

RECORDING DEVICE AND A CONTROLLER AND  
CONTROL METHOD FOR A RECORDING DEVICE

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Field of the invention

The present invention relates to a recording device such as a hard disk drive, a controller and a control method for a recording device, and in particular has applications for reducing or preventing malfunctions of such a device arising from electromagnetic wave noise.

Background

As is well known, feedback control can be used for head positioning in a rotary recording device such as a hard disk drive in which a recording medium is rotationally driven. To be more specific, positional information (servo pattern) recorded on the recording medium in advance is read from a head to identify a current position. A hard disk controller feeds back deviation between a target address (target position) and the current position to a servo controller, which calculates driving currents to be inputted to a voice coil motor in order to eliminate the deviation. The voice coil motor drives an arm according to the inputted driving currents to change the position of the head placed at the end of the arm. If such a feedback loop functions properly, then the head is followed to the target position (target address). After following the head to the target track (or a cylinder), reading or writing information via the head is enabled.

If the head receives a disturbance such as an external impact before being positioned to follow the target track, a normally functioning servo system detects the disturbance to automatically control the head position including taking account of the disturbance. However, if the head follows the target track and receives a disturbance such as an external impact

immediately after reading or writing is enabled, reading or writing is performed in a state where the head is off the track (off-track state). In the case of a read operation, it fails to read and so performs the read operation again. However, things are not simple in the case of writing. To be more specific, information may be written somewhere other than on the target track on which it should originally be written - in an intermediate region to an adjacent track or written onto the adjacent track in a superimposing manner. Writing to the adjacent track in a superimposing manner is unacceptable since it eliminates original data of the adjacent track. In addition, writing data to the intermediate region makes it difficult to read and so leads to reading errors later.

In recent years, information processing terminals having a communication function represented by a portable telephone and a personal digital assistant have become widespread. In these apparatuses, electromagnetic waves are radiated from the apparatuses when in use. Frequencies of the radiated electromagnetic waves are often in the band 800 MHz to 1.5 GHz, or higher frequencies. The frequencies handled in recent years tend to be increasing in accordance with increases in handled information content and increases in the number of users.

According to experiments and reviews by the inventors of the present invention, there are cases where, due to an effect of high frequency and high field electromagnetic waves radiated from these apparatuses, the head positioning on the aforementioned write operation becomes unstable enough to write the information off the desired track. Related to this problem is the trend in recent years towards decreasing track width and the need for high-precision head position control for higher recording density of hard disk drives. With such a background, the above described problem of the effect of the background electromagnetic waves on the head position control is becoming serious.

The inventors of the present invention have inferred that this problem arises because the electromagnetic waves caused a circuit pattern and wiring of a servo control system to induce high frequencies, which adversely effects the servo system. The above-mentioned problem of occurrence of off-track writing may lead to a situation where, if a user is operating a personal computer while talking by a portable telephone, information stored in the hard disk drive is unintentionally erased.

It is theoretically possible, by making an electromagnetic wave shield of the hard disk drive perfect, to prevent the above-mentioned unstableness of the head positioning by electromagnetic waves. However, a perfect electromagnetic wave shield is difficult to implement in reality, as well as in terms of the costs involved.

In addition, personal computers and the like often have their cabinets shielded by conductive paint. However, it has been found that, as a ground is not completely established, the shield functions instead like a radiation antenna and secondary radiation therefrom causes the above-mentioned problem.

The above-mentioned information write operation by the electromagnetic waves in the off-track state can also occur in writable rotary recording devices other than a hard disk drive. To be more specific, it also occurs in a writable optical or optical magnetic storage such as CD-R/W, DVD and MO storages and so on. Moreover, similar things occur in control of robotic arms and so on, which require precise work.

#### Summary of the invention

According to a first aspect of the invention, there is provided a recording device having means for detecting electromagnetic waves which are expected to have an effect on positioning of information writing

apparatus. When such electromagnetic waves are detected by the above described means, write operations from the information writing apparatus to a recording medium are interrupted. As this configuration inhibits write operation in the case where the electromagnetic waves would have an adverse effect, it can prevent the electromagnetic waves causing writing in an off-track state so as to avoid a situation where information recorded in a hard disk drive is unintentionally erased.

According to preferred embodiments of the present invention, there is provided a technology capable of achieving superior recording reliability even under the effect of high frequency electromagnetic waves. To be more specific, the invention can mitigate or prevent the problem of off-track writing under the effect of high frequency electromagnetic waves. In addition, the invention can provide a technology for preventing occurrence of an accident when positioning of a robotic arm or other controlled apparatus becomes unstable due to high frequency electromagnetic waves.

A preferred embodiment of the present invention can be described as follows. A rotary recording device comprises a rotary recording medium for recording information, means for writing information to the rotary recording medium, means for detecting electromagnetic waves, means for, in the case where the strength of the electromagnetic waves detected by the means for detecting exceeds a predetermined threshold, inhibiting writing of the information to the rotary recording medium.

The means for detecting the electromagnetic waves can be placed close to a control circuit for controlling the rotary recording device or in an enclosure covering the rotary recording device. Also, the means for detecting electromagnetic waves can include a conductor pattern of a printed wiring board or an antenna provided for the enclosure. Moreover, the conductor pattern preferably comprises a linear region and an area

region connected to one end of the linear region, the area region having a shape of a square, a rectangle, a comb, a circle, a doughnut or the like, which has a width larger than that of the linear region. In addition, the conductor pattern can be surrounded by a ground pattern of the printed wiring board formed in the same layer as the above described conductor pattern, the ground pattern capable of covering the wiring included in the control circuit formed in another layer of the printed wiring board.

Another aspect of the invention provides a control method for a recording device, and in addition the invention is applicable to a mechanism or a method of suppressing a control failure of a operation controller arising from high frequency electromagnetic waves.

#### Brief Description of The Drawings

Preferred embodiments of the present invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a top view showing an overview of an example of a hard disk drive that is an embodiment of the present invention;

Figure 2 is a cross-sectional view of the hard disk drive of Figure 1 viewed from the side;

Figure 3 is a plan view showing an example of a conductor pattern;

Figure 4 is a block diagram for explaining functions of the hard disk drive that is an embodiment of the present invention;

Figure 5 is a circuit diagram showing an example of the electromagnetic wave detection circuit;

Figure 6 is a timing chart showing electric power or voltage at the main section in the circuit diagram in Figure 5;

Figure 7 is a circuit diagram showing another example of the electromagnetic wave detection circuit;

Figure 8 is a timing chart showing voltage (or a current) of the main section in the circuit diagram in Figure 7; and

Figures 9A to E are plan views showing other examples of the conductor pattern.

However, the present invention can be implemented in many different forms, and so it should not be interpreted by limiting to the described embodiments. The same elements will be given the same symbols throughout the following description.

#### Detailed Description of Preferred Embodiments

Figure 1 is a top view showing an overview of an example of a hard disk drive that is an embodiment of the present invention. Figure 2 is a cross-sectional view of the hard disk drive of Figure 1 viewed from the side. A hard disk drive 1 of this embodiment comprises a rotary magnetic recording medium 2, a magnetic head 3, a drive 4, an arm 5 and a printed wiring board 6.

The magnetic recording medium 2 is rotationally driven by a spindle motor for instance, and information is recorded by utilizing magnetic action. The information recorded on the magnetic recording medium 2 is read by the magnetic head 3, and the information is also recorded by the magnetic action from the magnetic head 3. In addition, the magnetic recording medium 2 has positional information (servo pattern) written

thereon in advance, which information is utilized to control a relative position of the magnetic head 3 to the magnetic recording medium 2.

The magnetic head 3 reads and writes information as described above for the magnetic recording medium 2. For instance, a GMR (giant magneto resistive) element of which value of resistance changes due to magnetic action is used.

The drive 4 drives an end of the arm 5 in a radial direction of the magnetic recording medium 2. For instance, a voice coil motor (VCM) is used. The magnetic head 3 is placed at the end of the arm 5, and the position of the magnetic head 3 is moved by driving of the drive 4 in the radial direction of the magnetic recording medium 2.

On the face of the printed wiring board 6, a conductor pattern 7 functioning as an electromagnetic wave sensor is formed and other wiring patterns are also formed. Wiring patterns are formed in a wiring region 8. The printed wiring board 6 is configured as a multilayer printed wiring board, having wiring formed not only on the face but also on the backside and in the intermediate layer. On the backside of the printed wiring board 6, a hard disk controller for controlling the hard disk drive 1, an MPU, an LSI element 9 such as a memory, a resistance, and a passive element 10 such as a condenser are mounted. Moreover, it is a matter of course that elements may be mounted on the face of the printed wiring board 6.

The conductor pattern 7 functions as an antenna for detecting electromagnetic waves from outside, for instance, a disturbance wave such as a wave of a portable telephone. The conductor pattern 7 should be close to a servo control circuit, that is, preferably placed in a direction of the coming disturbance wave, which is on the top face of the hard disk drive 1 (the face reverse to the opposite face to the magnetic

recording medium 2) in Figures 1 and 2. It is for the purpose of detecting the disturbance wave with higher sensitivity. However, the direction of placement of the conductor pattern 7 is not specifically limited. As far as it can detect the disturbance wave, it can be formed on the backside or on a board placed separately from the printed wiring board 6, not limited to the face of the printed wiring board 6. Moreover, the above description is on the precondition that, when installing the hard disk drive 1 on a computer system, the conductor pattern 7 should be on the topside, that is, the hard disk drive 1 should be installed sideways so as to have the face of the printed wiring board 6 on the topside. As the hard disk drive 1 can be installed lengthwise or in an arbitrary direction, the expressions of "topside," "face" and "backside" in the foregoing description are relative expressions through and through. In short, it is sufficient to have the conductor pattern 7 placed in a position where the disturbance wave can be easily received, with no limitation to its direction and position of placement.

Figure 3 is a plan view showing an example of a conductor pattern. The conductor pattern 7 of this embodiment is comprised of an area portion 7a and a linear portion 7b. It is configured so that width La of the area portion 7a is larger than width Lb of the linear portion 7b. In addition, length Ly combining the area portion 7a and the linear portion 7b is smaller a wavelength (or a 1/2 wavelength or a 1/4 wavelength) of an electromagnetic wave. For instance, in the case of detecting a wave of a carrier (800 MHz or 1.5 GHz) of a portable telephone, Ly should preferably be 15 mm or so. It is thus possible, by providing the area portion 7a, to effectively capture various disturbance electromagnetic waves. While it is also possible, of course, to configure it to be a 1/2 wavelength of the wave to be detected like a dipole antenna, a phenomenon of producing strong resonance to a specific wavelength is not expected in the conductor pattern 7 of this embodiment. Thus, a detection band for the wave to be detected can be wide. In addition, as the size of the conductor pattern 7

of this embodiment is very small, it can be placed easily together with already designed wiring on the existing printed wiring board.

Moreover, a pattern 7c is wiring for providing grounding potential. It is possible to detect strength of the disturbance wave by detecting the potential between the end of the linear portion 7b and the pattern 7c. It is not especially required to provide the pattern 7c, and the potential of the conductor pattern 7 can be detected with reference to the wiring for providing arbitrary grounding potential.

Figure 4 is a block diagram for explaining functions of the hard disk drive of this embodiment. The hard disk drive 1 of this embodiment includes a hard disk controller 11, a servo controller 12, a VCM driver 13, a read/write channel 14, a head preamplifier 15, an electromagnetic wave detection circuit 16, a bus 17, an MPU 18, a memory 19 and an interface 20. Other illustrated members are as described above.

The hard disk drive of this embodiment receives a write instruction from a host apparatus to record data on the magnetic recording medium 2, and receives a read instruction from the host apparatus to send back the data recorded on the magnetic recording medium 2. Input-output of data between the host apparatus and the hard disk drive is performed via an interface 20. The data is transferred via the bus 17, which is connected with the hard disk controller 11, the MPU 18, the memory 19 and the interface 20.

The hard disk controller 11 controls the entire hard disk drive in synergy with the members described hereafter. Control is performed, for instance, according to a control program recorded in advance on the magnetic recording medium 2. The control program is read from the magnetic recording medium 2 for instance, by turning on the power of the drive or resetting it, and is stored in the memory 19. The memory 19 has

functions of storing the control program and also buffering the data to be interchanged with the host apparatus. Moreover, the memory 19 includes a volatile RAM (random access memory) and a nonvolatile ROM (read only memory) for storing an initial program. The MPU 18 executes the program and performs various types of processing.

The servo controller 12 performs servo control of the position of the magnetic head 3. It reads with the magnetic head 3 the positional information (servo pattern) recorded in advance on the magnetic recording medium 2, and acquires a current address via the head preamplifier 15, the read/write channel 14 and the hard disk controller 11. And it generates a signal required for driving the arm 5 from a finite difference from a target address, and sends the signal to the VCM driver 13. The VCM driver 13 generates driving currents to the voice coil motor 4 from the received signal. To be more specific, the relative position of the magnetic head 3 to the magnetic recording medium 2 is feedback-controlled by a route comprised of the magnetic head 3, the head preamplifier 15, the read/write channel 14, the hard disk controller 11, the servo controller 12 and the VCM driver 13 as above. When the magnetic head 3 is controlled on a target track (or a cylinder) (track following), it becomes possible to read and write information. Moreover, as the above feedback loop is controlled by an electric system, there is a possibility that the disturbance wave may act as noise and have a bad effect on the feedback loop. On receiving such an effect, the magnetic head 3 gets out of the control and is displaced in a position off the target track (off-track). However, as described later, this embodiment is configured so that, when such noise occurs, write processing is inhibited. Thus, it is possible to prevent an unintentional erasure of information recorded on an adjacent track or a data record inducing a read error arising from write operation in the off-track state.

The read/write channel 14 controls data reading from the magnetic head 3 or data writing to the magnetic head 3 via the head preamplifier 15. An analog signal from the magnetic head 3 amplified by the head preamplifier 15 is inputted to the read/write channel 14 and converted into a digital signal. In addition, the read/write channel 14 generates a read/write gate signal to control read or write operation.

The electromagnetic wave detection circuit 16 detects the potential or electric power of the conductor pattern 7 to determine whether or not there is the disturbance wave (noise). Figure 5 is a circuit diagram showing an example of the electromagnetic wave detection circuit.

The electromagnetic wave detection circuit 16 of this embodiment comprises an amplifier 21, a window comparator 22, a NOT gate 23 and an AND gate 24. An input signal SigIn from the conductor pattern 7 is inputted to the amplifier 21, and is amplified and then inputted to the window comparator 22. Moreover, it is possible to configure the amplifier 21 as an appropriate square circuit and measure the signal from the conductor pattern 7 as electric power.

The window comparator 22 determines whether or not an inputted signal level exceeds a predetermined threshold, and in the case where it exceeds it, it outputs a High level, and in the case where it is at or lower than it, it outputs a Low level. The output of the window comparator 22 is inverted at the NOT gate 23 and then inputted to the input of the AND gate 24.

On the other hand, a write gate signal WGIN generated by the read/write channel 14 is inputted to the other input of the AND gate. The write gate signal WGIN is a write enable signal in the case of not considering existence of the disturbance wave, and is generated under the control of the hard disk controller. Under normal circumstances, the head

is in a track following state when this write gate signal WGIN is at the High level, and write processing controlled by the read/write channel is performed.

However, in this embodiment, the write gate signal output WGOOut comes to the High level only when the inputs of the AND gate are both at the High level. This write gate signal output WGOOut is used as the write gate signal to be actually used for write control. To be more specific, strength of the disturbance wave is considered in this embodiment so that the write gate signal WGIN as-is becomes the write gate signal output WGOOut only in the case where the potential or electric power of the conductor pattern 7 is at or lower than the predetermined threshold (the output of the window comparator is at the Low level), and the write gate signal output WGOOut does not reach the High level even if the write gate signal WGIN is at the High level in the case where the potential or electric power from the conductor pattern 7 exceeds the threshold. To be more specific, it inhibits write processing in the case where the disturbance wave exceeds the predetermined threshold.

Figure 6 is a timing chart showing electric power or voltage at the main section in the circuit diagram in Figure 5. A is a power waveform showing an example of a signal from the conductor pattern 7, and B is a graph showing the head position at the time as a displacement from the track center. In addition, C is a graph showing the output of the window comparator 22, D showing the write gate signal WGIN and, E showing the write gate signal output WGOOut.

As illustrated, the electric power of the disturbance wave is small in timing of a time to (Figure 6A), and so the head position in the track following state is almost stable at the track center (Figure 6B). However, the electric power detected from the conductor pattern 7 becomes larger according to increase in the disturbance wave, and if it exceeds a

threshold  $P_{th}$  at a time  $t_1$ , the displacement of the head position becomes so significant, due to disorder of the servo system caused by the disturbance wave, that it exceeds a range  $D_{fw}$  that can be regarded as track following (Figure 6A, B). If in such a state, the output of the window comparator 22 comes to the High level (Figure 6C), and the write gate signal output  $WGO_{out}$  does not reach the High level even if the write gate signal  $WGI_{in}$  is at the High level (Figure 6D, E). To be more specific, the write processing is inhibited.

On the other hand, if the strength of the disturbance wave becomes weaker at a time  $t_2$ , signal power from the conductor pattern 7 becomes lower than the threshold  $P_{th}$  (Figure 6A), and the output of the window comparator 22 comes to the Low level (Figure 6C). If the write gate signal  $WGI_{in}$  comes to the High level in this state at a time  $t_3$ , the write gate signal output  $WGO_{out}$  also comes to the High level so that the actual write processing is enabled.

It is possible, by adopting such configuration, to keep from write processing when the disturbance wave is strong and prevent the write processing in the state where the servo system is disturbed and causing an off-track state. Consequently, it is possible to prevent an overwrite to an adjacent track or data recording between tracks.

Moreover, while the above example of the electromagnetic wave detection circuit shows a case of measuring the disturbance wave as electric power, the output of the window comparator 22 can be latched by an appropriate latch circuit 25 as shown in Figure 7 in the case of measuring it as voltage (or a current) or in the case of a fiercely changing signal that crosses the threshold many times in a very short time. Figure 7 is a circuit diagram showing another example of the electromagnetic wave detection circuit, provided that the latch circuit 25 is reset after a predetermined time has elapsed.

Figure 8 is a timing chart showing voltage (or a current) of the main section in the circuit diagram in Figure 7. A is a waveform showing an example of a voltage (or a current) signal from the conductor pattern 7, and B is a graph showing the head position at the time as a displacement from the track center. In addition, C is a graph showing the output of the window comparator 22, D showing the output of the latch 25, E showing the write gate signal WGI<sub>n</sub> and, F showing the write gate signal output WGO<sub>ut</sub>.

As illustrated in Figure 8A, the signal from the conductor pattern 7 is an AC signal in the case of measuring it as voltage. Thus, while the disturbance wave is strong, the voltage fiercely goes back and forth between the thresholds  $V_{th} (+)$  and  $V_{th} (-)$ . In addition, even a power signal crosses the threshold  $P_{th}$  frequently when the signal fiercely changes. Thus, as shown in Figure 8C, there is a period when the output of the window comparator 22 is at the Low level even during the times  $t_1$  to  $t_8$  when the disturbance wave is strong.

And then, it is possible to output a High level in a stable manner during the times  $t_1$  to  $t_9$  as shown in Figure 8D by using the latch 25 that maintains the High level input just for appropriate length of time. Moreover, while the problem of the disturbance wave is solved during the times  $t_8$  to  $t_9$ , the High level output is maintained by the latch. This period can also be utilized as a period required for stabilizing the servo system disorder due to the disturbance wave. This allows write processing of higher reliability.

While the above concretely described the invention conducted by the inventors based on the embodiment, the present invention is not limited to the above described embodiment and can be modified in various ways to the extent that it is not deviated from its abstract.

For instance, a shape shown in Figure 3 was illustrated as the conductor pattern 7 in the above described embodiment. However, the present invention is not limited to what is configured by such a square (area portion) and a linear portion, but it may also be configured by a circle (area portion) and a linear portion as shown in Figure 9A. In addition, the area portion may also be a doughnut shape as shown in Figure 9B. Furthermore, the area portion may be a rectangle (Figure 9C), a comb (Figure 9D) or an H-shape (Figure 9E), or another arbitrary shape of a width larger than that of the linear portion. Furthermore, as the conductor pattern, a linear pattern such as a dipole, a folded antenna pattern, a waveform linear pattern and so on may also be used.

Moreover, while the above described embodiment showed an example of using the conductor pattern for detecting the electromagnetic wave, it is also possible to provide an antenna separately and use it for detecting the disturbance electromagnetic wave. In this case, the antenna should preferably be provided close to a casing of the hard disk drive. In the case of providing an antenna separately, there is a merit of detecting the disturbance wave with higher sensitivity by allowing fine adjustments of the placement position.

In addition, an example where wiring is formed in the same layer as the conductor pattern 7 was described in the above described embodiment. To be more specific, it is an example of providing wiring in a wiring area 8 around the conductor pattern 7. However, it is possible to render as a grounding pattern all the wiring area 8 in the same layer as the conductor pattern 7. While an additional layer becomes necessary separately by utilizing multilayer interconnection, it is possible to reduce the effect of the disturbance wave on the servo system by forming the grounding pattern almost in its entirety. The present invention implements reliable write processing even in the circumstances of the disturbance wave, and it can implement further reliable write processing by a synergistic effect

with a shield effect of the above described grounding pattern. Moreover, it is also feasible to render such a grounding pattern as a shield of the wiring comprising the servo system by separately providing a printed wiring board.

Furthermore, the above described embodiment showed an example of adopting the present invention to the hard disk drive. However, it is possible to apply the present invention to apparatuses having a rotary recording medium such as a writable optical or optical magnetic storage such as CD-R/W, DVD and MO and so on. It is also applicable to removable rotary magnetic storage such as a ZIP apparatus and a floppy disk drive.

In the case of an apparatus wherein optical writing rather than magnetic writing of information is performed to the rotary recording medium, writing means is an oscillator of a laser beam or a portion having an objective lens section for irradiating the laser beam. In addition, the writing means is not limited to the ones moved by the arm such as the hard disk drive but includes those in the form of linearly moving on a rail.

Moreover, the present invention can be utilized for control of a robotic arm requiring accurate positioning for instance, other than for inhibiting off-track action in the information writing operation of the rotary recording device. To be more specific, while operation for inhibiting the information writing operation is performed in the case of detecting the electromagnetic wave at a problematic level in this embodiment, it is also possible to utilize the present invention for such operation as to interrupt or stop work performed by the robotic arm in such a case.

The present invention, according to preferred embodiments, achieves the following advantageous effects. A rotary recording device having

superior recording reliability even under the effect of high frequency electromagnetic waves can be achieved. In particular, the invention can provide a technology capable of inhibiting off-track write operation under the effect of electromagnetic waves. In addition, it can prevent a robotic arm and other controlled apparatus from working in an incorrect position due to interference of the electromagnetic waves.

One aspect of the invention is a controller for controlling a data processing or read/write operation, comprising: a detector for detecting electromagnetic waves; and a unit for inhibiting said operation if the strength of the electromagnetic waves detected by said detector exceeds a predetermined threshold; wherein said detector for detecting electromagnetic waves includes a conductor pattern of a printed wiring board on which wiring included in the control circuit of said controller is formed, or an antenna provided for an enclosure of said controller.

Another aspect of the invention is a control method comprising the steps of: controlling operation of a controller by using a feedback system such as a servo system; determining whether or not the strength of electromagnetic waves detected by a detector for detecting the same is at or lower than a predetermined threshold; and stopping operation of said controller, if result of said determination is false.

## Claims:

1. A recording device comprising:  
a recording medium for recording information;  
5 apparatus for writing information to said recording medium;  
a detector for detecting electromagnetic waves; and  
means for, if the strength of the electromagnetic waves detected by said detector exceeds a predetermined threshold, inhibiting writing of said information to said recording medium.  
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2. The recording device according to claim 1, wherein said detector for detecting electromagnetic waves is placed in an enclosure covering said recording device and said detector for detecting electromagnetic waves includes an antenna provided for said enclosure.  
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3. The recording device according to claim 1, wherein said detector for detecting electromagnetic waves includes a conductor pattern of a printed wiring board on which wiring included in a control circuit is formed.
- 20 4. The recording device according to claim 3, wherein said conductor pattern comprises a linear portion and an area portion connected to one end of said linear portion, said area portion having a width larger than that of said linear region.
5. The recording device according to claim 3 or claim 4, wherein said  
25 conductor pattern is surrounded by a ground pattern of said printed wiring board formed in the same layer as said conductor pattern, said ground pattern covering the wiring included in said control circuit formed in another layer of said printed wiring board.
6. The recording device of claim 1 wherein said recording device is a  
30 rotary recording device and said recording medium is a rotary recording medium.
7. A method for controlling a recording device, comprising the steps of:  
receiving a write instruction from a host;  
controlling a relative position of a head to a recording medium;

using a detector to detect electromagnetic waves and determining whether or not the strength of electromagnetic waves detected by the detector is above a predetermined threshold; and

inhibiting writing of information from said head to said recording medium, if the  
5 result of said determination is positive.

8. A controller for controlling a write operation performed by a data recording device, comprising:

a detector for detecting electromagnetic waves; and

10 an inhibitor for, if the strength of the electromagnetic waves detected by said detector exceeds a predetermined threshold, inhibiting said operation.

9. A controller according to claim 8, wherein said detector for detecting electromagnetic waves includes a conductor pattern of a printed wiring board on which  
15 wiring included in the control circuit of said controller is formed.

10. A controller according to claim 8, wherein said detector for detecting electromagnetic waves includes an antenna provided for an enclosure of said controller.

20 11. The controller according to claim 9, wherein said conductor pattern comprises a linear portion and an area portion connected to one end of said linear portion, said area portion having a width larger than that of said linear region.

12. The controller according to claim 9 or claim 11, wherein said conductor  
25 pattern is surrounded by a ground pattern of said printed wiring board formed in the same layer as said conductor pattern, said ground pattern covering the wiring included in said control circuit formed in another layer of said printed wiring board.

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