

Description

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to an apparatus for recording and/or reproducing a PCM audio signal by using a rotary head.

Description of the Prior Art:

A standardization for the so-called 8 mm video tape recorder has been set internationally. With such standardization, recording and/or reproducing are carried out by a pair of rotary heads provided with an angular spacing of 180° therebetween, and a tape is wrapped around 221° of the rotational circumferential surface of the rotary heads. In a 180° interval of the 221° , a video signal is recorded and/or reproduced, while a PCM audio signal with a compressed time base is recorded and/or reproduced in the interval of the remaining 36° .

Figure 1 shows a format of a recording track on a tape according to the above mentioned standardization. From the right-hand side at which the head begins to contact with the tape, at the tip end of the track there is provided a tracing start area 51 of 5° of a rotation angle of the head. At the next or rear portion of the tracing start area 51, over 2.06° (corresponding to 3 horizontal intervals (H) of a video signal), there is provided a clock run-in area 52 which is synchronized with succeeding PCM data. Next to the clock run-in area 52, there is provided a PCM data area 53 over 26.32° for use with an audio signal with a compressed time base. A period or area of 2.06° (3H) next to the data area 53 is assigned as a back margin area 54 for coping with the erroneous displacement of the recording position. The back margin area is followed by a guard area 55 of 2.62° between a video area and a PCM data area. Next to the guard area 55, there is provided a video signal area 56 for one field over 180° . Furthermore, the video signal area is followed by a head detaching area 57 of 5° .

Accordingly, in this standardization, the video signal of one field is recorded on and reproduced from the video signal area 56. At the same time, an audio signal of $1/60$ second is pulse code modulated, processed for error correction or the like, then time base compressed to about $1/6.8$, and is recorded on and reproduced from the PCM data area 53. This recording track is sequentially and obliquely formed along the longitudinal direction of the tape, by which the continuous video and audio signals are recorded and/or reproduced.

SUMMARY OF THE INVENTION

In an apparatus of the invention for recording and/or reproducing a PCM audio signal by using a rotary head, an index signal is recorded on a part of a recording interval of the PCM audio signal by using the rotary head. It is thus possible to easily find a beginning of a recorded portion upon playback.

A recording and/or reproducing apparatus according to the invention is arranged such that a tracing period of a rotary head for recording and/or reproducing is divided into a plurality of segments. A PCM audio signal is recorded and/or reproduced in desired divided segments. An index signal is recorded at a predetermined portion of a recording and/or reproducing interval of the PCM audio signal by using the rotary head as required. Upon playback, the index signal recorded at the predetermined portion is detected to thereby control the operation of the apparatus.

In an apparatus of the invention for recording and reproducing at least one digitized audio signal on a magnetic tape having a slant track format a rotary head for scanning a slant track format magnetic tape includes transducer means for recording and reproducing signals on slant tracks on the magnetic tape, pilot tracking means are connected to said rotary head transducer means for producing a four-frequency pilot signal, which is recorded by the rotary head, and audio signal processing means are connected to said transducer means for recording and reproducing at least one digitized audio signal on a part of a plurality of slant tracks.

Further, in an apparatus of the invention index signal means are also connected to said transducer means for supplying an index signal to said transducer means to be recorded at a rear back area associated with and directly following the part of each of a predetermined number of said plurality of slant tracks identifying the beginning of a desired program of the digitized audio signal, said index signal means producing said index signal such that it has a predetermined frequency chosen for searching said beginning of said desired program and so as not to interfere with the four-frequency pilot signal and it is recorded by said rotary head transducer means, and means for detecting said index signal reproduced by said rotary head transducer means are connected to said audio signal processing means so as to identify said beginning of the desired program of said digitized audio signal on the slant track during reproducing.

Upon playback, the index signal recorded at the predetermined portion is detected to thereby control the operation of the apparatus. It is thus possible to easily find a beginning of a recorded portion upon playback.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is useful for explaining a prior art track format;

Figure 2 is a block diagram of an embodiment of the present invention;

Figures 3 to 5 are diagrams useful for explaining the present invention; and

Figure 6 shows a track format to which the invention is applied.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

It is interesting to note in the above-mentioned standardization, that when the video signal area 56 of 180° is equally divided by 5, each segment has 36°. When, on the other hand, the angle of the PCM data area 53, 5° of the tracing start area 51, 206° of the succeeding back margin area 54, and 2.62° of the guard area 55 are added, the total angle becomes just 36°. Therefore, it is proposed that an audio signal recording and/or reproducing apparatus is formed by using the apparatus conforming to the above-mentioned standardization.

Figure 6 shows an example of a format of a recording track used therefor. In the figure, the portion from the tracing start area 51 in which the head begins to contact with the tape to the guard area 55 is the same as that of the above-mentioned standardization and this interval is assigned as a first segment. Subsequently, from the beginning of the above-mentioned video signal area 56, there are provided a next tracing start area 61, a clock run-in area 62, a data area 63, a back margin area 64, and a guard area 65, each of which is formed the same as described above. This interval is assigned as a second segment. Furthermore, a portion the same as the second segment is repeatedly formed at every 36° of the video signal area 56 and assigned as the 3rd to 6th segments, respectively. After the last segment, there is provided a head detaching area 57 of 5°.

Accordingly, there are provided 6 segments from the 1st to the 6th. Then, for each segment, the rotation angle position of the rotary head is detected and the PCM data is delivered and recorded at a time corresponding to each 36° from the tape contact start side of the head and corresponding to a desired segment (interval). Also, by gating the desired time on period of the reproduced signal, it is possible to independently record and/or reproduce the respective segments. When the re-recording is carried out on the tape which is used once, by using a so-called flying erase head only during the period in which this head is in contact with the tape in an interval of a desired segment, it is possible to carry out the re-recording

while erasing the corresponding interval selectively.

As described above, the PCM audio signal can independently be recorded and/or reproduced at the intervals that are provided by dividing the tape by 6 along the tape width direction. For example, by using a tape which is capable of 2-hour recording, it is possible to record the PCM audio signal for 12 hours, which is 6 times as long as the normal video recording.

In the prior art 1/2-inch tape video tape recorder, when it is desired to detect a beginning of a desired recorded portion, or a so-called program (beginning) search system is employed, and an index signal is formed by modifying a tracking control (CTL) signal recorded by a fixed head along the tape length. However, in the above standardization of the 8 mm video tape recorder, the tracking is carried out by using a pilot signal of a so-called four frequency system which is recorded by the rotary heads so that the recording of the CTL signal becomes unnecessary, unlike the prior art. In the 8 mm VTR, it is possible to record such an index signal on a special track provided outside the start area 51 on the detaching area 57 by a special fixed head. However, from a designing and manufacturing cost standpoint, it is not preferable to employ the special fixed head only for such purpose.

Furthermore, when the signals are divided into a plurality of (multiple) segments and then recorded, in order to record 6 index signals corresponding to the respective segments on one track, it becomes necessary to provide a complicated processing apparatus for coding the index signals and so on. Further, according to this method, it is very difficult to record, reproduce, and erase the index signal independently at every segment.

The prior art apparatus is constructed as described above so that the index signal for use in finding the beginning of the tape, etc. is recorded only by a special head and the like. Particularly, when the tape is divided into multiple segments, the prior art apparatus requires a code processing circuit which is complicated in circuit arrangement and the index signal can not be recorded, reproduced, and erased independently at every segment.

This invention provides a recording and/or reproducing apparatus in which scanning periods of rotary heads 13 and 14 capable of recording and/or reproducing are divided into a plurality of intervals, a PCM audio signal (output from a processor circuit 8) is recorded and/or reproduced in a desired divided interval, and an index signal (output from a MODEM circuit 10) is recorded on a predetermined portion of the recording and/or reproducing interval of the PCM audio signal as required. Thus, upon

playback, the index signal recorded on the pre-determined portion is detected to thereby control the operation.

According to this apparatus, since the index signal is recorded and/or reproduced by the rotary head, it becomes unnecessary to provide a special fixed head and so on. Particularly, when the tape is divided into multiple segments, the index signal is provided at every segment so that these index signals can independently be recorded, reproduced, and erased by a simple circuit arrangement, to thus find the beginning of a recording portion or a desired recorded portion, etc., satisfactorily.

Referring now to Figure 2, reference numeral 3 represents the video signal processor circuit, 4 and 5 the change-over switches, 8 the PCM-audio signal processor circuit, 10 the MODEM circuit for index signals, 13 and 14 the rotary heads, 21 the RF switching pulse generator circuit, 24 the PCM-audio area generator, and 25 the index area generator.

In Figure 2, the video signal input terminal 1 and a video signal output terminal 2 are connected to the video signal processor circuit 3, and an output of a recording signal from the video processor circuit 3 is supplied to respective fixed terminals a of the change-over switches 4 and 5. Input terminals 6 and output terminals 7 for two channel audio signals are connected to the PCM audio signal processor circuit 8, and an output of a recording signal from the processor circuit 8 is supplied to respective fixed terminals b of the switches 4 and 5. A system controlled circuit 9 is connected to the MODEM circuit 10 for an index signal, and an output of a recording signal from the MODEM circuit 10 is supplied to a fixed terminal c of the switch 4. The movable contacts of the switches 4 and 5 are connected through recording amplifiers 11 and 12 to rotary heads 13 and 14 which are provided with an angular spacing of 180° therebetween.

The rotary heads 13 and 14 are connected through playback amplifiers 15 and 16 to fixed terminals a and b of change-over switches 17 and 18, respectively. The movable contact of the switch 17 is connected to a reproduced signal input terminal of the video processor circuit 3. The movable contact of the switch 18 is commonly connected to reproduced signal input terminals of the PCM audio signal processor circuit 8 and the index signal MODEM circuit 10.

A drum motor 19 for driving the rotary heads 13 and 14 is provided with a pulse generator 20 which detects the rotary phase. This generator 20 is connected to the RF switching pulse generator circuit 21 which produces RF switching pulses corresponding to the video signal periods of the rotary heads 13 and 14. The output from the generator

circuit 21 is supplied through a normal side fixed terminal n of a normal and multi-segment change-over switch 22 to control terminals a of the switches 4 and 17. The output from the generator circuit is further supplied through the switch 22 and an inverter 23 to control terminals a of the switches 5 and 17.

The output signal from the switch 22 is supplied to the PCM audio area generator 24 and the index area generator 25. The output signal from the generator 24 and the output signal from the inverter 23 are supplied through an AND circuit 26 to the control terminal c of the switch 4. The output signal from the generator 24 and the output signal from the switch 22 are supplied through an AND circuit 27 to the control terminal b of the switch 5. The output signal from the generator 25 and the output signal from the inverter 23 are supplied through an AND circuit 28 to the control terminal b of the switch 4.

An output signal from an erase signal generator 29 is supplied through a switch 30 and an amplifier 31 to a flying erase head 32. The output signal from the switch 22 is supplied to an index signal erase area generator 33 and a PCM - audio erase area signal generator 34. The output signals from these generators 33 and 34, and an output signal from an erase control signal generator 35, are supplied through an OR circuit 36 to the control portion of the switch 30.

The output signal from the generator circuit 21 is supplied to a multi-segment area delay circuit 37. The delay circuit 37 is connected to the system controller circuit 9, and the output signal from the delay circuit 37 is supplied to a multi-segment side fixed terminal m of the switch 22.

Referring to Figure 3, the timing chart thereof will now be described. When an RF switching pulse shown in Figure 3A is generated, the PCM-audio area signal and the index area signal become as shown in Figures 3B and 3C. Accordingly, on the basis of these signals, from the switches 4 and 5 there are derived signals shown in Figures 3D and 3E. These signals are recorded by the heads 13 and 14.

Upon playback, from the rotary heads 13 and 14 there are reproduced signals shown in Figures 3F and 3G. Hence, a video signal shown in Figure 3H is derived from the switch 17, and the PCM-audio signal and the index signal are derived from the switch 18.

When the index signal is written, the apparatus is placed in the recording mode only during an index area shown in Figure 3J; and during this period, an index signal shown in Figure 3K is formed. Furthermore, preceding the index signal recording in the index area, an index erase area is formed at the position preceded by an attaching

angle (for example, 90°) of the flying erase head as shown in Figure 3L. During this period, an erase signal shown in Figure 3L is generated. If the index area is selected, for example in Figure 3M, to be 2.06° (3H), the index erase area has a period longer than the same by 1H each to the head and to the tail.

When the index signal is only to be erased without recording a new index signal, only the index erase signal is formed as shown at the right-hand side of Figures 3L and 3M.

As described above, the index signal area is formed at a predetermined position of the recording track and the index signal can be recorded, reproduced, written and erased in and from this area.

A multi-segment operation will now be described. In the above mentioned circuit, by delaying the RF switching pulse by 36° or by multiple of 36° in the delay circuit 37, as shown in Figure 4, it is possible to independently record and/or reproduce the PCM audio signal in and from respective segments that are provided by equally dividing the video signal portion by 5.

Also in that case, by using the above mentioned circuit, the index area can be provided at the position across the rear back margin and guard area of each segment and the run-in area of the succeeding segment, in which the index signal can be provided independently.

A practical example of an index signal will now be described. The frequency of the index signal is selected to be a frequency having a small azimuth loss that can be detected by both the heads 13 and 14 as a low frequency, and to be a frequency having a small interference with the other pilot signal (the 8 mm video tape recorder uses a pilot signal with frequency ranging from 100 to 200 kHz for tracking purposes). By example, in the 8 mm video tape recorder, the frequency of the index signal is selected to be 386 kHz, that is 1/30 of the master clock. The index signal is recorded continuously for a period of several fields.

When there is a crosstalk of the index signal from the adjacent track and there are crosstalks as shown in Figures 5A and 5C relative to an index output signal shown in Figure 5B, the envelope is disturbed due to zero beat as, for example shown in Figure 5D. Therefore, according to the above mentioned circuit, by recording the index signal only by the head 13 (see Figures 3D and 3E), it is possible to prevent the crosstalk from occurring and thus to remove a fear that the mis-operation due to the disorder of the envelope which may occur.

Furthermore, for reproducing and detecting the index signal, the synchronous detection is suitably utilized. In that case, the frequency deviation caus-

ed upon the fast forward mode and the rewind mode can be corrected by changing a self-running frequency of a PLL circuit of the synchronous detector.

The index signal may be a signal with a constant frequency and may be an encoded signal after a certain modulation.

According to the present invention, since the index signal is recorded and/or reproduced by the rotary head, a special fixed head or the like is not required. Particularly when there is provided a multi-segment, the index signal is provided in each segment so that these index signals can be recorded, reproduced, and erased independently by the simple circuit arrangement. Therefore, it becomes possible to find out the beginning of the recording portion, etc. satisfactorily.

Claims

1. An apparatus for recording and reproducing at least one digitized audio signal on a magnetic tape having a slant track format comprising: a rotary head (4,5,11-18) for scanning a slant track format magnetic tape including transducer means (4,5,11,12,15-18) for recording and reproducing signals on slant tracks on the magnetic tape, pilot tracking means connected to said rotary head transducer means (4,5,11,12,15-18) for producing a four-frequency pilot signal which is recorded by the rotary head (4,5,11-18), and audio signal processing means (8) connected to said transducer means (4,5,11,12,15-18) for recording and reproducing at least one digitized audio signal on a part of a plurality of slant tracks, characterized in that index signal means (9,10,19-28) are also connected to said transducer means (4,5,11,12,15-18) for supplying an index signal to said transducer means (4,5,11,12,15-18) to be recorded at a rear back area associated with and directly following the part of each of a predetermined number of said plurality of slant tracks identifying the beginning of a desired program of the digitized audio signal, said index signal means (9,10,19-28) producing said index signal such that it has a predetermined frequency chosen for searching said beginning of said desired program and so as not to interfere with the four-frequency pilot signal and it is recorded by said rotary head transducer means (4,5,11,12,15-18), and means for detecting said index signal reproduced by said rotary head transducer means (4,5,11,12,15-18) are connected to said audio signal processing means (8) so as to identify



angle (for example, 90°) of the flying erase head as shown in Figure 3L. During this period, an erase signal shown in Figure 3L is generated. If the index area is selected, for example in Figure 3M, to be 2.06° (3H), the index erase area has a period longer than the same by 1H each to the head and to the tail.

When the index signal is only to be erased without recording a new index signal, only the index erase signal is formed as shown at the right-hand side of Figures 3L and 3M.

As described above, the index signal area is formed at a predetermined position of the recording track and the index signal can be recorded, reproduced, written and erased in and from this area.

A multi-segment operation will now be described. In the above mentioned circuit, by delaying the RF switching pulse by 36° or by multiple of 36° in the delay circuit 37, as shown in Figure 4, it is possible to independently record and/or reproduce the PCM audio signal in and from respective segments that are provided by equally dividing the video signal portion by 5.

Also in that case, by using the above mentioned circuit, the index area can be provided at the position across the rear back margin and guard area of each segment and the run-in area of the succeeding segment, in which the index signal can be provided independently.

A practical example of an index signal will now be described. The frequency of the index signal is selected to be a frequency having a small azimuth loss that can be detected by both the heads 13 and 14 as a low frequency, and to be a frequency having a small interference with the other pilot signal (the 8 mm video tape recorder uses a pilot signal with frequency ranging from 100 to 200 kHz for tracking purposes). By example, in the 8 mm video tape recorder, the frequency of the index signal is selected to be 386 kHz, that is 1/30 of the master clock. The index signal is recorded continuously for a period of several fields.

When there is a crosstalk of the index signal from the adjacent track and there are crosstalks as shown in Figures 5A and 5C relative to an index output signal shown in Figure 5B, the envelope is disturbed due to zero beat as, for example shown in Figure 5D. Therefore, according to the above mentioned circuit, by recording the index signal only by the head 13 (see Figures 3D and 3E), it is possible to prevent the crosstalk from occurring and thus to remove a fear that the mis-operation due to the disorder of the envelope which may occur.

Furthermore, for reproducing and detecting the index signal, the synchronous detection is suitably utilized. In that case, the frequency deviation caus-

ed upon the fast forward mode and the rewind mode can be corrected by changing a self-running frequency of a PLL circuit of the synchronous detector.

The index signal may be a signal with a constant frequency and may be an encoded signal after a certain modulation.

According to the present invention, since the index signal is recorded and/or reproduced by the rotary head, a special fixed head or the like is not required. Particularly when there is provided a multi-segment, the index signal is provided in each segment so that these index signals can be recorded, reproduced, and erased independently by the simple circuit arrangement. Therefore, it becomes possible to find out the beginning of the recording portion, etc. satisfactorily.

Claims

1. An apparatus for recording and reproducing at least one digitized audio signal on a magnetic tape having a slant track format comprising: a rotary head (4,5,11-18) for scanning a slant track format magnetic tape including transducer means (4,5,11,12,15-18) for recording and reproducing signals on slant tracks on the magnetic tape, pilot tracking means connected to said rotary head transducer means (4,5,11,12,15-18) for producing a four-frequency pilot signal which is recorded by the rotary head (4,5,11-18), and audio signal processing means (8) connected to said transducer means (4,5,11,12,15-18) for recording and reproducing at least one digitized audio signal on a part of a plurality of slant tracks, characterized in that index signal means (9,10,19-28) are also connected to said transducer means (4,5,11,12,15-18) for supplying an index signal to said transducer means (4,5,11,12,15-18) to be recorded at a rear back area associated with and directly following the part of each of a predetermined number of said plurality of slant tracks identifying the beginning of a desired program of the digitized audio signal, said index signal means (9,10,19-28) producing said index signal such that it has a predetermined frequency chosen for searching said beginning of said desired program and so as not to interfere with the four-frequency pilot signal and it is recorded by said rotary head transducer means (4,5,11,12,15-18), and means for detecting said index signal reproduced by said rotary head transducer means (4,5,11,12,15-18) are connected to said audio signal processing means (8) so as to identify



said beginning of the desired program of said digitized audio signal on the slant track during reproducing.

2. An apparatus according to claim 1, wherein said audio signal processing means (8) includes means for recording six separate PCM audio channels at six substantially equal 36° PCM audio parts along a 221° expanse of each slant track.
3. An apparatus according to claim 1, wherein the rotary head (4,5,11-18) is adapted for a magnetic tape that is 8 mm wide.
4. An apparatus according to claim 1, wherein the index signal is recorded across both a rear back margin area (54) and guard area (55) of each audio part and a run-in area (61,62) of a succeeding audio part.
5. An apparatus of any of the claims 1 to 4, characterized in that said index signal is recorded by only one (13) of the recording heads (13,14).

Patentansprüche

1. Vorrichtung zur Aufzeichnung und Wiedergabe von mindestens einem digitalisierten Audiosignal auf einem Magnetband mit einem Schrägspurformat, welche umfaßt:
einen rotierenden Kopf (4, 5, 11-18) zum Abtasten eines Magnetbands mit einem Schrägspurformat, welcher Umformermittel (4, 5, 11, 12, 15-18) zum Aufzeichnen und Wiedergeben von Signalen auf Schrägspuren auf einem Magnetband enthält,
Pilotspureinstellungsmittel, die mit den genannten Umformermitteln (4, 5, 11, 12, 15-18) des rotierenden Kopfs zur Erzeugung eines Vierfrequenz-Pilotsignals, welches durch den rotierenden Kopf (4, 5, 11-18) aufgezeichnet wird, verbunden sind, und
Audiosignalverarbeitungsmittel (8), die mit den genannten Umformermitteln (4, 5, 11, 12, 15-18) zur Aufzeichnung und Wiedergabe von mindestens einem digitalisierten Audiosignal auf einem Teil einer Vielzahl der Schrägspuren verbunden sind,
dadurch gekennzeichnet,
daß außerdem Indexsignalmittel (9, 10, 19-28) mit den genannten Umformermitteln (4, 5, 11, 12, 15-18) zum Zuführen eines Indexsignals zu den genannten Umformermitteln (4, 5, 11, 12, 15-18) verbunden sind, damit dieses in einem rückwärtigen hinteren Bereich aufgezeichnet wird, der mit dem Teil von jedem von einer

vorgegebenen Anzahl der genannten Vielzahl der Schrägspuren verbunden ist und diesem unmittelbar folgt, welcher den Anfang eines gewünschten Programms des digitalisierten Audiosignals identifiziert, wobei die genannten Indexsignalmittel (9, 10, 19-28) ein derartiges Indexsignal erzeugen, daß es eine vorgegebene ausgewählte Frequenz zum Suchen des genannten Anfangs des gewünschten Programms aufweist, und daß es sich nicht mit dem Vierfrequenz-Pilotsignal überlagert, und daß es durch die genannten Umformermittel (4, 5, 11, 12, 15-18) des rotierenden Kopfs aufgezeichnet wird, und daß Mittel zur Detektion des durch die genannten Umformermittel (4, 5, 11, 12, 15-18) des rotierenden Kopfs wiedergegebenen genannten Indexsignals mit den genannten Audiosignalverarbeitungsmitteln (8) verbunden sind, um den genannten Anfang des gewünschten Programms des genannten digitalisierten Audiosignals auf der Schrägspur während der Wiedergabe zu identifizieren.

2. Vorrichtung nach Anspruch 1, bei welcher die genannten Audiosignalverarbeitungsmittel (8) Mittel zur Aufzeichnung sechs getrennter PCM-Audiokanäle auf sechs im wesentlichen gleichen 36°-PCM-Audioabschnitten entlang einer 221°-Ausdehnung von jeder Schrägspur enthalten.
3. Vorrichtung nach Anspruch 1, in welcher der rotierende Kopf (4, 5, 11-18) für ein Magnetband angepaßt ist, das 8 mm breit ist.
4. Vorrichtung nach Anspruch 1, in welcher das Indexsignal sowohl über einen rückwärtigen hinteren Randbereich (54) und Schutzbereich (55) von jedem Audioteil als auch über einen Einlaufbereich (61, 62) von einem nachfolgenden Audioteil aufgezeichnet wird.
5. Vorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß das genannte Indexsignal nur durch einen (13) der Aufzeichnungsköpfe (13, 14) aufgezeichnet wird.

Revendications

1. Appareil d'enregistrement et de reproduction d'au moins un signal audio numérisé sur une bande magnétique présentant un format de piste inclinée, comprenant :
une tête tournante (4, 5, 11 - 18) pour balayer une bande magnétique à format de piste inclinée incluant un moyen de transducteur (4, 5, 11, 12, 15 - 18) pour enregistrer et



reproduire des signaux sur des pistes inclinées sur la bande magnétique ;

un moyen de suivi de piste pilote connecté audit moyen de transducteur de tête tournante (4, 5, 11, 12, 15 - 18) pour produire un signal pilote à quatre fréquences qui est enregistré au moyen de la tête tournante (4, 5, 11 - 18) ; et

un moyen de traitement de signal audio (8) connecté audit moyen de transducteur (4, 5, 11, 12, 15 - 18) pour enregistrer et reproduire au moins un signal audio numérisé sur une partie d'une pluralité de pistes inclinées,

caractérisé en ce que :

un moyen de signal d'indexage (9, 10, 19 - 28) est également connecté audit moyen de transducteur (4, 5, 11, 12, 15 - 18) pour appliquer un signal d'indexage audit moyen de transducteur (4, 5, 11, 12, 15 - 18), lequel doit être enregistré au niveau d'une zone arrière associée à la partie de chaque nombre prédéterminé de ladite pluralité de pistes inclinées identifiant le début d'un programme souhaité du signal audio numérisé et directement à la suite de cette partie, ledit moyen de signal d'indexage (9, 10, 19 - 18) produisant ledit signal d'indexage de telle sorte qu'il présente une fréquence prédéterminée choisie pour rechercher ledit début du programme souhaité et qu'il n'interfère pas avec le signal pilote à quatre fréquences et qu'il soit enregistré par ledit moyen de transducteur de tête tournante (4, 5, 11, 12, 15 - 18) ; et

un moyen pour détecter ledit signal d'indexage reproduit par ledit moyen de transducteur de tête tournante (4, 5, 11, 12, 15 - 18) est connecté audit moyen de traitement de signal audio (8) de manière à identifier ledit début du programme souhaité du signal audio numérisé sur la piste inclinée pendant la reproduction.

audio et au travers d'une zone de début de défilement (61, 62) d'une partie audio suivante.

5. Appareil selon l'une quelconque des revendications 1 à 4, caractérisé en ce que ledit signal d'indexage est enregistré au moyen de seulement l'une (13) des têtes d'enregistrement (13, 14).

2. Appareil selon la revendication 1, dans lequel ledit moyen de traitement de signal audio (8) inclut un moyen pour enregistrer six canaux audio de modulation par impulsions et codage (MIC) distincts au niveau de six parties audio MIC à 36° sensiblement égales le long d'une extension à 221° de chaque piste inclinée.
3. Appareil selon la revendication 1, dans lequel la tête tournante (4, 5, 11 - 18) est conçue pour une bande magnétique qui présente une largeur de 8 mm.
4. Appareil selon la revendication 1, dans lequel le signal d'indexage est enregistré au travers à la fois d'une zone de marge arrière (54) et d'une zone de garde (55) de chaque partie