(10)

Description

The present invention relates to a method and apparatus for recording and playing back a continuous-play video signal, a stop-motion audio signal, and a stop-motion video signal on a record medium, the video signal representing a plurality of continuous-play video frames and a stop-motion video frame associated with the stop-motion audio signal.

Systems of this type are particularly useful in recording and playing back video signals on video discs, in which the signals are recorded in a succession of substantially circular and concentric recording tracks, each track recording an individual video frame. During play-back, selected recording tracks are scanned in a repeated fashion, to display the video frames recorded on them in a stop-motion fashion, while accompanied by playback of corresponding audio signals.

In case of one known system (see DE—A—2,849,791) the still-frame picture is recorded in two TV frames of the video signal. Thereby the still frame picture time-shares the track on the disc with recorded audio segments, the video and audio segments being alternately dispersed along a given field with each segment occupying a portion of the video signal equal to one horizontal line. While the audio-signal in the audio segments is time-compressed, extremely complicated recording and play-back apparatuses are required to separate the continuous digitized audio stream of information and the continuous video stream of information into H-sized segments, to accumulate the segments upon playback, to separate the audio segments from the video segments, and to piece together the audio packets and video packets separately until a continuous audio and video signal is reconstructed.

In case of another known system (see IEEE Transactions on Consumer Electronics, Vol CE-22, No. 4, 1976, pages 327—337) it is proposed to provide alternate circular tracks on the video disc to contain the compressed audio information and still-frame video information respectively. Additionally, it is suggested to intermix the still pictures with sections of normal motion pictures and audio. Thereby a compression of the audio signal can be obtained by recording the audio information while the disc is rotating at a slow rate and playing back the analog audio information at a normal higher rate.

Although the known recording and playback systems are effective in recording and playing back a video signal in a stop motion fashion with accompanying audio, they have not been proven entirely satisfactory, especially in cases, when the stop motion pictures have to be presented over longer time periods, requiring in this case relative large amounts of stop-motion audio information.

It is therefore the object of the present invention to provide a method and apparatus for recording and playing back continuous-play video signal together with stop motion video and audio signals whereby even in case that stop-motion pictures have to be presented over extended time periods sufficient audio stop-motion information can be presented, without disturbing the handling of the continuous and stop-motion video signal.

In case of the recording of video and audio signals this object can be obtained in that the stop-motion audio signal and the portion of the video signal representing the continuous-play video frames are combined, to form a composite signal and that the composite signal is recorded on a first portion of the record medium, while the portion of the video signal representing the stop-motion video frame is recorded on a second portion of the record medium downstream of said first portion.

On the other hand, in case of the playing back of the video and audio signals, this object can be obtained in that from the first portion of the record medium the composite signal is first recovered being then separated into the continuous-play video signal for displaying on the video monitor while the stop-motion video signal is recovered from the second portion of the record medium.

It therefore appears, that during the recording the stop-motion audio signal is first combined with the continuous-play video signal, to form a composite signal for recording on a first portion of the record medium, and the stop-motion video signal is then recorded on a second portion of the record medium. During the playback, however the first portion of the medium is first scanned, to recover and display the continuous-play video signal, and to recover and store the stop-motion audio signal. The second portion of the medium is then scanned in a repeated fashion, to recover and display the stop-motion video signal, while simultaneously playing back the stored stop-motion audio signal. Thereby no drop-outs occur in the video picture displayed during playback, since the stop-motion audio signal is recovered while the continuous-play video signal is being displayed.

The method and apparatus of the invention are of particularly useful in recording and playing back a video signal on a video disc, in which the signal is recorded in a succession of substantially circular and concentric recording tracks. In this case a separate video frame is recorded on each track. Thus, the composite signal, which includes the stop-motion audio signal and the continuous-play video signal, is recorded on a prescribed plurality of tracks, while the stop-motion video signal is recorded on a single track that follows the prescribed plurality of tracks. Thereby the continuous-play video signal includes normally a continuous-play audio signal, for simultaneous playback with it.

According to an other aspect of the in-

vention, the stop-motion audio signal preferably is first converted to a corresponding digital signal and then used to modulate a second audio subcarrier signal of the continuous-play video signal. Since the stop-motion audio signal normally is not recorded on all of the tracks on which the continuous-play video signal is recorded, a second channel of audio can be recorded in its place on those tracks, for simultaneous playback with the continuous-play video signal.

Within the framework of the present invention, the stop-motion audio signal preferably is also digitized using an adaptive delta modulator. The digital signal is then entered into a digital memory at a first, relatively low rate, and then extracted from the memory at a second, relatively high rate for recording on the disc at the appropriate time. Time-compression of the audio signal is thereby effected.

Other aspects of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawings, showing:

Fig. 1 a simplified block diagram of an apparatus for recording a video signal and a corresponding stop-motion audio signal on a video disc; and

Fig. 2 a simplified block diagram of an apparatus for playing back a video disc recorded by the apparatus of Fig. 1, for stop-motion display of a video frame with accompanying audio.

Referring now to the drawings, and particularly to FIG. 1, there is shown apparatus for formatting a video signal and a corresponding stop-motion audio signal into a special composite signal for recording on a video disc 10. The video signal recorded on the disc represents a succession of video frames, some of which are for play-back in a continuous-play fashion, and others of which are for playback in a stop-motion fashion. The signal is recorded on the disc in a succession of substantially circular and concentric recording tracks, each track recording a separate video frame. The video signal for the continuous-play video frames includes a conventional continuous-play audio subcarrier signal, for simultaneous playback with the video frames.

In accordance with the invention, audio for playback with each stop-motion video frame is combined with prescribed portions of the continuous-play video signal and recorded on preceding recording tracks on the video disc 10. In playing back a video disc recorded in this fashion, the tracks recording the continuous-play video signal are first scanned, to provide a continuous display of the continuous-play video frames and to extract and store in memory the recorded stop-motion audio signal. Thereafter, when the track recording the corresponding stop-motion video frame is reached, it is scanned in a repeated fashion to provide a stop-motion display of the frame, while simultaneously the stop-motion audio signal is retrieved from memory and played back. As a result, there are no dropouts in the video picture displayed on a monitor during playback. The above-described playback sequence is repeated for each stop-motion video frame to be displayed.

The recording apparatus of FIG. 1 includes a stop-motion audio source 11 for providing each stop-motion audio signal, an adaptive delta modulator 13 for converting each such audio signal into a corresponding digital signal, and a digital memory 15 for short-term storage of the digitized audio signal. The apparatus further includes a sequence controller 17 for generating appropriate control signals to properly sequence the various elements of the apparatus, as will be described, and an oscillator circuit 19 for generating clock signals for use by the delta modulator and the digital memory.

In operation, when a prescribed stop-motion audio signal is to be digitized preparatory to its being recorded on the video disc 10, the sequence controller 17 outputs a start retrieve control signal for coupling over line 21 to both the stop-motion audio source 11 and the oscillator circuit 19. The audio signal is then transmitted over line 23 to the delta modulator 13. Also, the oscillator circuit then outputs a 16 KHz clock signal for transmission over line 25 to both the delta modulator and the CLOCK IN terminal of the digital memory 15. In a conventional fashion, the delta modulator converts the analog stop-motion audio signal into a corresponding 16 KHz digital signal, which is then transmitted over line 27 to the memory, and entered into the memory by the 16 KHz clock signal. One convenient technique for entry of the serial digital data into the memory is to first convert the data into a succession of eight-bit words, using an eight-bit shift register (not shown). After the analog audio signal has been completely digitized, the sequence controller 17 outputs a stop retrieve control signal for transmission on line 29 to both the stop-motion audio source 11 and the oscillator circuit 19 to terminate the analog audio signal and the 16 KHz clock signal.

At the appropriate time when the digitized stop-motion audio signal is to be recorded on the video disc 10, the sequence controller 17 outputs a record control signal for transmission on line 31 to the oscillator circuit 19. This enables output of a 24 KHz clock signal, for transmission on line 33 to the CLOCK OUT terminal of the digital memory 15, to clock out the stored audio data at a rate of 24 kilobit/second. Since this bit rate is higher than the 16 kilobit/second bit rate of the digital audio signal entered into the memory, time compression of the signal is effected. The amount of time compression permitted is dictated largely by the band-width of the original analog audio signal and the bandwidth allotted for recording the digital audio signal. The 24 kilobit/second time-

compressed digital audio signal is coupled over line 35 from the memory to a 12 KHz low-pass filter 37, to limit the bandwidth of the signal, accordingly.

The video signal to be recorded, which contains both continuous-play video frames and stop-motion frames, is a conventional format signal having a baseband luminance signal, a chrominance subcarrier, and an audio subcarrier. In combining the video signal with stop-motion audio signal, to form the composite signal actually recorded on the disc 10, the stop-motion audio information is first modulated on a second or supplementary audio subcarrier, which is then summed with the video signal.

More particularly, the filtered digital audio signal is coupled over line 39 from the low-pass filter 37 to an analog switch 41, and in turn over line 43 to an amplitude modulator or mixer 45, which modulates a supplementary audio subcarrier signal supplied on line 47, accordingly. The modulated subcarrier and the video signal are coupled over lines 49 and 51, respectively, to a summing circuit 53, which produces the composite signal to be recorded. The composite signal is then coupled over line 55 to a conventional video disc mastering machine 57, for recording.

The analog switch 41 for coupling the low-pass filtered digital audio signal to the mixer 45 is controlled by the record control signal output on line 31 by the sequence controller 17. During those video frames when the stop-motion audio signal is not being recorded on the video disc 10, the second audio subcarrier signal is available to carry other information, such as a second analog audio signal, for playback with the corresponding continuous-play video frames. Thus, a supplementary audio signal is shown being coupled over line 59 to the analog switch.

Referring now to FIG. 2, there is shown apparatus for playing back a video disc replica 61 of the disc 10 recorded by the apparatus of FIG. 1. The apparatus includes a conventional video disc player machine 63 for scanning the disc in the fashion described below, to recover and demodulate the recorded signal.

The operating sequence of the video disc player machine 63 is controlled by program instructions entered into the machine either manually or automatically by first scanning selected portions of the disc 61.

In normal operation, the player machine 63 scans the prescribed tracks recording a continuous-play video signal, to recover and display the continuous-play video frames, and to recover and store the recorded stop-motion audio signal. The machine then scans repeatedly the track recording the corresponding stop-motion video signal, to provide a stop-motion display of the frame while simultaneously playing back the stored stop-motion audio signal.

The player machine 63 demodulates the signal recovered from the video disc 61 and outputs a demodulated composite video signal and a stop-motion digital audio signal on lines 65 and 67, respectively. The video signal is coupled to a conventional video monitor 69 for continuous display of the recovered picture. The stop-motion digital audio signal is coupled to special circuitry for returning the signal to its original analog format, and for transmitting the re-created analog audio signal back to the player machine 63 at the appropriate time, for coupling to the monitor 69 when the corresponding stop-motion video frame is being displayed. More specifically, this special audio signal circuitry includes a detector 71 for detecting the successive bits of the digital audio signal, a digital memory 73 for short term storage of the successive detected bits, an adaptive delta demodulator 75 for converting the audio data back to its original analog format, and an oscillator circuit 77 for generating appropriate clock pulse signals to control the memory and the delta demodulator.

In operation, when it is determined from the program instructions input to the player machine 63 that a group of tracks recording a stop-motion audio signal are about to be scanned, a start retrieve control signal is output by the player machine. This signal is coupled over line 79 to the oscillator circuit 77, which then outputs a 24 KHz clock signal for coupling over line 81 to the CLOCK IN terminal of the digital memory 73. The successive bits of the stop-motion digital audio signal are then detected by the detector 71 and coupled over line 83 to the input terminal of the digital memory. As was the case with the digital memory 15 of the recording apparatus of FIG. 1, an eight-bit shift register can be used to convert the serial data sequence into a succession of eight-bit words, for convenient entry into the memory. After the last track recording the stop-motion audio signal has been scanned, the player machine outputs a stop retrieve control signal for coupling over line 85 to the oscillator circuit 77, to terminate the 24 KHz clock signal.

When the recording track on the video disc 61 recording the corresponding stop-motion video frame is reached by the player machine 63, a play control signal is output by the machine for coupling over line 87 to the oscillator circuit 77. A 16 KHz clock signal is then output by the oscillator for coupling over line 89 to both the CLOCK OUT terminal of the digital memory 73 and the adaptive delta demodulator 75. The stored stop-motion digital audio delta is then output as a serial bit sequence over line 91 from the output terminal of the memory to the delta demodulator, which in turn converts the audio information back to its original analog format. The resultant analog audio signal is coupled over line 93 back to the player machine. The resultant audio is applied to speakers over a line 65a.

After the stop-motion video frame has been

displayed for a prescribed time duration, in accordance with the program instructions input to the player machine 63, the cycle of scanning continuous-play tracks to recover a stop-motion audio signal and then scanning the track recording its corresponding stop-motion video signal, can be repeated. It will be appreciated that throughout this cycle, a video picture will be displayed on the monitor 69, and no dropouts in the displayed picture will occur while the stop-motion audio signal is being recovered.

In an alternative embodiment of the invention (not shown in the drawings), a pair of stop-motion audio signals are recorded for stereo playback with the associated stop-motion video signal. The two audio signals are recorded on the disc as digital signals, and can be interleaved with each other in any convenient fashion. During playback, the two signals are converted back to their original analog formats in parallel, by separate adaptive delta demodulators.

It will be appreciated from the foregoing description that the present invention provides an improved method and apparatus for recording an improved method and apparatus for recording and playing back a video signal in a stop-motion fashion, with accompanying audio. Each stop-motion video frame is recorded on a single recording track on a video disc, and the associated stop-motion audio signal is combined with a continuous-play video signal and recorded on a plurality of preceding tracks. During playback, while this stop-motion audio signal is being recovered, the continuous-play video signal recorded on the same tracks is displayed, and there thus are no dropouts in the displayed picture while the stop motion audio information is being recovered.

Claims

1. Method of recording a continuous-play video signal, a stop-motion audio signal, and a stop-motion video signal on a record medium, the video signal representing a plurality of continuous-play video frames and a stop-motion video frame associated with the stop-motion audio signal, characterized in that the stop-motion audio signal and the portion of the video signal representing the continuous-play video frames are combined to form a composite signal and that the composite signal is recorded on a first portion of the record medium, while the portion of the video signal representing the stop-motion video frame is recorded on a second portion of the record medium downstream of said first portion.

2. Method according to Claim 1, characterized in that the stop-motion audio signal, being an analog signal, is converted to a corresponding digital stop-motion audio signal before being combined with the video signal.

3. Method according to Claim 2, characterized in that additionally a time-compression of the digital stop-motion audio signal is provided, so that the digital audio signal recorded on the record medium has a shorter time duration than the original analog stop-motion audio signal.

4. Method according to Claim 3, characterized in that the time-compressing is performed by entering the data forming the digital stop-motion audio signal into a memory device at a first rate and extracting the data from the memory at a second rate, the second rate being higher than the first rate.

5. Method according to one of the previous Claims, characterized in that additionally there is provided an audio subcarrier signal which is modulated in accordance with the stop-motion audio signal and that the modulated audio subcarrier signal and the video signal are summed together in order to form the composite signal.

6. Method according to one of the previous Claims, characterized in that in case of a record medium in form of a video disc, with a succession of substantially circular and concentric recording tracks, and each track recording a portion of the video signal representing a single video frame, the composite signal, representing the continuous-play video frames and the stop-motion audio signal, is recorded on a prescribed plurality of recording tracks while the video signal representing the stop-motion video frame is recorded on a prescribed recording track following the tracks recording the composite signal.

7. Method according to Claim 6, characterized in that in case of the recording of a plurality of composite signals and a corresponding plurality of stop-motion video frames each stop-motion video frame is recorded on a prescribed, separate recording track, while each composite signal is recorded on a prescribed plurality of recording tracks preceding the prescribed track for recording the stop-motion video frame.

8. Apparatus for recording a continuous-play video signal, a stop-motion audio signal, and a stop-motion video signal on a record medium, in accordance with the method of one of the claims 1—7, characterized in that there is provided a summing circuit (53) which by combining the stop-motion audio signal and the portion of the video signal representing the continuous-play video frames, forms a composite signal, and that the video mastering machine (57) is controlled in such a way that the composite signal is recorded on a first portion of the record medium, while the portion of the video signal representing the stop-motion video frame is recorded on a second portion of the record medium downstream of said first portion.

9. Apparatus according to Claim 8, characterized in that additionally there is provided a modulator (13) which converts the stop-motion audio signal being in an analog form to a corresponding digital stop-motion audio signal before being combined with the video signal by

displayed for a prescribed time duration, in accordance with the program instructions input to the player machine 63, the cycle of scanning continuous-play tracks to recover a stop-motion audio signal and then scanning the track recording its corresponding stop-motion video signal, can be repeated. It will be appreciated that throughout this cycle, a video picture will be displayed on the monitor 69, and no dropouts in the displayed picture will occur while the stop-motion audio signal is being recovered.

In an alternative embodiment of the invention (not shown in the drawings), a pair of stop-motion audio signals are recorded for stereo playback with the associated stop-motion video signal. The two audio signals are recorded on the disc as digital signals, and can be interleaved with each other in any convenient fashion. During playback, the two signals are converted back to their original analog formats in parallel, by separate adaptive delta demodulators.

It will be appreciated from the foregoing description that the present invention provides an improved method and apparatus for recording an improved method and apparatus for recording and playing back a video signal in a stop-motion fashion, with accompanying audio. Each stop-motion video frame is recorded on a single recording track on a video disc, and the associated stop-motion audio signal is combined with a continuous-play video signal and recorded on a plurality of preceding tracks. During playback, while this stop-motion audio signal is being recovered, the continuous-play video signal recorded on the same tracks is displayed, and there thus are no dropouts in the displayed picture while the stop motion audio information is being recovered.

Claims

1. Method of recording a continuous-play video signal, a stop-motion audio signal, and a stop-motion video signal on a record medium, the video signal representing a plurality of continuous-play video frames and a stop-motion video frame associated with the stop-motion audio signal, characterized in that the stop-motion audio signal and the portion of the video signal representing the continuous-play video frames are combined to form a composite signal and that the composite signal is recorded on a first portion of the record medium, while the portion of the video signal representing the stop-motion video frame is recorded on a second portion of the record medium downstream of said first portion.

2. Method according to Claim 1, characterized in that the stop-motion audio signal, being an analog signal, is converted to a corresponding digital stop-motion audio signal before being combined with the video signal.

3. Method according to Claim 2, characterized in that additionally a time-compression of the digital stop-motion audio signal is provided, so that the digital audio signal recorded on the record medium has a shorter time duration than the original analog stop-motion audio signal.

4. Method according to Claim 3, characterized in that the time-compressing is performed by entering the data forming the digital stop-motion audio signal into a memory device at a first rate and extracting the data from the memory at a second rate, the second rate being higher than the first rate.

5. Method according to one of the previous Claims, characterized in that additionally there is provided an audio subcarrier signal which is modulated in accordance with the stop-motion audio signal and that the modulated audio subcarrier signal and the video signal are summed together in order to form the composite signal.

6. Method according to one of the previous Claims, characterized in that in case of a record medium in form of a video disc, with a succession of substantially circular and concentric recording tracks, and each track recording a portion of the video signal representing a single video frame, the composite signal, representing the continuous-play video frames and the stop-motion audio signal, is recorded on a prescribed plurality of recording tracks while the video signal representing the stop-motion video frame is recorded on a prescribed recording track following the tracks recording the composite signal.

7. Method according to Claim 6, characterized in that in case of the recording of a plurality of composite signals and a corresponding plurality of stop-motion video frames each stop-motion video frame is recorded on a prescribed, separate recording track, while each composite signal is recorded on a prescribed plurality of recording tracks preceding the prescribed track for recording the stop-motion video frame.

8. Apparatus for recording a continuous-play video signal, a stop-motion audio signal, and a stop-motion video signal on a record medium, in accordance with the method of one of the claims 1—7, characterized in that there is provided a summing circuit (53) which by combining the stop-motion audio signal and the portion of the video signal representing the continuous-play video frames, forms a composite signal, and that the video mastering machine (57) is controlled in such a way that the composite signal is recorded on a first portion of the record medium, while the portion of the video signal representing the stop-motion video frame is recorded on a second portion of the record medium downstream of said first portion.

9. Apparatus according to Claim 8, characterized in that additionally there is provided a modulator (13) which converts the stop-motion audio signal being in an analog form to a corresponding digital stop-motion audio signal before being combined with the video signal by

* C L M S *

the summing circuit (53).

10. Apparatus according to Claim 9, characterized in that there is additionally provided a digital memory (15), which is controlled by an oscillator circuit (19) in such a way, that the digital stop-motion audio signal is entered into the digital memory (15) at a first rate and extracted from the digital memory (15) at a second rate, the second rate being higher than the first rate, thereby producing a time-compressed digital stop-motion audio signal for combining with the video signal by the summing circuit (53).

11. Apparatus according to one of claims 3 to 10, characterized in that in addition a mixer (45) is provided which modulates the audio subcarrier signal in accordance with the stop-motion audio signal, the modulated subcarrier signal then being summed together with the video signal by the summing circuit (53) in order to form the composite signal.

12. Method of playing back a signal recorded on a record medium containing a continuous-play video signal, a stop-motion audio signal, and a stop-motion video signal, whereby a first portion of the medium contains a recorded composite signal that includes the continuous-play video signal and the stop-motion audio signal, and whereby a second portion of the medium contains the recorded stop-motion video signal, characterized in that the composite signal is recovered first from the first portion of the record medium and then separated into the continuous-play video signal for displaying on the video monitor and the stop-motion audio signal for storing within a memory while the stop-motion video signal is recovered from the second portion of the record medium.

13. Method according to Claim 12, characterized in that the separated audio signal being in a digital form is converted to a corresponding analog signal, being simultaneously played back together with the display of the stop-motion video signal.

14. Method according to Claim 13, characterized in that the digital stop-motion audio signal being recorded in a time compressed manner is entered into the memory at a first, relatively high rate, and extracted therefrom at a second, relatively low rate, whereby the audio signal is returned to its normal play speed.

15. Method according to one of the claims 12—14, characterized in that a plurality of composite signals and a corresponding plurality of stop-motion video signals are recorded on the record medium whereby the recited steps are repeated for each pair of composite and stop-motion video signals.

16. Apparatus for playing back a signal recorded on a record medium, whereby a first portion of the medium contains a recorded composite signal that includes a continuous-play video signal and a stop-motion audio signal, while a second portion of the medium contains a recorded stop-motion video signal in accordance with the method of one of the claims 12—15, characterized in that the video player machine (63) includes means for recovering the composite signal from the first portion of the record medium (61) and other means for separating the same into the continuous-play video signal for display on a video monitor (69) and the stop-motion audio signal for storage within a digital memory (73) and that the video player machine (63) includes further means for recovering the stop-motion video signal from the second portion of the record medium (61).

17. Apparatus according to Claim 16, characterized in that the same is provided additionally with a demodulator (75) which converts the separated audio signal being in a digital form to a corresponding analog signal, being played back simultaneously with the display of the stop-motion video signal.

18. Apparatus according to Claim 16 or 17, characterized in that in case of a time compressed recording of the digital stop-motion audio signal there is provided additionally an oscillator circuit (77) which controls the digital memory (73) in such a way that the digital audio signal is entered into the memory (73) at a first, relatively high rate and extracted therefrom at a second, relatively low rate, whereby the audio signal is returned to its normal play speed.

Revendications

1. Méthode pour enregistrer un signal vidéo continu, un signal audio pour images arrêtées et un signal vidéo pour images arrêtées sur un support d'enregistrement, le signal vidéo représentant un certain nombre d'images vidéo continues et une image vidéo arrêtée en association au signal audio pour images arrêtées, caractérisée en ce que le signal audio pour images arrêtées et la partie du signal vidéo représentant les images vidéo continues sont combinés pour former un signal composite et en ce que le signal composite est enregistré sur une première partie du support d'enregistrement tandis que la partie du signal vidéo représentant l'image vidéo arrêtée est enregistrée sur une seconde partie du support d'enregistrement en aval de la première partie.

2. Méthode selon la revendication 1 caractérisée en ce que le signal audio pour images arrêtées, étant un signal analogique, est converti en un signal audio numérique pour images arrêtées correspondant avant d'être combiné au signal vidéo.

3. Méthode selon la revendication 2 caractérisée en ce que de plus une compression dans le temps du signal audio numérique pour images arrêtées est prévue, de façon que le signal audio numérique enregistré sur le support d'enregistrement ait une plus courte durée, dans le temps, que le signal audio analogique d'origine pour images arrêtées.

* C L M S *

(15)

4. Méthode selon la revendication 3 caractérisée en ce que la compression dans le temps est accomplie en introduisant la donnée formant le signal audio numérique pour images arrêtées dans un dispositif à mémoire à une première allure et en extrayant la donnée de la mémoire à une seconde allure, la seconde allure étant plus élevée que la première allure.

5. Méthode selon l'une quelconque des revendications précédentes caractérisée en ce qu'on prévoit de plus un signal de sous-porteuse audio qui est modulé selon le signal audio pour images arrêtées et en ce que le signal modulé de sous-porteuse audio et le signal vidéo sont additionnés afin de former le signal composite.

6. Méthode selon l'une quelconque des revendications précédentes caractérisée en ce que dans le cas d'un support d'enregistrement ayant la forme d'un vidéodisque avec une succession de pistes sensiblement circulaires et concentriques d'enregistrement, et où chaque piste enregistre une partie du signal vidéo représentant une seule image vidéo, le signal composite, représentant une seule image vidéo, le signal composite, représentant les images vidéo continues et le signal audio pour images arrêtées, est enregistré sur un certain nombre prescrit de pistes d'enregistrement tandis que le signal vidéo représentant l'image vidéo pour images arrêtées est enregistré sur une piste prescrite d'enregistrement suivant les pistes enregistrant le signal composite.

7. Méthode selon la revendication 6 caractérisée en ce que dans le cas de l'enregistrement d'un certain nombre de signaux composites et d'une quantité correspondante d'images vidéo pour images arrêtées, chaque image vidéo pour images arrêtées est enregistrée sur une une piste prescrite séparée d'enregistrement tandis que chaque signal composite est enregistré sur une quantité prescrite de pistes d'enregistrement précédant la piste prescrite pour enregistrer l'image vidéo pour images arrêtées.

8. Appareil pour enregistrer un signal vidéo continu, un signal audio pour images arrêtées et un signal vidéo pour images arrêtées sur un support d'enregistrement, selon la méthode de l'une quelconque des revendications 1 à 7, caractérisé en ce qu'on prévoit un circuit d'addition (53) qui, en combinant le signal audio pour images arrêtées et la partie du signal vidéo représentant les images vidéo continues, forme un signal composite et en ce que la machine de production du vidéodisque (57) est commandée de façon que le signal composite soit enregstré sur une première partie du support d'enregistrement, tandis que la partie du signal vidéo représentant l'image vidéo pour images arrêtées est enregistrée sur une seconde partie du support d'enregistrement en aval de ladite première partie.

9. Appareil selon la revendication 8 caractérisé en ce qu'on prévoit de plus un modulateur (13) qui convertit le signal audio pour images arrêtées qui est sous une forme analogique en un signal audio correspondant pour images arrêtées avant combinaison au signal vidéo par le circuit d'addition (53).

10. Appareil selon la revendication 9 caractérisé en qu'on prévoit de plus une mémoire numérique (15), commandée par un circuit oscillateur (19) de façon que le signal audio numérique pour images arrêtées soit introduit dans la mémoire numérique (15) à une première allure et extrait de la mémoire numérique (15) à une seconde allure, la seconde allure étant supérieure à la première, pour ainsi produire un signal audio numérique pour images arrêtées comprimé dans le temps pour une combinaison au signal vidéo par le circuit d'addition (53).

11. Appareil selon l'une quelconque des revendications 3 à 10 caractérisé en ce qu'en plus un mélangeur (45) est prèvu qui module le signal de sous-porteuse audio selon le signal audio pour images arrêtées, le signal modulé de sous-porteuse étant alors additionné au signal vidéo par le circuit d'addition (53) afin de former le signal composite.

12. Méthode de reproduction d'un signal enregistré sur un support d'enregistrement contenant un signal vidéo continu, un signal audio pour images arrêtées et un signal vidéo pour images arrêtées, une première partie du support contenant un signal composite enregistré qui contient le signal vidéo continu et le signal audio pour images arrêtées et une seconde partie du support contenant le signal vidéo enregistré pour images arrêtées, caractérisée en ce que le signal composite est d'abord reproduit de la première partie du support d'enregistrement puis est séparé en signal vidéo continu pour visualisation sur le moniteur vidéo et signal audio pour images arrêtées pour stockage dans une mémoire tandis que le signal vidéo pour images arrêtées est reproduit de la seconde partie du support d'enregistrement.

13. Méthode selon la revendication 12 caractérisée en ce que le signal audio séparé étant sous une forme numérique est converti en un signal analogique correspondant, qui est simultanément reproduit en même temps que la visualisation du signal vidéo pour images arrêtées.

14. Méthode selon la revendication 13 caractérisée en ce que le signal audio numérique pour images arrêtées étant enregistré d'une manière comprimée dans le temps est introduit dans la mémoire à une première allure relativement rapide et en est extrait à une seconde allure relativement faible, ainsi le signal audio est ramené à vitesse normale de restitution.

15. Méthode selon l'une quelconque des revendications 12 à 14 caractérisée en ce qu'un certain nombre de signaux composites et une quantité correspondante de signaux vidéo pour images arrêtées sont enregistrés sur le support d'enregistrement et lesdites étapes sont répétées pour chaque paire de signaux vidéo composites et pour images arrêtées.

* C L M S *

16. Appareil pour reproduire un signal enregistré sur un support d'enregistrement, où une première partie du support contient un signal composite enregistré qui contient un signal vidéo continu et un signal audio pour images arrêtées, tandis qu'une seconde partie du support contient un signal vidéo enregistré pour images arrêtées selon la méthode de l'une quelconque des revendications 12 à 15, caractérisé en ce que l'appareil de reproduction vidéo (63) comprend un moyen pour reproduire le signal composite de la première partie du support d'enregistrement (61) et un autre moyen pour le séparer en un signal vidéo continu pour visualisation sur un moniteur vidéo (69) et le signal audio pour images arrêtées pour un stockage dans une mémoire numérique (73) et en ce que l'appareil de restitution vidéo (63) comprend un autre moyen pour restituer le signal vidéo pour images arrêtées de la seconde partie du support d'enregistrement (61).

17. Appareil selon la revendication 16 caractérisé en ce qu'il est pourvu de plus d'un démodulateur (75) qui convertit le signal audio séparé sous une forme numérique en un signal analogique correspondant, qui est reproduit en méme temps que la visualisation du signal vidéo pour images arrêtées.

18. Appareil selon la revendication 16 ou 17 caractérisé en ce que dans le cas de l'enregistrement comprimé dans le temps du signal audio numérique pour images arrêtées, on prévoit de plus un circuit oscillateur (77) qui commande la mémoire numérique (73) de façon que le signal audio numérique soit introduit dans la mémoire (73) à une première allure relativement élevée et en soit extrait à une seconde allure relativement faible, ainsi le signal audio est ramené à sa vitesse normale de reproduction.

Patentansprüche

1. Verfahren zur Aufzeichnung eines Videosignals für bewegte Szenen, eines Audiosignals für ein Standbild und eines Videosignals für ein Standbild auf einem Aufzeichnungsmedium, wobei das Videosignal eine Vielzahl von Videobildern kontinuierlicher Szenen und ein Videostandbild darstellt, das zum Standbild-Audiosignal gehört, dadurch gekennzeichnet, daß das Audiosignal für ein Standbild und der Teil des Videosignals, der die Videobilder der bewegten Szene darstellt, miteinander zur Bildung eines Signalgemisches kombiniert sind, und daß das Signalgemisch auf einem ersten Teil des Aufzeichnungsmedium aufgezeichnet ist, während der Teil des Videosignals, der ein Standbild darstellt, auf einem zweiten Teil des Aufzeichnungsmediums aufgezeichnet ist, der in Abspielrichtung gesehen hinter dem ersten Teil liegt.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß das Audiosignal für ein Standbild ein Analogsignal ist und vor seiner Kombination mit dem Videosignal zu einem entsprechenden digitalen Audiosignal für ein Standbild umgesetzt wird.

3. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß zusätzlich eine Zeitkompression des digitalen Audiosignals für ein Standbild vorgenommen wird, so daß das auf dem Aufzeichnungsmedium aufgezeichnete digitale Audiosignal eine kürzere Zeitdauer aufweist als das originale Audiosignal für ein Standbild.

4. Verfahren nach Anspruch 3, dadurch gekennzeichnet, daß die Zeitkompression durchgeführt wird, indem die Daten, die das digitale Audiosignal für ein Standbild darstellen, mit einer ersten Geschwindigkeit in eine Speichereinrichtung eingeschrieben werden, und die Daten mit einer zweiten Geschwindigkeit aus dem Speicher ausgelesen werden, wobei die zweite Geschwindigkeit höher ist als die erste Geschwindigkeit.

5. Verfahren nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß zusätzlich ein Tonträgersignal vorgesehen ist, das entsprechend dem Audiosignal für ein Standbild moduliert wird, und daß das modulierte Tonträgersignal und das Videosignal addiert werden, um das Signalgemisch zu bilden.

6. Verfahren nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß im Fall eines Aufzeichnungsmediums in Form einer Bildplatte mit einer Folge von im wesentlichen kreisförmigen und konzentrischen Aufzeichnungsspuren, bei der jede Spur einen Teil des Videosignals aufzeichnet, der ein einzelnes Videobild darstellt, das Signalgemisch, das die Videobilder der bewegten Szenen und das Audiosignal eines Standbildes darstellt, auf einer bestimmten Vielzahl von Aufzeichnungsspuren aufgezeichnet wird, während das Videosignal, das ein Standbild darstellt, auf einer bestimmten Aufzeichnungsspur aufgezeichnet wird, die hinter den Spuren mit dem Signalgemisch liegt.

7. Verfahren nach Anspruch 6, dadurch gekennzeichnet, daß im Fall der Aufzeichnung einer Vielzahl von Signalgemischen und einer entsprechenden Vielzahl von Standbildern jedes Standbild auf einer bestimmten eigenen Aufzeichnungsspur aufgezeichnet wird, während jedes Signalgemisch auf einer bestimmten Vielzahl von Aufzeichnungsspuren aufgezeichnet ist, die der jeweiligen bestimmten Spur zur Aufzeichnung des Standbildes vorangehen.

8. Einrichtung zur Aufzeichnung eines Videosignals für bewegte Szenen, eines Audiosignals für ein Standbild und eines Videostandbildes auf einem Aufzeichnungsmedium gemäß dem Verfahren nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß ein Summierschaltkreis (53) vorgesehen ist, der durch Kombination des Audiosignals eines Standbildes und des Teils des Videosignals, das Videobilder bewegter Szenen darstellt, ein Signalgemisch bildet, und daß die Videoaufzeichnungsmaschine (57)

* C L M S *

für Bildplattenorignale so gesteuert wird, daß das Signalgemisch auf einen ersten Teil des Aufzeichnungsmediums aufgezeichnet wird, während der Teil des Videosignals, der ein Standbild darstellt, auf einem zweiten Teil des Aufzeichnungsmediums aufgezeichnet wird, das in Abspielrichtung gesehen hinter dem ersten Teil liegt.

9. Einrichtung nach Anspruch 8, dadurch gekennzeichnet, daß zusätzlich ein Modulator (13) vorgesehen ist, der das Audiosignal eines Standbildes, das in analoger Form vorliegt, in ein entsprechendes digitales Audiosignal eines Standbildes umsetzt, bevor dieses mit dem Videosignal durch den Summierschaltkreis (53) kombiniert wird.

10. Einrichtung nach Anspruch 9, dadurch gekennzeichnet, daß zusätzlich ein Digitalspeicher (15) vorgesehen ist, der durch einen Oszillatorschaltkreis (19) so gesteuert wird, daß das digitale Audiosignal eines Standbildes in den Digitalspeicher (15) mit einer ersten Geschwindigkeit eingeschrieben wird und aus dem Digitalspeicher (15) mit einer zweiten Geschwindigkeit entnommen wird, wobei die zweite Geschwindigkeit höher ist als die erste Geschwindigkeit, und so ein zeitkomprimiertes digitales Audiosignal für ein Standbild ensteht, das mit dem Videosignal im Summierschaltkreis (53) kombiniert wird.

11. Einrichtung nach einem der Ansprüche 8 bis 10, dadurch gekennzeichnet, daß zusätzlich ein Mischer (45) vorgesehen ist, der das Tonträgersignal entsprechend dem Audiosignal für ein Standbild moduliert, wobei das modulierte Tonträgersignal dann vom Summierschaltkreis (53) mit dem Videosignal addiert wird, um das Signalgemisch zu erzeugen.

12. Verfahren zur Wiedergabe eines Signals, das auf einem Aufzeichnungsmedium aufgezeichnet ist, das ein Videosignal für bewegte Szenen enthält, ein Audiosignal für ein Standbild und ein Videosignal für ein Standbild, wobei ein erster Teil des Mediums ein aufgezeichnetes Signalgemisch enthält, das das Videosignal für die bewegten Szenen und das Audiosignal für ein Standbild enthält, und wobei ein zweiter Teil des Mediums das aufgezeichnete Videosignal für ein Standbild enthält, dadurch gekennzeichnet, daß das Signalgemisch zuerst aus dem ersten Teil des Aufzeichnungsmediums wiederhergestellt wird und dann aufgetrennt wird in das Videosignal für bewegte Szenen, das auf dem Videomonitor dargestellt wird, und das Audiosignal für ein Standbild, das innerhalb eines Speichers gespeichert wird, während das Videosignal für ein Standbild aus dem zweiten Teil des Aufzeichnungsmediums wiederhergestellt wird.

13. Verfahren nach Anspruch 12, dadurch gekennzeichnet, daß das abgetrennte Audiosignal, das in digitaler Form vorliegt, in ein entsprechendes Analogsignal umgesetzt wird, das gleichzeitig mit der Wiedergabe des Videosignals für das Standbild wiedergegeben wird.

14. Verfahren nach Anspruch 13, dadurch gekennzeichnet, daß das digitale Audiosignal für ein Standbild, das in einer zeitkomprimierten Weise aufgezeichnet ist, in den Speicher mit einer ersten relativ hohen Geschwindigkeit eingegeben wird und daraus mit einer zweiten relativ geringen Geschwindigkeit entnommen wird, wodurch das Audiosignal in seine normale Wiedergabegeschwindigkeit zurückgeführt wird.

15. Verfahren nach einem der Ansprüche 12 bis 14, dadurch gekennzeichnet, daß eine Vielzahl von Signalgemischen und eine entsprechende Vielzahl von Videosignalen für Standbilder auf dem Aufzeichnungsmedium aufgezeichnet sind, wodurch die vorgenannten Schritte für jedes Paar von Signalgemisch und Videosignalen für Standbilder wiederholt werden.

16. Einrichtung zur Wiedergabe eines auf einem Aufzeichnungsmedium aufgezeichneten Signals, wobei ein erster Teil des Mediums ein aufgezeichnetes Signalgemisch enthält, das ein Videosignal für bewegte Szenen und ein Audiosignal für ein Standbild enthält, während ein zweiter Teil des Mediums ein aufgezeichnetes Videosignal eines Standbilds enthält, gemäß dem Verfahren nach einem der Ansprüche 12 bis 15, dadurch gekennzeichnet, daß die Videowiedergabemaschine (63) Vorrichtungen zur Wiederherstellung des Signalgemisches aus dem ersten Teil des Aufzeichnungsmediums (61) enthält und andere Vorrichtungen zu dessen Trennung in das Videosignal bewegter Szenen zur Anzeige auf einem Videomonitor (69) und das Audiosignal für ein Standbild zur Speicherung innerhalb eines Digitalspeichers (63), und daß die Videowiedergabemaschine (63) weitere Einrichtungen enthält, mit denen das Videosignal für ein Standbild vom zweiten Teil des Aufzeichnungsmediums (61) wieder hergestellt werden kann.

17. Einrichtung nach Anspruch 16, dadurch gekennzeichnet, daß zusätzlich ein Demodulator (75) vorgesehen ist, der das abgetrennte Audiosignal, das in digitaler Form vorliegt, in ein entsprechendes Analogsignal umsetzt, das gleichzeitig mit der Anzeige des Videosignals für ein Standbild wiedergegeben wird.

18. Einrichtung nach Anspruch 16 oder 17, dadurch gekennzeichnet, daß im Fall einer zeitkomprimierten Aufzeichnung des digitalen Audiosignals eines Standbildes zusätzlich ein Oszillatorschaltkreis (77) vorgesehen ist, der den Digitalspeicher (73) so steuert, daß das digitale Audiosignal in den Speicher (73) mit einer ersten relativ hohen Geschwindigkeit eingegeben und daraus mit einer zweiten relativ geringen Geschwindigkeit entnommen wird, wodurch das Audiosignal zu seiner normalen Wiedergabegeschwindigkeit zurückgeführt wird.

* C L M S *