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☑ Description : paged ...1... to paged ...17...
☑ Claim(s) : paged ...18... to paged ...22...
☑ Drawing(s) : paged ...4/6... to paged ...6/6...
☑ Abstract : paged ...23... to paged ...
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Signalling the nature of defects in optical information carriers

The invention relates to a method and an arrangement for signalling the nature of defects in optical information carriers using a reproduction equipment, in the sense of "fuzzy logic", which does not just signal the presence of a defect but also the nature of the defect such as for example, finger prints on a compact disc and this thereby enables the user, where possible, to re-establish the original quality of reproduction of the optical information carrier. The field, with which the invention is to be associated, concerns the signalling of at least one kind of defect of an optical information carrier such as could occur from careless handling of the compact disc CD, laser disc or similar information carriers, whereby the play-back equipment usually provided for the reproduction of the information is utilised.

Despite taking the greatest of care, optical information carriers used for the recording and reproduction of audio and/or video signals or data signals exhibit both manufacturing defects as well as defects caused by their environment which are corrected or interpolated to a certain extent by the play-back equipments using an error correcting device. Without this capability, the compact discs or laser discs could not be implemented as otherwise none of the many bits could be allowed to be lost or none of the innumerable pits in the disc could be allowed to become dirty or covered over. However, defects in the optical information carrier may have an effect on at least the originality of the reproduction or could lead to drop-outs during the reproduction process. Both accidental isolated defects, such as air bubbles or dirt in the protective layer of the optical information carrier, as well as so-called surface defects i.e. scratches and finger prints occur, which defects destroy or hide a very large amount of information so that the user can no longer distinguish as to whether original items of information or, computed or interpolated items of information are being reproduced.

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fault indicating equipment for indicating the technical quality of a CD that is currently being played and which indicates the loading involved in the error correction is known, c.f. KRIEG, Bernhard: Praxis der digitalen Audiotechnik: digitale Aufnahme und Wiedergabe, Franzis-Verlag GmbH, Munich 1989, p 60 - 63. The loading involved in the error correction is a mirror image of the degree of error in the optical information carrier which the programme counter present in the play-back equipment is signalling. The degree of error represents both the frequency as well as the number of defects. Although it is a direct indication for the technical quality of a CD that is currently being played, the user does not receive any information regarding the measures which are possibly needed for reducing the degree of error since, although the frequency and the number of faults is signalled, the nature of the fault is not signalled.

The process for signalling the nature of the defect thus requires a system which, in respect of its complexity, goes beyond that of the degree-of-error process. It is generally known to designate those kinds of systems which assist people to form a basis for decisions in respect of weighty, complex problems as "Fuzzy Logic".

It is known furthermore, that laser scanners are utilised for optically inspecting the information carriers during the manufacture of the CDs, these scanners requiring a heavy outlay and, when using them in the framework of a quality control using an automatic monitoring system, only a good/bad sorting of the CDs occurs c.f. "Wenn es klickt, nicht gleich den Spieler schelten" in: Frankfurter Allgemeine Zeitung dated 07. 01.1992. The degree of error, which represents the number of occurrences of trouble with the disc, likewise serves as the test criterion. However, to use an expensive system of this type for signalling defects in the optical information carrier, in the form of an auxiliary equipment, cannot be expected of the consumer. It

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should also be mentioned that a distinction between the various types of defect cannot be effected with these devices.

Furthermore, a method for determining faults in the case of signals stored in spiral tracks on disc-shaped, rotating information carriers is known, in which method a fault signal is identified by means of a comparison with the signal content from previous revolutions in a manner such that, in the event of a repetition of the fault signal in the succeeding revolutions, then an abrasion is registered whereas, if there is no repetition, then an isolated fault is registered c.f. DE-OS 28 51 822. A shift register having a length of one revolution is provided for carrying out the method. Spatially bounded faults are found electronically in any sort of specific manner and passed on as pulse signals to the input of the device. The method is based on comparing a fault signal with the signal content from previous revolutions. A repetition of the fault signal in a radial direction at the same place during the next revolution is registered by means of a shift register. In this way, only faults or fault signals, which occur on a straight, radially extending line of the recording medium, lead to the signalling of an abrasion. However, the fact that abrasions or scratches exhibit a trend which, as a general rule, does not coincide with a straight, radially extending line is not taken into account. The electronic fault signal is written into a shift register having a length of exactly one revolution so that only places located on a straight, radial line are recorded.

A pulse generator, which is rigidly attached to the driving axle of the information carrier - something which is unusual in the case of play-back equipments for disc shaped, rotating information carriers, is utilised for determining the locations.

Consequently, the object of the invention is to develop a method and an arrangement which makes it possible, at low cost, to signal at least one kind of defect in an optical recording medium, such as finger prints for example, using a reproduction

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equipment so that a judgment in respect of the quality of the optical recording medium is made easier for the user using the advisory or signaling system and a hint as to how to achieve an improved quality of reproduction is given in the case of the presence of the cause of error - fingerprint.

The posed object is achieved in accordance with the invention in that at least one cause of error or type of defect is determined in a first method step and is signalled or indicated in a second method step.

Insofar as an optical information carrier being played exhibits a defect, then at least one cause of error is explicitly indicated so that, in the case of the cause of error - finger print, the user can re-establish the original quality of reproduction by simply wiping off the finger prints, preferably by following a straight line from the centre to the edge.

The optical information carrier, which increasingly exhibits defects caused in particular by multiple and careless handling and which is optically scanned by a play-back equipment that is usually used for the reproduction of the items of information, forms the starting point for the method.

For the purposes of determining the cause of error from the degree of error and owing to the positional characteristics that the causes of error exhibit, the relationship between a number of error prone frames, which are no longer being corrected by the decoder and which represent the degree of error of an optical disc, and the location of the defect is set, whereby the location of the defect can be determined from the number of sub-code blocks between error packets weighted in correspondence with the error rate. The cause of error is thereby determined by means of an error rate occurring in adjacent tracks of a disc sector.

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the repairable cause of error - finger print - is dicated upon the occurrence of more than three error packets n five adjacent tracks. On the other hand, scratches and so-called black dots are preferably identified or determined as being the cause of error upon the occurrence of up to three error packets in three adjacent tracks and these are then signalled.

On the other hand, the high frequency signal from the optical information carrier that is detected by the play-back equipment can be used for determining at least one cause of error. To this end, a test signal, whose occurrence within an upper and a lower threshold level over a time period characteristic of the cause of error has been established, is derived from the high frequency signal. Preferably, 10 and 90 % of the high frequency signal are used as the threshold levels for determining the cause of error, whereby the threshold levels are applied to the upper and lower peak levels of the high frequency signal in order to compensate, in particular, for tolerances of the scanner and the reflective properties of differing optical information carriers. In order to be able evaluate the test signal with respect to threshold levels that are likewise derived from the high frequency signal, threshold levels having a time constant that is substantially greater vis a vis that of the test signal are used.

It is advantageous, when playing the optical information carrier at a higher speed, such as for example, when re-recording the optical disc onto a tape using the so-called high speed dubbing process or in the course of a search process for causes of error using a substantially diminished playing time, to use threshold levels having a much lower time constant since impairments would otherwise only be detected when playing-back at normal play-back speeds.

The time period, which characterises the cause of error - finger print, is preferably a duration of 4 msecs in which the tes-

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derived from the high frequency signal occurs within the threshold levels. Other causes of error, in addition to the cause of error - finger print, can be determined by altering the threshold levels, the time constants of the threshold levels and the time period. Moreover, it is possible to determine differing causes of error and to undertake a weighting of the degree of the cause of error or of the causes of error by varying the parameters when using the solution emanating from the process using the degree of error as well as when using the solution emanating from the process using the high frequency signal and also possibly, by using a combination of these solutions. For example, it may be signalled to the user as to whether one is concerned with light finger prints, heavy finger prints or with a reproduction that is audibly interfered with by finger prints or some other cause of error.

In order to increase the degree of certainty in the identification of finger prints as opposed to other forms of disturbance, the signal representing the defect is preferably logically combined with a signal equivalent to the revolution of the disc. One thereby avoids letting a plurality of short disturbances, which do not stem from finger prints, from being added together to form a signal corresponding to the signal - finger print. The signal equivalent to the revolution of the disc is preferably the output signal from a so-called radial detector. Furthermore, it is advantageous not to break off the process of adding a predetermined number of track completions for detecting the radial extent of finger prints immediately when, in the course of the counting process, a single track revolution is free of interference signals.

The indication of a cause of error or of a plurality of causes of error occurs visually and/or acoustically. In order to ensure that the operator takes notice of the fault indicator, the cause of error is signalled for a time extending beyond that of its occurrence.

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carrying out the method, there is provided an arrangement which consists of a processing circuit for processing signals from the play-back equipment representing defects in an optical information carrier and for supplying information to an indicating device for at least one cause of error.

A processing circuit, which serves for processing the degree of error of an optical information carrier, is preferably connected to the decoder or programme-error-counter of the play-back equipment and is formed by a computational unit that sets the relationship between an error prone frame and the location of the defect.

A processing circuit, which serves for processing the high frequency signals from the optical disc that are detected by the play-back equipment, is preferably connected to the scanning unit of the play-back equipment and consists of a threshold level circuit which provides an upper threshold level and a lower threshold level for the high frequency signal and with which, a test signal, that is derived from the high frequency signal and that is within the threshold levels, is detected and also consists of a delay member with which the duration or the persistence period of the test signal within the threshold levels is established.

The processing circuit preferably consists of two oppositely poled first peak level rectifiers which are connected to each other via a voltage divider, to which divider there are connected two comparators that are connected, on the input side, to a second peak level rectifier which provides the test signal and, on the output side, to the input of a gate.

The peak level rectifiers each consist of a diode, a capacitor and a constant current source or at least a resistor in combination with a diode and a capacitor. Thereby, the first peak level rectifiers exhibit a substantially greater time constant vis a vis the second peak level rectifier in order to

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threshold levels for the test signal derived from the high frequency signal. The time constant of the first peak level rectifiers preferably amounts to 200 msecs while the time constant of the second peak level rectifier has a level in the region of 2 msecs. Preferably, 10 % and 90 % of the high frequency signal are used as the threshold levels which are formed by the voltage divider connecting the peak level rectifiers and these are supplied to the comparators as comparison levels. The test signal derived from the high frequency signal is likewise supplied to these comparators so that an occurrence of the test signal within the threshold levels is determined by virtue of the differing time constants and is signalled via a gate due to the logical coupling of the outputs of the comparators.

Since, in contrast to so-called black-dots, finger prints do not show up in the high frequency signal as complete collapses of the voltage of the high frequency signal, it is thereby immediately possible to distinguish between these causes of error.

However, as an optical information carrier may also exhibit scratches, which show up in the high frequency signal, analogously to the cause of error - finger print, as a test signal within the threshold levels, a more extensive evaluation of the test signal is required. To this end, there is provided a delay member which is connected to the gate and with which the duration of the occurrence of the test signal within the threshold levels is established and evaluated. Since the local extent of finger prints is greater than that of scratches, the duration of the attenuation or of the collapses of the high frequency signal or the test signal is used as an additional criterion for distinguishing the causes of error. An appropriate switching circuit or an integrator having a subsequently connected integrator is suitable as a delay member, its output providing an output signal which is used for determining the cause of error - finger print - upon the occurrence of the test

within the threshold levels for a duration of upwards of ecs.

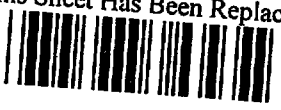
In order to ensure that the fault indicator is indeed noticed by the operator of the play-back equipment, due to the generally, only very short duration of the occurrence of faults, a monoflop and/or a resettable store is connected after the comparator. An indication transcending the time period of the occurrence of a cause of an error is thereby achieved. Furthermore, this type of indicator is advantageous in connection with so-called automatic changers or magazine play-back equipments since the information regarding a defective optical disc occurs, if necessary, until the insertion of a new magazine by virtue of which a resetting of the store is then effected.

It is further envisaged that the peak level rectifiers should be implemented so as to be switchable to other time constants in order to ensure the effectiveness of the indication of the cause of error even when playing back at a higher speed such as is required for example, when re-recording using the so-called high speed dubbing process. Since, as a rule, one does not listen in the case of this type of re-recording, faults would otherwise only be noticed when playing back at normal speed. A time constant switching circuit of this type is also required for a so-called search process during which the optical disc is investigated in respect of the occurrence of faults using a substantially diminished play-back time.

Causes of error other than the cause of error - finger print- can also be determined by altering the parameters of the arrangement and an appropriate adaptation to the information carrier is then undertaken. Moreover, the arrangement is suitable for effecting an evaluation of a cause of error in respect of its intensity.

Independently of the construction of the processing circuit with which at least one cause of error is determined, there is

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visually and/or acoustically signalling indicating
ich consists of one or more light emitting diodes, a
r display fields or one or more ringing devices which
sound signals. Repairable causes of error or even
le and/or irreparable causes of error are preferably
d by means of the indicating device.

ect of the design of the equipment, the indicating device
processing circuit are combined into a fault indicating
nt which is connected to the play-back equipment as a
e fault indicating equipment, or, the fault indicating
nt is integrated into the play-back equipment and forms a
constructional entity therewith.

vantage of the method and the arrangement consists
ally in that judgements in respect of the quality of
uction of an optical information carrier is made easier
e operator of the play-back equipment, to which end,
es available in the play-back equipment and method steps
have already been implemented can be used and the user
ves an explicit piece of information regarding possibly
ing causes of error in the optical information carrier that
rrently being played which, in the case of finger prints,
s him to re-establish the original quality of reproduction
optical information carrier by simply wiping them off.

method and the arrangement can be implemented at low cost
the user receives explanations as to whether original items
nformation, or, items of information that have mainly been
lated by a correcting system or that have been interpolated
being reproduced.

invention will be explained in more detail hereinafter with
help of the drawings which illustrate two forms of
diment. Therein

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1 shows a [illegible] circuit diagram for carrying out the method signalling the cause of a defect in an optical information [illegible]rrier using a play-back equipment 1,

Fig. 2 a flow diagram for the method of indicating the nature of the defect emanating from the process using the degree of error,

Fig. 3 schematically illustrated signal waveforms for the method and the arrangement for the process of signalling the cause of error emanating from the process using the high frequency signal RF from the play-back equipment 1,

Fig. 4 an arrangement for indicating the nature of the defect emanating from the process using the high frequency signal RF,

Fig. 5 a block circuit diagram of an arrangement for indicating the nature of the defect emanating from the process using the high frequency signal RF,

Fig. 6 a block circuit diagram of an arrangement for indicating the nature of the defect emanating from the process using the degree of error.

In correspondence with Fig. 1, the method of signalling the nature of a defect in an optical information carrier using a play-back equipment 1, with which at least one cause of error is determined in the first method step and indicated in the second method step, is carried out using a processing circuit 3 and an indicating device 4.

In a first form of embodiment for signalling the nature of a defect in a compact disc, the first method step consists in that at least one cause of error is determined from the degree of error which a decoder 2 of the play-back equipment 1 provides, the decoder not being illustrated in Fig. 1. In correspondence with Fig. 2 and for the determination of the causes of error from the degree of error of an optical information carrier, the

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tracks k which are to be investigated in respect of occurrence of faults as well as a flag m representing an rate z are initially set to zero upon starting the play-back equipment with PLAY. The number of the subcode blocks y is also set equal to zero with the starting of the play-back equipment by PLAY. One moves onward through the signal flow chart upon the occurrence of the first subcode synchronisation signal SCOR. The flag m representing the error rate z is set when an interpolation occurs for the first time, its presence being derived, analogously to the error rate z, from the devices in the play-back equipment which are signalling the degree of error in the optical disc. If an error rate z = 1 occurs, a determination of the location OB is carried out by calculating the number of subcode blocks y in each revolution x. The number of subcode blocks y in each revolution x results from the scanning size which is calculated from the so-called subcode ATIME, multiplied by the number ¶ divided by the product of the subcode block-period and the scanning speed. In known manner, the scanning speed only has to be determined once for each disc and the number of the subcode blocks y in each revolution x is preferably rounded off to a whole number. Furthermore, the flag m representing the error rate z is set equal to one and thereafter, by increasing the number of the subcode blocks y by one, it is awaited as to whether an error rate z reappears in the same sector of the disc. Moreover, the inexactitude of two subcode blocks y is taken into account in a following step. This is followed by an evaluation of error prone frames in error packets h. In correspondence with experimental results, a magnitude of the error packet h related to four frames within a subcode block-period corresponding to 96 frames was selected in order to make it possible, in combination with a number of tracks k that are to be investigated in respect of the occurrence of faults, to distinguish between the cause of error - finger print - and scratches, black-dots. It has transpired that the repairable cause of error - finger print - is present as a first type of defect FA1 upon the occurrence of more than three error packets h in five adjacent tracks k. On the other

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ches and black-dots are identified as a second type
ct FA2 upon the occurrence of up to three error packets h
three adjacent tracks k.

In order to increase the degree of certainty for the identification of finger prints as opposed to other forms of disturbance, the signal representing the defect is logically combined with a signal which is equivalent to the revolution of the disc. One thereby avoids letting a plurality of short disturbances, which do not stem from finger prints, from being added together to form a signal corresponding to a finger print. The output signal from a so-called radial detector is preferably used as the signal equivalent to the revolution of the disc. On the other hand, it is advantageous not to break off the process of adding a predetermined number of track completions corresponding to the revolutions of the disc for detecting the radial extent of finger prints immediately when, in the course of the count, a single track revolution is free of interference signals.

An arrangement corresponding to this form of embodiment is illustrated in Fig. 6. It consists of the play-back equipment 1 which contains a decoder 2 that signals the degree of error of the optical disc, a processing circuit 3 and an indicating device 4. The processing circuit 3, by means of which the signals representing the degree of error of the optical disc currently being played are processed, is connected to the decoder 2. It is a computational unit by means of which the relationships between error prone frames and the location of the defect are set. As a result of the calculation, one of the possibly existing causes of error, finger print, or scratch, black-dot is determined and a signal relating thereto is passed on to the indicating device 4 connected to the processing circuit 3, which device signals the corresponding cause of error by means of the indicator as a first type of defect FA1 or as a second type of defect FA2.

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second form of embodiment, the first method step consists hat at least the cause of error - finger print - is rmined from the high frequency signal RF from the optical c that is detected by the play-back equipment 1. For laining the method, a high frequency signal RF, in which the sential causes of error are specified, is illustrated chematically in Fig. 3. It has been discovered that when the ause of error - black-dot - is present, the voltage URF of the high frequency signal RF exhibits considerable collapses which extend from zero up to virtually 10 % of the high frequency signal RF. These collapses may exhibit differing depths of collapse and lengths of collapse as is illustrated in the signal waveform.

The cause of error - scratch - leads to collapses of the voltage URF of the high frequency signal RF which are characterised by a lower depth of collapse and also predominantly a lower length of collapse.

Finger prints, by virtue of their extent over the optical disc, lead to collapses of the voltage URF of the high frequency signal RF having a length of collapse or duration in time of upwards of 4 msecs. The heaviness of the finger print corresponds hereby to the depth of collapse. Since very light finger prints do not have any effect upon the quality of reproduction from the optical disc, they may be left out of consideration. Based upon the knowledge thus obtained, a test signal M is derived from the high frequency signal RF and the cause of error - fingerprint - is established upon the occurrence of the test signal M, over a time span having a duration of upwards of 4 msecs, within an upper threshold level W1 which was defined as being 90 % of the high frequency signal RF and a lower threshold level W2 which corresponds to 10 % of the high frequency signal RF.

Due to the relationship of the threshold levels W1, W2 to the peak levels A, B of the high frequency signal RF, there is

ved an independence from the absolute voltage URF of the frequency signal RF which is specific to the equipment and dependent on the quality of the reflecting layer of the optical disc. In order to be able to evaluate the test signal M with reference to the threshold levels W1, W2 which are likewise derived from the high frequency signal RF, their time constant was selected to be considerably greater in comparison with the time constant of the test signal M. The time constant of the threshold levels W1, W2 amounts to 200 msecs and that of the test signal to 2 msecs.

Independently of the form of embodiment of the first method step, at least one cause of error is then signalled in a second method step by the indicating device 4 which has already been mentioned.

For implementing the form of embodiment emanating from the process using the high frequency signal RF, there is provided an arrangement corresponding to Fig. 4 whose block circuit diagram is illustrated in Fig. 5. In analogy with the block circuit diagram of the arrangement for indicating defects emanating from the process using the degree of error that is specified in Fig. 6, this block circuit diagram comprises a processing circuit 3 to which, in this case, there is connected an indicating device 4 that is limited to the cause of error - finger print. In the same way, the processing circuit 3 is connected to the play-back equipment 1 and, in this form of embodiment, it is connected to the scanner 7 of the play-back equipment 1 which is detecting the high frequency signal RF from the optical disc. Together with the indicating device 4, it forms the fault indicating equipment 5 whose internal construction is illustrated in the arrangement corresponding to Fig. 4. This consists of three peak level rectifiers D1, C1, S1; D2, C2, S2; D3, C3, S3 which each comprise a diode D1, D2, D3, a capacitor C1, C2, C3 and a constant current source S1, S2, S3.

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constant current sources S1, S2, S3 are connected, in correspondence with the direction of the diodes D1, D2, D3, to an earth line or a supply voltage line U1 and the capacitors C1, C2, C3 are connected to the earth line. The diodes D1, D2 of the first two peak level rectifiers D1, C1, S1; D2, C2, S2 are oppositely poled and, together with the diode D3 of the second peak level rectifier D3, C3, S3, shot at [connected to] the scanner 7 which is providing the high frequency signal RF. The direction of the diode D3 of the second peak level rectifier D3, C3, S3, with which the test signal M is derived from the high frequency signal RF, corresponds to the phase angle of the high frequency signal RF and two first comparators V1, V2 are connected to the second peak level rectifier D3, C3, S3, the comparison inputs of the comparators being connected to the voltage divider R1, R2, R3 which interconnects the first peak level rectifiers D1, C1, S1; D2, C2, S2 and provides threshold levels W1, W2, which are related to the upper and lower peak levels A, B of the high frequency signal RF and which amount respectively to 10 % and 90 % of the high frequency signal RF. The fact as to whether the test signal M exceeds or falls below the threshold levels W1, W2 is determined by the two first comparators V1, V2. The output signals a, b of the two first comparators V1, V2 for the test signals M corresponding to the causes of error are illustrated in Fig. 3. By logically coupling the output signals a, b of the two first comparators V1, V2 via an AND gate G connected to the comparators V1, V2, a signal c is provided when the test signal M exhibits a level within the threshold levels W1, W2.

Since a time evaluation of the output signal M also has to be undertaken, a delay member, which is formed by an integrator and a subsequently connected comparator V3, is connected to the output of the gate G. The integrator consists of a diode D4, a constant current source S4, which is connected to a supply voltage U2, and a capacitor C4. An integration signal d, which is likewise illustrated in Fig. 3, is provided to the signal c from the gate G and supplied to the comparator V3 for comparison

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the reference voltage U3 so that the fault signal, which characterises the cause of error - finger print, is emitted at the output of the comparator V3 by virtue of the time period of 4 msecs that is defined by the reference voltage U3.

In order to ensure that the fault signal e, which only occurs for a short time, is noticed by the operator of the play-back equipment 1, a monoflop F for lengthening the pulses is connected to the comparator V3, its indicating signal f likewise being illustrated in Fig. 3 and being supplied to a light emitting diode LD which visually indicates the cause of error - finger print. This fault indicating equipment 5 emanating from the process using the high frequency signal RF may, analogously with the fault indicating equipment 5 emanating from the process using the degree of error which likewise consists of a processing circuit 3 and an indicating device 4, be combined with the play-back equipment 1 into a constructional unit 6 in correspondence with the Figures 5 and 6.

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Method of signalling the cause of at least one defect in optically scannable information carriers or optical discs, such as fingerprints and/or scratches for example,
characterised in that, in a first method step, in a play-back equipment (1) used for the reproduction of the items of information on an optical information carrier, at least one cause of error - fingerprint - comprised by an error rate (z) occurring in adjacent tracks (k) of a disc sector is determined from a comparison of an error rate (z) occurring in adjacent tracks (k) of one disc sector of a compact disc with predetermined limiting levels, in that, upon the first occurrence of an error packet (h), which is formed upon the occurrence of an error rate (z) from a plurality of error prone frames within one subcode block-period (y) corresponding to a plurality of frames, it is checked as to whether, after at least one revolution, error packets (h) likewise occur in the vicinity of the location of the occurrence of a first error packet (h) and, upon the occurrence of a number of error packets (h) corresponding to more than a predetermined plurality in a number of adjacent tracks (k) corresponding to a predetermined plurality, at least the cause of error - fingerprint - is determined and/or
that in a first method step for at least one cause of error - fingerprint, in a play-back equipment (1) used for the reproduction of the items of information on an optical information carrier, a test signal (M) in the form of an envelope curve signal corresponding to the amplitude of a high frequency signal (RF) is formed from the high frequency signal (RF) from the optical information carrier which is detected by the play-back equipment (1) and, upon the occurrence of the test signal (M), over a time span exceeding a predetermined time span, within an upper threshold level (W1) which corresponds to an upper level of the test signal (M) of the high frequency signal (RF) when not subjected to any interference and a lower threshold level (W2) which corresponds to a lower level of the

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signal (M) of the high frequency signal (RF) when not bjected to any interference, at least the cause of error - fingerprint - is determined and the cause of error is signalled in a second method step.

2. Method in accordance with Claim 1, characterised in that, an error packet (h) is formed upon the occurrence of an error rate (z) from four error prone frames within a subcode block-period (y) corresponding to 96 frames and it is checked, after at least one revolution, as to whether error packets (h) likewise occur in the vicinity of the location of the occurrence of a first error packet (h) and, upon the occurrence of more than three error packets (h) in five adjacent tracks (k), the cause of error - fingerprint - is determined.

3. Method in accordance with Claim 1, characterised in that, upon the occurrence over a time span exceeding four milliseconds of the test signal (M) within an upper threshold level (W1) which corresponds to a level of 90 % of the test signal (M) of the high frequency signal (RF) when not subjected to any interference and a lower threshold level (W2) which corresponds to a level of 10 % of the test signal (M) of the high frequency signal (RF) when not subjected to any interference, the cause of error - fingerprint - is determined.

4. Method in accordance with any of the Claims 1 to 3, characterised in that, at least one cause of error is signalled visually and/or acoustically over a time period transcending the immediate period of its occurrence until an optical disc or a magazine of optical discs is inserted afresh.

5. Arrangement for signalling the cause of at least one defect in optically scannable information carriers or optical discs, such as fingerprints and/or scratches for example, by comparing the locations of the occurrence of an error signal, characterised in that, in a play-back equipment (1) used for the reproduction of the items of information, there is provided a

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cessing circuit (3) for processing the signals from an ical information carrier representing the defects and for pplying them to an indicating device (4) for at least one ause of error - fingerprint - wherein the processing circuit 3) is a computational unit which is connected to a decoder (2) of the play-back equipment (1) and sets the relationship between the error prone frames and a fault location that is calculated from subcode blocks (y) and with which, at least one cause of error - fingerprint - of a compact disc comprised by an error rate (z) occurring in adjacent tracks (k) of one disc sector is determined by comparison with predetermined limiting levels of an error rate (z) occurring in adjacent tracks (k) of one disc sector, in that, upon the first occurrence of an error packet (h) which is formed upon the occurrence of an error rate (z) from a plurality of error prone frames within a subcode block-period (y) corresponding to a multiplicity of frames, it is checked, after at least one revolution, as to whether error packets (h) likewise occur in the vicinity of the location of the occurrence of a first error packet (h) and, upon the occurrence of a number of error packets (h) corresponding to more than a predetermined plurality in a number of adjacent tracks (k) corresponding to a predetermined plurality, at least the cause of error - fingerprint - is determined and the processing circuit (3) is connected to the indicating device (4).

6. Arrangement in accordance with Claim 5, characterised in that, an error packet (h) is formed by the computational unit upon the occurrence of an error rate (z) from four error prone frames within a subcode block-period (y) corresponding to 96 frames and it is checked, after at least one revolution, as to whether error packets (h) likewise occur in the vicinity of the location of the occurrence of a first error packet (h) and, upon the occurrence of more than three error packets (h) in five adjacent tracks (k), the cause of error - fingerprint - is determined.

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arrangement for signalling the cause of at least one defect in optically scannable information carriers or optical discs, such as fingerprints and/or scratches for example, by comparing the locations of the occurrence of an error signal, wherein a specific anomaly in the reproduced high frequency signal is established in a first method step, characterised in that, in a play-back equipment (1) used for the reproduction of the items of information, there is provided a processing circuit (3) for processing the signals from an optical information carrier representing the faults and for supplying them to an indicating device (4) for at least one cause of error - fingerprint, wherein the processing circuit (3) forms a test signal (M) in the form of an envelope curve signal corresponding to the amplitude of the high frequency signal (RF) and, upon the occurrence of the test signal (M), over a time span exceeding a time span formed by a delay member, within an upper threshold level (W1) which corresponds to an upper level of the test signal (M) of the high frequency signal (RF) when not subjected to any interference and which is formed by a threshold level circuit and a lower threshold level (W2) which corresponds to a lower level of the test signal (M) of the high frequency signal (RF) when not subjected to any interference and which is formed by thethreshold level circuit, at least the cause of error - fingerprint - is determined and the processing circuit (3) is connected to the indicating device (4).

8. Arrangement in accordance with Claim 7, characterised in that, the cause of error - fingerprint - is determined by the processing circuit (3) upon the occurrence over a time span exceeding four milliseconds of the test signal (M) within an upper threshold level (W1) which corresponds to a level of 90 % of the test signal (M) of the high frequency signal (RF) when not subjected to any interference and a lower threshold level (W2) which corresponds to a level of 10 % of the test signal (M) of the high frequency signal (RF) when not subjected to any interference, and the threshold level circuit consists of two

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oppositely poled first peak level rectifiers (D1, C1, S1; D2, C2, S2) which are connected to each other via a voltage divider (R1, R2, R3), to which there are connected two first comparators (V1, V2) which are connected, on the input side, to a second peak level rectifier (D3, C3, S3) that provides the test signal (M) from the high frequency signal (RF) and, on the output side, to the inputs of a gate (G).

9. Arrangement in accordance with Claim 8, characterised in that, the peak level rectifiers (D1, C1, S1; D2, C2, S2; D3, C3, S3) each consist of a diode (D1, D2, D3), a capacitor (C1, C2, C3) and a constant current source (S1, S2, S3) and the first peak level rectifiers (D1, C1, S1; D2, C2, S2) exhibit a substantially greater time constant vis a vis the second peak level rectifier (D3, C3, S3) whereby the time constants are switchable, especially for determining the cause of error, when playing back at a higher speed.

10. Arrangement in accordance with any of the Claims 7 to 9, characterised in that, the delay member is an integrator which is formed by a diode (D4), a capacitor (C4) and a constant current source (S4) and is followed by a comparator (V3) and in that there is provided a monoflop (F) and/or a resettable store for the indication of the cause of an error over a time period transcending the period of its occurrence.

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