

Description

The invention relates to a system for asymmetrical signal transmission from a pair of transmission devices through a pair of signal paths each having at least one signal line and one reference line to a pair of receiver devices, two devices of which have a supply reference potential in common and are coupled to one end of each of the two signal paths, and the other two devices of which have a further supply reference potential in common and are coupled to the other end of each of the two signal paths. The invention also relates to a transmission and receiver device for use in such a system.

The said system may be realised when inter-connecting electronic devices — such as, for example, a TV receiver to peripheral equipment (e.g. a video recorder, a video disc player, a TV monitor, etc.) — in accordance with the European standard ratified on 7 July 1982 and published by the European Committee for Electro-technical Standardization (CENELEC) in the report EN 50049 "Domestic or similar electronic equipment inter-connection requirements: peritelevision connector", of December 1983. The plugs and sockets as defined by this standard enable the use of signal paths separated as to signal type. In addition a sufficient number of connections is reserved for audio and video signals to realise asymmetrical two-traffic along the audio and video signal paths. The transmission cross-talk can thereby be reduced to a minimum. In addition the asymmetrical transmission limits the number of lines per signal path: thus, for n signals only $(n+1)$ lines are required per signal path (n signal lines and one common reference line), whereas $2n$ lines are always required in the case of a balanced signal transmission.

In practice it often occurs that several transmission and/or receiver devices are accommodated in one apparatus. Thus the audio and video demodulator circuits of a TV receiver may apply audio and video signals to, for example, a TV monitor and consequently function as transmission devices. Conversely, for example, a video recorder or video disc player may apply audio and video signals to the audio and video processing and reproducing devices of a TV receiver, which devices thus function as receiver devices.

For practical reasons the several devices of one apparatus are connected to one common supply reference potential. When interconnecting two such apparatuses, a parallel arrangement of the reference lines of two or more different signal paths is, however, brought about in each apparatus through the connections to the supply reference potentials. As a result of this parallel arrangement, part of one signal (for example, the video signal) may pass from one (video) signal path into the other signal path (for example, the audio signal path) and vice versa, and may give rise to cross-talk components across the impedance of the relevant lines, hereinafter referred to as line impedance, thereby causing the desired signal to be disturbed.

The preliminary publication "Differential technology in recording consoles and the impact of transformerless circuitry on grounding technique" by Thomas M. Hay, presented at the 68th AES Convention in Hamburg on 17-20 March 1981, particularly in Figures 10-18, shows circuits for suppressing 50/60 Hz supply hum which may be induced in a signal path from transmission to receiver device.

It is an object of the invention to obviate the cross-talk between two distinctly desired signals, which cross-talk is caused by the aforementioned parallel arrangement of the reference lines of two asymmetrical signal paths.

According to the invention a system of the type described in the opening paragraph is characterized in that a differential stage is disposed in at least one of the said devices for common mode suppression between a pair of input terminals and a pair of output terminals, said differential stage, if disposed in one of said transmission devices, having one end connected through a signal terminal of the pair of input terminals to a signal source and through a reference terminal to one of the two supply reference potentials, and having the other end connected through a signal terminal of the pair of output terminals to the signal line and through a reference terminal to the reference line of one of the two signal paths, or, if disposed in one of said receiver devices, having one end connected through the input signal terminal to the signal line and through the input reference terminal to the reference line of one of the two signal paths, and having the other end connected through the output signal terminal to a signal processing device and through the output reference terminal to one of the two supply reference potentials.

The invention is based on the recognition of the fact that the cross-talk components — in the same way as the induced hum in the aforementioned known hum suppression circuits — occur in common mode and that the desired signal occurs in differential mode on the signal and reference lines of a signal path.

When using the system according to the invention the differential stage blocks the passage of the common mode cross-talk components at the input or output of a signal path and is only transparent to the desired differential mode signals. The said parallel arrangement is thus interrupted for these common mode cross-talk components, whilst a multiple asymmetrical signal generation or processing of different signals by means of only one common supply reference potential per apparatus need not be modified.

A preferred embodiment of a system of this type in which audio and video signals are generated, transmitted and received, is characterized in that the differential stage is disposed in the audio transmission or audio receiver device, thus imposing only slight requirements on the bandwidth of the differential stage.

A system of this type may be rendered suitable for transmitting first and second audio signals by disposing a further signal line in the audio signal path.

A transmission device for use in the latter system is characterized by a further differential stage whose input reference terminal, together with that of the first-mentioned differential stage, is connected to the same supply reference potential and whose input signal terminal is connected to a further audio signal source, an output reference terminal, together with that of the first-mentioned differential stage, being connected to the same reference line and an output signal terminal being connected to the further signal terminal.

In this device each differential stage is preferably provided with a transistor pair in long-tail configuration, with one of the base electrodes of each transistor pair being connected for alternating current to the relevant supply reference potential so as to obtain an asymmetrical signal input.

A receiver device for use in the latter system is characterized by a further differential stage having an input reference terminal together with that of the first-mentioned differential stage connected to the same audio reference line, and having an input signal terminal coupled to the further audio signal line, an output reference terminal, together with that of the first-mentioned differential stage, being coupled to the same supply reference potential and an output signal terminal being coupled to a further audio signal processing device.

In this device each differential stage is preferably provided with an operational differential amplifier having an asymmetrical signal output.

The invention will further be described with reference to the Figures shown in the drawings.

In the drawings

Fig. 1 shows a system comprising an audio transmission device according to the invention;

Fig. 2 shows a system comprising an audio receiver device according to the invention;

Fig. 3 shows a system according to the invention constituted by interconnection of a stereophonic TV receiver provided with the devices shown in the previous Figures, including a peripheral apparatus, for example, a video recorder.

Fig. 1 shows a system for asymmetrical transmission of audio and video signals from audio and video transmission devices AT and VT, respectively, incorporated in one apparatus T — such as, for example, a TV receiver, a video recorder, a video disc player, a home computer, etc. — through audio and video signal paths (ASL, ARL) and (VSL, VRL), respectively, to audio and video receiver devices AR' and VR, respectively, likewise incorporated in one apparatus R such as, for example, a TV monitor or one of the aforementioned apparatuses. The audio and video transmission devices AT and VT are connected to one common supply reference potential G1 of the apparatus T. The audio and video receiver devices AR' and VR are connected to one common further supply reference potential G2 of

the apparatus R. The video signal path comprises a video signal line VSL through which video signals from the video transmission device VT are applied to the video receiver device VR, and a video reference line VRL which interconnects the two supply reference potentials G1 and G2. The video signals supplied from the video receiver device VR to the supply reference potential G2 return through the video reference line VRL to the video transmission device VT. Correspondingly, the audio signal path comprises an audio signal line ASL through which audio signals are applied from the audio transmission device AT to the audio receiver device AR', and an audio reference line ARL coupled to the supply reference potential G2; through which audio reference line the audio signals supplied from the audio receiver device AR' to the last-mentioned supply reference potential G2 return to the audio transmission device AT. In practice, the said lines have a certain finite, distributed line impedance.

In conventional systems the audio reference line ARL in the apparatus T would also be connected to the supply reference potential G1 and is thereby arranged in parallel with the video reference line VRL. As a result the video signal in such conventional systems may partly return through the audio reference line ARL, and a part of the audio signal may return through the video reference line VRL to the video and audio transmission devices VT and AT, respectively. As a result a signal mixing or cross-talk is caused across the line impedances in the two signal paths (VSL, VRL) and (ASL, ARL).

In the embodiment shown the audio transmission device AT includes a differential stage DS interrupting the said unwanted parallel arrangement. The differential stage DS is provided with a pair of input terminals IS, IR, one of which — hereinafter referred to as the input signal terminal IS — is coupled through a source resistor to an audio source A and the other of which — hereinafter referred to as the input reference terminal IR — is coupled to the supply reference potential G1. Consequently, an asymmetrical design of the audio source A remains possible. The differential stage DS is provided with a pair of output terminals OS, OR to which the difference between the signals applied to the pair of input terminals, that is to say, the audio signal to be transmitted, appears in amplified or unamplified form. One of the two terminals of the pair of output terminals — hereinafter referred to as the output signal terminal OS — is coupled to the audio signal line ASL. The other terminal — hereinafter referred to as the output reference terminal OR — is coupled to the audio reference line ARL.

For differential mode signals the differential stage DS has an output impedance which is very low relative to common mode signals. For common mode signals the differential stage DS has a comparatively high output impedance, notably relative to the line impedance. The differential stage DS thus closes the audio loop which is constituted by the audio signal line ASL, the input

impedance of the audio receiver device AR' and the audio reference line ARL. This audio loop is connected at only one point, namely at the connection point to the further supply reference potential G2, to the video loop constituted across the video transmission device VT, the video signal line VSL, the input impedance of the video receiver device VR and the video reference line VRL. A mutual signal mixing or cross-talk is thereby excluded or at least greatly reduced.

Fig. 2 shows a further embodiment of a system according to the invention in which elements having the same function as the elements in Fig. 1 have the same reference indications. Unlike the embodiment described above the audio signal to be transmitted in this system is supplied from the asymmetrical audio source A of an audio transmission device AT' — which together with the audio reference line ARL is connected to the first supply reference potential G1 — to an audio receiver device AR incorporating a differential stage DS'. This differential stage DS' shows at its pair of input terminals IS', IR' a comparatively high impedance for common mode input signals, relative to the line impedance.

Since the pair of input terminals IS', IR' is connected to the audio signal and audio reference lines ASL and ARL, the differential stage DS' closes the audio loop which is also constituted by the last-mentioned lines and the audio transmission device AT'. This loop is coupled at only one point, namely at the point of connection to the supply reference potential G1, to the video loop so that also in this case a signal mixing or cross-talk is excluded or at least greatly reduced.

To realise asymmetrical signal processing in the apparatus R, the differential stage DS' is provided with an asymmetrical pair of output terminals OS', OR' one of which — hereinafter referred to as the output reference terminal OR' — is connected to the further supply reference potential G2 and the other of which — hereinafter referred to as the output signal terminal OS' — is connected to an asymmetrical input of a signal processing device of the audio receiver device AR.

It stands to reason that the systems shown are also realised when the devices are incorporated at one end of the signal paths in different, separate apparatuses connected to one common supply reference potential, that the use of the invention is also possible when a transmission and a receiver device are mutually connected to one common supply reference potential at each of the two ends, and that a combination of the embodiments shown in the Figures 1 and 2 is possible, as well as the use of a differential stage in the video loop.

Fig. 3 shows a coupling in accordance with the aforementioned European standard between a video transmission device VT, a stereophonic audio transmission device AT and a stereophonic audio receiver device AR, which are connected to the supply reference potential G1 and may occur in one apparatus T, for example, a stereophonic TV receiver. A video receiver device VR, a

stereophonic audio receiver device, AR' and a stereophonic audio transmission device AT' are connected to one common further supply reference potential G2 and may both occur in one peripheral apparatus R, for example, a stereophonic video recorder.

The said stereophonic audio transmission device AT' may comprise asymmetrical output circuits of a stereo decoder functioning as left and right stereo signal sources L and R, whilst the stereophonic audio receiver device AR' may comprise asymmetrical left and right stereo signal processing and reproducing circuits APL and APR.

In order to realise a broad-band separation between the video loop and the audio loop, differential stages are to be incorporated not only for the two audio signals, i.e. for both the left and right stereo signals, but also for the two directions, that is to say, both in the audio path from T to R and vice versa. For practical reasons it is preferable to accommodate these differential stages in one apparatus, for example, as shown in the apparatus T.

In the audio transmission device AT of the apparatus T the left and right differential stages DSL and DSR are thus connected to the outputs of the left and right stereo signal sources L and R, respectively, and in the audio receiver device AR the left and right differential stages DSL' and DSR' are connected to the inputs of the left and right stereo signal processing and reproducing circuits APL and APR, respectively. Each of the two differential stages DSL and DSR includes emitter-coupled transistor pairs (T_1, T_2) and (T_3, T_4), respectively, having a current source in the emitter tail coupled to the first supply reference potential G1, and collector resistors R_c which are coupled to a supply voltage (+) via a common high-impedance resistor R functioning as a current source. One of the base electrodes of each transistor pair (T_1, T_2) and (T_3, T_4) is connected through input signal terminals ISL and ISR, respectively, to the left and right stereo signal sources L and R, respectively, and the other base electrode is connected through input reference terminals IRL and IRR, respectively, to a bias voltage V_B and hence AC-connected to the first supply reference potential G1.

One of the two collectors of each transistor pair (T_1, T_2) and (T_3, T_4) is coupled through a coupling capacitor C_k and input terminals OSL and OSR, respectively, to first and further or second audio output signal lines ASL 1 and ASL 2, respectively, and the other collector is connected through output reference terminals ORL and ORR, respectively, and a coupling capacitor C_k to the audio reference line ARL. The differential stages DSL and DSR separate the audio output signal lines ASL1 and ASL2 and the audio reference line ARL in a broad band from the first supply reference potential G1. A parallel arrangement of the audio reference line ARL with the video reference line VRL via the audio transmission device AT is thereby prevented.

A parallel arrangement of ARL with VRL via the audio receiver device AR is prevented by the differential stages DSL' and DSR'. Each differential stage comprises an operational differential amplifier an inverting input of which is connected through an input resistor R_i and a coupling capacitor C_k to first and further or second audio input signal lines ASL3 and ASL4, respectively, whilst a non-inverting input is connected at one end through an input resistor R_i' and a coupling capacitor C_k to the audio reference line ARL and at the other end through a resistor R_b' to a bias voltage V_b' and is consequently AC-connected for an alternating current to the first supply reference potential G1. An output of each operational amplifier is feedback negatively through a negative feedback resistor R_f to the inverting input. In order to obtain a correct compensation of common mode components in the differential stages DSL' and DSR', the respective input resistors R_i and R_i' , the respective negative feedback resistors R_f and the respective resistors R_b' should have the same value.

Each operational amplifier is provided with an asymmetrical output, an output signal terminal of which is connected to the left and right stereo signal processing circuits APL and APR, respectively, and an output reference terminal of which is coupled to the first supply reference potential G1.

In a practical embodiment the resistors R_o , R_i , R_f and the coupling capacitor C_k have the values 500 Ohm, 10 kOhm, 10 kOhm and 10 μ F, respectively.

It stands to reason that the invention is not limited to the embodiment shown, but that, for example, the arrangement of the differential stages DSL and DSR is also applicable in the audio receiver device AR: alternatively, the audio circuits AR' and AT' may comprise these differential stages. These audio circuits AR' and AT' and the video receiver device VR' may be incorporated in separate apparatuses which are connected to one and the same supply reference potential.

Claims

1. A system for asymmetrical signal transmission from a pair of transmission devices (AT/AT', VT) through a pair of signal paths (ASL, ASL1, ASL3, ARL, VSL, VRL) each having at least one signal line (ASL, ASL1, ASL3, VSL) and one reference line (ARL, VRL) to a pair of receiver devices (AR'/AR, VR), two devices of which have a supply reference potential (G1) in common and are coupled to one end of each of the two signal paths, and the other two devices of which have a further supply reference potential (G2) in common and are coupled to the other end of each of the two signal paths, characterized in that a differential stage (DS, DSL, DS', DSL') is disposed in at least one of said devices (AT, AR) for common mode suppression between a pair of input terminals (IS, IR; ISL, IRL; IS', IR') and a pair of output terminals (OS, OR; OSL, ORL; OS', OR'),

said differential stage, if disposed in one of said transmission devices (AT), having one end connected through a signal terminal (IS, ISL) of the pair of input terminals to a signal source (A, L) and through a reference terminal (IR, IRL) to one of the two supply reference potentials, and having the other end connected through a signal terminal (OS, OSL) of the pair of output terminals to the signal line (ASL, ASL1) and through a reference terminal (OR, ORL) to the reference line (ARL) of one of the two signal paths, or, if disposed in one of said receiver devices (AR), having one end connected through the input signal terminal (IS') to the signal line (ASL, ASL3) and through the input reference terminal (IR') to the reference line (ARL) of one of the two signal paths, and having the other end connected through the output signal terminal (OS') to a signal processing device (APL) and through the output reference terminal (OR') to one of the two supply reference potentials (G2, G1).

2. A system for asymmetrical signal transmission as claimed in Claim 1, in which the pair of transmission devices consists of an audio and a video transmission device (AT) and (VT) for transmitting audio and video signal respectively, the pair of signal paths consists of an audio and a video signal path (ASL, ASL1, ASL3, ARL) and (VSL, VRL) respectively and the pair of receiver devices consists of an audio and a video receiver device (AR/AR') and (VR) respectively for receiving audio and video signals, characterized in that the differential stage (DS, DSL; DS', DSL') is disposed in the audio transmission (AT) or audio receiver device (AR).

3. A transmission device (AT) for asymmetrical transmission of audio signals in a system for asymmetrical transmission of a video and first and second audio signals connected to an audio signal path (ASL1, ASL2, ARL) having a signal line (ASL1) and a reference line (ARL) coupled to a supply reference potential (G1) as well as a further signal line (ASL2), characterized by a differential stage (DSL) for common mode suppression between a pair of input terminals (ISL, IRL) and a pair of output terminals (OSL, ORL) at one end being connected through a signal terminal (ISL) of the pair of input terminals (ISL, IRL) to a signal source (L) and through a reference terminal (IRL) to the supply reference potential (G1) and at the other end connected through a signal terminal (OSL) of the pair of output terminals (OSL, ORL) to the signal line (ASL1) and through a reference terminal (ORL) of the pair of output terminals (OSL, ORL) to the reference line (ARL) as well as a further differential stage (DSR), whose input reference terminal (IRR) together with that (IRL) of the first-mentioned differential stage (DSL), is connected to the same supply reference potential (G1) and whose input signal terminal (ISR) is connected to a further audio signal source (R), and an output reference terminal (ORR), together with that (ORL) of the first-mentioned differential stage (DSL), being connected to the same reference line (ARL) and an output



A parallel arrangement of ARL with VRL via the audio receiver device AR is prevented by the differential stages DSL' and DSR'. Each differential stage comprises an operational differential amplifier an inverting input of which is connected through an input resistor R_i and a coupling capacitor C_k to first and further or second audio input signal lines ASL3 and ASL4, respectively, whilst a non-inverting input is connected at one end through an input resistor R_i' and a coupling capacitor C_k to the audio reference line ARL and at the other end through a resistor R_b' to a bias voltage V_b' and is consequently AC-connected for an alternating current to the first supply reference potential G1. An output of each operational amplifier is feedback negatively through a negative feedback resistor R_f to the inverting input. In order to obtain a correct compensation of common mode components in the differential stages DSL' and DSR', the respective input resistors R_i and R_i' , the respective negative feedback resistors R_f and the respective resistors R_b' should have the same value.

Each operational amplifier is provided with an asymmetrical output, an output signal terminal of which is connected to the left and right stereo signal processing circuits APL and APR, respectively, and an output reference terminal of which is coupled to the first supply reference potential G1.

In a practical embodiment the resistors R_i , R_i' , R_f and the coupling capacitor C_k have the values 500 Ohm, 10 kOhm, 10 kOhm and 10 μ F, respectively.

It stands to reason that the invention is not limited to the embodiment shown, but that, for example, the arrangement of the differential stages DSL and DSR is also applicable in the audio receiver device AR: alternatively, the audio circuits AR' and AT' may comprise these differential stages. These audio circuits AR' and AT' and a video receiver device VR' may be incorporated in separate apparatuses which are connected to one and the same supply reference potential.

Claims

1. A system for asymmetrical signal transmission from a pair of transmission devices (AT/AT', VT) through a pair of signal paths (ASL, ASL1, ASL3, ARL, VSL, VRL) each having at least one signal line (ASL, ASL1, ASL3, VSL) and one reference line (ARL, VRL) to a pair of receiver devices (AR'/AR, VR), two devices of which have a supply reference potential (G1) in common and are coupled to one end of each of the two signal paths, and the other two devices of which have a further supply reference potential (G2) in common and are coupled to the other end of each of the two signal paths, characterized in that a differential stage (DS, DSL, DS', DSL') is disposed in at least one of said devices (AT, AR) for common mode suppression between a pair of input terminals (IS, IR; ISL, IRL; IS', IR') and a pair of output terminals (OS, OR; OSL, ORL; OS', OR'),

said differential stage, if disposed in one of said transmission devices (AT), having one end connected through a signal terminal (IS, ISL) of the pair of input terminals to a signal source (A, L) and through a reference terminal (IR, IRL) to one of the two supply reference potentials, and having the other end connected through a signal terminal (OS, OSL) of the pair of output terminals to the signal line (ASL, ASL1) and through a reference terminal (OR, ORL) to the reference line (ARL) of one of the two signal paths, or, if disposed in one of said receiver devices (AR), having one end connected through the input signal terminal (IS') to the signal line (ASL, ASL3) and through the input reference terminal (IR') to the reference line (ARL) of one of the two signal paths, and having the other end connected through the output signal terminal (OS') to a signal processing device (APL) and through the output reference terminal (OR') to one of the two supply reference potentials (G2, G1).

2. A system for asymmetrical signal transmission as claimed in Claim 1, in which the pair of transmission devices consists of an audio and a video transmission device (AT) and (VT) for transmitting audio and video signal respectively, the pair of signal paths consists of an audio and a video signal path (ASL, ASL1, ASL3, ARL) and (VSL, VRL) respectively and the pair of receiver devices consists of an audio and a video receiver device (AR/AR') and (VR) respectively for receiving audio and video signals, characterized in that the differential stage (DS, DSL; DS', DSL') is disposed in the audio transmission (AT) or audio receiver device (AR).

3. A transmission device (AT) for asymmetrical transmission of audio signals in a system for asymmetrical transmission of a video and first and second audio signals connected to an audio signal path (ASL1, ASL2, ARL) having a signal line (ASL1) and a reference line (ARL) coupled to a supply reference potential (G1) as well as a further signal line (ASL2), characterized by a differential stage (DSL) for common mode suppression between a pair of input terminals (ISL, IRL) and a pair of output terminals (OSL, ORL) at one end being connected through a signal terminal (ISL) of the pair of input terminals (ISL, IRL) to a signal source (L) and through a reference terminal (IRL) to the supply reference potential (G1) and at the other end connected through a signal terminal (OSL) of the pair of output terminals (OSL, ORL) to the signal line (ASL1) and through a reference terminal (ORL) of the pair of output terminals (OSL, ORL) to the reference line (ARL) as well as a further differential stage (DSR), whose input reference terminal (IRR) together with that (IRL) of the first-mentioned differential stage (DSL), is connected to the same supply reference potential (G1) and whose input signal terminal (ISR) is connected to a further audio signal source (R), and whose output reference terminal (ORR), together with that (ORL) of the first-mentioned differential stage (DSL), being connected to the same reference line (ARL) and an output



signal terminal (OSR) being connected to the further signal line (ASL2).

4. An audio transmission device as claimed in Claim 3, characterized in that each differential stage (DSL; DSR) includes an emitter-coupled transistor pair (T1, T2; T3, T4) having a current source between the coupled emitters and the relevant supply reference potential (G1), one base electrode of each transistor pair being connected for alternating current through the input reference terminal (IRL; IRR) to the said supply reference terminal at one end, and the other base electrode of the transistor pair of the first-mentioned (DSL) and further (DSR) differential stages being coupled through the first-mentioned (ISL) and further (ISR) input signal terminals, respectively, to the first-mentioned (L) and further (R) signal sources, respectively and one collector of each transistor pair being coupled at the other end for alternating current through the output reference terminal (ORL; ORR) to the reference line (ARL) of the audio signal path (ASL1, ASL2, ARL) and the other collector of the transistor pair of the first-mentioned (DSL) and further differential (DSR) stages being coupled through the output signal terminal (OSL; OSR) to the first-mentioned (ASL1) and further (ASL2) signal lines, respectively, of the audio signal path (ASL1, ASL2, ARL).

5. A receiver device (AR) for receiving asymmetrical audio signals in a system for asymmetrical transmission of a video and first and second audio signals connected to an audio signal path (ASL3, ASL4, ARL) having a signal line (ASL3) and a reference line (ARL) coupled to a supply reference potential (G1) as well as a further signal line (ASL4), characterized by a differential stage (DSR') for common mode suppression between a pair of input terminals and a pair of output terminals at one end being connected through a signal input terminal to the first-mentioned signal line (ASL 3) and through an input reference terminal to the reference line (ARL) of the audio signal path (ASL3, ASL4, ARL), at the other end connected through an output signal terminal to a signal processing device (APR) and through an output reference terminal to the supply reference potential (G1) as well as a further differential stage (DSL') having an input reference terminal, which, together with that of the first-mentioned differential stage (DSR'), is connected to the audio reference line (ARL), an input signal terminal being coupled to the further audio signal line (ASL4), an output reference terminal, together with that of the first-mentioned differential stage (DSR'), being coupled to the same supply reference potential (G1) and an output signal terminal being coupled to a further audio signal processing device (APL).

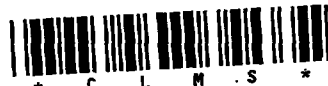
6. An audio receiver device as claimed in Claim 5, characterized in that each differential stage (DSR'; DSL') includes an operational amplifier having an inverting and a non-inverting input, and an asymmetrical output, said non-inverting input being coupled through the input reference terminal to the audio reference line (ARL) and said

inverting input of the operational amplifier of the first-mentioned (DSR') and further differential stages (DSL') being coupled through the input signal terminal to the first-mentioned (ASL3) and further (ASL4) audio signal lines, respectively, said asymmetrical output of the first-mentioned (DSR') and further (DSL') differential stages being coupled through the output signal terminal to the first-mentioned (APR) and further (APL) audio signal processing devices, respectively, and through the output reference terminal to the said supply reference potential (G1).

Patentansprüche

1. System zur asymmetrischen Signalübertragung von einem Paar Sendeanordnungen (AT/AT', VT) über ein Paar Signalstrecken (ASL, ASL1, ASL3, ARL, VSL, VRL) mit je wenigstens einer Signalleitung (ASL, ASL1, ASL3, VSL) und einer Bezugsleitung (ARL, VRL) zu einem Paar Empfangsanordnungen (AR'/AR, VR) von denen zwei Anordnungen ein Speisebezugspotential (G1) gemeinsam haben und mit einem Ende jeder der beiden Signalstrecken gekoppelt sind, und wobei die beiden anderen Anordnungen ein weiteres Speisebezugspotential (G2) gemeinsam haben und mit dem anderen Ende jeder der beiden Signalstrecken gekoppelt sind, dadurch gekennzeichnet, daß in wenigstens einer der genannten Anordnungen (AT, AR) eine Differenzstufe (DS, DSL, DS', DSL') vorgesehen ist zur Unterdrückung gleichphasiger Signale zwischen einem Paar Eingangsklemmen (IS, IR; ISL, IRL; IS', IR') und einem Paar Ausgangsklemmen (OS, OR; OSL, ORL; OS', OR'), wobei diese Differenzstufe, wenn in eine der genannten Sendeanordnungen (AT) aufgenommen, einerseits über eine Signalklemme (IS, ISL) des Eingangsklemmenpaares mit einer Signalquelle (A, L) und über eine Bezugsklemme (IR, IRL) mit einem der beiden Speisebezugspotentiale verbunden ist und andererseits über eine Signalklemme (OS, OSL) des Ausgangsklemmenpaares mit der Signalleitung (ASL, ASL1) und über eine Bezugsklemme (OR, ORL) mit der Bezugsleitung (ARL) einer der beiden Signalstrecken verbunden ist, oder, wenn in eine der genannten Empfangsanordnungen (AR) aufgenommen, einerseits über die Eingangssignalklemme (IS') mit der Signalleitung (ASL, ASL3) und über die Eingangsbezugsklemme (IR') mit der Bezugsleitung (ARL) einer der beiden Signalstrecken und andererseits über die Ausgangssignalklemme (OS') mit einer Signalverarbeitungsanordnung (APL) und über die Ausgangsbezugsklemme (OR') mit einem der beiden Speisebezugspotentiale (G2, G1) gekoppelt ist.

2. System zur asymmetrischen Signalübertragung nach Anspruch 1, wobei das Paar Sendeanordnungen aus einer Audio- und einer Video-Sendeanordnung (AT) und (VT) zum Senden von Audio- bzw. Video-Signalen besteht, wobei das Paar Signalstrecken aus einer Audio- und einer Video-Signalstrecke (ASL, ASL1, ASL3, ARL) bzw. (VSL, VRL) besteht und das Paar Empfangsanord-



nungen aus einer Audio- und Video-Empfangsanordnung (AR/AR') bzw. (VR) zum Empfangen von Audio- und Video-Signalen besteht, dadurch gekennzeichnet, daß die Differenzstufe (DS, DSL; DS', DSL') in der Audio-Sende- (AT) oder Audio-Empfangsanordnung (AR) vorgesehen ist.

3. Sendeanordnung (AT) zur asymmetrischen Übertragung von Audio-Signalen in einem System zur asymmetrischen Übertragung eines Video- und eines ersten und zweiten Audio-Signals, die mit einer Audio-Signalstrecke (ASL1, ASL2, ARL) verbunden ist, die eine mit einem Speisebezugspotential (G1) gekoppelte Signalleitung (ASL1) und eine Bezugsleitung (ARL), sowie eine weitere Signalleitung (ASL2) hat, gekennzeichnet durch eine Differenzstufe (DSL) zur Unterdrückung gleichphasiger Signale zwischen einem Paar Eingangsklemmen (ISL, IRL) und einem Paar Ausgangsklemmen (OSL, ORL), die einerseits über eine Signalklemme (ISL) des Eingangsklemmenpaares (ISL, IRL) mit einer Signalleitung (L) und über eine Bezugsleitung (IRL) mit dem Speisebezugspotential (G1) verbunden ist und andererseits über eine Signalklemme (OSL) des Ausgangsklemmenpaares (OSL, ORL) mit der Signalleitung (ASL1) und über eine Bezugsleitung (ORL) des Ausgangsklemmenpaares (OSL, ORL) mit der Bezugsleitung (ARL) verbunden ist, sowie durch eine weitere Differenzstufe (DSR), deren Eingangsbezugsklemme (IRR) zusammen mit der (IRL) der erstgenannten Differenzstufe (DSL) mit demselben Speisebezugspotential (G1) verbunden ist und deren Eingangssignalklemme (ISR) mit einer weiteren Audio-Signalquelle (R) verbunden ist, wobei eine Ausgangsbezugsklemme (ORR) zusammen mit der (ORL) der erstgenannten Differenzstufe (DSL) mit derselben Bezugsleitung (ARL) verbunden ist und wobei eine Ausgangssignalklemme (OSR) mit der weiteren Signalleitung (ASL2) verbunden ist.

4. Audio-Sendeanordnung nach Anspruch 3, dadurch gekennzeichnet, daß jede Differenzstufe (DSL; DSR) ein emittergekoppeltes Transistorpaar (T1, T2; T3, T4) aufweist, wobei zwischen den gekoppelten Emittern und dem betreffenden Speisebezugspotential (G1) eine Stromquelle vorgesehen ist, wobei eine Basis-Elektrode jedes Transistorpaares wechselstrommäßig einerseits über die Eingangsbezugsklemme (IRL; IRR) mit der Speisebezugsklemme verbunden ist und wobei die andere Basis-Elektrode des Transistorpaares der erstgenannten (DSL) und der weiteren (DSL) Differenzstufe über die erstgenannte (ISL) und die weitere (ISR) Eingangssignalklemme mit der erstgenannten (L) bzw. der weiteren (R) Signalquelle gekoppelt ist und wobei ein Kollektor jedes Transistorpaares andererseits wechselstrommäßig über die Ausgangsbezugsklemme (ORL; ORR) mit der Bezugsleitung (ARL) der Audio-Signalstrecke (ASL1, ASL2, ARL) und der andere Kollektor des Transistorpaares der erstgenannten (DSL) und der weiteren Differenzstufe (DSR) über die Ausgangssignalklemme (OSL; OSR) mit der erstgenannten (ASL1) bzw. der

weiteren (ASL2) Signalleitung der Audio-Signalstrecke (ASL1, ASL2, ARL) gekoppelt ist.

5. Empfangsanordnung (AR) zum Empfangen asymmetrischer Audio-Signale in einem System zur asymmetrischen Übertragung eines Video- und eines ersten und zweiten Audio-Signals, die mit einer Audio-Signalstrecke (ASL3, ASL4, ARL) verbunden ist, die eine Signalleitung (ASL3) und eine mit einem Speisebezugspotential (G1) gekoppelte Bezugsleitung (ARL) sowie eine weitere Signalleitung (ASL4) aufweist, gekennzeichnet durch eine Differenzstufe (DSR') zur Unterdrückung gleichphasiger Signale zwischen einem Paar Eingangsklemmen und einem Paar Ausgangsklemmen, die einerseits über eine Signalleitung (ASL3) und über eine Eingangsbezugsklemme mit der Bezugsleitung (ARL) der Audio-Signalstrecke (ASL3, ASL4, ARL) und andererseits über eine Ausgangssignalklemme mit einer Signalverarbeitungsanordnung (APR) und über eine Ausgangsbezugsklemme mit dem Speisebezugspotential (G1) verbunden ist, sowie durch eine weitere Differenzstufe (DSL') mit einer Eingangsbezugsklemme, die, zusammen mit der der erstgenannten Differenzstufe (DSR') mit der Audio-Bezugsleitung (ARL) verbunden ist, wobei eine Eingangssignalklemme mit der weiteren Audio-Signalleitung (ASL4) gekoppelt ist, wobei eine Ausgangsbezugsklemme zusammen mit der der erstgenannten Differenzstufe (DSR') mit demselben Speisebezugspotential (G1) gekoppelt ist und wobei eine Ausgangssignalklemme mit einer weiteren Audio-Signalverarbeitungsanordnung (APL) gekoppelt ist.

6. Audio-Empfangsanordnung nach Anspruch 5, dadurch gekennzeichnet, daß jede Differenzstufe (DSR'; DSL') einen Operationsverstärker mit einem invertierenden und einem nicht-invertierenden Eingang und einem asymmetrischen Ausgang aufweist, wobei dieser nichtinvertierende Eingang über die Eingangsbezugsklemme mit der Audio-Bezugsleitung (ARL) gekoppelt ist und der invertierende Eingang des Operationsverstärkers der erstgenannten (DSR') und der weiteren Differenzstufe (DSL') über die Eingangsbezugsklemme mit der erstgenannten (ASL3) bzw. weiteren (ASL4) Audio-Signalleitung gekoppelt ist, wobei der asymmetrische Ausgang der erstgenannten (DSR') und der weiteren (DSL') Differenzstufe über die Ausgangssignalklemme mit der erstgenannten (APR) bzw. der weiteren (APL) Audio-Signalverarbeitungsstufe und über die Ausgangsbezugsklemme mit dem genannten Speisebezugspotential (G1) gekoppelt ist.

Revendications

1. Système pour la transmission asymétrique de signaux à partir de deux dispositifs de transmission (AT/AT', VT), par deux trajets de signaux (ASL, ASL1, ASL3, ARL, VSL, VRL) comportant chacun au moins une ligne d'acheminement de signal (ASL, ASL1, ASL3, VSL) et une ligne de référence (ARL, VRL), vers deux dispositifs récep-

teurs (AR/AR', VR), deux dispositifs du système ayant un potentiel de référence (G1) en commun étant couplés à une extrémité de chacun des deux trajets de signaux, et les deux autres dispositifs ayant un autre potentiel de référence d'alimentation (G2) en commun et étant couplés à l'autre extrémité de chacun des deux trajets de signaux, caractérisé en ce qu'un étage différentiel (DS, DSL, DS', DSL') est disposé dans au moins un des dispositifs (AT, AR) pour la suppression en mode commun entre une paire de bornes d'entrée (IS, IR; ISML, IRL; IS', IR') et une paire de bornes de sortie (OS, OR; OSL, ORL; OS', OR'), l'étage différentiel comportant, s'il est disposé dans un des dispositifs de transmission (AT), une extrémité connectée, par l'intermédiaire d'une borne de signal (IS, ISL) de la paire de bornes d'entrée, à une source de signal (A, L) et, par l'intermédiaire d'une borne de référence (IR, IRL) à l'un des deux potentiels de référence d'alimentation, tandis que son autre extrémité est connectée, par l'intermédiaire d'une borne de signal (OS, OSL) de la paire de bornes de sortie, à la ligne d'acheminement de signal (ASL, ASL1) et, par l'intermédiaire d'une borne de référence (OR, ORL), à la ligne de référence (ARL) d'un des deux trajets de signaux, ou, s'il est disposé dans un des dispositifs récepteurs (AR), une extrémité connectée, par l'intermédiaire de la borne de signal d'entrée (IS'), à la ligne d'acheminement de signal (ASL, ASL3) et, par l'intermédiaire de la borne de référence d'entrée (IR'), à la ligne de référence (ARL) d'un des deux trajets de signaux, tandis que son extrémité est connectée, par l'intermédiaire de la borne de signal de sortie (OS'), à un dispositif de traitement de signaux (APL) et, par l'intermédiaire de la borne de référence de sortie (OR'), à l'un des deux potentiels de référence d'alimentation (G2, G1).

2. Système pour la transmission asymétrique de signaux suivant la revendication 1, dans lequel la paire de dispositifs de transmission est constituée d'un dispositif de transmission audio et d'un dispositif de transmission vidéo (AT) et (VT), destinés respectivement à transmettre un signal audio et un signal vidéo, la paire de trajets de signaux comprend un trajet de signal audio et un trajet de signal vidéo (ASL, ASL1, ASL3, ARL) et (VSL, VRL) respectivement et la paire de dispositifs récepteurs comprend un dispositif récepteur audio et un dispositif récepteur vidéo (AR/AR') et (VR), destinés respectivement à recevoir un signal audio et un signal vidéo, caractérisé en ce que l'étage différentiel (DS, DSL; DS', DSL') est disposé dans le dispositif de transmission audio (AT) ou dans le dispositif récepteur audio (AR).

3. Dispositif de transmission (AT) pour la transmission asymétrique de signaux audio dans un système pour la transmission asymétrique d'un signal vidéo et d'un premier ainsi que d'un second signal audio connecté à un trajet de signal audio (ASL1, ASL2, ARL) comportant une ligne d'acheminement de signal (ASL1) et une ligne de référence (ARL) couplées à un potentiel de référence d'alimentation (G1) ainsi qu'une autre ligne

d'acheminement de signal (ASL2), caractérisé par un étage différentiel (DSL) pour la suppression du mode commun entre une paire de bornes d'entrée (ISL, IRL) et une paire de bornes de sortie (OSL, ORL) connecté à une extrémité, par l'intermédiaire d'une borne de signal (ISL) de la paire de bornes d'entrée (ISL, IRL), à une source de signal (L) et, par l'intermédiaire d'une borne de référence (IRL), au potentiel de référence d'alimentation (G1) et, à l'autre extrémité, par l'intermédiaire d'une borne de signal (OSL) de la paire de bornes de sortie (OSL, ORL), à la ligne de signal (ASL1) et, par l'intermédiaire d'une borne de référence (ORL) de la paire de bornes de sortie (OSL, ORL), à la ligne de référence (ARL) ainsi qu'un autre étage différentiel (DSR) dont la borne de référence d'entrée (IRR) ainsi que celle (IRL) de l'étage différentiel (DSL) mentionné en premier lieu sont connectées au même potentiel de référence d'alimentation (G1) et dont la borne de signal d'entrée (ISR) est connectée à une autre source de signaux audio (R), une borne de référence de sortie (ORR) ainsi que celle (ORL) de l'étage différentiel (DSL) mentionné en premier lieu étant connectées à la même ligne de référence (ARL), et une borne de signal de sortie (OSR) étant connectée à l'autre ligne d'acheminement de signal (ASL2).

4. Dispositif de transmission audio suivant la revendication 3, caractérisé en ce que chaque étage différentiel (DSL; DSR) comprend une paire de transistors couplés par les émetteurs (T₁, T₂; T₃, T₄) comportant une source de courant entre les émetteurs couplés et le potentiel de référence d'alimentation en question (G1), une électrode de base de chaque paire de transistors étant connectée pour le courant alternatif par l'intermédiaire de la borne de référence d'entrée (IRL; IRR) à la borne de référence d'alimentation à une extrémité, et l'autre électrode de base de la paire de transistors du premier étage différentiel (DSL) et de l'autre étage différentiel (DSR) étant couplée, par l'intermédiaire de la première borne de signal d'entrée (ISL) et de l'autre borne de signal d'entrée (ISR), respectivement à la première source de signal (L) et à l'autre source de signal (R), et un collecteur de chaque paire de transistors étant couplé à l'autre extrémité pour le courant alternatif, par l'intermédiaire de la borne de référence de sortie (ORL; ORR), à la ligne de référence (ARL) du trajet de signal audio (ASL1, ASL2, ARL) et l'autre collecteur de la paire de transistors du premier étage différentiel (DSL) et de l'autre étage différentiel (DSR) étant couplé, par l'intermédiaire de la borne de signal de sortie (OSL; OSR), respectivement à la première ligne de signal (ASL1) et à l'autre ligne de signal (ASL2) du trajet de signal audio (ASL1, ASL2, ARL).

5. Dispositif récepteur (AR) destiné à recevoir des signaux audio asymétriques dans un système pour la transmission asymétrique d'un signal vidéo et d'un premier ainsi que d'un second signal audio connecté à un trajet de signal audio (ASL3, ASL4, ARL) comportant une ligne de signal (ASL3) et une ligne de référence (ARL) couplées à un potentiel de référence d'alimentation (G1)



ainsi qu'une autre ligne de signal (ASL4), caractérisé par un étage différentiel (DSR') pour la suppression du mode commun entre une paire de bornes d'entrée et une paire de bornes de sortie qui est connecté, à une extrémité, par l'intermédiaire d'une borne d'entrée de signal, à la première ligne d'acheminement de signal (ASL3) et, par l'intermédiaire d'une borne de référence d'entrée, à la ligne de référence (ARL) du trajet de signal audio (ASL3, ASL4, ARL) et, à l'autre extrémité, par l'intermédiaire d'une borne de signal de sortie, à un dispositif de traitement de signaux (APR) et, par l'intermédiaire d'une borne de référence de sortie, au potentiel de référence d'alimentation (G1), ainsi qu'un autre étage différentiel (DSL') comportant une borne de référence d'entrée qui, en compagnie de celle du premier étage différentiel (DSR'), est connecté à la ligne de référence audio (ARL), une borne de signal d'entrée étant couplée à l'autre ligne d'acheminement de signal audio (ASL4), une borne de référence de sortie, avec celle du premier étage différentiel (DSR'), étant couplées au même potentiel de référence d'alimentation (G1) et une borne de signal de sortie étant couplée à

un autre dispositif de traitement de signaux audio (APL).

6. Dispositif récepteur audio suivant la revendication 5, caractérisé en ce que chaque étage différentiel (DSR', DSL') comprend un amplificateur opérationnel comportant une entrée inverseuse et une entrée non inverseuse, ainsi qu'une sortie asymétrique, l'entrée non inverseuse étant couplée, par l'intermédiaire de la borne de référence d'entrée, à la ligne de référence audio (ARL), et l'entrée inverseuse de l'amplificateur opérationnel du premier étage différentiel (DSR') et celle de l'autre étage différentiel (DSL') étant couplées, par l'intermédiaire de la borne de signal d'entrée, à la première (ASL3) et à l'autre ligne d'acheminement de signal audio (ASL4) respective, la sortie asymétrique du premier étage différentiel (DSR') et de l'autre étage différentiel (DSL') étant couplée, par l'intermédiaire de la borne de signal de sortie, au premier dispositif de traitement de signal audio (APR) et à l'autre dispositif de traitement de signal audio (APL) respectif et, par l'intermédiaire de la borne de référence de sortie, audit potentiel de référence d'alimentation (G1).

