

Description

The present invention relates to an apparatus which monitors ambient sound level and, upon sensing the occurrence of a surge in sound level, interrupts data transmission from a sound source to a receiver. More particularly, the invention relates to an electronic device which controls the attenuation level and/or generates a signal to interfere with the signal emanating from a transmitter, for example, a cassette player, record player, or radio, and directed to a receiver, for example, headphones.

In common use are many types of miniature portable appliances, such as cassette players, compact disc players, or credit card-sized radios, which through headphones, allow the user to listen to favorite music or programs anywhere and at anytime. Such appliances have enjoyed great success for several years but they have the major disadvantage of acoustically isolating the user from the surrounding environment, particularly since a large number of users prefer to listen at a very high volume. Although perfect acoustic isolation allows for listening comfort, such isolation could subject the user to a wide range of accidents or risks.

Indeed, it is observed everyday and in every environment, such as in parks, on highways, or in sports grounds, that the majority of users of portable appliances are, by virtue of their helmets or headphones, completely insensitive to calls, warning signals, and, above all, to any sudden, unexpected change in their surroundings. This drawback could have such severe consequences that, in many locales, the use of such appliances with headphones is strictly forbidden to drivers of vehicles, pedestrians, and others who are required to be alert to their surroundings.

Furthermore, it is unpleasant, when calling someone nearby who is wearing headphones, to have to shout in order to warn the person of some danger or simply to attract the person's attention.

Consequently, the use of such appliances in public places or places which are heavily frequented is not recommended because it renders the users insensitive to calls or communications of general or safety interests.

Several safety devices have been proposed in the past for making users or operators sensitive to the external noise.

The device disclosed in U.S. patent 3.158.835 simply detects, amplifies and transmits traffic noise to the operator of an enclosed vehicle.

Such a permanent transmission is totally unacceptable as it would bother the user of portable appliances.

Other devices, such as those disclosed in U.S. patents 4.088.836 and 4.475.230 and in the Japanese patents JP-A-58 190 107 and JP-A-59 11018 and also

to same extent in WO-A-8 603 353 have been proposed to avoid the above mentioned drawback by providing circuits monitoring the level of the ambient noise and delivering either warning or command signals for decreasing the amplifying ratio or powering an alarm when the level of the monitored ambient noise exceeds a preset threshold for a given period of time.

Other devices, such as those disclosed in the Japanese patents JP-A-58 47 308 and JP-A-57 104 312 and in the German patent DE-A-30 46 862 are based on the detection of one or more frequencies or of a predetermined change in frequencies by means of electronic filters.

The device disclosed in WO-A-8 603 353 detects to some extent a source of informations by measuring the electric power consumption or by means of a logical electronic circuit.

As can be easily understood, such devices would also not be satisfactory as only reacting to a change of sound level. In fact, a bus, a car, an aircraft simply passing by; air conditioners, vacuum cleaners,... in operation, would make such devices operative while the noise or level of sound that they generate does not represent at all hazardous situations or abnormal events of which the user should be made aware

The principal objective of the present invention is to remedy the aforesaid disadvantages by providing an apparatus by which the headphone user is alerted in a reliable manner upon the occurrence of a surge in sound representing an abnormal event or a warning of which the user should be made aware while minimizing false alerts in response to high sound levels that do not represent dangerous situations.

A second objective of the invention is to provide an inexpensive apparatus having a very small overall size which can be easily incorporated into miniature appliances or in the accompanying helmets or headphones or even partially in both.

Another object is to provide an apparatus with a built-in mechanism which generates a warning signal in an audible or visual form and maintains the signal for a predetermined period of time after it is generated.

A further object of the invention is to provide circuitry that accomplishes the predefined functions with minimum power consumption.

Those objectives and objects are met by using a method and an apparatus to perform that method according to the invention and having the characteristics described in claims 1 and 7.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings and illustrating a preferred embodiment, in which :

Figure 1 is a perspective view of a portable appliance connected to headphones through circuit components shown in block diagram form; Figures 2A and 2B represent schematically the

electronic system components of the apparatus; Figures 3A, 3B, 3C, and 3D represent diagrams of the electrical signals appearing at different points in the electronic circuits shown in Figures 2A and 2B; and

Figures 4 and 5 represent alternative embodiments of warning devices.

Figure 1 shows a conventional portable cassette player 10 provided with a milled wheel 14 which volume can be regulated and a start-stop switch 12. A flap 16 pivoting about a spindle 18 makes it possible to insert or remove a magnetic tape cassette in the player 10. Connected to the player 10 via a lead 20 provided with a plug 22 are a pair of headphones 23 on a band or helmet 24. The cassette player 10 and headphones 23 are electronic system components currently available on the market which play and receive sound from recordings on a magnetic tape that are listened to by a user.

In accordance with the invention, electronic circuits are included in the lead 20 between the cassette player 10 and the headphones 23 which are operative when a user is listening through the headphones 23 and occur to generate a control signal which affects the transmission of sound to the headphones 23 and thereby alerts the user to an abnormal event or occurrence.

For this purpose and to carry out the invention, a microphone 30 is mounted at a location to receive sound from the surroundings. The microphone may be mounted on one of the components of the system, such as the headphones support 24, one of the headphones 23, or the cassette player 10, as desired, as long as the location is adapted to pick-up sound from the surroundings. The microphone 30 transduces input ambient sound to an electrical signal which is fed to an amplifier 32, as illustrated in Figure 1, which, in turn, is connected to a signal processor 34 and a control signal generator 36.

With reference to Figure 2A, it can be seen in block diagram that in the amplifier 32 the amplification control is provided in the form of an adjustable potentiometer 42. The electrical signal obtained after amplification to enhance the signal-to-noise ratio can be measured at the point or node T1 in the form illustrated in Figure 3A.

The output signal from the amplifier which appears at the node T1 is supplied to the circuitry shown in Figure 2B which produces a control signal output only when a surge in sound occurs that represents an abnormal event, the circuitry being effective to filter or screen out surges in sound which are too brief or too gradual to represent an event about which the user should be alerted.

To accomplish this, as shown in Figure 2B, an envelope detector 43 detects the envelope of the amplified signal and produces a first output signal which can be measured at point T2 as shown in Figure

3B.

The first output signal is then processed by a differentiator 44, to obtain a second output signal measured at point T3 as shown in Figure 3C which is a "derivative" of the curve shown in Figure 3B and has an amplitude which is a function of the rate of change of the leading edge of the first output signal from the envelope detector 43.

The second output signal is then applied to the input of a comparator 45 which is calibrated to a preset threshold, so labeled in Figure 3C, the comparator 45 providing, at its output T4, a control signal, shown in Figure 3D, when the amplitude of the second output signal applied at its input exceeds the preset threshold value. The control signal is maintained for a duration determined by timer circuitry 46 in Figure 2B. A control signal is provided at the output terminal B shown in Figure 2B and is illustrated in Figure 3D.

Consequently, a control signal is delivered when a surge above the average ambient sound level is detected, the surge having predetermined minimum characteristics, such characteristics, including a minimum amplitude and duration and minimum slope of the rising leading edge of the surge-representing signal envelope. These minimum characteristics qualify a detected surge in sound as having been caused by an abnormal event about which a user of the system should be informed.

According to the invention, the rate at which the surge in sound is changing is a more accurate and reliable representation of an abnormal event than the amplitude of the surge alone.

Sensitivity of the system to surges in sound and the minimum characteristics of amplitude and duration of the surge-representing signal envelope that result in a control signal are set by the adjustable potentiometer 42 and by the RC time constants of the amplification, envelope detection, and differentiation circuits.

Two embodiments are illustrated which utilize the control signal to alert a user of the headphones 23 to an abnormal event. In the first embodiment, shown schematically in Figure 4, two transistors 50, 51 one for each audio channel between the cassette player 10 and the headphones 23, are supplied with the control signal appearing at the output terminal B in Figure 2B. The transistors 50, 51 are operated to attenuate or cut-off the audio signal transmitted from the player 10 to the headphones 23 so that the user becomes aware of the surrounding conditions for a predetermined length of time.

Alternatively, the control signal received from the terminal B may be utilized to activate a pulse or frequency generator, in place of the transistors 50, 51, the output from which is superimposed on the audio signal transmitted to the headphones 23 in such a manner as to warn or alert the user, the warning signal being maintained for a predetermined length of

time.

In another alternative embodiment illustrated schematically in Figure 5, the microphone 30 is connected through a circuit to the headphones 23 so that, responsive to a surge in sound, the output from the cassette player 10 is disconnected and the microphone output is directly connected to the headphones so that the user hears the ambient sound from the surroundings. For this purpose, as shown in Figure 5, the control signal from the terminal B in Figure 2B is utilized to operate a switching circuit 55 which disconnects the L and R audio channels from the cassette player 10 to the headphones 23 and connects into the same two channels the output of the microphone 30.

These alternative embodiments discussed above may be combined in a single system.

Other alternatives of warning signals for alerting users may be used, such as modulated signals or interruption of the reproduction mode, without departing from the invention.

With regard to the construction of the circuitry and the location of the component parts, a wide range of alternative exists. As previously noted, the microphone may be associated with the appliance, such as the cassette player, or with the helmet (24) or one of the headphones (23). In the case of portable appliances provided with recording means, it is possible to use the microphone incorporated into the appliance and provided to pick up signals to be recorded in order to detect surges in sound in relation to the ambient sound level after the appliance is switched from the recording to the playback mode. To provide a most compact apparatus, the circuitry may be constructed entirely in integrated circuit form instead of in discrete circuits and components as shown.

The disclosed apparatus enables the user to listen to the ambient surroundings by generating an alert or control message, a process which is far simpler and faster than searching for the volume control of the player and turning down the sound volume and then restoring it to its original level, as is customary with existing appliances.

As will be appreciated, such an apparatus, with its simple and inexpensive construction, considerably enhances the safety of using headphones without hampering the user in any way. It ensures that the user is warned of any occurrence producing a surge in sound satisfying certain set criteria, as previously noted.

Claims

1. Warning method for a device transmitting data from a sound source (10) along a transmission path to headphones (23) worn by a user comprising the steps of :

- picking up ambient sound and transducing it to

an electrical signal,

- amplifying said electric signal, characterized in that it further includes the steps of :

- applying said amplified signal to an envelope detector for obtaining a first output signal representing an envelope of the amplified signal,
- differentiating said first output signal and producing a second output signal, the amplitude of which is a representation of the rate of change of the first output signal,
- comparing said second output signal to a preset threshold so as to generate a control signal when the second output signal exceeds said threshold, representing the occurrence of a surge in ambient sound.

2. A method according to claim 1, characterized in that the control signal is generated for a predetermined length of time.

3. A method according to claim 1 in which indicating to the user the occurrence of an abnormal event is carried out by attenuating the transmission of reproduced sound along the transmission path.

4. A method according to claim 1 in which the occurrence of an abnormal event is indicated to the user by superimposing a warning signal on the reproduced sound transmitted along the transmission path.

5. A method according to claim 1 including the step of disconnecting the sound reproduced by the sound source from the transmission path and connecting input ambient sound into the transmission path and transmitting the ambient sound to the headphones worn by the user.

6. A method according to claim 1, characterized in that the preset threshold, representing the occurrence of a surge in ambient sound, can be modified.

7. A device for detecting a surge in ambient sound above an average ambient sound level applied to a sound reproduction system (10) transmitting reproduced sound along a transmission path (20) to headphones (23) worn by a user and comprising :

- a microphone (30) which transduces input ambient sound to an electrical signal ;
 - an amplifier (32) connected to receive the electrical signal from said microphone (30) and which provides an amplified signal ;
- characterized in that it further includes :
- an envelope detector (43) which provides a first output signal representing an envelope of the amplified signal ;
 - a differentiator (44) which differentiates said first output signal and produces a second output signal, having an amplitude which is a representation of the rate of change of the first output signal, and
 - a comparator (45) which compares the amplitude of said second output signal to a preset threshold level so as to generate a control signal

time.

In another alternative embodiment illustrated schematically in Figure 5, the microphone 30 is connected through a circuit to the headphones 23 so that, responsive to a surge in sound, the output from the cassette player 10 is disconnected and the microphone output is directly connected to the headphones so that the user hears the ambient sound from the surroundings. For this purpose, as shown in Figure 5, the control signal from the terminal B in Figure 2B is utilized to operate a switching circuit 55 which disconnects the L and R audio channels from the cassette player 10 to the headphones 23 and connects into the same two channels the output of the microphone 30.

These alternative embodiments discussed above may be combined in a single system.

Other alternatives of warning signals for alerting users may be used, such as modulated signals or interruption of the reproduction mode, without departing from the invention.

With regard to the construction of the circuitry and the location of the component parts, a wide range of alternative exists. As previously noted, the microphone may be associated with the appliance, such as the cassette player, or with the helmet (24) or one of the headphones (23). In the case of portable appliances provided with recording means, it is possible to use the microphone incorporated into the appliance and provided to pick up signals to be recorded in order to detect surges in sound in relation to the ambient sound level after the appliance is switched from the recording to the playback mode. To provide a most compact apparatus, the circuitry may be constructed entirely in integrated circuit form instead of in discrete circuits and components as shown.

The disclosed apparatus enables the user to listen to the ambient surroundings by generating an alert or control message, a process which is far simpler and faster than searching for the volume control of the player and turning down the sound volume and then restoring it to its original level, as is customary with existing appliances.

As will be appreciated, such an apparatus, with its simple and inexpensive construction, considerably enhances the safety of using headphones without hampering the user in any way. It ensures that the user is warned of any occurrence producing a surge in sound satisfying certain set criteria, as previously noted.

Claims

1. Warning method for a device transmitting data from a sound source (10) along a transmission path to headphones (23) worn by a user comprising the steps of :

- picking up ambient sound and transducing it to

an electrical signal,

- amplifying said electric signal, characterized in that it further includes the steps of :

- applying said amplified signal to an envelope detector for obtaining a first output signal representing an envelope of the amplified signal,
- differentiating said first output signal and producing a second output signal, the amplitude of which is a representation of the rate of change of the first output signal,
- comparing said second output signal to a preset threshold so as to generate a control signal when the second output signal exceeds said threshold, representing the occurrence of a surge in ambient sound.

2. A method according to claim 1, characterized in that the control signal is generated for a predetermined length of time.

3. A method according to claim 1 in which indicating to the user the occurrence of an abnormal event is carried out by attenuating the transmission of reproduced sound along the transmission path.

4. A method according to claim 1 in which the occurrence of an abnormal event is indicated to the user by superimposing a warning signal on the reproduced sound transmitted along the transmission path.

5. A method according to claim 1 including the step of disconnecting the sound reproduced by the sound source from the transmission path and connecting input ambient sound into the transmission path and transmitting the ambient sound to the headphones worn by the user.

6. A method according to claim 1, characterized in that the preset threshold, representing the occurrence of a surge in ambient sound, can be modified.

7. A device for detecting a surge in ambient sound above an average ambient sound level applied to a sound reproduction system (10) transmitting reproduced sound along a transmission path (20) to headphones (23) worn by a user and comprising :

- a microphone (30) which transduces input ambient sound to an electrical signal ;
- an amplifier (32) connected to receive the electrical signal from said microphone (30) and which provides an amplified signal ;
- characterized in that it further includes :
 - an envelope detector (43) which provides a first output signal representing an envelope of the amplified signal ;
 - a differentiator (44) which differentiates said first output signal and produces a second output signal, having an amplitude which is a representation of the rate of change of the first output signal, and
 - a comparator (45) which compares the amplitude of said second output signal to a preset threshold level so as to generate a control signal



when the second output signal exceeds said threshold representing the occurrence of a surge in ambient sound.

8. A device according to claim 7, characterized in that it includes a timing circuit (46) determining the duration of the control signal.

9. A device according to claim 7, characterized in that the amplifier (32) includes an adjustable potentiometer (42) and that the threshold level is set by said adjustable potentiometer and by RC time constants of circuits including said amplifier (32), envelope detector (43), differentiator (44) and comparator (45).

10. A device according to claim 7 in which said sound reproducing system includes a portable appliance having a recording microphone, characterized in that said microphone which permits recording is used as the microphone (30) which transduces input ambient sound to an electrical signal when the portable appliance is in a playback mode.

11. A device according to claim 7, characterized in that the microphone (30) which transduces input ambient sound to an electrical signal is located adjacent the headphones (23).

Patentansprüche

1. Warnverfahren für eine Vorrichtung, die Daten von einer Tonquelle (10) längs eines Übertragungsweges an Kopfhörer (23) überträgt, die von einem Anwender getragen werden, umfassend folgende Schritte:

- Aufnehmen von Umgebungsschall und Umwandlung desselben in ein elektrisches Signal;
- Verstärken des elektrischen Signals;
- dadurch gekennzeichnet, dass es ferner die Schritte umfasst:
- Zuführung des verstärkten Signals zu einem Hüllkurvengleichrichter zwecks Erhalt eines ersten Ausgangssignals, das eine Hüllkurve des verstärkten Signals darstellt;
- Differenzieren des ersten Ausgangssignals und Erzeugen eines zweiten Ausgangssignals, dessen Amplitude eine Darstellung der Änderungsgeschwindigkeit des ersten Ausgangssignals ist;
- Vergleichen des zweiten Ausgangssignals mit einem voreingestellten Schwellenwert zwecks Erzeugung eines Steuersignals, wenn das zweite Ausgangssignal den Schwellenwert überschreitet, was das Auftreten einer Sprungwelle im Umgebungsschall darstellt.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass das Steuersignal während einer vorbestimmten Zeitspanne erzeugt wird.

3. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass die Anzeige eines abnormalen Ereignisses für den Anwender durchgeführt wird, indem die

Übertragung des reproduzierten Schalls längs des Übertragungsweges gedämpft wird.

4. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass das Auftreten eines abnormalen Ereignisses dem Anwender angezeigt wird, indem ein Warnsignal auf den reproduzierten Schall überlagert wird, der längs des Übertragungsweges übertragen wird.

5. Verfahren nach Anspruch 1, gekennzeichnet durch den Schritt der Trennung des von der Tonquelle reproduzierten Schalls von dem Übertragungsweg und Anschluss von eingegebenem Umgebungsschall in den Übertragungsweg und Übertragung des Umgebungsschalls an die Kopfhörer, die vom Anwender getragen werden.

6. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass der voreingestellte Schwellenwert, der das Auftreten einer Sprungwelle im Umgebungsschall darstellt, modifiziert werden kann.

7. Vorrichtung zur Erfassung einer Sprungwelle in einem Umgebungsschall, die oberhalb eines durchschnittlichen Umgebungsschallpegels liegt, der einem Schallreproduktionssystem (10) zugeführt wird, das reproduzierten Schall längs eines Übertragungsweges (20) an von einem Anwender getragene Kopfhörer (23) überträgt, und umfassend:

- ein Mikrofon (30), das eingegebenen Umgebungsschall in ein elektrisches Signal umwandelt;
- einen Verstärker (32), der angeschlossen ist, um das elektrische Signal aus dem Mikrofon (30) aufzunehmen und der ein verstärktes Signal liefert;
- dadurch gekennzeichnet, dass sie ferner enthält:
- einen Hüllkurvengleichrichter (43), der ein erstes Ausgangssignal liefert, das eine Hüllkurve des verstärkten Signals darstellt;
- einen Differentiator (44), der das erste Ausgangssignal differenziert und ein zweites Ausgangssignal erzeugt, das eine Amplitude hat, die ein Maß für die Änderungsgeschwindigkeit des ersten Ausgangssignals ist; und
- einen Komparator (45), der die Amplitude des zweiten Ausgangssignals mit einem voreingestellten Schwellenwertpegel vergleicht, um ein Steuersignal zu erzeugen, wenn das zweite Ausgangssignal den Schwellenwert überschreitet, der das Auftreten einer Sprungwelle im Umgebungsschall darstellt.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, dass sie eine Zeitgeberschaltung (46) enthält, die die Dauer des Steuersignals bestimmt.

9. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, dass der Verstärker (32) ein einstellbares Potentiometer (42) enthält und dass der Schwellenpegel durch das einstellbare Potentiometer und durch RC-Zeitkonstanten von Schaltungen eingestellt wird, die den Verstärker (32), den Hüllkurven-



gleichrichter (43), den Differentiator (44) und Komparator (45) enthalten.

10. Vorrichtung nach Anspruch 7, in dem das reproduzierende System ein tragbares Gerät enthält, das ein Aufnahmefunktion aufweist, dadurch gekennzeichnet, dass das Mikrofon, das eine Aufnahme gestattet, als das Mikrofon (30) verwendet wird, das eingegebenen Umgebungsschall in ein elektrisches Signal umwandelt, wenn das tragbare Gerät in einem Wiedergabebetrieb verwendet wird.

11. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, dass das Mikrofon (30), das eingegebenen Umgebungsschall in ein elektrisches Signal umwandelt, neben den Kopfhörern (23) liegt.

Revendications

1. Procédé d'avertissement pour un dispositif transmettant des données d'une source sonore (10) par un canal de transmission vers des écouteurs (23) portés par un utilisateur, comprenant les pas suivants :

- captage du son ambiant et conversion de celui-ci en un signal électrique,
- amplification dudit signal électrique, caractérisé en ce qu'il comporte les pas suivants :
- application dudit signal amplifié à un circuit détecteur d'enveloppe pour obtenir un premier signal de sortie représentant une enveloppe du signal amplifié,
- différenciation dudit premier signal de sortie et production d'un second signal de sortie dont l'amplitude est une représentation du taux de variation du premier signal de sortie,
- comparaison dudit second signal de sortie à un seuil préétabli de façon à générer un signal de contrôle lorsque le second signal de sortie excède ledit seuil, représentant l'occurrence d'une émergence dans le son ambiant.

2. Procédé selon la revendication 1, caractérisé en ce que le signal de contrôle est généré pendant un laps de temps prédéterminé.

3. Procédé selon la revendication 1, dans lequel l'indication à l'utilisateur de l'occurrence d'un événement anormal s'effectue en atténuant la transmission du son reproduit dans le canal de transmission.

4. Procédé selon la revendication 1 dans lequel l'occurrence d'un événement anormal est indiqué à l'utilisateur en superposant un signal d'avertissement au son reproduit transmis dans le canal de transmission.

5. Procédé selon la revendication 1 incluant le pas de déconnecter le son reproduit par la source sonore du canal de transmission et de connecter à l'entrée dudit canal de transmission le son ambiant pour le transmettre aux écouteurs portés par l'utilisa-

teur.

6. Procédé selon la revendication 1, caractérisé en ce que le seuil préétabli, représentant l'occurrence d'une émergence dans le son ambiant, peut être modifié.

7. Dispositif pour détecter une émergence dans un son ambiant au-dessus d'un niveau de son ambiant moyen appliqué à des moyens de reproduction sonores (10) transmettant un son reproduit à l'aide d'un canal de transmission (20) à destination d'écouteurs (23) portés par un utilisateur et comprenant :

- un microphone (30) qui convertit le son ambiant capté en un signal électrique ;
- un amplificateur (32) connecté de façon à recevoir le signal électrique provenant dudit microphone (30) et fournissant un signal amplifié ; caractérisé en ce qu'il comporte en outre :
- un circuit de détection d'enveloppe (43) qui délivre un premier signal de sortie représentant une enveloppe du signal amplifié ;
- un circuit de différenciation (44) qui différencie le premier signal de sortie et produit un second signal de sortie ayant une amplitude qui est une représentation du taux de variation du premier signal de sortie, et
- un circuit de comparaison (45) qui compare l'amplitude dudit second signal de sortie à un seuil de référence préétabli de façon à générer un signal de contrôle lorsque le second signal de sortie excède ledit seuil, représentant l'occurrence d'une émergence dans le son ambiant.

8. Dispositif selon la revendication 7, caractérisé en ce qu'il comporte un circuit de temps (46) déterminant la durée du signal de contrôle.

9. Dispositif selon la revendication 7, caractérisé en ce que l'amplificateur (32) comprend un potentiomètre ajustable (42) et le niveau du seuil de référence est fixé par ledit potentiomètre ajustable et par des constantes de temps RC des circuits comprenant ledit amplificateur (32), la détection d'enveloppe (43), la différenciation (44) et la comparaison (45).

10. Dispositif selon la revendication 7, dans lequel lesdits moyens de reproduction sonore comprennent un appareil portable muni d'un microphone pour l'enregistrement, caractérisé en ce que ledit microphone qui permet l'enregistrement assure le rôle du microphone (30) qui convertit le son ambiant appliqué sur son entrée en un signal électrique lorsque l'appareil portable est en mode de reproduction.

11. Dispositif selon la revendication 7, caractérisé en ce que le microphone (30) qui convertit le son ambiant appliqué sur son entrée en un signal électrique est situé à proximité des écouteurs (23).

