



CLAIMS

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1. An information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track pitches, on which information recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track pitch detection means for detecting the track pitch of the information disc from the information disc;

a track cross detection means for generating track cross signals on the basis of playback signals that are generated when the reading means crosses the information tracks;

a count means for counting track cross pulses that are detected by the track cross detection means, and outputting the count; and

a control means for
determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus on the basis of the count and the



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track pitch, or determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration speed of the information disc recording/playback apparatus on the basis of the count, the track pitch, and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

2. An information disc recording/playback apparatus as defined in Claim 1 further comprising:

a track cross direction detection means for detecting a track cross direction indicating the direction in which the reading means crosses the information tracks;

a rotation angle detection means for outputting rotation angle information of the disc rotation means; and

said count means for counting the track cross pulses with signs, which are detected by the track cross detection means, on the basis of the result of the detection by the track cross direction detection means, and the rotation angle information outputted from the rotation angle detection means.

3. An information disc recording/playback apparatus as defined in Claim 1 further comprising:

a track cross direction detection means for detecting a track cross direction indicating the direction in which the reading means crosses the information tracks;

a track cross speed detection means for detecting the frequency of the track cross pulses;

a rotation angle detection means for outputting rotation angle information of the disc rotation means; and

said count means for

counting the track cross pulses with signs, which are detected by the track cross detection means, on the basis of the result of the detection by the track cross direction detection means and the rotation angle information outputted from the rotation angle detection means, while detecting the track cross direction by the track cross direction detection means when the result of the detection by the track cross speed detection means indicates that the track cross speed is lower than a predetermined value, and

counting the track cross pulses with signs, without detecting the track cross direction by the track cross direction detection means, on the basis of the track cross direction that has just previously been detected by the track cross direction detection means, when the result of the detection by the track cross speed detection means indicates that the track cross speed becomes higher than the predetermined value.

4. An information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track pitches, on which information recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track pitch detection means for detecting the track pitch of the information disc from the information disc;

a track cross detection means for generating track cross signals on the basis of playback signals that are generated when the reading means crosses the information tracks;

a track cross direction detection means for detecting a track cross direction indicating the direction in which the reading means crosses the information tracks;

a rotation angle detection means for outputting rotation angle information of the disc rotation means, which is divided into n areas for one rotation;

a zero cross area detection means for detecting two areas where the track cross speed has a lowest value, from among the n areas;

a count means for

counting track cross pulses with signs, which are detected by the track cross detection means, on the basis of the result of the detection by the track cross direction detection means and the rotation angle information outputted from the rotation angle detection means, while detecting the track cross direction by the track cross direction detection means, in an area where the track cross speed has the lowest value according to the result of the detection by the zero cross area detection means,

counting the track cross pulses with signs, without detecting the track cross direction by the track cross direction detection means, on the basis of the track cross direction that has just previously been detected by the track cross direction detection means, in an area where the track cross speed does not have the lowest value according to the result of the detection by the zero cross area detection means, and

outputting the count; and

a control means for

determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus on the basis of the count and the track pitch, or determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration speed of the information disc recording/playback apparatus on the

basis of the count, the track pitch, and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

5. An information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track pitches, on which information recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track pitch detection means for detecting the track pitch of the information disc from the information disc;

a track cross detection means for generating track cross signals on the basis of playback signals that are generated when the reading means crosses the information tracks;

a track cross direction detection means for detecting a track cross direction indicating the direction in which the reading

means crosses the information tracks;

a rotation angle detection means for outputting rotation angle information of the disc rotation means, which is divided into n areas for one rotation;

a zero cross area detection means for detecting two areas where the track cross speed has a lowest value, from among the n areas;

a count means including

a first count means for counting track cross pulses with signs, which are detected by the track cross detection means, on the basis of the result of the detection by the track cross direction detection means and the rotation angle information outputted from the rotation angle detection means, and

a second count means for counting the track cross pulses detected by the track cross detection means, without detecting the track cross direction, on the basis of the rotation angle information outputted from the rotation angle detection means,

said count means for

obtaining a first count of the first count means when the drive means is disabled and the information disc loaded on the disc rotation means is rotated,

obtaining a second count in which a sign is added to the count of the second count means, on the basis of the track cross direction which has just previously been detected by the track cross direction detection means, when the drive means is disabled

and the information disc loaded on the disc rotation means is rotated,

selecting the first count in an area where the track cross speed has the lowest value according to the result of the detection by the zero cross area detection means,

selecting the second count in an area where the track cross speed does not have the lowest value according to the result of the detection by the zero cross area detection means, and

counting the track cross pulses for every rotation angle and outputting it; and

a control means for

determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus on the basis of the counts and the track pitch, or determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration speed of the information disc recording/playback apparatus on the basis of the counts, the track pitch, and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

6. An information disc recording/playback apparatus as defined in Claim 4 or 5, wherein

said rotation angle detection means divides the rotation angle information of the disc rotation means into six areas for each rotation, and outputs the divided information; and

said zero cross area detection means detects, as zero cross areas, an area where the count of the count means has the smallest value, and an area on a diagonal line with respect to the area.

7. An information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track pitches, on which information recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track pitch detection means for detecting the track pitch of the information disc from the information disc;

a track cross detection means for generating track cross signals on the basis of playback signals that are generated when

the reading means crosses the information tracks;

a count means for counting track cross pulses that are detected by the track cross detection means, and outputting the count; and

a control means for

using, as the count, a difference between the track cross count that is obtained when the information disc is rotated at a first rotation speed and at least one rotation speed that is higher than the first rotation speed, and a count that is obtained with the at least one rotation speed higher than the first rotation speed,

determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus on the basis of the count and the track pitch, or determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration speed of the information disc recording/playback apparatus on the basis of the count, the track pitch, and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

8. An information disc recording/playback apparatus as defined

in Claim 7, wherein

the first rotation speed is a sufficiently low speed at which no vibration occurs between the information disc and the reading means, and the track cross pulses due to the eccentricities of the information disc and the disc rotation means are counted.

9. An information disc recording/playback apparatus as defined in Claim 7, wherein

said count means counts the track cross pulses at the first rotation speed for a predetermined number of times, and counts the track cross pulses with the at least one rotation speed that is higher than the first rotation speed, for the predetermined number of times; and

said control means employs, as the count, an average of counts for more than one time, which are selected from among the counts obtained by the above-described repetition, or a value in proportion to the average.

10. An information disc recording/playback apparatus as defined in Claim 7, wherein

said rotation angle detection means outputs the rotation angle information of the disc rotation means, which is divided into six areas for one rotation; and

when a difference between the track cross count measured at the first rotation speed with each of the six-divided rotation

angles, and the track cross count measured with the at least one rotation speed higher than the first rotation speed is as follows:

$$\text{DAT}[n] = \text{DAT}[0], \text{DAT}[1], \text{DAT}[2], \text{DAT}[3], \text{DAT}[4], \text{DAT}[5]$$

(when $n > 5$, $n = n \bmod 6$ (a remainder of n being divided by 6),

the control means determines a maximum rotation speed that is lower than the allowable amplitude of the information disc recording/playback apparatus, on the basis of a value in proportion to a vibration amount 1 or a vibration amount 2, or a value in proportion to the second power of the vibration amount 1 or the second power of the vibration amount 2, and the track pitch, said vibration amounts 1 and 2 being represented as follows:

(Formula 1)

$$\text{vibration amount } 1[n] = \frac{2}{\sqrt{3}} \sqrt{|\text{DAT}[n]^2 + \text{DAT}[n]\text{DAT}[n+1] + \text{DAT}[n+1]^2|}$$

(Formula 2)

$$\text{vibration amount } 2[n] = \frac{2}{\sqrt{3}} \sqrt{|\text{DAT}[n]^2 - \text{DAT}[n]\text{DAT}[n+2] + \text{DAT}[n+2]^2|}$$

11. An information disc recording/playback apparatus as defined in Claim 10, wherein

said control means determines a maximum rotation speed that is lower than the allowable amplitude of the information disc recording/playback apparatus, on the basis of

a value in proportion to an average of twelve vibration amounts 1 or vibration amounts 2 which are calculated for $n=0\sim 5$ according to (Formula 1) or (Formula 2), and the track pitch, or

a value in proportion to an average of m pieces of central values selected from among the twelve vibration amounts 1 or vibration amounts 2, and the track pitch, or

a value in proportion to an average of m pieces of central values selected from the second powers of the twelve vibration amounts 1 or vibration amounts 2, and the track pitch.

12. An information disc recording/playback apparatus as defined in Claim 7, wherein

said rotation angle detection means divides the rotation angle information of the disc rotation means into six areas for one rotation, and outputs the divided rotation angle information; and

when a difference between the track cross count which is obtained at the first rotation speed for each of the six-divided rotation angles, and the track cross count which is obtained with the at least one rotation speed higher than the first rotation speed is represented by

$$\text{DAT}[n] = \text{DAT}[0], \text{DAT}[1], \text{DAT}[2], \text{DAT}[3], \text{DAT}[4], \text{DAT}[5]$$

(when $n > 5$, $n = n \bmod 6$ (a remainder of n being divided by 6),

and the rotation speed of the disc rotation means is

$V_{\text{rpm}}[\text{rpm}]$,

said control means determines a maximum rotation speed that is lower than the allowable amplitude of the information disc recording/playback apparatus, on the basis of a value in proportion to a vibration speed 1 or a vibration speed 2, or a value in proportion to the second power of the vibration speed 1 or the second power of the vibration speed 2, and the track pitch, said vibration speeds 1 and 2 being represented by

(Formula 3)

$$\text{vibration speed 1}[n] = \frac{2\pi V_{rpm}}{60} \frac{2}{\sqrt{3}} \sqrt{|DAT[n]^2 + DAT[n]DAT[n+1] + DAT[n+1]^2|}$$

(Formula 4)

$$\text{vibration speed 2}[n] = \frac{2\pi V_{rpm}}{60} \frac{2}{\sqrt{3}} \sqrt{|DAT[n]^2 - DAT[n]DAT[n+2] + DAT[n+2]^2|}$$

13. An information disc recording/playback apparatus as defined in Claim 12, wherein

said control means determines a maximum rotation speed that is lower than the allowable amplitude of the information disc recording/playback apparatus, on the basis of

a value in proportion to an average of twelve vibration speeds 1 or vibration speeds 2 which are calculated for $n=0\sim5$ according to (Formula 3) and (Formula 4), respectively, and the track pitch, or

a value in proportion to an average of m pieces of central values selected from the values of the twelve vibration

speeds 1 or vibration speeds 2, and the track pitch, or

a value in proportion to an average of m pieces of central values selected from the second powers of the twelve vibration speeds 1 or the second powers of the vibration speeds 2, and the track pitch.

14. An information disc recording/playback apparatus as defined in Claim 7, wherein

said rotation angle detection means divides the rotation angle information of the disc rotation means into six areas for one rotation, and outputs the divided rotation angle information; and

when a difference between the track cross amount which is measured at the first rotation speed for each of the six-divided rotation angles, and the track cross amount which is measured with the at least one rotation speed higher than the first rotation speed is represented by

$$\text{DAT}[n] = \text{DAT}[0], \text{DAT}[1], \text{DAT}[2], \text{DAT}[3], \text{DAT}[4], \text{DAT}[5]$$

(when $n > 5$, $n = n \bmod 6$ (a remainder of n being divided by 6),

and the rotation speed of the disc rotation means is

$V_{\text{rpm}}[\text{rpm}]$,

said control means determines a maximum rotation speed that is lower than the allowable amplitude of the information disc recording/playback apparatus, on the basis of a value in proportion to a vibration acceleration 1 or a vibration

acceleration 2, or a value in proportion to the second power of the vibration acceleration 1 or the second power of the vibration acceleration 2, and the track pitch, said vibration accelerations 1 and 2 being represented by

(Formula 5)

vibration acceleration 1[n]=

$$\left(\frac{2\pi V_{rpm}}{60}\right)^2 \frac{2}{\sqrt{3}} \sqrt{|DAT[n]^2 + DAT[n]DAT[n+1] + DAT[n+1]^2|}$$

(Formula 6)

vibration acceleration 2[n]=

$$\left(\frac{2\pi V_{rpm}}{60}\right)^2 \frac{2}{\sqrt{3}} \sqrt{|DAT[n]^2 - DAT[n]DAT[n+2] + DAT[n+2]^2|}$$

15. An information disc recording/playback apparatus as defined in Claim 14, wherein

said control means determines a maximum rotation speed that is lower than the allowable amplitude of the information disc recording/playback apparatus, on the basis of

a value in proportion to an average of twelve vibration accelerations 1 or vibration accelerations 2 which are calculated for $n=0\sim5$ according to (Formula 5) and (Formula 6), respectively, and the track pitch, or

a value in proportion to an average of m pieces of central values selected from the values of the twelve vibration accelerations 1 or vibration accelerations 2, and the track pitch,

or

a value in proportion to an average of m pieces of central values selected from the second powers of the twelve vibration accelerations 1 or the second powers of the twelve vibration accelerations 2, and the track pitch.

16. An information disc recording/playback apparatus as defined in Claim 1, wherein

said track pitch detection means detects the type of the loaded information disc, and selects a track pitch corresponding to the detected disc type, with reference to a table in which standard track pitches corresponding to the respective types of the information discs are described.

17. An information disc recording/playback apparatus as defined in Claim 1 further comprising:

a move distance detection means for detecting the distance by which the reading means moves; and

said track pitch detection means for making the reading means move for a predetermined period of time or by a predetermined distance when the information disc is loaded, counting the number of tracks the reading means crosses while it is moving, and detecting the track pitch on the basis of the move distance and the track cross count.

18. An information recording/playback apparatus as defined in Claim 1, further comprising:

a linear speed detection means for detecting the linear speed of the information disc;

a playback speed detection means for detecting the current playback speed of the information disc; and

said track pitch detection means for calculating the track pitch of the information disc, on the basis of the detected type of the information disc, the linear speed of the information disc detected by the linear speed detection means, the playback speed detected at a predetermined rotation speed and a predetermined address, the predetermined rotation speed, the predetermined address, the innermost radius of data area which is unique to the detected type of the disc, and the data rate when the disc is played at the predetermined playback speed which is unique to the type of the disc.

19. An information disc recording/playback apparatus capable of recording or playing an information disc on which information recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track cross detection means for generating track cross pulses on the basis of playback signals that are generated when the reading means crosses the information tracks;

a variable filter means for preventing counting of pulses whose widths are narrower than a set value, among the track cross pulses;

a count means for counting the pulses outputted from the variable filter means; and

a control means for

determining a maximum rotation speed that is lower than an allowable number of track crosses of the information disc recording/playback apparatus on the basis of the count, or determining a maximum rotation speed that is lower than an allowable track cross speed or track cross acceleration of the information disc recording/playback apparatus on the basis of the count and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

20. An information disc recording/playback apparatus as defined in Claim 19, further comprising:

a track cross direction detection means for detecting the track cross direction which indicates the direction in which the reading means crosses the information tracks;

a rotation angle detection means for outputting rotation angle information of the disc rotation means; and

said count means for counting the track cross pulses with signs, which are detected by the track cross detection means, on the basis of the result of the detection by the track cross direction detection means and the rotation angle information outputted from the rotation angle detection means.

21. An information disc recording/playback apparatus capable of recording or playing an information disc on which information recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track cross detection means for generating track cross pulses on the basis of playback signals that are generated when the reading means crosses the information tracks;

a variable filter means for preventing counting of pulses

whose widths are narrower than a set value, among the track cross pulses;

a track cross direction detection means for detecting the track cross direction which indicates the direction in which the reading means crosses the information tracks;

a rotation angle detection means for outputting rotation angle information of the disc rotation means;

a count means including

a first count means for counting the track cross pulses with signs, which are outputted from the filter means, on the basis of the result of the detection by the track cross direction detection means and the rotation angle information outputted from the rotation angle detection means, and

a second count means for counting the track cross pulses outputted from the filter means, without detecting the track cross direction, on the basis of the rotation angle information outputted from the rotation angle detection means,

said count means for

obtaining the count of the first or second count means when an initial value of count is set for setting an initial value of the variable filter means, a value of the variable filter is set on the basis of the count and the current rotation speed, the drive means is disabled, and the information disc loaded on the disc rotation means is rotated at a predetermined rotation speed, and

repeating the process of obtaining the count of the first or second count means when the value of the variable filter is set and the information disc is rotated at the predetermined speed, for a required number of times, thereby obtaining the counts for more than one rotation; and

a control means for

determining a maximum rotation speed that is lower than an allowable number of track crosses of the information disc recording/playback apparatus on the basis of the count, or determining a maximum rotation speed that is lower than an allowable track cross speed or track cross acceleration of the information disc recording/playback apparatus on the basis of the count and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

22. An information disc recording/playback apparatus as defined in Claim 21, wherein

said count means obtains the count of the first count means when the value of the variable filter is set on the basis of the count and the current rotation speed, the drive means is disabled, and the information disc loaded on the disc rotation means is rotated at a predetermined rotation speed, and repeats the

process of obtaining the count of the first count means when the information disc is rotated at the predetermined speed, for a required number of times, thereby obtaining the counts for more than one rotation.

23. An information disc recording/playback apparatus as defined in Claim 21 or 22, wherein

when setting the value of the variable filter on the basis of the count and the current rotation speed, if the count is one obtained without detecting the track cross direction,

assuming that the total number of track crosses per rotation is $4T_c$, and the current rotation speed is V_{rpm} ,

a maximum track cross speed is calculated by
(Formula 7)

$$\text{maximum track cross speed} = \frac{2\pi V_{rpm}}{60} T_c$$

and, on the basis of the calculated maximum track cross speed, the value of the variable filter is set, and a minimum track count pulse width is set.

24. An information disc recording/playback apparatus as defined in Claim 21 or 22, wherein

said rotation angle detection means divides the rotation angle information of the disc rotation means into six areas for one rotation and outputs the divided rotation angle information,

and

when the count is one obtained when the track cross direction is detected, the count at each of the six-divided rotation angles is represented by

$$DAT[n] = DAT[0], DAT[1], DAT[2], DAT[3], DAT[4], DAT[5]$$

(when $n > 5$, $n = n \bmod 6$ (a remainder of n being divided by 6),

and

the rotation speed of the disc rotation means is $V_{rpm}[rpm]$,

a value in proportion to a maximum track cross speed 1 or a maximum track cross speed 2 which are represented as follows are calculated as a maximum track cross speed,

(Formula 8)

maximum track cross speed 1[n]=

$$\frac{2\pi V_{rpm}}{60} \frac{2}{\sqrt{3}} \sqrt{|DAT[n]^2 + DAT[n]DAT[n+1] + DAT[n+1]^2|}$$

(Formula 9)

maximum track cross speed 2[n]=

$$\frac{2\pi V_{rpm}}{60} \frac{2}{\sqrt{3}} \sqrt{|DAT[n]^2 - DAT[n]DAT[n+2] + DAT[n+2]^2|}$$

and a value in proportion to an average of twelve maximum track cross speeds 1 or maximum track cross speeds 2 which are calculated for $n=0 \sim 5$ according to (Formula 8) and (Formula 9), respectively, or a value in proportion to an average of m pieces of central values selected from the values of the twelve maximum track cross speeds 1 or maximum track cross speeds 2, is employed

as a maximum track cross speed.

25. An information disc recording/playback apparatus as defined in Claim 24, wherein

when the value of the variable filter is set on the basis of the count and the current rotation speed, if the count is one obtained when the track cross direction is detected, the count at each of the six-divided rotation angles is represented by

$$\text{DAT}[n] = \text{DAT}[0], \text{DAT}[1], \text{DAT}[2], \text{DAT}[3], \text{DAT}[4], \text{DAT}[5]$$

(when $n > 5$, $n = n \bmod 6$ (a remainder of n being divided by 6)),
and

the rotation speed of the disc rotation means is $V_{\text{rpm}}[\text{rpm}]$,

a maximum track cross speed is calculated on the basis of the following formulae,

(Formula 10)

$$4T_c = |\text{DAT}[0]| + |\text{DAT}[1]| + |\text{DAT}[2]| + |\text{DAT}[3]| + |\text{DAT}[4]| + |\text{DAT}[5]|$$

(Formula 11)

$$\text{maximum track cross speed} = \frac{2\pi V_{\text{rpm}}}{60} T_c \frac{1}{\cos \frac{\pi}{6}} = \frac{2\pi V_{\text{rpm}}}{60} T_c \frac{2}{\sqrt{3}}$$

and, on the basis of the maximum track cross speed so calculated, the value of the variable filter is set, and a minimum track count pulse width is set.

26. An information disc recording/playback apparatus as defined in Claim 19, wherein

when setting the maximum rotation speed of the information disc recording/playback apparatus, the control means employs, as the count, a difference between the track cross count that is obtained when the information disc is rotated at a first rotation speed and at least one rotation speed that is higher than the first rotation speed, and the count obtained with the at least one rotation speed that is higher than the first rotation speed.

27. An information disc recording/playback apparatus as defined in Claim 19, wherein

the track cross count is the number of track crosses which is calculated on the basis of an average of counts corresponding to more than one rotation, which counts are selected from among the counts obtained by the repetition.

28. An information disc recording/playback apparatus as defined in Claim 27, wherein

when calculating the track cross count, if the value of the variable filter means which is reset by repetition at the same rotation speed changes by a predetermined value or more, the counts obtained before the change are not used as the counts for calculating the average.

29. An information disc recording/playback apparatus capable of recording or playing an information disc on which information

recording tracks are formed spirally or concentrically, said apparatus comprising:

a disc rotation means for rotating the information disc at a predetermined speed;

a reading means for reading an information signal from the disc;

a drive means for driving the reading means in the direction of the radius of the disc;

a track cross detection means for generating track cross signals on the basis of playback signals that are generated when the reading means crosses the information tracks;

a pulse width storage means for holding the pulse width of a just-previous track cross signal;

a filter means for comparing the pulse width of the just-previous track cross signal with the pulse width of the current track cross signal, and preventing the current track cross signal from being outputted when the current track cross signal is reduced by a predetermined value or more;

a count means for counting the pulses which are outputted from the variable filter means; and

a control means for

determining a maximum rotation speed that is lower than an allowable number of track crosses of the information disc recording/playback apparatus on the basis of the obtained counts for one or more rotation, or determining a maximum rotation speed

that is lower than an allowable track cross speed or track cross acceleration of the information disc recording/playback apparatus on the basis of the obtained counts for one or more rotation, and the current disc rotation speed, and

controlling the disc rotation means so that the disc rotation means rotates the information disc at a speed lower than the allowable maximum rotation speed to record or reproduce data in/from the disc.

30. An information disc recording/playback apparatus as defined in Claim 29, wherein

said information disc recording/playback apparatus is able to record or play two or more kinds of information discs having different track pitches; and

setting of the maximum rotation speed of the information disc recording/playback apparatus is performed by

detecting the track pitch of the information disc, and

determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus on the basis of the count and the track pitch, or determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration of the information disc recording/playback apparatus on the basis of the count, the track pitch, and the current disc rotation speed.

31. A method for detecting vibrations of an information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track pitches, on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of detecting the track pitch of the information disc;

a step of counting track cross pulses on the basis of playback signals which are generated when the information disc fixedly loaded on the apparatus is rotated and a reading unit crosses the information tracks on the information disc, thereby obtaining a count;

a step of determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus, on the basis of the obtained count and the track pitch; and

a step of determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration of the information disc recording/playback apparatus, on the basis of the count, the track pitch, and the current disc rotation speed.

32. A method for detecting vibrations of an information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track

pitches, on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of detecting the track pitch of the information disc;

a step of detecting the track cross direction indicating the direction in which a reading means crosses the information tracks;

a step of outputting rotation angle information of the information disc, which is divided into n areas for one rotation;

a step of detecting two areas wherein the track cross speed has the lowest value, from among the n -divided areas;

a step of counting track cross pulses, which are based on playback signals that are generated when the information disc fixedly loaded onto the apparatus is rotated and the reading means crosses the information tracks on the information disc, such that the track cross pulses with signs are counted while detecting the track cross direction in an area where the track cross speed has the lowest value, on the basis of the detected track cross direction and the rotation angle information;

a step of counting track cross pulses, which are based on playback signals that are generated when the information disc fixedly loaded onto the apparatus is rotated and the reading means crosses the information tracks on the information disc, such that the track cross pulses with signs are counted without detecting the track cross direction, on the basis of the track cross direction which has just previously been detected, in an

area where the track cross speed does not have the lowest value;

a step of determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus, on the basis of the obtained count and the track pitch; and

a step of determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration of the information disc recording/playback apparatus, on the basis of the count, the track pitch, and the current disc rotation speed.

33. A method for detecting vibrations of an information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track pitches, on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of detecting the track pitch of the information disc;

a step of detecting the track cross direction indicating the direction in which a reading means crosses the information tracks;

a step of outputting rotation angle information of the information disc, which is divided into n areas for one rotation;

a step of detecting two areas wherein the track cross speed has the lowest value, from among the n -divided areas;

a step of obtaining a first count on the basis of playback

signals which are generated when the information disc fixedly loaded onto the apparatus is rotated and the reading means crosses the information tracks on the information disc;

a step of obtaining a second count in which a sign is added to the count, on the basis of the track cross direction which has just previously been detected, when the information disc is rotated;

a step of selecting the first count in an area where the track cross speed has the lowest value, and selecting the second count in an area where the track cross speed does not have the lowest value, thereby counting the track cross pulses for every rotation angle and outputting the count;

a step of determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus, on the basis of the obtained count and the track pitch; and

a step of determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration of the information disc recording/playback apparatus, on the basis of the count, the track pitch, and the current disc rotation speed.

34. A method for detecting vibrations of an information disc recording/playback apparatus capable of recording or playing at least two kinds of information discs having different track

pitches, on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of detecting the track pitch of the information disc;

a step of counting track cross pulses on the basis of playback signals which are generated when the information disc fixedly loaded onto the apparatus is rotated at a first rotation speed and a reading unit crosses the information tracks on the information disc, thereby obtaining a count;

a step of calculating a difference between a track cross count which is obtained when the information disc is rotated with at least one rotation speed that is higher than the first rotation speed, and a count which is obtained when the information disc is rotated at the first rotation speed, thereby obtaining a difference count;

a step of determining a maximum rotation speed that is lower than an allowable vibration amplitude of the information disc recording/playback apparatus, on the basis of the obtained difference count and the track pitch; and

a step of determining a maximum rotation speed that is lower than an allowable vibration speed or vibration acceleration of the information disc recording/playback apparatus, on the basis of the difference count, the track pitch, and the current disc rotation speed.

35. A method for detecting vibrations of an information disc

recording/playback apparatus capable of recording or playing an information disc on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of counting track cross pulses on the basis of playback signals which are generated when the information disc fixedly loaded on the apparatus is rotated and a reading unit crosses the information tracks on the information disc, thereby obtaining a count;

a step of comparing the widths of the detected track pulses with a predetermined value, and invalidating the counts of track pulses whose widths are shorter than the predetermined value;

a step of determining a maximum rotation speed that is lower than an allowable number of track crosses of the information disc recording/playback apparatus, on the basis of the count; and

a step of determining a maximum rotation speed that is lower than an allowable track cross speed or track cross acceleration, on the basis of the count and the current disc rotation speed.

36. A method for detecting vibrations of an information disc recording/playback apparatus capable of recording or playing an information disc on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of counting track cross pulses on the basis of playback signals which are generated when the information disc fixedly loaded on the apparatus is rotated and a reading unit

crosses the information tracks on the information disc, thereby obtaining a count;

a step of detecting the track cross direction indicating the direction in which the reading means crosses the information tracks;

a step of outputting rotation angle information of the information disc;

a step of comparing a set pulse width with the pulse width of the current track cross pulse, and invalidating the count of the current track cross pulse when its pulse width is decreased by a predetermined value or more;

a first count step of counting the track cross pulses with signs, whose widths are not decreased by the predetermined value or more, on the basis of the track cross direction and the rotation angle information;

a second count step of counting the track cross pulses whose widths are not decreased by the predetermined value or more, without detecting the track cross direction, on the basis of the rotation angle information;

a step of setting the set pulse widths by repeating the steps of obtaining the first and second counts by a required number of times;

a step of obtaining a count corresponding to one or more rotation of the information disc, by obtaining the counts obtained in the first and second count steps using the repeatedly

set pulse widths;

a step of determining a maximum rotation speed that is lower than an allowable number of track crosses of the information disc recording/playback apparatus, on the basis of the count; and

a step of determining a maximum rotation speed that is lower than an allowable track cross speed or track cross acceleration, on the basis of the count and the current disc rotation speed.

37. A method for detecting vibrations of an information disc recording/playback apparatus capable of recording or playing an information disc on which information recording tracks are formed spirally or concentrically, said method comprising:

a step of counting track cross pulses on the basis of playback signals which are generated when the information disc fixedly loaded on the apparatus is rotated and a reading unit crosses the information tracks on the information disc, thereby obtaining a count;

a step of storing the pulse width of a track cross pulse which has just previously been detected;

a step of comparing the stored track cross pulse width with the pulse width of the current track cross pulse, and invalidating the count of the current track cross pulse when its pulse width is decreased by a predetermined value or more;

a step of determining a maximum rotation speed that is lower than an allowable number of track crosses of the information disc

recording/playback apparatus, on the basis of the count; and

a step of determining a maximum rotation speed that is lower than an allowable track cross speed or track cross acceleration, on the basis of the count and the current disc rotation speed.