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(54) Title: SYSTEM FOR PRODUCING 3 DIMENSIONAL DIGITAL STEREO SURROUND SOUND NATURAL 360 DEGREES (3D DSSR N-360)

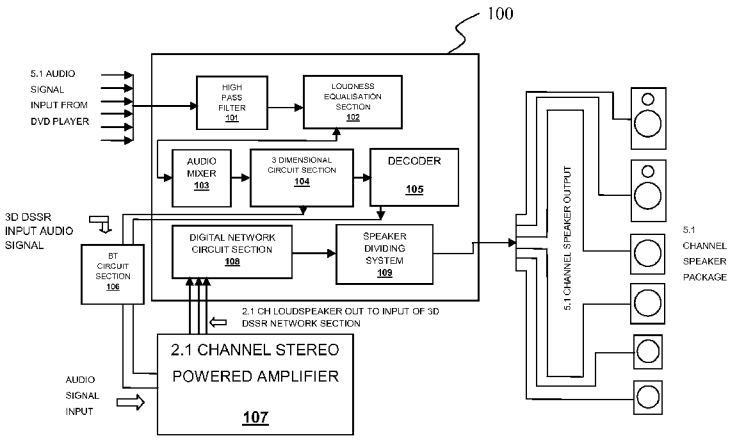

FIG 1

(57) Abstract: The present invention discloses a system for producing at least three dimensional digital stereo surround sound output with an angle coverage of 360 degrees without using powered amplifiers at output stage while covering both horizontal and vertical listening layout areas whereby facilitating evenly distributed three dimensional surround effects irrespective of the position of the listener for 360 degree listening experience with immersive surround sound effects. The output audio signal is synchronizes with the actual source in three dimensional space. The present invention is also used with the headphone device to produce three dimensional stereo surround sound effect and provides a soothening effect so that the user hears the so produced surround sound for a very long time. Upon re-recording with a camcorder, the media content having 3 dimensional digital stereo surround sound output, the output video has unrecognisable audio whereby providing an antipiracy mechanism.

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Description

Title of Invention: System for producing 3 dimensional digital stereo surround sound natural 360 degrees (3D DSSR N-360)

Technical Field

[1] The present invention generally relates to a system for producing at least three dimensional digital stereo surround sound natural 360 degree from high-quality digital stereo sound without power and without utilizing any powered amplifiers at output stage. More particularly, the present invention relates to a stereo sound circuit system for providing three dimensional digital stereo surround sound effect and listening area coverage of 360 degrees.

Background Art

[2] The sound technology has evolved from mono sound to stereo sound to present day latest innovation in digital surround sound technology. The term stereophonic commonly called as stereo sound refers to the method of sound reproduction in which an illusion of directionality and audible perspective is created. The creation of illusion is usually achieved by using the two or more independent audio channels through configuration of two or more loudspeaker system. Thus, the term 'stereophonic' applies to so called 'quadraphonic' and 'surround sound' systems as well as 2-channel, 2-speaker systems. The monophonic sound is still widely used in today's contexts where a stereo device uses a high bandwidth.

[3] Some prior art systems and methods have adopted a plurality of high end digital circuits to produce natural effect for recorded audio track. For achieving this, the existing prior art systems and methods use a plurality of main speakers, woofers and sub-woofers.

[4] Also some prior systems and methods implement digital circuits to produce an audio effect with a large coverage angle. To achieve this, the existing prior systems and methods provide audio speakers in a plurality of vertical as well as horizontal positions in an enclosed zone like a movie theatre.

[5] However the existing prior arts fail to provide sound environment with coverage angle of 360 degrees. Also the existing prior arts are limited in provision of an immersive audio experience. Apart from this, the existing prior methods fail to provide a 3 dimensional surround sound effect. For example- if the existing prior art methods are used in an enclosed area like a theatre, the audio effect produced is effectively heard by the person sitting near to the speakers while the effectiveness of sound quality so produced reduces to a large extent for a person sitting far away the speakers. All existing surround sound effects are limited to two-dimensional movements on a

horizontal plane, because vertical movements of sound images have not been achieved with the 5.1 surround sound system. In case the rear loudspeakers are set higher than the front loudspeakers, some feeling of elevation may be perceived, but that spoils the aesthesis of the sound system. Hence existing sound systems fail to provide an exact 360 degree sound effect as is experienced in a natural environment such as a sound from an area on top of the head is heard or a difference between a nearer sound and a farther sound is heard.

[6] Moreover, present day technologies generally miss or oversee the sound data which is playing in the background or which is generally recorded with least pitch and is almost unnoticed.

[7] The technology used for the home theatre systems for providing a theatre quality digital surround sound technology requires prodigious amounts of power to deliver the audio output with a large coverage area by employing high powered amplifiers to amplify the sounds to a desired level. Thus, the power consumed by such amplifiers increases as the number of channels increase. For example, to give a 2.1 channel output, the amplifier consumes a power of approx 60Watts-120Watts whereas a higher channel amplifier generally consumes 300 Watts or more.

[8] The ever growing demand of video games and mobile devices has definitely changed both the market and the consumer's habits. Consumers now-a-days wants to enjoy 3d immersive sound from their portable device as well such as mobile phone, tablets or laptops etc. There is no existing system that can provide 360 degree listening experience to a person using earphones or headphones as all surround sound audio technologies require at least 5.1 channel speakers to implement the sound effects.

[9] Hence there is a need for a system to produce at-least 360 degree surround sound with a large coverage area. Also there is a need for a system to extract small hidden information provided in an audio track. Further there is a need for a system to reduce the power consumption.

Object of the invention

[10] The primary object of the present invention is to provide a system for producing a 3 dimensional digital stereo surround sound in natural 360 degrees using at least 2.1 channel output.

[11] Another object of the present invention is to provide a system for facilitating evenly distributed 3 dimensional surround effects irrespective of the position of the listener.

[12] Yet another object of the present invention is to provide a system for eliminating powered amplifiers at the output stage while generating high quality 3 dimensional sound effect.

[13] Yet one more object of the present invention is to provide 360 degree listening experience with immersive surround sound effects.

[14] Yet another object of the present invention is to provide a system for reducing the power consumed while generating high quality sound effect.

[15] One more object of the present invention is to enhance the natural sound splitting effects virtually and naturally during videos playback by synchronizing sound with the actual sound source in three dimensional space.

[16] Yet one more object of the present invention is to prevent piracy caused by unauthorized re-recording of a motion picture using a camcorder while being played in a movie theatre and the like.

[17] One more object of the present invention is to provide a system for producing a 3 dimensional digital stereo surround sound in natural 360 degrees using a headphone or earphone without causing discomfort to the ears.

Summary of the invention

[18] To achieve these and other objectives, various embodiments of the present invention disclose a system for producing three dimensional digital stereo surround sound in natural 360 degrees using at least 2.1 channel output.

[19] In one embodiment, the system for producing three dimensional digital stereo surround sound in natural 360 degrees comprises a high pass filter circuit section, a loudness equalization section, a digital audio mixer section, a three dimensional digital stereo surround sound section, a decoder circuit section, a bass and treble circuit section, an amplifier, a digital network circuit section natural 360, a speaker dividing system and an at-least 5.1 channel speaker package system.

[20] The high pass filter circuit section receives an audio signal from at-least 5.1 channel digital audio source or at least 5.1 channel video source wherein the high pass filter circuit section is configured to pass a high frequency audio signal and to attenuate a plurality of low frequency audio signals, without disturbing the original audio signal. The high pass filter circuit section recognizes a plurality of low frequency audio data produced in an original sound track. At-least two audio signals are provided as inputs to the high pass filter circuit section.

[21] The loudness equalization section receives an audio signal from the high pass filter circuit section. The loudness equalization section maintains a constant volume level across a plurality of sources of the audio signal on a real time basis for avoiding a variation in pressure level of sound over normal excursion of the sound. The loudness of at-least two audio signals is equalized through the loud equalisation section.

[22] The digital audio mixer section receives an audio signal from the loudness equalisation section, wherein the digital audio mixer converts the received audio signals into at least 2.1 channel audio signal carrying information of at least 5.1 channel audio signal. The digital audio mixer section changes volume level of the received audio signal wherein the digital audio mixer section adds a plurality of sound

effects. The digital audio mixer section also changes the timbre of a plurality of sound sources which produces the audio signal. At-least two audio signals are intermingled in the digital audio mixer.

[23] The three dimensional digital stereo surround sound section receives an audio signal from the digital audio mixer section to create three dimensional stereo surround audio effects by raising the pitch of the received audio signal for recognition of a plurality of low pitch audio signals in the received audio signal to improve the quality of sound signal by recognizing the smallest hidden information in the received audio signal and creating an illusion of a plurality of sound sources placed virtually in a three dimensional space.

[24] The decoder circuit section receives an audio signal from three dimensional digital stereo surround sound section wherein the received audio signal is at-least 5.1 channel audio signal. The decoder circuit section decodes the audio signal into at-least 2.1 channel audio signal. The 2.1 channel audio signal carries an information provided in the at-least 5.1 channel audio signal.

[25] The bass and treble circuit section receives at-least 2.1 channel audio signal from the decoder circuit section. The bass and treble circuit section further comprises a low pass filter for modulating the bass of the received at-least 2.1 channel audio signal and a high pass filter for modulating the treble of the received at-least 2.1 channel audio signal. The bass and treble circuit section acts as a two band equaliser wherein the bass and treble circuit section mixes the modulated signal produced from the high pass filter and the low pass filter to enhance the quality of the signals.

[26] An atleast 2.1 channel powered amplifier receives an audio signal from the bass and treble circuit section, wherein the powered amplifier amplifies the received audio signal.

[27] The digital network circuit section natural 360 comprising an electronic filter, receives an amplified audio signal from the 2.1 channel powered amplifier wherein the digital network circuit section natural 360 further comprises a crossover sub-circuit wherein the crossover sub-circuit splits the received audio signal into a low frequency signal and a high frequency signal to provide an enhanced natural 360 degrees coverage.

[28] The speaker dividing system receives an audio signal from the digital network circuit section natural 360 wherein the speaker dividing system delivers a surround sound. The surround sound comprises at-least five discrete full range channels and a channel with low frequency effects wherein at-least five discrete full range channels further comprise a left channel, a right channel, a centre channel, a left surround channel and a right surround channel.

[29] The system also includes an output section to output the three dimensional sound

signal to a predetermined output device. In one embodiment the output section is at-least 2.1 channel speaker package system, wherein the channel speaker channel speaker package system receives an audio signal from the speaker dividing system, and the speaker package system produces three dimensional stereo surround audio signal as an output. The output audio signal is synchronized with actual sound source in three dimensional space whereby providing enhanced natural sound splitting effects virtually and naturally in videos playback.

[30] The invented system generates an audio output with an angle coverage of 360 degrees without using powered amplifiers at output stage while covering both horizontal and vertical listening layout areas whereby facilitating evenly distributed 3 dimensional surround effects irrespective of the position of the listener for 360 degree listening experience with immersive surround sound effects. The system provides a highly synchronised three dimensional digital stereo surround sound effects on implementation with a three dimensional video playback for synchronizing sound with the actual sound source in three dimensional space and enhancing the natural sound splitting effects virtually and naturally.

[31] In another embodiment, the system implements a buffer circuit in the conjunction with three dimensional digital stereo surround sound section working with power supply wherein the buffer circuit enhances the audio coverage and quality.

[32] In one more embodiment, the system is a device agnostic implemented with a plurality of audio input devices wherein the audio input devices are at-least 5.1 channel digital stereo audio devices.

[33] In another embodiment, the output section is a headphone wherein said output audio signal from said system produces three dimensional stereo surround sound in natural 360 degree. In this embodiment, the output audio produced by the system in conjunction with the headphone produces a left, a right, a virtual centre, a virtual left middle and a virtual right middle audio effects while producing a high quality soothing audio effects without causing discomfort to the ears.

[34] In one more embodiment, the digital network circuit section natural 360 gives output in the form of three dimensional digital stereo surround sound natural 360 with Wide surround Sound for use with headphone or earphone to produces three dimensional stereo surround sound in natural 360 degree with surround sound. In this embodiment, the output section is a headphone or an earphone. The output signal produced the system in conjunction with the headphone produces a left, a right, a virtual centre, a virtual left middle, a virtual right middle, rear right and rear left audio effects while producing a high quality soothing audio effects without causing discomfort to the ears.

[35] In yet another embodiment, upon re-recording with a camcorder, the media content such as motion picture having 3 dimensional digital stereo surround sound output, the

output video has unrecog nisable audio whereby providing an antipiracy mechanism.

[36] The invented system transforms high-quality digital stereo sound into at least 5.1-channel three dimensional digital stereo surround sound natural 360 degrees sound technology naturally and provide listening experience with immersive surround sound effects. While all present day state-of-art sound technologies are using more powered amplifiers to give the desired output, the present invention provides desired output without using powered amplifier at output stage and transforms and delivers three di-mensional digital stereo surround sound natural 360 degrees. The three dimensional digital stereo surround sound natural 360 degrees format of sound can be implemented to enhance the natural sound splitting effects virtually and naturally during videos playback by synchronizing sound with the actual sound source in three dimensional space. The system efficiently helps in preventing the piracy of an audio and a video to a great extent.

Brief Description Of Drawings

[37] The foregoing and other features of embodiments will become more apparent from the following detailed description of embodiments when read in conjunction with the accompanying drawings. In the drawings, like reference numerals refer to like elements.

[38] **FIG 1** illustrates a detailed functional block diagram of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention.

[39] **FIG 2** illustrates a broad functional block diagram of the three dimensional digital stereo surround sound system of technology in accordance with one embodiment of the invention.

[40] **FIG 3** shows the circuit diagram of the three dimensional digital stereo surround sound system (without power) in accordance with one embodiment of the invention.

[41] **FIG 3a** shows the circuit diagram of the input section of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention.

[42] **FIG 3b** shows the circuit diagram of the high pass filter section and loudness equalization section of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention.

[43] **FIG 3c** shows the circuit diagram of the digital audio mixer circuit section of the three dimensional digital stereo surround sound system in accordance with one em-bodiment of the invention.

[44] **FIG 3d** shows the circuit diagram of the decoder circuit section and the three di-mensional digital stereo surround circuit section of the system in accordance with one embodiment of the invention.

[45] **FIG 3e** shows the circuit diagram of the bass and treble circuit section, the digital network circuit section natural 360 and the speaker dividing system of the three di-

mensional digital stereo surround sound system in accordance with one embodiment of the invention.

[46] **FIG 4** shows the circuit diagram of the three dimensional digital stereo surround sound system (with power) in accordance with one embodiment of the invention.

[47] **FIG 5** shows 5.1 channel to 9.1 channel surround digital network circuit diagram in accordance with one embodiment of the invention.

[48] **FIG 6** shows 2 channel stereo to 5 channel network circuit diagram according to one embodiment of the invention.

[49] **FIG 7** shows 5.1 channel to 7.1 channel network circuit diagram according to one embodiment of the invention.

[50] **FIG 8** shows 5.1 channel to 8.1 channel network circuit diagram according to one embodiment of the invention.

[51] **FIG 9** shows 5.1 channel to 2.1 channel with stereo network circuit diagram according to one embodiment of the invention.

[52] **FIG 10** shows 5.1 channel to 9.1 channel with 3 dimensional digital surround sound natural 360 network circuit diagram according to one embodiment of the invention.

[53] **FIG 11** shows 5.1 channel to 5.1 channel with 3 dimensional digital surround sound natural 360 surround wide network circuit diagram according to one embodiment of the invention.

[54] **FIG 12** shows 5.1 channel to 5.1 channel with multi speaker enclosure network circuit diagram according to one embodiment of the invention.

[55] **FIG 13** shows 5.1 channel to 3.1 channel surround wide with multi speaker enclosure digital network circuit diagram according to one embodiment of the invention.

[56] **FIG 14** shows 5.1 channel to 5.1 channel surround wide with multi speaker enclosure digital network circuit diagram according to one embodiment of the invention.

[57] **FIG 15** shows 5.1 channel to 1.1 channel surround wide with single speaker enclosure network circuit diagram according to one embodiment of the invention.

[58] **FIG 16** shows 5.1 channel to 6.1 channel 3 dimension surround digital wide network circuit diagram according to one embodiment of the invention.

[59] **FIG 17** shows 5.1 channel to stereo wide network with 1+1 single speaker enclosure circuit diagram according to one embodiment of the invention.

[60] **FIG 18** shows 3 dimensional digital surround sound natural 360 wide network circuit diagram according to one embodiment of the invention.

[61] **FIG 19** shows the output from a headphone playing three dimensional digital stereo surround sound natural-360 Surround Wide technology the according to one embodiment of the present invention.

[62] **FIG 20** shows the method of converting video track into the three dimensional digital stereo surround sound natural-360 format to prevent a undesirable copying, according to one embodiment of the invention.

Disclosure of Invention

DETAILED DESCRIPTION OF THE INVENTION

[63] Reference will now be made in detail to the description of the present subject matter, one or more examples of which are shown in figures. Each example is provided to explain the subject matter and not a limitation. Various changes and modifications obvious to one skilled in the art to which the invention pertains are deemed to be within the spirit, scope and contemplation of the invention.

[64] The present invention provides a 360 degrees sound technology format which transforms high-quality digital stereo sound into at least 5.1-channel three dimensional digital stereo surround sound natural 360 degrees sound technology naturally. While all present day state-of-art sound technologies are using more powered amplifiers to give the desired output, the present invention provides desired output without using powered amplifier at output stage and transforms and delivers three dimensional digital stereo surround sound natural 360 degrees. The present system of technology uses only one 2.1 channel powered amplifier to amplify the audio signals for processing. The three dimensional digital stereo surround sound natural 360 degrees format of sound can be implemented to enhance the natural sound splitting effects virtually and naturally in videos playback by synchronizing sound with the actual source in three dimensional space.

[65] **FIG 1** illustrates a detailed functional block diagram of the three dimensional stereo surround sound system in accordance with one embodiment of the invention. The three dimensional stereo surround sound system (**100**) includes a high pass filter circuit section (**101**), a loudness equalization section (**102**), a digital audio mixer section (**103**) , an three dimensional digital stereo surround section (**104**), a decoder circuit section (**105**), a bass and treble (BT) circuit section (**106**), an amplifier (**107**), a digital network circuit section natural 360 (**108**), and a speaker dividing system (**109**). The three dimensional sound system (**100**) receives a 5.1 channel audio input from a plurality of digital audio and video source such as a DVD player, a blue ray disc player, an AVCHD camcorder, a personal computer, an AV receiver or a tablet computer having at-least 5.1 channel audio output. The 5.1 channel audio output comprises an audio signal which is usually in the format of a digitally pre-recorded analog signal. The audio signals are usually encoded with a format of a multi channel support for the surround sound effects. Output from the audio or video source is fed to the high pass filter circuit section (**101**) through the at-least 5.1 channel connecting cables.

[66] The high pass filter circuit section (**101**) passes the frequencies of the audio signal which are higher than the cut-off frequency of the high pass filter (**101**) and attenuates (i.e. reduces the amplitude) the frequencies lower than the cut-off frequency of the high pass filter (**101**) without disturbing the original audio signal. An output audio signal from high pass filter circuit section (**101**) is fed to the loudness equalization circuit section (**102**). The high pass filter circuit section (**101**) recognizes a plurality of low frequency audio data produced in an original sound track.

[67] The loudness equalization circuit section (**102**)implements a plurality of DSP based algorithms used for loudness equalization to ensure that the volume level across a plurality of sources of the received audio signal stays constant in a real time. An o utput audio signal from the loudness equalization circuit section (**102**) is fed to the digital audio mixer circuit section (**103**). Maintaining of the constant volume level avoids a variation in a pressure level of a sound over a normal excursion of the sound.

[68] The digital audio mixer section (**103**) is an electronic console. The audio signals transmitted from the high pass filter circuit section (**101**) and the loudness equalization section (**102**) are in the form of at-least 5.1 channel audio signals. The processed 5.1 channel audio signals from the high pass filter circuit section (**101**) and the loudness equalization circuit section (**102**) are converted into 2.1 channel signals in audio mixer circuit section (**103**). The so produced 2.1 channel audio signals carry all the information provided in the at-least 5.1 channel information.

[69] The processed output audio signals from the digital audio mixer section (**103**) are fed to the input of the three dimensional digital stereo surround circuit section (**104**) that creates three dimensional stereo surround audio effects. The three dimensional audio effects are a group of sound effects that widen the three dimensional stereo sound signals to create an illusion of the three dimensional sound spaces which include a sound space in front, behind, above and below the listener.

[70] There are several classes of the three dimensional audio signal: a) a class of the three dimensional audio signal widens an stereo image by modifying a phase information; b) a class of the three dimensional audio signal places sounds outside a stereo coverage zone; c) a class of the three dimensional audio signal includes a complete three dimensional stereo simulation. The audio signal output from three dimensional digital stereo surround circuit section (**104**) are fed to decoder circuit section (**105**)for decoding process.

[71] The decoder circuit section (**105**) decodes the so obtained audio signals to retrieve the original information. The decoder circuit section (**105**) converts the at-least 5.1 channel audio signals into the at-least 2.1 channel audio signal. The decoded three dimensional digital stereo surround audio signals are sent to the bass and treble (BT) circuit section (**106**).

[72] The bass and treble (BT) circuit section (**106**) acts like a two band equalizer. The bass control is usually set to vary the level of the audio signals in a band of frequencies which are centered around 100 Hertz. The treble control acts is set to vary the level of the audio signals in a band of frequencies which are centered around 10,000 hertz. The bass portion of the bass and treble circuit section (**106**) comprises a low pass filter for modulating the bass of the received at-least 2.1 channel audio signal and the treble portion of the bass and treble circuit section (**106**) comprises a high pass filter for modulating the treble of the received at-least 2.1 channel audio signal. The audio signals are mixed in a central section of the bass and treble circuit section (**106**) for quality enhancement. The output audio signals from the bass and treble circuit section (**106**) are the two channel audio signal with low amplitude in nature.

[73] In order to amplify the audio signal, the signals from the bass and treble circuit section are fed to an amplifier. In one embodiment, the amplifier is at-least 2.1 powered amplifier (**107**) to perform an audio signal amplification. The amplified audio signals from the amplifier (**107**) are fed to the digital network circuit section natural 360 (**108**).

[74] The digital network circuit section natural 360 (**108**) is a class of electronic filter used in a plurality of audio applications. The digital network circuit section natural 360 (**108**) comprises crossovers which split the received audio signal into a horizontal and a vertical frequency bands. The horizontal and the vertical frequency bands are separately routed to the loudspeakers dedicated for respective bands.

[75] The output audio signals from the digital network circuit section natural 360 (**108**) are fed into the speaker dividing system (**109**). The speaker dividing system (**109**) delivers a 3 dimensional digital stereo surround sound in natural 360 degree. The digital stereo surround sound provides a five discrete full range channels which further comprises a left channel, a right channel, a center channel, a left surround channel and a right surround channel along with a channel for the low frequency effects (LFE). The LFE is also referred to as '.1' channel. The output audio signals from the speaker dividing system (**109**) are fed to the at-least 5.1 channel speaker package system that delivers sound output in the form of the three dimensional digital stereo surround natural 360.

[76] **FIG 2** illustrates the functional block diagram of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention. The system of the present invention uses the principle of extracting the smallest un-recognized audio information from both, audio and video tracks. The input stage comprises a digital audio or video source (**200**) with the at-least 5.1 channel output, the three dimensional digital stereo surround sound natural 360 system (**100**), a 2.1 channel stereo powered amplifier (**107**) and a plurality of cables and connectors. At

output stage, the system employs an at-least 5.1 channel speaker package system (**201**).

[77] **FIG 3** illustrates the circuit diagram of the three dimensional digital stereo surround sound system (without power) in accordance with one embodiment of the invention. The circuit diagram depicted in the **FIG. 3** comprises a plurality of components which further comprises a high pass filter circuit section (**101**), a loudness equalization section (**102**), a digital audio mixer section (**103**), an three dimensional digital stereo surround circuit section (**105**), a decoder circuit section (**105**), a bass and treble section (**106**), a 2.1 channel powered amplifier (**107**), a digital network circuit section natural 360 (**108**) and a speaker dividing system (**109**). The plurality of components employed in the three dimensional digital stereo surround sound system comprise a plurality of active as well as passive systems. In this embodiment, the 2.1 channel powered amplifier (**107**)works with power supply.

[78] **FIG 3a** shows the circuit diagram of the input section of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention. With respect to **FIG. 3a**, the input section (**101a**) receives the audio signals from a digital audio or video source which supplies at-least 2.1 channel audio output. The output from a digital audio or video source is in the form of analog audio signals which further comprises a main left signal, a main right signal, a rear left surround signal, a rear right surround signal, the centre channel signal and a 0.1 sub-woofer audio signal. The main left audio signal is fed through VC-1 [variable controller] and the main right audio signal is fed through VC-2 [variable controller], the rear left surround signal is fed through VC-3 [variable controller], the rear right surround signal is fed through VC-4 [variable controller], the centre channel audio signal is fed through VC-5 [variable controller] and the 0.1 sub-woofer audio signal is fed through VC-6 [Variable Controller] of the three dimensional digital stereo surround sound system input section. The variable controllers are used in the input circuit section (**101a**) to control the at-least 5.1 channel input audio signals levels individually. The variable controllers act as master controllers to control the flow level of the audio input signals. The values of volume controllers VC1 to VC6 are preferably 100 KΩ. The three dimensional digital stereo surround sound natural 360 system implements a plurality of the resistor whose value varied according to pre-requisites of the system.

[79] **FIG 3b** shows the circuit diagram of the high pass filter section and loudness equalization section of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention. With respect to **FIG. 3b**, the input section (**101a**) has two main input channels flowing through the high pass filter section circuit section (**101**). At-least 5.1 channel input audio signals are fed through the master variable controllers. The 5.1 channel audio signals are connected to the high pass filter circuit section (**101**) through the capacitors C1, C2, C3, C4, C5 and C6 re-

spectively. The second audio input signals which are fed to the high pass filter circuit section (**101**) are received from VC-1 and C1 Junction and fed through capacitor C7. The audio input signals are received from VC-2 and C2 junction and are fed through capacitor C8. The audio input signals are received from VC-3 and C3 junction and are fed through capacitor C10. The input audio signals are received from VC-4 and C4 junction and are fed through capacitor C9 respectively. The values of VC-1 to VC- 6 are preferably 100 KΩ, values of C1 to C10 are preferably 2.2 μf/63V.

[80] In high pass filter section (**101**), the audio signals are processed to get the high frequency audio signals by recognizing and amplifying the low frequency sound signal without disturbing the original audio signal. By raising the frequency of audio signals having low frequency, the missing and hidden sound becomes audible. The high pass filter circuit section (**101**) passes higher frequencies of sound through it and attenuates (i.e. reduces the amplitude of) frequencies than the filter's cut-off frequency. The audio signal levels are processed to a flat mode by leveling of the left audio signals or the virtual centre and the right audio signals. The audio signals are fed to the loudness equalization section (**102**) for further DSP based processing. The output from high pass filter circuit section (**101**) is fed to the loudness equalization circuit section (**102**) through capacitors C20, C21, C23, C24, C25, C26, C27, C28 and C29 respectively. The value of capacitors C20 to C29 is preferably 2.2 μf/63 V.

[81] **FIG 3c** shows the circuit diagram of the digital audio mixer circuit section of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention. With respect to **FIG. 3c**, the output from the loudness equalization circuit section (**102**) is fed to the digital audio mixer circuit section (**103**) through the capacitors C40, C41, C43, C44 & C45, C46, C47, C48 and C49 respectively. The value of the capacitors C40, C41, C43, C44, C45, C46, C47, C48 and C49 is preferably 2.2μf/63V. The output from the digital audio mixer circuit section **(101)** is fed to the decoder circuit section (**104, FIG 3d**) for decoding process, through capacitors C78 and C79 wherein the values of C78 and C79 are preferably 2.2 μf/63V.

[82] **FIG 3d** shows the circuit diagram of the decoder circuit section and the three dimensional digital stereo surround circuit section of the system in accordance with one embodiment of the invention. The processed output signals from the digital audio mixer section (**103**) are fed as input to the three dimensional digital stereo surround circuit section (**105**). The three dimensional digital stereo surround sound section (**105**) further comprises at least two transformers (step up or step down transformer or line out transformer). The Variable Controllers VC-7 and VC-8 are connected to TF-1 (transformer-1) of the primary windings and the Variable Controllers VC-9 and VC-10 are connected to the TF-2 (transformer-2) of primary windings. The values of VC-7 to VC-10 are preferably 100 KΩ. The output signals from the three dimensional digital

stereo surround sound section (**105**) are fed to the decoder circuit section (**104**). The secondary windings of the TF-1 [Transformer-1] and the secondary windings of the TF-2 [Transformer-2] are connected to each other via the capacitors C70, C71, C72 and C73 respectively for decoding process. The values of the capacitors C70, C71, C72 and C73 are preferably 2.2μf/63V. The decoded output signals from the decoder circuit section (**104**) are fed to the bass and treble circuit section (**106, FIG 3e**) through capacitors C82 & C83 (**FIG 3e**).

[83] **FIG 3e** shows the circuit diagram of the bass and treble circuit section, the digital network circuit section natural 360 and the speaker dividing system of the three dimensional digital stereo surround sound system in accordance with one embodiment of the invention. With respect to **FIG. 3e**, the bass and treble circuit section (**106**) consists of the variable capacitors VC-11, VC-12 and VC-13 and VC-14. The output signals from the bass and treble circuit section (**106**) are fed to the 2.1 powered amplifier (**107**) through the capacitors C106 and C107 for the audio signal amplification. The output signals from the 2.1 channel powered amplifier (**107**) are fed to the digital network circuit section natural 360 (**108**). The values of capacitors C106 and C107 are preferably 2.2μf/63V. The amplified signals from the 2.1 channel powered amplifier (**107**) are connected to the digital network circuit section natural 360 (**108**) through capacitors C92, C93, C94, C95, C96, C97 and C98 respectively. The values of capacitors C92, C93, C94, C95, C96, C97 and C98 are preferably 2200 μf/50V.

[84] The processed output signals from the digital network circuit section natural 360 (**108**) are fed to output section of the speaker dividing system (**109**) through the capacitors C99, C100, C101, C102, C103, C104 and C105. The values of capacitors C99, C100, C101, C102, C103, C104 and C105 are preferably 2200 μf/50V.

[85] The values of the Variable Controllers can be varied and modified to suit the needs of film industry, music industry, audio-video companies/AV receiver companies, media and satellite industry etc.

[86] **FIG 4** shows the circuit diagram of the three dimensional digital stereo surround sound system (with power supply) in accordance with one embodiment of the invention. In this embodiment 3 dimensional digital stereo surround sound system uses powered amplifiers at output stage. At input stage, 2 channel buffer circuits - **BC1, BC2, BC3** and **BC4** are used that amplify the incoming audio signals from the audio source or the video source to a higher level. The sound processors **CR1** and **CR2** convert the stereo sound signals into the stereo surround sound signals. The high pass filter circuit section (**101**) and the digital audio mixer circuit section (**103**) recognize the plurality of low pitch audio signals in the received audio signal and improve the quality of sound signal by raising the pitch which creates an illusion of a plurality of sound sources placed virtually in a three dimensional space. The digital audio mixer

circuit section (**103**) transforms and mixes the 5.1 channel audio signal into the 2.1 channel audio signal. The bass and treble circuit section (**108**) adjusts the bass and treble of the audio signal according to the information of audio signals. The 2.1 channel stereo powered amplifier (**107**) amplifies the 2.1 channel audio signals. The digital network circuit section natural 360 (**108**) introduces the splitting of the audio signals and enhances the coverage angle to 360 degrees.

[87] **FIG 5** shows 5.1 channel to 9.1 channel surround digital network circuit diagram in accordance with one embodiment of the invention. In this embodiment, the 5.1 channel input audio signals are converted into 9.1 channel audio signal having three dimensional digital surround sound natural 360 . In this embodiment, the surround sound digital network consists of audio mixer circuit section that provides 9.1 channel splitting effects from a 5.1 channel audio source. In this circuit section, 5.1 channel analogue signals are received from the digital audio/video source playing 5.1 channel original audio soundtrack. The audio signals are fed to 5.1 channel AV receiver and 5.1 channels loudspeaker output is fed to 9.1 channel three dimensional stereo surround digital network circuit section. The sound signals are fed to loudspeaker package of 9.1 channel and the final output is received in the format of three dimensional digital surround sound natural 360 .

[88] **FIG 6** shows 2 channel stereo to 5 channel network circuit diagram according to one embodiment of the invention. In this embodiment, the 2 channel stereo audio signal is converted into 5 channel audio signal having three dimensional digital surround sound natural 360 . In this embodiment, the surround sound digital network section consists of audio mixer circuit section that provides 5 channel splitting effects from a 2 channel stereo sound source. In this circuit section, the input is received from 2 channel stereo sound source. The audio signals are fed to 2 channel AV receiver (601) and 2 channels stereo output is fed to 5 channel 3D surround digital network circuit section as shown in the figure. The sound signals are fed to loudspeaker package of 5 channel and the final output is received in the format three dimensional digital surround sound natural 360.

[89] **FIG 7** shows 5.1 channel to 7.1 channel network circuit diagram according to one embodiment of the invention. In this embodiment, the digital network circuit section of the three dimensional digital stereo surround sound system gives output of 7.1 channel from 5.1 channel audio signal having three dimensional digital surround sound natural 360 . In this embodiment, the surround sound digital network section consists of audio mixer circuit section that provides 7.1 channel splitting effects from a 5.1 channel audio source. In this circuit section, 5.1 channel analogue signals are received from the digital audio/video source playing 5.1 channel original audio soundtrack. The audio signals are fed to 5.1 channel AV receiver and 5.1 channels loudspeaker output is fed

to 7.1 channel 3D surround digital network circuit section as shown in the figure. The sound signals are fed to loudspeaker package of 7.1 channel and the final output is received in the format of having three dimensional digital surround sound natural 360 .

[90] **FIG 8** shows 5.1 channel to 8.1 channel network circuit diagram according to one embodiment of the invention. In this embodiment, the 5.1 channel stereo sound signal is converted into 8.1 channel stereo sound track having three dimensional digital surround sound natural 360.

[91] **FIG 9** shows 5.1 channel to 2.1 channel with stereo network circuit diagram according to one embodiment of the invention. In this embodiment, the 5.1 channel stereo sound track is converted into 2.1 channel stereo sound track having three dimensional digital surround sound natural 360.

[92] **FIG 10** shows 5.1 channel to 9.1 channel with 3 dimensional digital surround sound natural 360 network circuit diagram according to one embodiment of the invention. In this embodiment, the 5.1 channel stereo sound track is converted into 9.1 channel stereo sound track having three dimensional digital surround sound natural 360.

[93] **FIG 11** shows 5.1 channel to 5.1 channel with 3 dimensional digital surround sound natural 360 surround wide network circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel stereo sound track is converted into 5.1 channel three dimensional digital surround sound natural 360 surround wide format.

[94] **FIG 12** shows 5.1 channel to 5.1 channel with multi speaker enclosure network circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel stereo sound track is converted into 5.1 channel with multi speaker enclosure having three dimensional digital surround sound natural 360.

[95] **FIG 13** shows 5.1 channel to 3.1 channel surround wide with multi speaker enclosure digital network circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel stereo sound track is converted into 3.1 channel wide surround with multi speaker enclosure having three dimensional digital surround sound natural 360 surround wide format.

[96] **FIG 14** shows 5.1 channel to 5.1 channel surround wide with multi speaker enclosure digital network circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel stereo sound track is converted into 5.1 channel wide surround having three dimensional digital surround sound natural 360 surround wide format.

[97] **FIG 15** shows 5.1 channel to 1.1 channel surround wide with single speaker enclosure network circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel stereo sound track is converted into 1.1 channel wide surround with single speaker enclosure having three dimensional digital surround

sound natural 360 surround wide format.

[98] **FIG 16** shows 5.1 channel to 6.1 channel 3 dimension surround digital wide network circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel stereo sound track is converted into 6.1 channel sound track having three dimensional digital surround sound natural 360.

[99] **FIG 17** shows 5.1 channel to stereo wide network with 1+1 single speaker enclosure circuit diagram according to one embodiment of the invention. In one more embodiment, the 5.1 channel is converted into stereo wide network with 1+1 single speaker enclosure.

[100] The invention provides a 360 degrees sound technology format which transforms high-quality digital stereo sound into at least 5.1-channel three dimensional digital stereo surround sound natural 360 degrees sound technology naturally. While all present day state-of-art sound technologies are using more powered amplifiers to give the desired output, the present invention provides desired output without using powered amplifier at output stage and transforms and delivers three dimensional digital stereo surround sound natural 360 degrees. The present system of technology uses only one 2.1 channel powered amplifier to amplify the audio signals for processing. The three dimensional digital stereo surround sound natural 360 degrees format of sound can be implemented to enhance the natural sound splitting effects virtually and naturally in videos playback by synchronizing sound with the actual source in three dimensional space.

[101] **FIG 19** shows the output from a headphone playing three dimensional digital stereo surround sound natural-360 Surround Wide technology the according to one embodiment of the present invention. In this embodiment, the invented system is used to produce three dimensional digital stereo surround sound natural 360 degree with Surround sound Wide (SRW) output using headphones or earphone. The three dimensional digital stereo surround sound natural 360 degrees with Surround sound Wide (SRW) format is designed exclusively for headphones. The Surround sound Wide (SRW) format is achieved by modifying the output using Variable Controllers while converting the input signal into 5.1 channel three dimensional digital stereo surround sound natural-360 with Surround sound Wide. The listener can hear the sound being delivered from various directions in the three dimensional space with coverage angle surrounding the listener with 360 degrees in a natural manner. In this embodiment, by using standard head phone or earphones, the listener can feel the left, right, virtual centre, virtual left middle and virtual right middle, rear left and rear right. Furthermore the realistic natural hearing is provided with use of the three dimensional digital stereo surround sound natural 360 degrees with Surround sound Wide (SRW). The present invention provides a soothening effect so that the user can hear the sound

for a longer time without causing any discomfort to the ears.

[102] **FIG 20** illustrates the method of converting an already existing source audio signal of 5.1 channel video track into the three dimensional digital stereo surround sound natural-360 format, according to one embodiment of the present invention. Piracy issues in connection with the theatrical exhibition of motion picture films are well known. Once a film distributor distributes prints of a motion picture film to exhibitors for theatrical exhibition, a certain degree of control over the product is lost. In the regular course of exhibiting the film, a customer in the theatre may surreptitiously record the film using, for example, a hand held camcorder. At a more sophisticated level, a person seeking to obtain an illegal copy of a film print may gain access to a theatre projection booth in collusion with an employee of the exhibitor and make a copy of the film after hours in a relatively controlled environment. In such an environment, the audio from the projection equipment can be directly fed to the camcorder. A tripod can be used to ensure a clear and steady picture. As a result, an illicit copy can be made. By using the invented three dimensional digital stereo surround sound format, the quality of such illicit copies becomes distorted and undesirable to the consumers. With respect to **FIG. 20,** the at-least dimensional digital surround sound natural-360 system is used to stop the piracy of an original audio and video track by using the method as below. First of all at step **2001**, the master copy of an original video track is compressed to 50% of its original size. At step **2002**, the original sound track is extracted from the compressed video. At step **2003,** the extracted sound track is converted into the three dimensional digital stereo surround sound natural 360 sound format. At step **2004,** the original sound track from the recorded video is replaced with the converted sound track. At step **2005,** the master copy is re-recorded by eliminating original sound track from the video. The process of recording the three dimensional digital stereo surround natural 360 sound track with the master copy video increases the size of the video in a DVD format.

[103] Another important feature of the invention is that if the video with converted sound tracks having 3 dimensional digital stereo surround natural 360 is re-recorded from a movie playing in movie theatres or any other such place using a camcorder, the recorded output video gets recorded in the video cameras with 50% distorted video with poor sound quality. When the camcorder recorded movie video is copied to a DVD for an unauthorized distribution, or is copied as a 3-in-1 (i.e. 3 movies in a single DVD) movie format, the recorded video is 100% distorted video which prevents piracy to a great extent. This feature can prove as a boon to the entertainment industries in the entire world.

[104] Another feature of the method is that it prevents unauthorized copying of the original sound tracks through the mobile phones and hence completely prevents piracy. If an

audio track is converted into the three dimensional digital stereo surround sound natural 360 format, then the audio or music tracks are available in the form of 5.1 channel audio format. Since the mobile phone supports only a 2 or 2.1 channel audio format, so the output audio signal in the mobile phone is very poor. Hence the system efficiently helps in preventing the piracy of an audio and a video to a great extent.

[105] The sound format of 3 dimensional digital stereo surround sound natural 360 degrees has huge application in entertainment industry such as film industries, music industries, audio-video companies/AV receiver companies, media and satellite industries.

[106] The invention provides a fool proof solution to piracy which will prove to be a boon to the entertainment industry especially film industry and music industry.

[107] The present invention implements a plurality of active and passive elements and their corresponding. But the present invention is not limited to the provided values. The values of the active and passive components can attain preferred value as per system requisites. Also the present can use various alternatives of the so provided active and passive components as per system requisites.

Claims

[Claim 1] A system for producing three dimensional digital stereo surround sound in natural 360 degrees, the system comprising:

a) a high pass filter circuit section, wherein said high pass filter circuit section receives an audio signal from at-least 5.1 channel digital audio source, wherein said high pass filter circuit section is configured to pass a high frequency audio signal and to attenuate a plurality of low frequency audio signals, without disturbing the original audio signal, and wherein the high pass filter circuit section recognizes a plurality of low frequency audio data produced in an original sound track;

a) a loudness equalization section, wherein the loudness equalization section receives an audio signal from the high pass filter circuit section, wherein said loudness equalization section maintains a constant volume level across a plurality of sources of the audio signal on a real time basis for avoiding a variation in pressure level of sound over normal excursion of the sound;

b) a digital audio mixer section, wherein the digital audio mixer section receives an audio signal from the loudness equalisation section, wherein the digital audio mixer converts the received audio signals into at least 2.1 channel audio signal carrying information of at least 5.1 channel audio signal, wherein the digital audio mixer section changes volume level of the received audio signal, wherein the digital audio mixer section adds a plurality of sound effects, and wherein the digital audio mixer section changes the timbre of a plurality of sound sources which produces said audio signal;

c) an at least three dimensional digital stereo surround sound section, wherein the three dimensional digital stereo surround sound section receives an audio signal from the digital audio mixer section to create three dimensional stereo surround audio effects by raising the pitch of the received audio signal for recognition of a plurality of low pitch audio signals in the received audio signal to improve the quality of sound signal by recognizing the smallest hidden information in the received audio signal and creating an illusion of a plurality of sound sources placed virtually in a three dimensional space;

d) a decoder circuit section, wherein the decoder circuit section receives an audio signal from three dimensional digital stereo surround sound section, wherein the received audio signal is at-least 5.1 channel

audio signal, wherein the decoder circuit section decodes the audio signal into at-least 2.1 channel audio signal, and wherein the at-least 2.1 channel audio signal carries an information provided in the at-least 5.1 channel audio signal;

e) a bass and treble circuit section, wherein the bass and treble circuit section receives at-least 2.1 channel audio signal from the decoder circuit section, wherein the bass and treble circuit section further comprises:

i. a low pass filter for modulating the bass of the received at-least 2.1 channel audio signal;

ii. a high pass filter for modulating the treble of the received at-least 2.1 channel audio signal,

wherein the bass and treble circuit section acts as a two band equaliser, wherein the bass and treble circuit section mixes the modulated signal produced from the high pass filter and the low pass filter, to enhance the quality of the signals;

a) an amplifier, wherein the amplifier receives an audio signal from the bass and treble circuit section, wherein the amplifier amplifies the received audio signal, wherein the amplifier is an at-least 2.1 channel powered amplifier;

b) a digital network circuit section natural 360, wherein the digital network circuit section is an electronic filter, wherein the digital network circuit section receives an amplified audio signal from the at-least 2.1 channel powered amplifier, wherein the digital network circuit section further comprises a crossover sub-circuit, wherein the crossover sub-circuit splits the received audio signal into a low frequency signal and a high frequency signal to provide an enhanced natural 360 degrees coverage;

c) a speaker dividing system wherein said output section receives an audio signal from the digital network circuit section natural 360 to delivers a surround sound, wherein the surround sound comprises at-least five discrete full range channels and a channel with low frequency effects, and wherein the at-least five discrete full range channels further comprises a left channel, a right channel, a centre channel, a left surround channel and a right surround channel;

d) an output section to output the three dimensional sound signal to a predetermined output device,

wherein the system generates an audio output with an angle coverage of

360 degrees without using powered amplifiers at output stage while covering both horizontal and vertical listening layout areas whereby facilitating evenly distributed three dimensional surround effects irrespective of the position of the listener for 360 degree listening experience with immersive surround sound effects.

[Claim 2] The system according to claim **1** wherein at-least two audio signals are provided as inputs to the high pass filter circuit section.

[Claim 3] The system according to claim **1** wherein the loudness of at-least two audio signals is equalized through the loud equalisation section.

[Claim 4] The system according to claim **1** wherein at-least two audio signals are intermingled in the digital audio mixer.

[Claim 5] The system according to claim **1** wherein said system provides an in-phase and out-of-phase audio effects.

[Claim 6] The system according to claim **1** wherein said system provides a highly synchronised three dimensional digital stereo surround sound effects on implementation with a three dimensional video playback for synchronizing sound with the actual sound source in three dimensional space and enhancing the natural sound splitting effects virtually and naturally.

[Claim 7] The system according to claim **1** wherein said system implements a buffer circuit in the conjunction with three dimensional digital stereo surround sound section working with power supply wherein said buffer circuit enhances the audio coverage and quality.

[Claim 8] The system according to claim **1** wherein said system is a device agnostic implemented with a plurality of audio input devices, and wherein the audio input devices are at-least 5.1 channel digital stereo audio devices.

[Claim 9] The system as claimed in claim **1** wherein said output section is at-least 2.1 channel speaker package system, wherein the channel speaker channel speaker package system receives an audio signal from the speaker dividing system, and the speaker package system produces three dimensional stereo surround audio signal as an output.

[Claim 10] The system as claimed in claim **1** wherein said digital network circuit section natural 360 gives output in the form of three dimensional digital stereo surround sound natural 360 with Wide surround Sound for use with headphone or earphone to produces three dimensional stereo surround sound in natural 360 degree with surround sound.

[Claim 11] The system as claimed in claim **1** and claim **10** wherein said output

section is a headphone or an earphone.

[Claim 12] The system as claimed in claim **11** wherein the output signal produced by said system in conjunction with the headphone produces a left, a right, a virtual centre, a virtual left middle, a virtual right middle, rear right and rear left audio effects while producing a high quality soothing audio effects without causing discomfort to the ears.

[Claim 13] The system as claimed in claim **1** wherein upon re-recording with a camcorder, the media content having 3 dimensional digital stereo surround sound output, the output video has unrecognizable audio whereby providing an antipiracy mechanism.

[Claim 14] The system as claimed in claim **13** wherein said media content is motion picture.

[Claim 15] The system as claimed in claim **1** wherein the output audio signal is synchronized with actual sound source in three dimensional space whereby providing enhanced natural sound splitting effects virtually and naturally in videos playback.

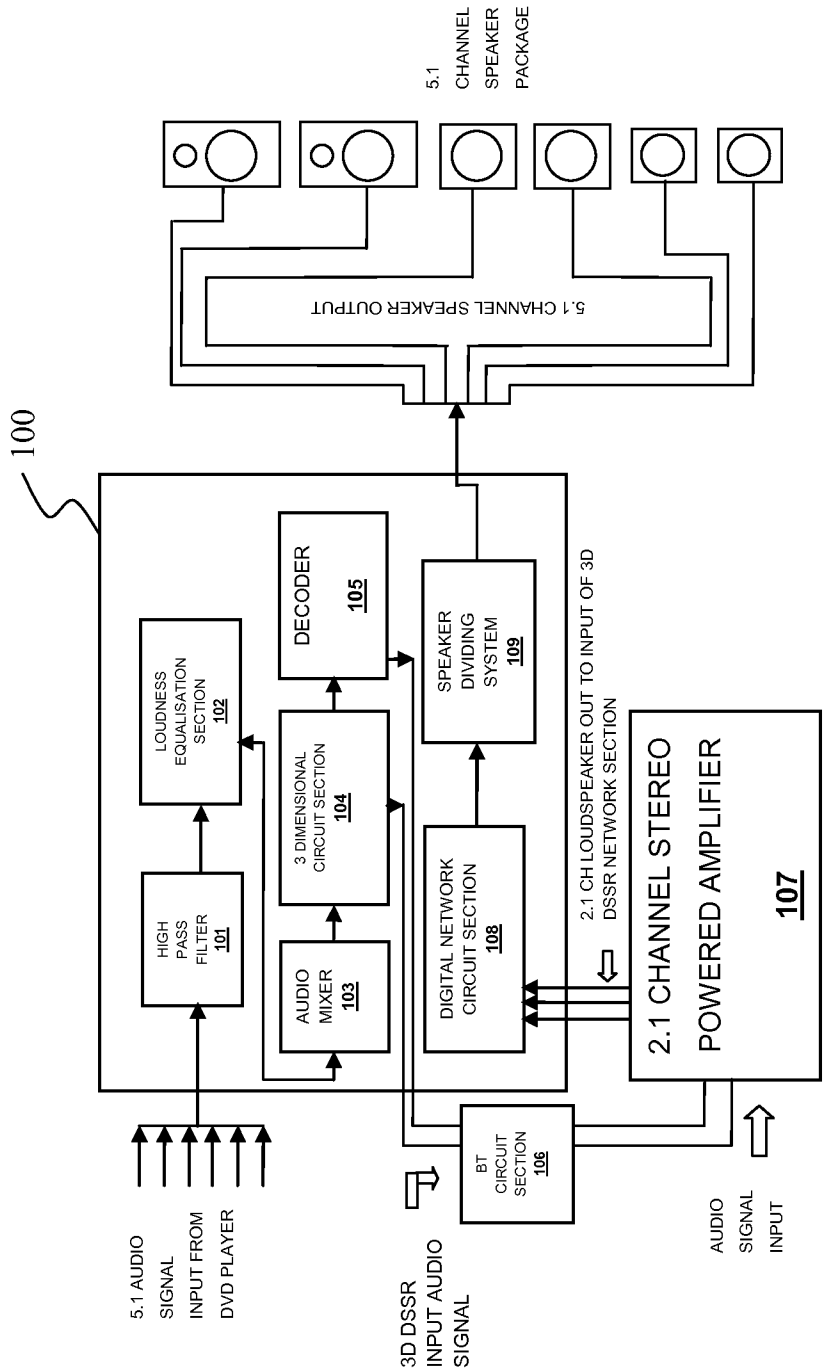
100
5.1 CHANNEL SPEAKER PACKAGE
5.1 CHANNEL SPEAKER OUTPUT
LOUDNESS EQUALISATION SECTION 102
HIGH PASS FILTER 101
DECODER 105
3 DIMENSIONAL CIRCUIT SECTION 104
AUDIO MIXER 103
SPEAKER DIVIDING SYSTEM 109
DIGITAL NETWORK CIRCUIT SECTION 108
2.1 CH LOUDSPEAKER OUT TO INPUT OF 3D DSSR NETWORK SECTION
2.1 CHANNEL STEREO POWERED AMPLIFIER 107
BT CIRCUIT SECTION 106
5.1 AUDIO SIGNAL INPUT FROM DVD PLAYER
3D DSSR INPUT AUDIO SIGNAL
AUDIO SIGNAL INPUT

FIG 1

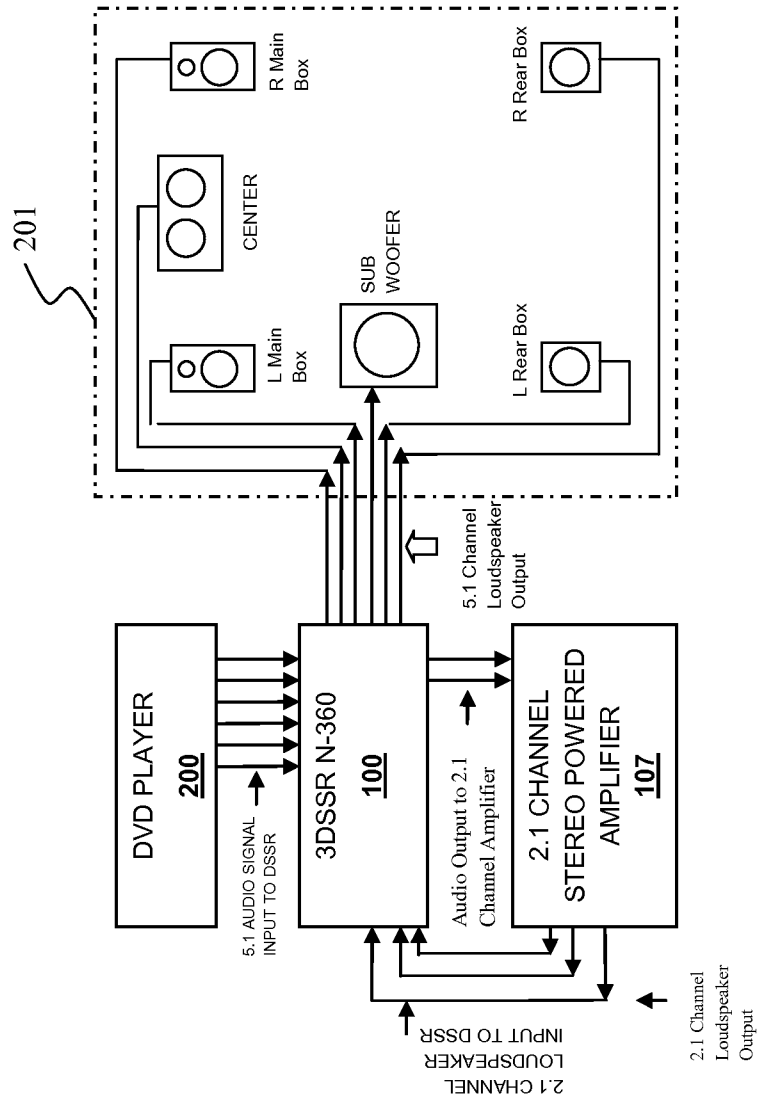
201
R Main Box
R Rear Box
CENTER
SUB WOOFER
L Main Box
L Rear Box
5.1 Channel Loudspeaker Output
DVD PLAYER 200
3DSSR N-360 100
2.1 CHANNEL STEREO POWERED AMPLIFIER 107
5.1 AUDIO SIGNAL INPUT TO DSSR
Audio Output to 2.1 Channel Amplifier
2.1 CHANNEL LOUDSPEAKER INPUT TO DSSR
2.1 Channel Loudspeaker Output

FIG 2

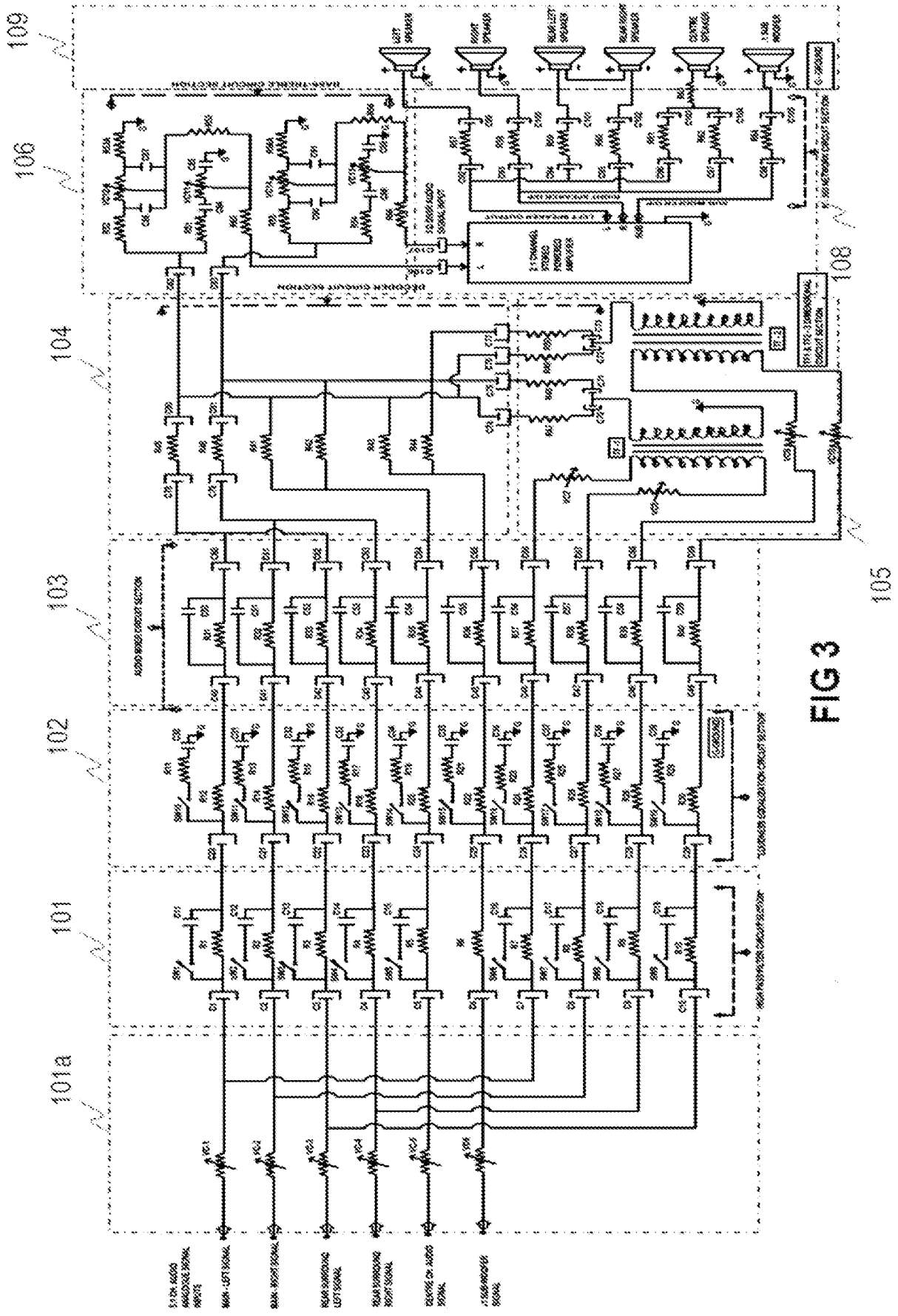

FIG 3

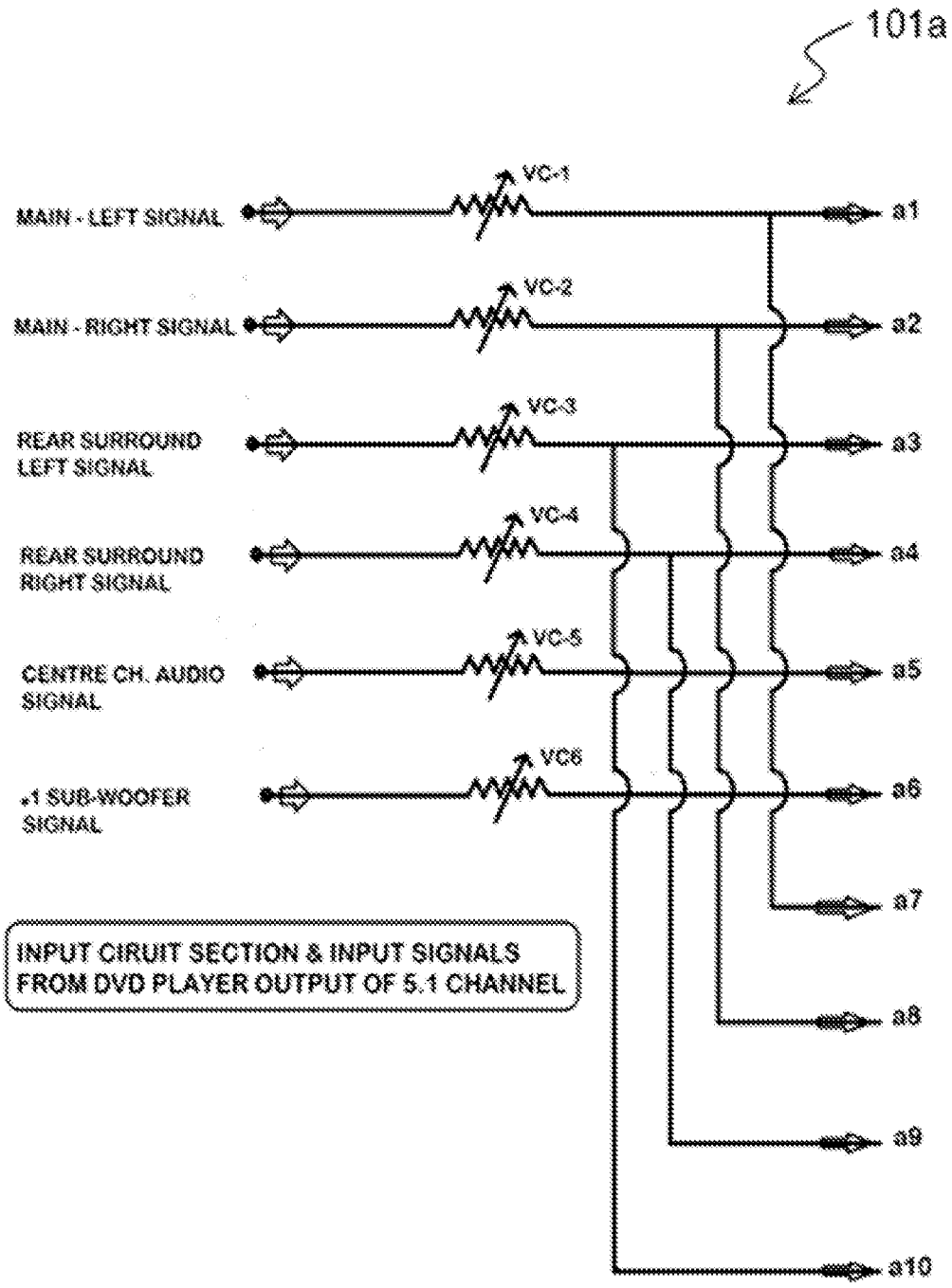
101a
MAIN - LEFT SIGNAL
VC-1
a1
MAIN - RIGHT SIGNAL
VC-2
a2
REAR SURROUND LEFT SIGNAL
VC-3
a3
REAR SURROUND RIGHT SIGNAL
VC-4
a4
CENTRE CH. AUDIO SIGNAL
VC-5
a5
.1 SUB-WOOFER SIGNAL
VC6
a6
a7
a8
a9
a10
INPUT CIRUIT SECTION & INPUT SIGNALS FROM DVD PLAYER OUTPUT OF 5.1 CHANNEL

FIG 3a

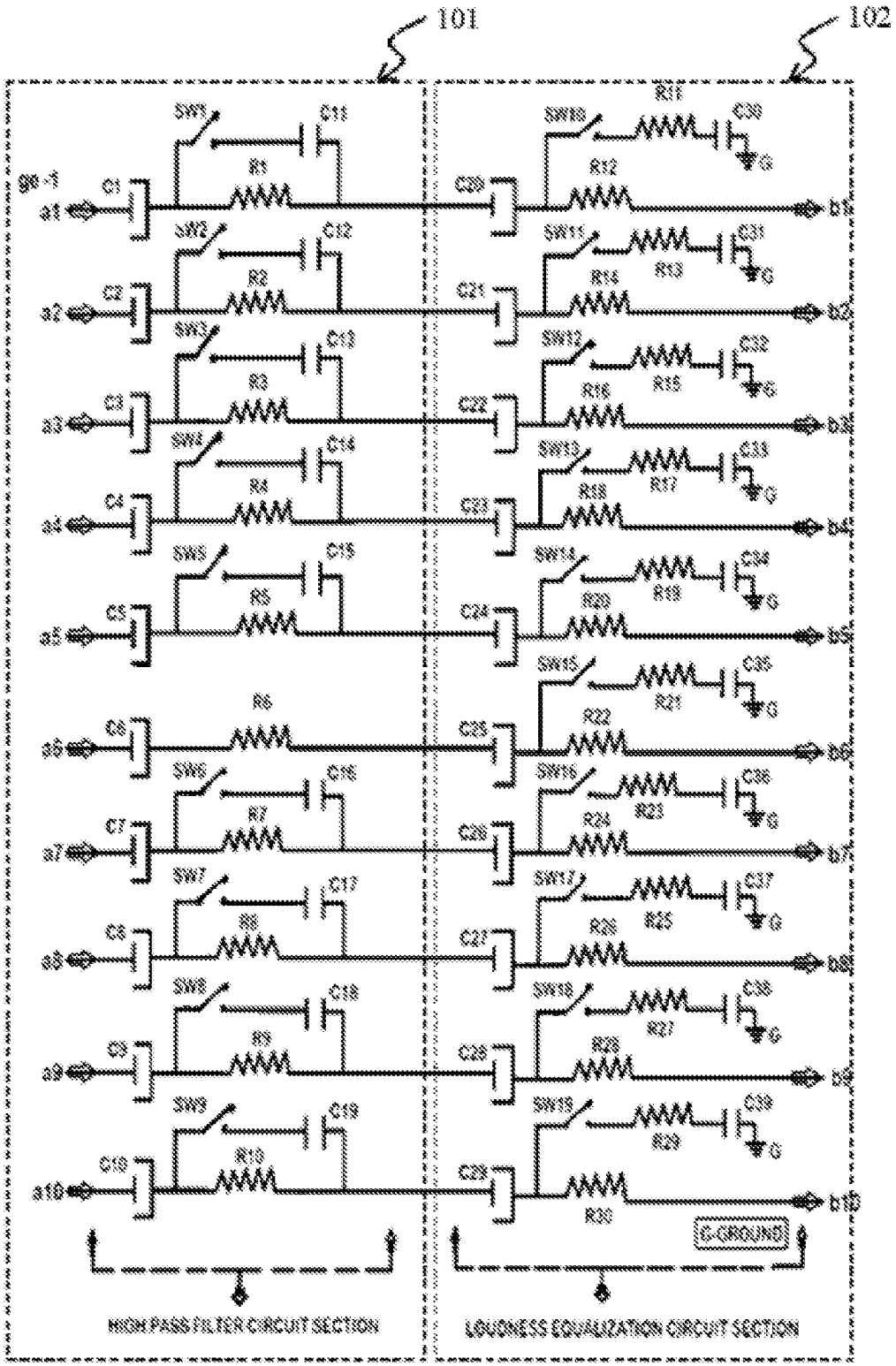
101
102
HIGH PASS FILTER CIRCUIT SECTION
LOUDNESS EQUALIZATION CIRCUIT SECTION
G-GROUND

FIG 3b

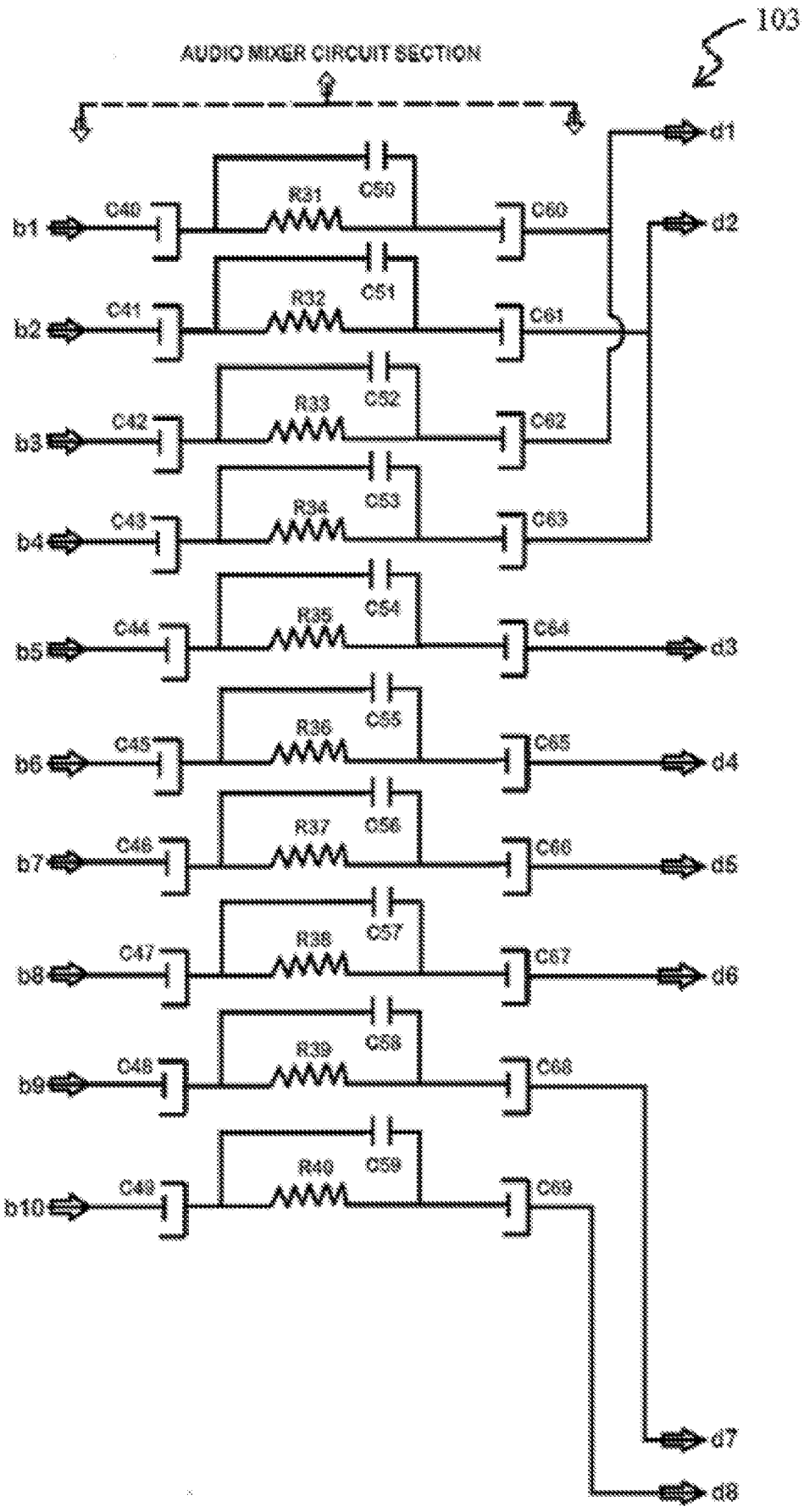
103
AUDIO MIXER CIRCUIT SECTION
b1
b2
b3
b4
b5
b6
b7
b8
b9
b10
C40
C41
C42
C43
C44
C45
C46
C47
C48
C49
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
C50
C51
C52
C53
C54
C55
C56
C57
C58
C59
C60
C61
C62
C63
C64
C65
C66
C67
C68
C69
d1
d2
d3
d4
d5
d6
d7
d8

FIG 3c

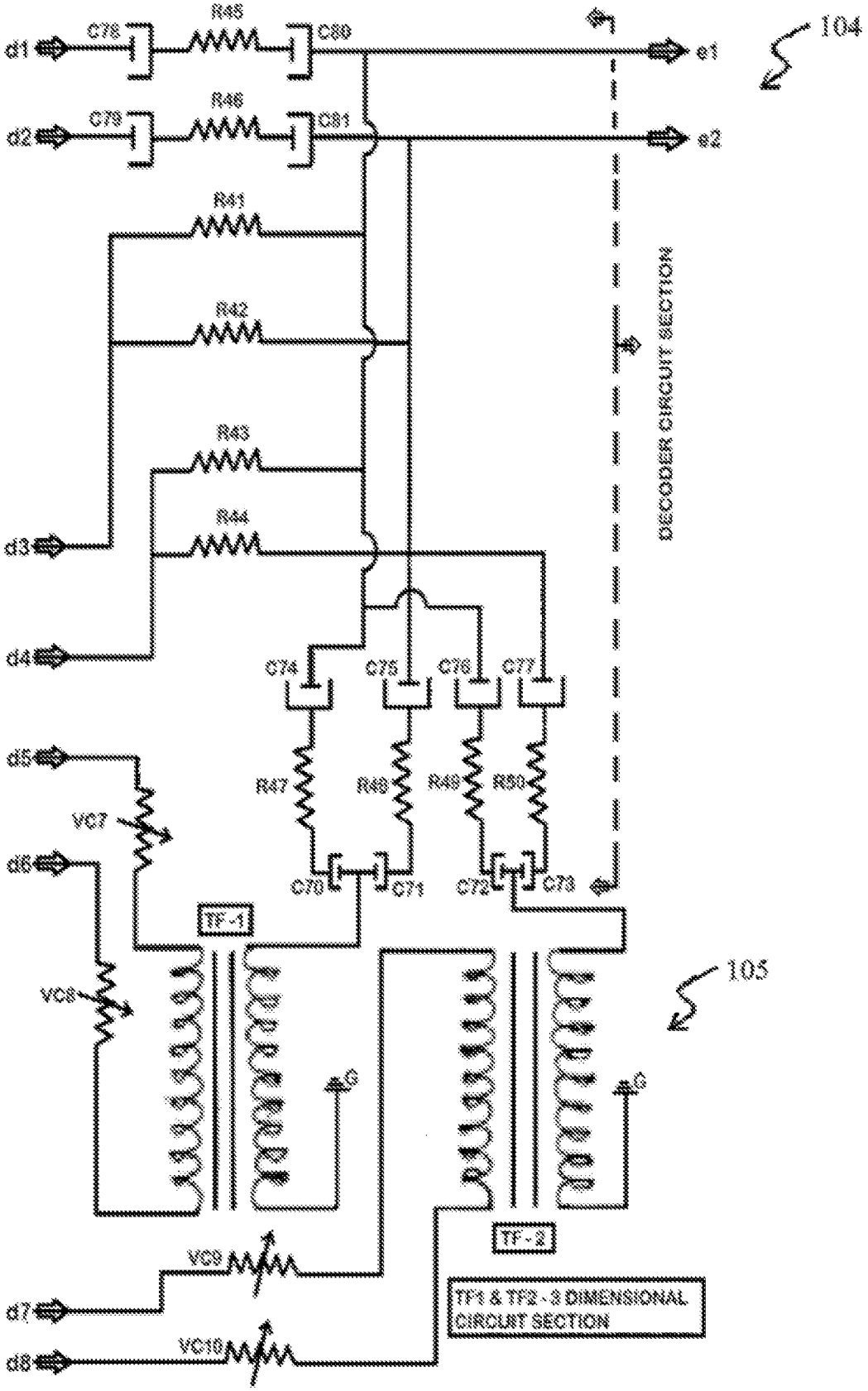
104
d1
C78
R45
C80
e1
d2
C79
R46
C81
e2
R41
R42
R43
R44
d3
d4
DECODER CIRCUIT SECTION
C74
C75
C76
C77
d5
R47
R48
R49
R50
VC7
d6
C70
C71
C72
C73
TF -1
105
VC8
VC9
d7
VC10
d8
TF - 2
TF1 & TF2 - 3 DIMENSIONAL CIRCUIT SECTION

FIG 3d

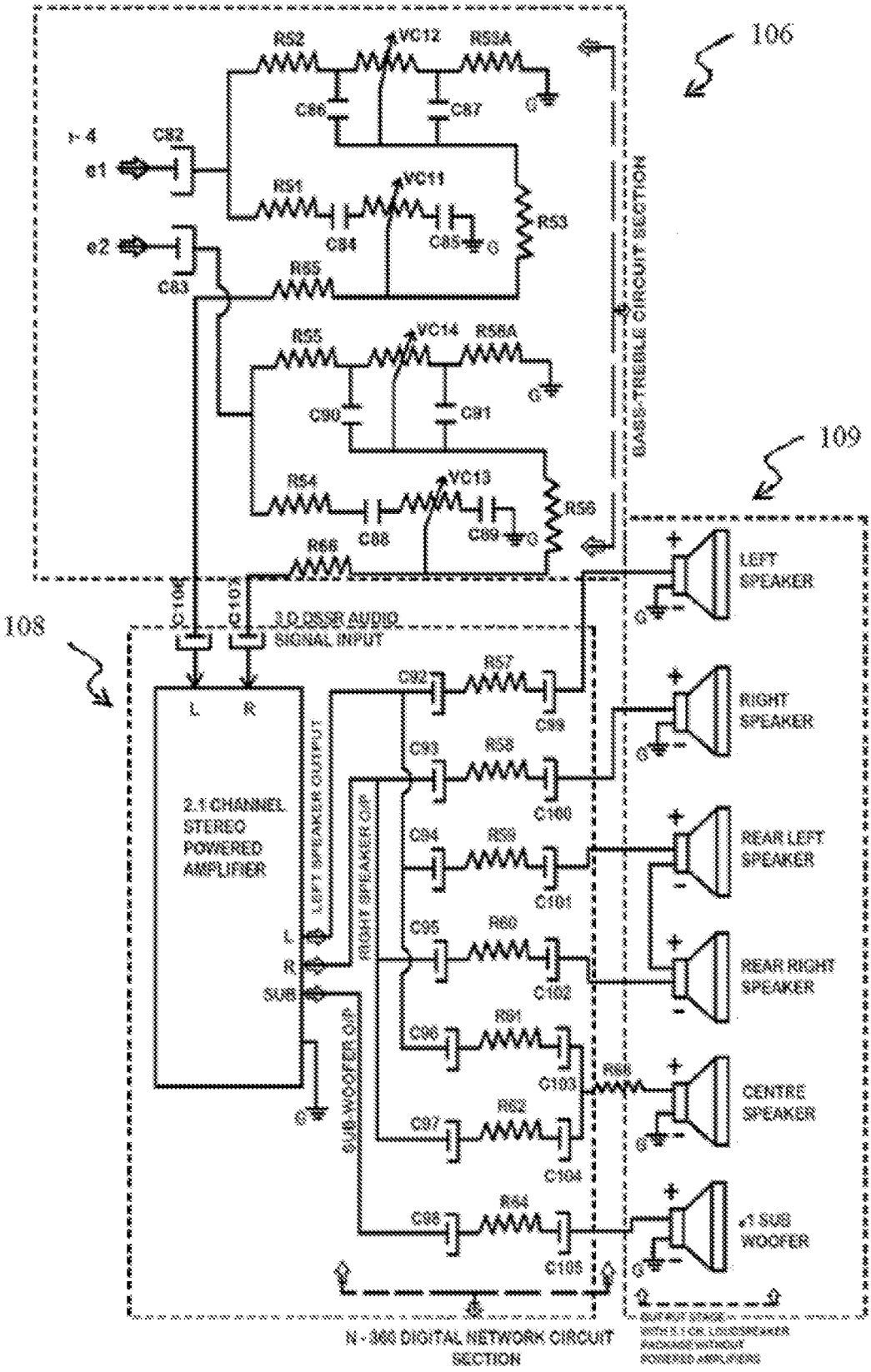
106
109
108
BASS-TREBLE CIRCUIT SECTION
3.0 DESK AUDIO SIGNAL INPUT
2.1 CHANNEL STEREO POWERED AMPLIFIER
LEFT SPEAKER O/P
RIGHT SPEAKER O/P
SUB-WOOFER O/P
LEFT SPEAKER
RIGHT SPEAKER
REAR LEFT SPEAKER
REAR RIGHT SPEAKER
CENTRE SPEAKER
x1 SUB WOOFER
N - 300 DIGITAL NETWORK CIRCUIT SECTION

FIG 3e

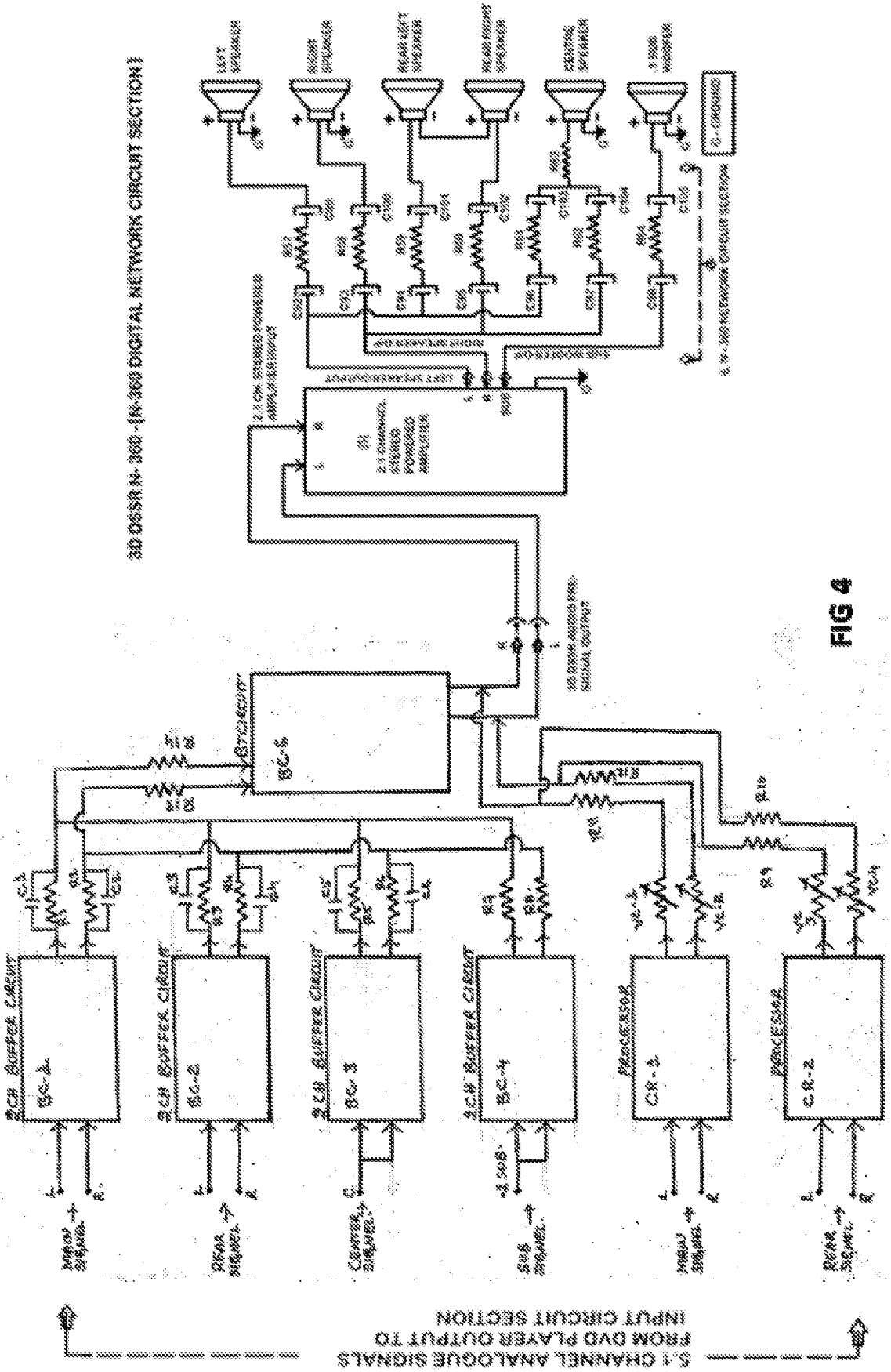

FIG 4

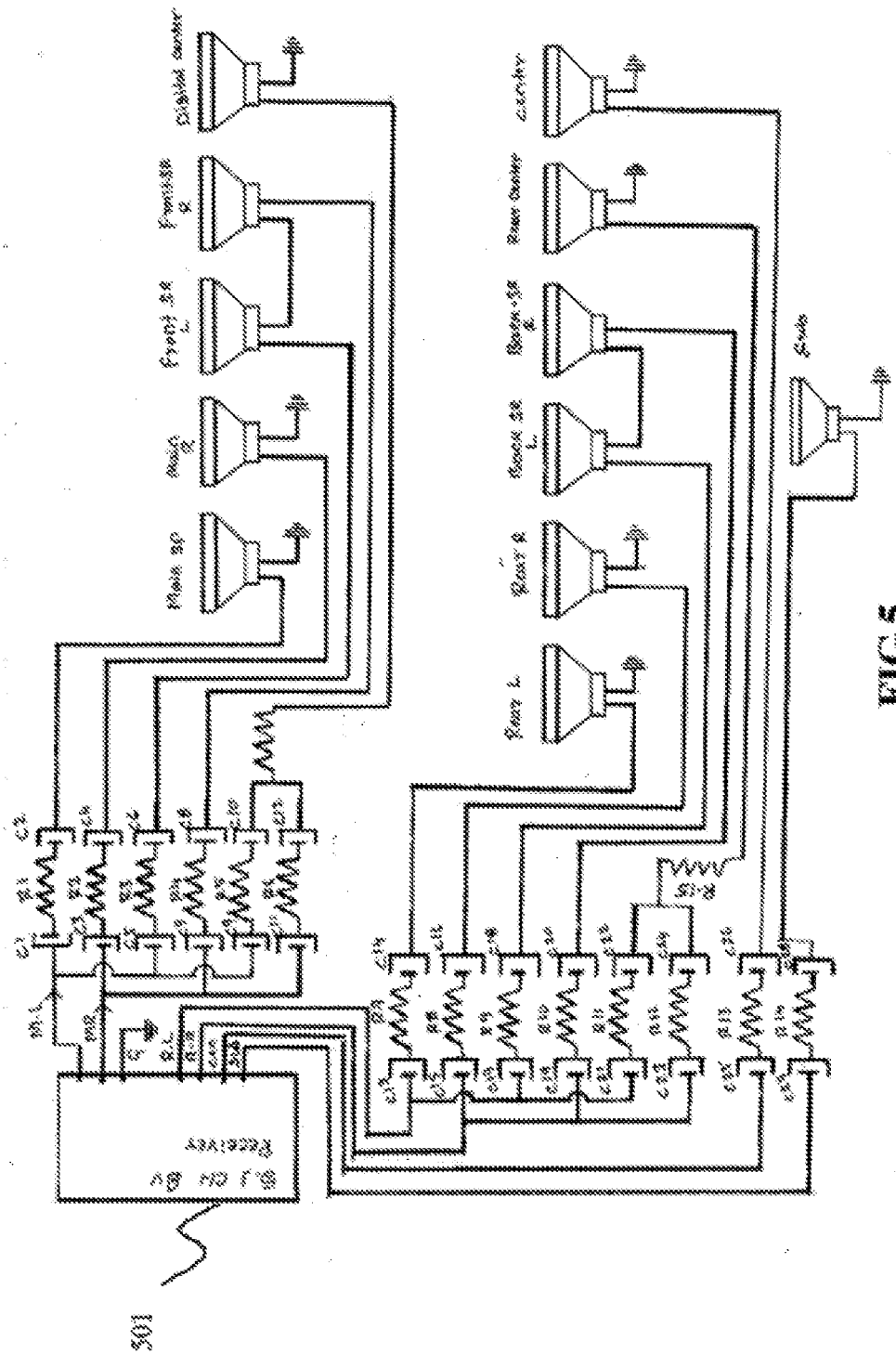

FIG 5

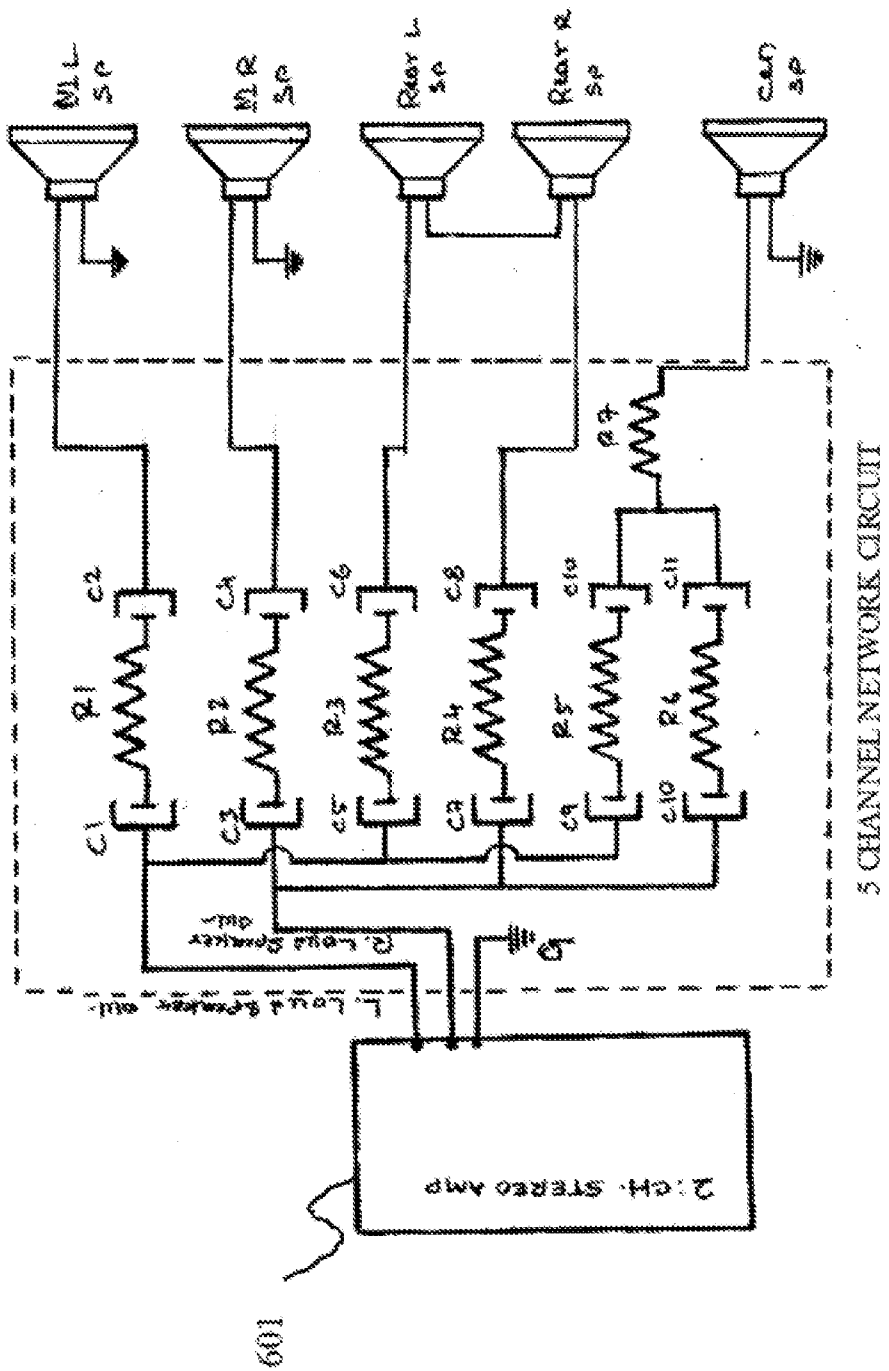

FIG 6

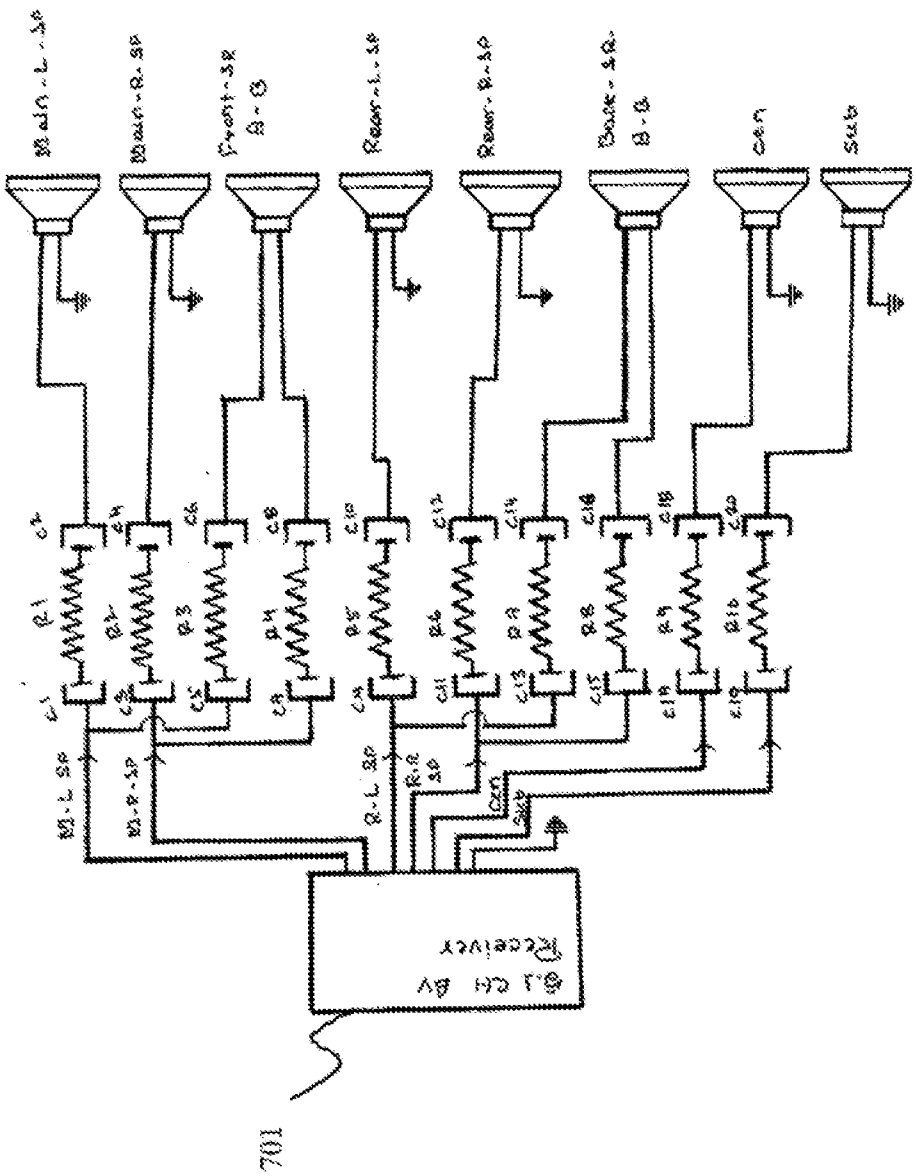
Main-L-Sp
Main-R-Sp
Front-Sp
R-C
Rear-L-Sp
Rear-R-Sp
Back-Sp
R-C
Cen
Sub
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
L-L Sp
R-R Sp
L-R Sp
R-L Sp
R-C Sp
Cen Sub
5.1 CH 8V
Receiver
701

FIG 7

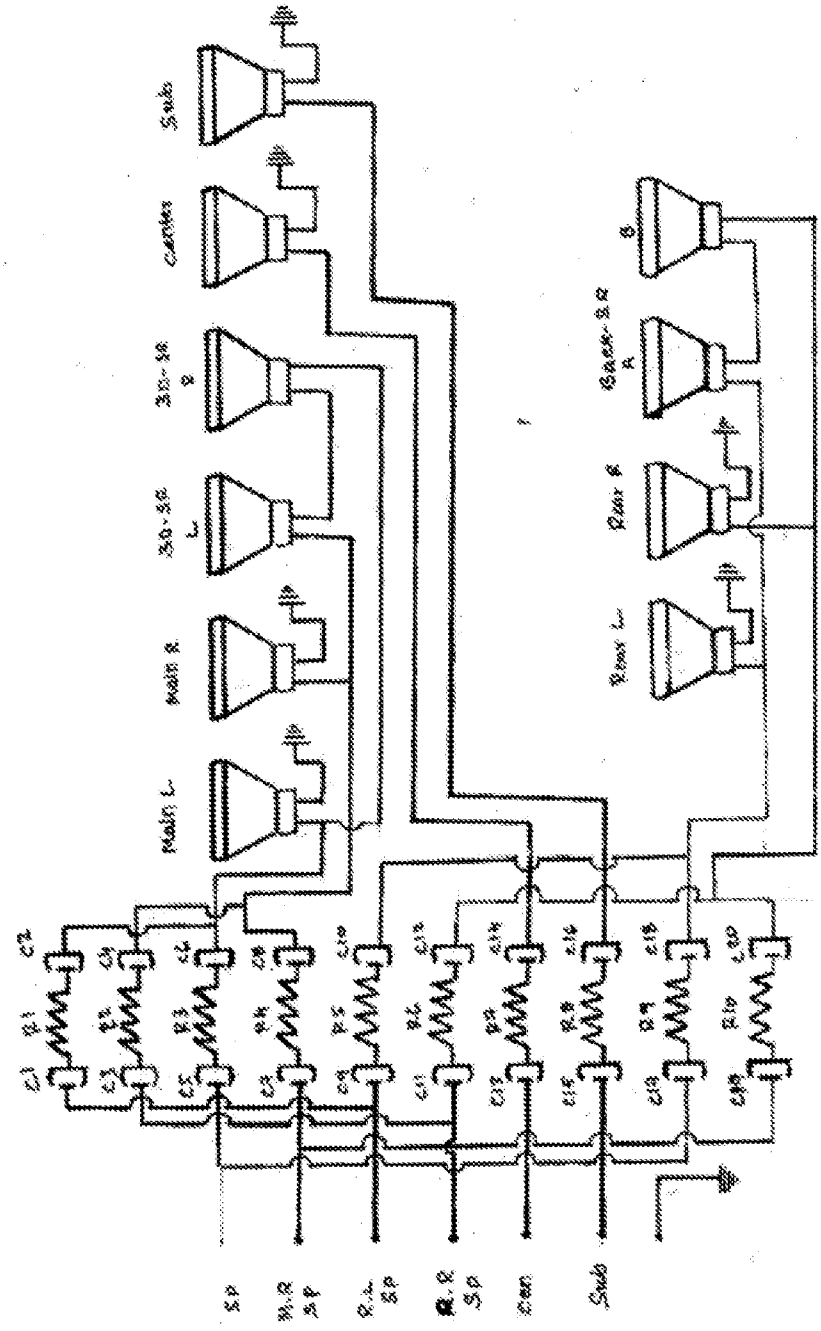

FIG 8

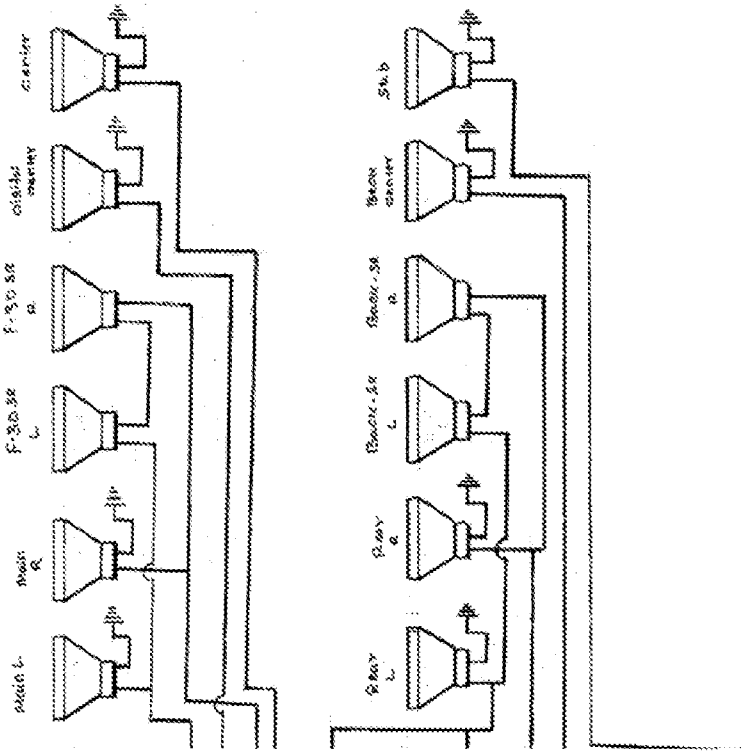

FIG 10

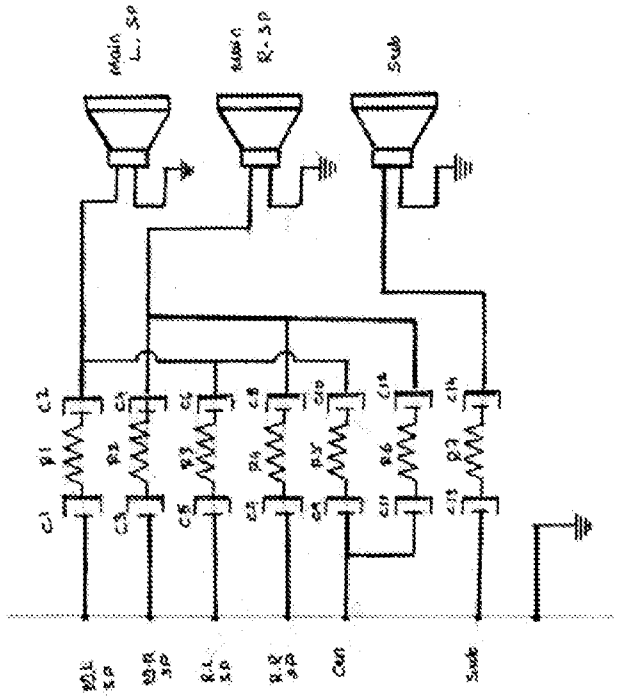

FIG 9

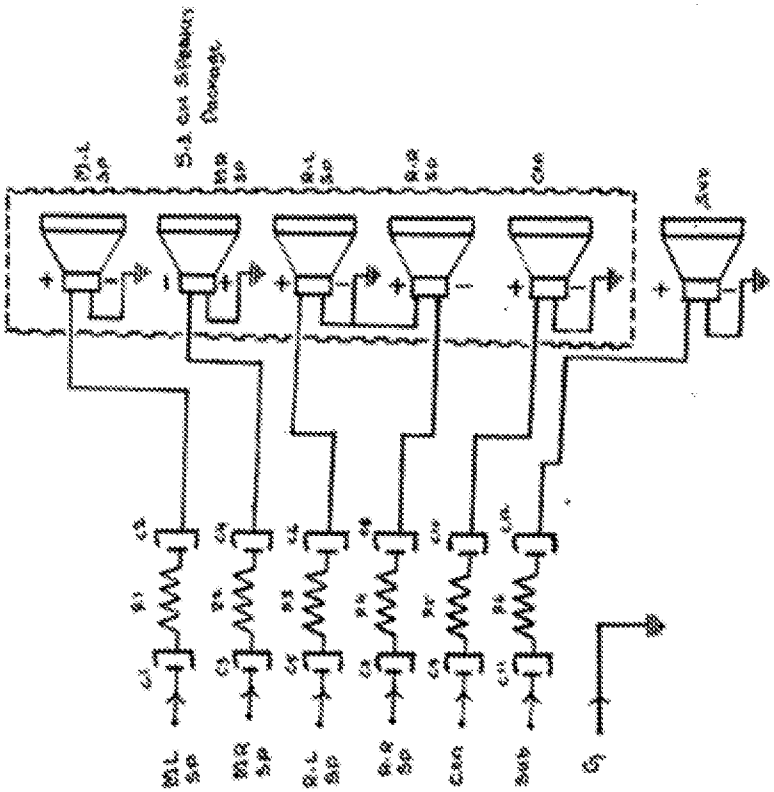

FIG 12

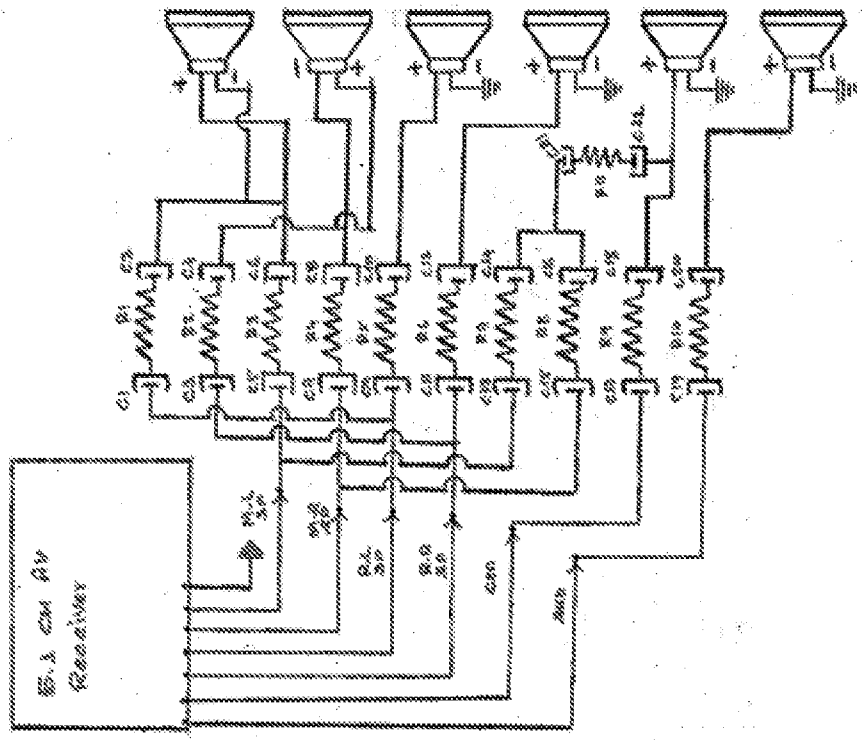

FIG 11

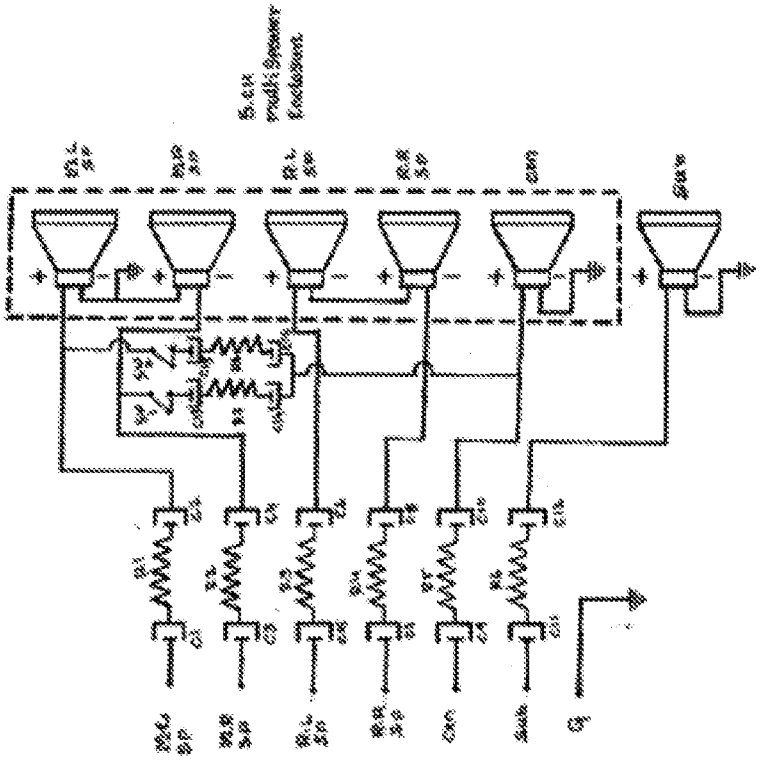

FIG 14

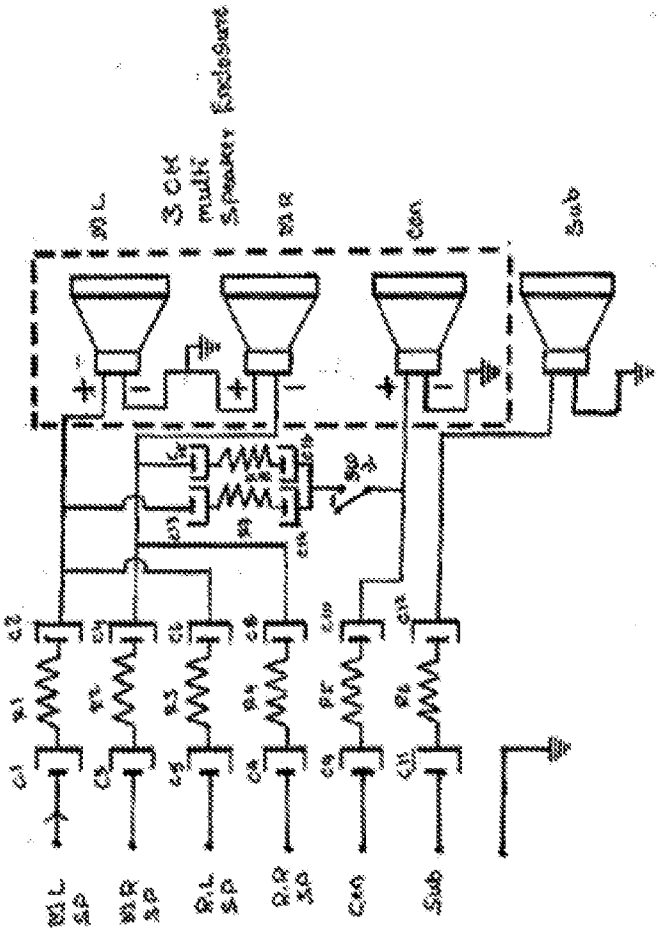

FIG 13

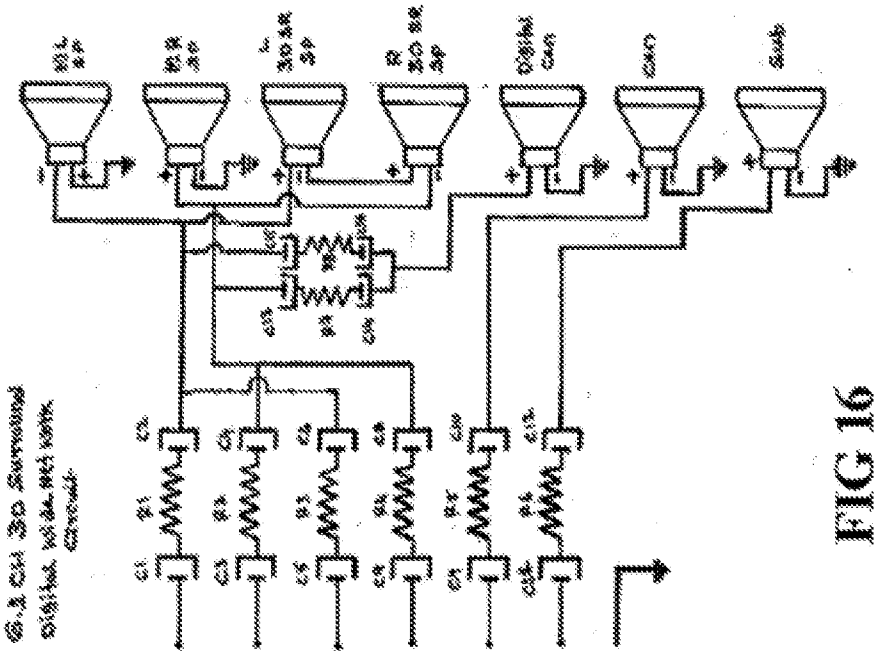

FIG 16

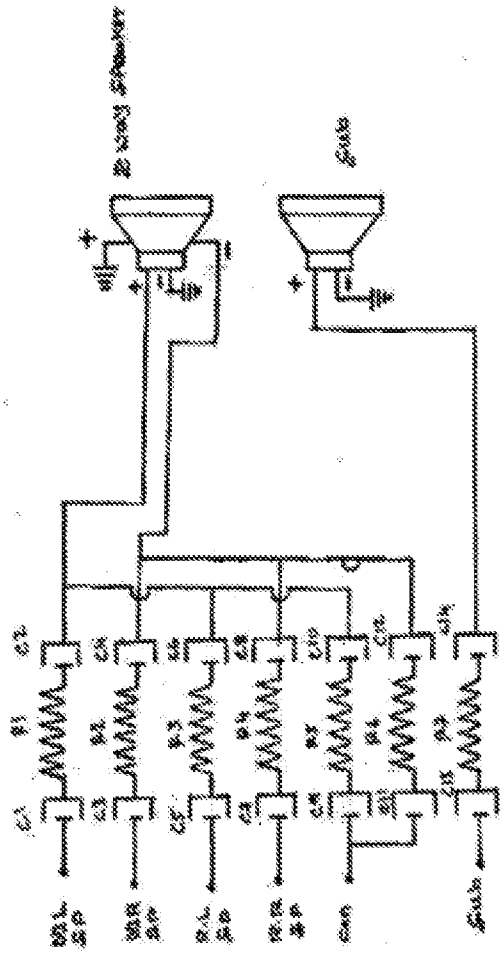

FIG 15

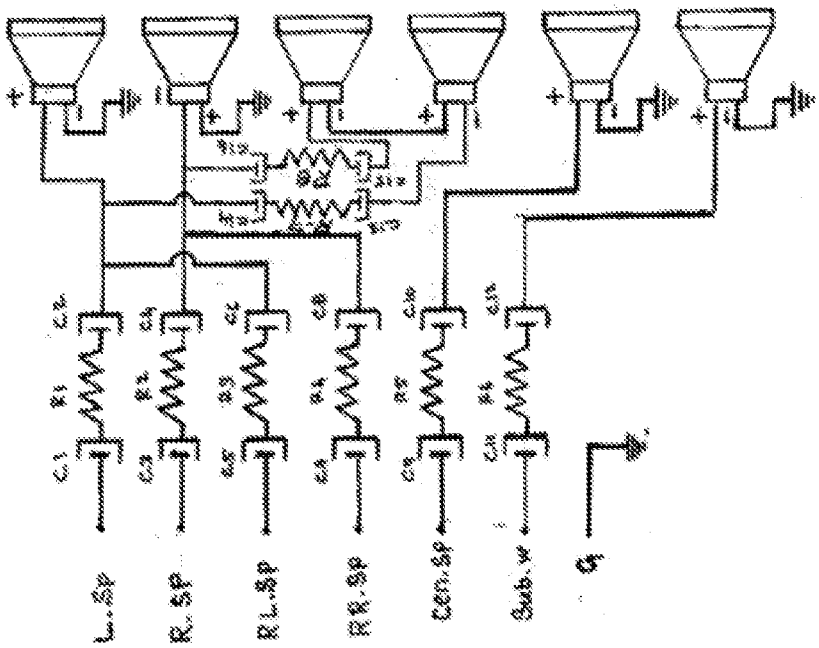

FIG 18

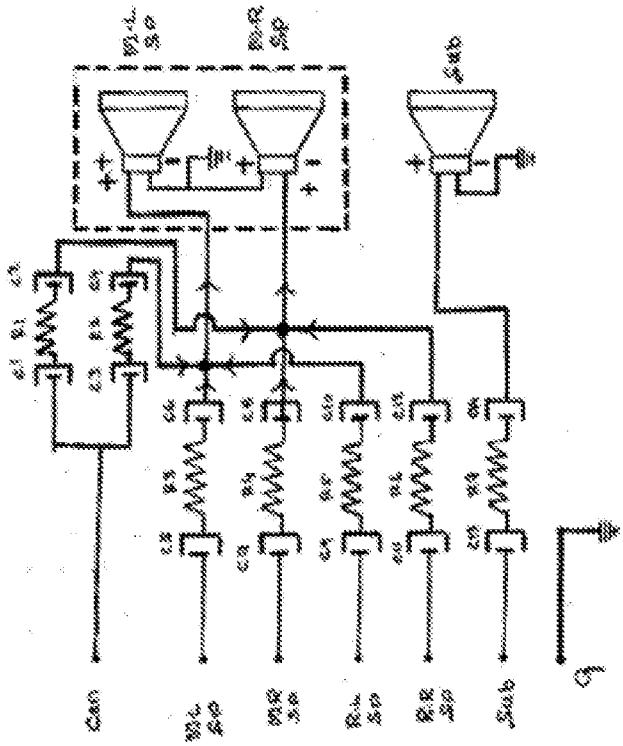

FIG 17

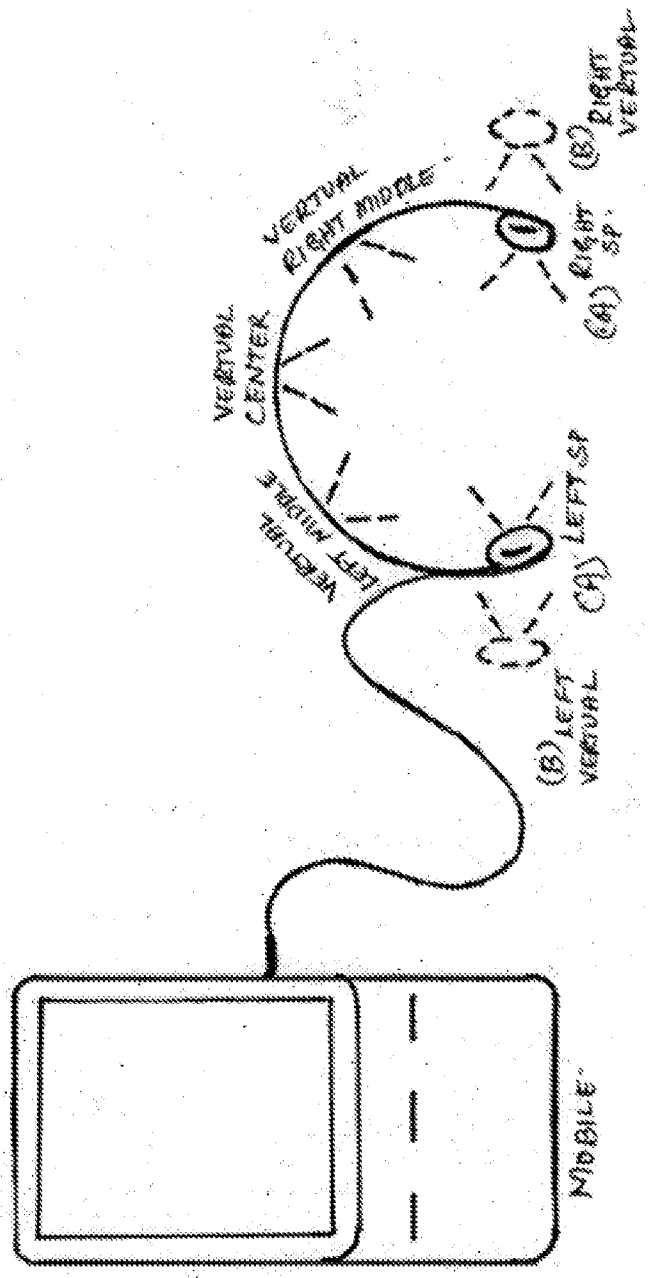
VERTICAL CENTER
VERTICAL RIGHT MIDDLE
VERTICAL LEFT MIDDLE
(A) RIGHT SP.
(B) RIGHT VERTUAL
(A) LEFT SP
(B) LEFT VERTUAL
MIDDLE

FIG 19

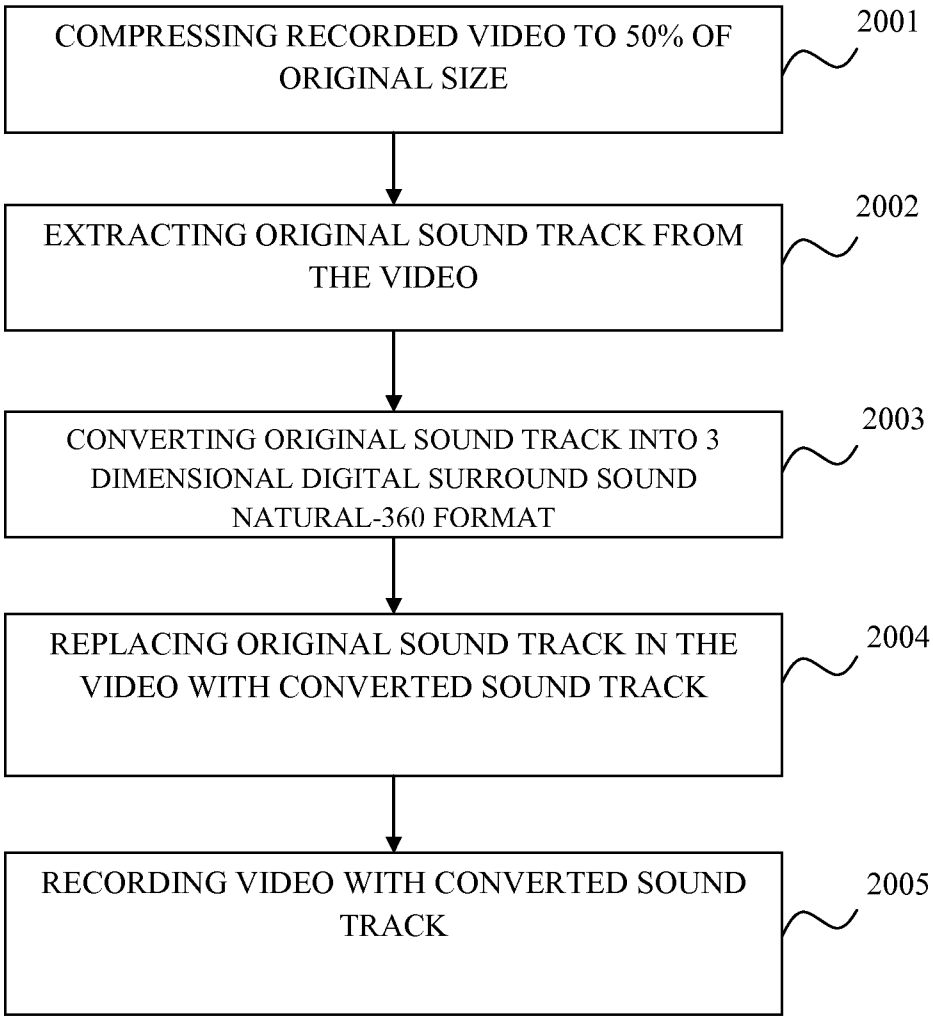
COMPRESSING RECORDED VIDEO TO 50% OF ORIGINAL SIZE
2001
EXTRACTING ORIGINAL SOUND TRACK FROM THE VIDEO
2002
CONVERTING ORIGINAL SOUND TRACK INTO 3 DIMENSIONAL DIGITAL SURROUND SOUND NATURAL-360 FORMAT
2003
REPLACING ORIGINAL SOUND TRACK IN THE VIDEO WITH CONVERTED SOUND TRACK
2004
RECORDING VIDEO WITH CONVERTED SOUND TRACK
2005

FIG 20