sound signals from the single sound responsive device over the sound signal channel corresponding to the particular television camera selected.

6. In a television system wherein related sound and picture signals are transmitted simultaneously, a plurality of television cameras for individually producing picture signals, a single sound responsive device common to the plurality of cameras for producing sound signals, a plurality of sound signal channels each associated with a different television camera, means in each of the said channels for altering the wave form of the sound signals transmitted thereover, switching means for selectively and individually utilizing the picture signals from the plurality of television cameras, and means coordinated with said switching means and operating in conjunction therewith to simultaneously transmit the sound signals from the single sound responsive device over the associated sound signal channel for each individual television camera selected.

7. In a television system wherein sound and picture signals are simultaneously transmitted, a plurality of television cameras for individually producing separate picture signal series, a single sound responsive device for producing a sound signal series, a plurality of sound signal channels associated with each of the television cameras, means in each of the sound signal channels for affecting the character or quality of the sound signal series transmitted thereover, and means including a selector switch for selectively utilizing the separate picture signal series and for simultaneously transmitting the sound signal series produced by the single sound responsive device over a different sound signal channel for each picture signal series selected.

8. In a television system wherein sound and picture signals are simultaneously transmitted, a plurality of television cameras for individually producing separate picture signal series, a single sound responsive device for producing a sound signal series, a different sound signal channel associated with each of the television cameras, means in each of the sound signal channels for affecting the wave form of the sound signal series transmitted thereover, and means including a switching device for selectively and individually utilizing the separate picture signal series and for simultaneously transmitting the sound signal series produced by the single sound-responsive device over the associated sound signal channel.

9. In a television system wherein sound and picture signals are simultaneously transmitted, a plurality of light responsive devices for individually producing separate picture signal series, a single sound responsive device for producing a sound signal series, a plurality of sound signal channels corresponding to each of the light responsive devices, means in each of the sound signal channels for affecting the character of the sound signal series transmitted thereover, and means including a selector switch for selectively utilizing the separate picture signal series and for simultaneously transmitting the sound signal series produced in the single sound responsive device over the corresponding sound signal channel for the particular picture signal series selected.

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