25 JUL 2002

Specification

Title of the invention:

Disk drive device, fabrication method thereof, seek control method for a disk drive device, and disk drive control device

Detailed Description of the Invention:

[0001]

Industrial Field of the Invention:

The present invention relates to a disk drive device in which performance is improved while reliability is maintained, a fabrication method thereof, a seek control method for the disk drive device, and a disk drive control device.

[0002]

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G00002

Prior Art:

As the recording density increases in disk drive devices employing magnetic disks as recording media, the track pitch becomes narrower, and higher-precision seek control is needed. In addition, so-called off-track recording inhibition processing, which inhibits recording when the position of the head is a predetermined distance from the track center, is carried out to maintain reliability.

[0003]

The OS (operating system) executed in information processing apparatus using this type of disk drive device also employs a predetermined area as a file system management area such as a FAT (file allocation table). The OS records information such as file attributes in this type of management area, and accesses it frequently, whenever the recording or reproducing of a file is carried out.

[0004]

Problems to be Solved by the Invention:

There are cases, however, in which the seek performance of a disk drive device is degraded when higher-precision seek control or off-track write inhibition processing is implemented as described above. The impact of the degradation of the performance of frequently accessed areas such as the above-mentioned file system management area on the performance of the entire drive is particularly great.

[0005]

The present invention addresses the problem described above, with the object of providing a disk drive device, a fabrication method thereof, a seek control method for a disk drive device, and a disk drive control device that can improve the access performance of frequently accessed areas such as the file system management area, the OS storage area, and storage areas of moving-picture files,

contributing to an improvement in performance of the entire disk drive device, while maintaining reliability.

[0006]

Means of Solution of the Problems:

To solve the problem described above, a disk drive device according to the present invention comprises a disk-shaped recording medium with a recording surface on which tracks having a predetermined width in the radial direction are formed, tracks used for recording and tracks not used for recording being arranged alternately in a predetermined area in the radial direction of the recording surface.

[0007]

It may also be provided with a recording means recording information on the disk-shaped recording medium, a position error detecting means detecting position error from a track (target track) to be recorded on, a seek means moving the recording means to the target track according to the position error, and an end-of-seek detection means detecting end of motion if the position error is equal to or less than a first threshold, when the recording means is moved to a target track inside the predetermined area, and detecting end of motion if the position error is equal to or less than a second threshold smaller than the first threshold, when the recording means is moved to a target track outside the predetermined area.

[0008]

It may also be provided with a position error detecting means detecting position error from a track (target track) to be recorded on, and a recording inhibition means inhibiting recording if the position error is equal to or greater than a first threshold, when the target track is inside the predetermined area, and inhibiting recording if the position error is equal to or greater than a second

threshold smaller than the first threshold, when the target track is outside the predetermined area.

[0009]

A method of fabricating a disk drive device according to the present invention comprises forming tracks having a predetermined width in the radial direction on a recording surface of a disk-shaped recording medium, and arranging tracks used for recording and tracks not used for recording alternately in a predetermined area in the radial direction of the recording surface.

[0010]

A table indicating the tracks not used for recording may be recorded in a predetermined area of the recording surface, or servo sectors may be recorded on the tracks when the tracks are formed, and areas other than the servo sectors of the tracks not used for recording may be placed in a predetermined magnetic state.

[0011]

Embodiments:

FIG. 1 is a block diagram showing the configuration of a disk drive device embodying the present invention.

[0012]

This disk drive device comprises such items as a magnetic disk 1 for recording data, a memory 2 employed for the storage of control programs, record/reproduce data, etc., a control unit 3 that controls, among other things, the operation of the entire disk drive device and the input and output of data to and from a host device 10 such as an external personal computer or the like, a channel 4 that carries out mutual conversion between analog signals and digital data, a servo system 5 that carries out control of the record/reproduce position of a head 6 according to control from the control unit 3, a head 6 for carrying out recording and reproducing on the magnetic disk 1, a head

driving mechanism (rotary actuator) 7 that moves the head 6 in the approximately radial direction of the magnetic disk 1, and an interface (HIC: Host Interface Controller) 8 for controlling input and output to and from the external information processing device 10.

[0013]

Provided in the memory 2 are an area in which record/reproduce data, control programs for the control unit 3, data (for example, a reassignment table etc.) and the like are stored, and a buffer area in which record/reproduce data is stored. The buffer area has a capacity capable of storing data for several hundred or more of the recording units (data sectors) of the magnetic disk 1.

[0014]

The control unit 3 comprises such items as a processor (MPU) that executes control programs, a hard disk controller (HDC) that performs calculations of a position error signal (PES), servo data, and the like, a data bus y_1 to which the memory 2 and HIC 8 are coupled, and a control bus y_2 to which the MPU, HDC, and HIC 8 are coupled. By executing the control programs stored in the aforesaid memory 2, this control unit 3 controls the operation of the entire disk drive device, and executes, among other things, control of recording and reproducing on the magnetic disk 1 according to commands and data supplied from the host device 10.

[0015]

The control unit 3, which is adapted to be able to execute a plurality of processes concurrently, executes cache control of record/reproduce data, control of the position of the head 6, etc.

[0016]

The head 6 comprises, for example, an inductive recording head and a reproducing head employing, for

example, an MR (magnetoresistive) element or a GMR (giant magnetoresistive) element.

[0017]

The HIC 8, which is coupled to the memory 2 by one of the data buses in the control unit 3, executes input-output control of commands with the host device 10 and input-output control of data via the memory 2.

[0018]

A large number of recording tracks are formed on the recording surface of the magnetic disk 1 at regular intervals in the radial direction. Servo sectors are recorded at regular angular intervals (for example, 360°/66) for identification of each of these tracks, detection of tracking error, or the like. Such items as a burst pattern for detecting tracking error, a cylinder ID for identifying each individual track, and a physical sector number for identifying each individual servo sector are recorded in these servo sectors.

[0019]

As shown in FIG. 2, in a frequently accessed area in this disk drive device, such as an area used as a file system management area with, for example, a FAT (File Allocation Table) or the like in which file attributes, the positions at which the files are recorded, and the like are recorded by the OS, at least one unused track is provided between tracks used for recording.

[0020]

This management area is provided in an area comprising, for example, the outermost several tracks or several tens of tracks on the magnetic disk 1; information is recorded indicating the areas in which the OS has recorded files on the magnetic disk, and indicating attributes of the files, such as the date, type of file, and access restrictions.

This information is accessed frequently, whenever a file is written on or read.

[0021]

Because of the provision of at least one unused track (a track not used for recording, including defective tracks) between tracks used for recording in this type of frequently accessed area (referred to hereinafter simply as a 'particular area'), even if the recording position is slightly incorrect, within the width of one track (or half of that width), this does not affect the data on the adjacent track used for recording.

[0022]

As will be explained in detail later, during recording, the head is moved to the target track by a seek operation; when the position error from the target track is equal to or less than a predetermined threshold, track following control is executed to make the head 6 follow the target track, and the recording of data is executed.

[0023]

The position error of the head is also monitored during the recording of data, and if the head moves away from the target track by a predetermined threshold value or more, or if it shows a tendency to move away, recording is inhibited, to prevent so-called off-track recording.

[0024]

As stated above, at least one unused track is provided between tracks used for recording in the particular area, so seek characteristics can be improved by somewhat relaxing the threshold for detecting end-of-seek, or the threshold for preventing off-track recording.

[0025]

To relax these thresholds, making the track pitch wider in the particular area than in other areas could also be considered, but if the track pitch on the recording surface

of the magnetic disk 1 becomes non-uniform, servo patterns of corresponding width must be formed, and the recording of servo patterns becomes difficult. Also, if the track pitch is non-uniform, seek characteristics are actually worsened, and performance is worsened.

[0026]

To set the above type of unused tracks, incidentally, management of unused tracks could be carried out separately from the conventional management of bad tracks, with operation being switched when access to a track in the particular area occurred, but among other things, the control system would become complex, and there would be room for improvement from the viewpoint of enhancing the performance of the disk drive device.

[0027]

In disk drive devices, since only tracks without defects are used for the recording of data, the practice has been to record defective tracks detected at the time of manufacture in a bad track table of the type shown in FIG. 3, for example. An individual address (cylinder ID) is assigned to each track on the recording surface, and the defective tracks are managed by listing their cylinder IDs in a table like the one shown in FIG. 3. Using this table, the control unit 3 detects tracks without defects, assigns logical cylinder numbers to these tracks, and manages them as areas used for recording.

[0028]

In this disk drive device, the aforesaid unused tracks, instead of the conventional defective tracks, are listed in the bad track table shown in FIG. 3. Thus, the control unit 3 does not use the listed unused tracks for the recording of data. This table is recorded in a predetermined area on the magnetic disk 1, for example, when the disk drive device is manufactured; during use, it is read from the predetermined

area when the power of the disk drive is switched on, for example, and is stored in the memory 2, or in registers or the like provided by the control unit 3.

[0029]

In this disk drive, the control unit 3 also stores information (for example, a range of logical cylinder numbers) indicating which area has been designated as the aforesaid particular area, and carries out changes of the above-mentioned thresholds responsive thereto. This information may, like the aforesaid bad track table, be recorded in a predetermined area on the magnetic disk 1 and read at time of operation, or it may be installed as firmware in the microcode or the like of the MPU in the control unit 3.

[0030]

In addition, all but the servo sectors of an unused track may be erased, placing it in the state in which nothing has been recorded. The head 6 can thereby be made not to reproduce unnecessary signals during reproducing. With erasure performed in this way, even if tracking is somewhat inexact during reproducing, the reproduced signal is only weakened, so it becomes possible to reproduce the data by carrying out processing such as amplifying the reproduced signal to a suitable level.

[0031]

The operation of a disk drive device configured as described above will be explained below.

[0032]

When data is recorded or reproduced, the area on which recording or reproducing is carried out is specified in predetermined data-block units by the information processing device 10. From the indicated data block identification information (for example, an LBA: Logical Block Address), the control unit 3 determines information (for example,

track, sector, or the like) indicating the actual recording position on the magnetic disk 1.

[0033]

When the target track has been calculated, the control unit 3 executes seek control to move the head 6 to the target track as shown in FIG. 4. In this seek control, first the head 6 is accelerated toward the target track; when the velocity of the head 6 reaches a predetermined velocity, control is executed to move the head 6 at a constant velocity (velocity control mode). Next, when the head 6 reaches the vicinity of the target track, control is executed to decelerate the head 6 (settling mode). When the head 6 reaches the target track, the seek ends, and following control is executed to make the head 6 follow the target track (track following mode).

[0034]

To execute this seek control and track following control, the control unit 3 determines the position error signal (PES) from the position of the head 6 to the target track, and supplies corresponding servo data to the head driving mechanism 7.

[0035]

Each time the burst pattern of one of the above-mentioned servo sectors is reproduced, the channel 4 determines the reproduced levels of the burst pattern, converts them from analog to digital (A/D), and detects the cylinder ID and the like from the reproduced output of the servo sector.

[0036]

The control unit 3 detects the current position of the head 6 from the cylinder ID and the data indicating the reproduced levels of the burst pattern supplied from the channel 4, determines the position error signal (PES) with

respect to the target track, and controls the switching of the modes mentioned above.

[0037]

It carries out the switching from the aforesaid settling mode to the track following mode by detecting whether or not the PES is equal to or less than a predetermined threshold (Cp), as shown in FIG. 5.

[0038]

It also changes this threshold Cp, depending on whether the target track is in the aforesaid particular area or not, as mentioned above. It carries out the processing that changes this threshold Cp according to the flowchart shown in FIG. 6, for example.

[0039]

The control unit 3 begins execution of the processing shown in FIG. 6 upon determining the target track as described above.

[0040]

In step ST1, the control unit 3 begins seeking the target track, and proceeds to step ST2. As stated above, the control unit 3 is able to execute a plurality of processes concurrently; the subsequent seek control is executed independently of the processing shown in FIG. 6.

[0041]

In step ST2, the control unit 3 detects whether or not the logical cylinder number m of the target track belongs to the aforesaid particular area. Specifically, the control unit 3 stores information indicating the particular area as described above, as information indicating a range of logical cylinder numbers or the like (for example, S, T, if the area has logical cylinder numbers from S to T), and detects whether or not the logical cylinder number m of the target track is within this range.

[0042]

If the target track is not within the particular area, the process proceeds to step ST3 and ends with the threshold Cp set to the normal value Cp1. Conversely, if the target track is within the particular area, the process proceeds to step ST4, and ends with the threshold Cp set to a value Cp2 more lax than the normal value Cp1. The threshold Cp for detecting end-of-seek is thereby set to an appropriate value according to the position of the target track.

[0043]

The setting of the values Cp1 and Cp2 of the threshold in the particular area and in non-particular areas will now be explained.

[0044]

In areas outside the particular area, tracks having consecutive logical cylinder numbers are mutually adjacent, and to avoid interference and the like between adjacent tracks, the threshold Cp1 for detecting end-of-seek is a PES indicating a range of substantially 1/8 of the track width, for example, as shown in FIG. 7.

[0045]

In the particular area, however, there is at least one unused track between tracks having consecutive logical cylinder numbers, and interference and the like with the adjacent track can be prevented even if the PES is substantially 1/2 of the track width, for example. The threshold Cp2 for detecting end-of-seek is therefore a PES indicating a range of substantially 1/2 of the track width, for example. This Cp2 may also be approximately the track width, or the sum of 1/2 the track width and a certain margin.

[0046]

Because of the setting of a threshold Cp according to the area to which the target track belongs, the timing (Tb) at which a seek ends in the particular area can be earlier

than the timing (Ta) at which a seek ends in a non-particular area, as shown in FIG. 5. Seek characteristics can thereby be improved in the particular area.

[0047]

Since the frequency of access to the particular area is high, as mentioned above, improving the seek characteristics of the particular area contributes to an improvement in the performance of the entire disk drive device.

[0048]

Also, in this disk drive device, the control load is scarcely increased, because all that has been done is to provide at least one unused track on each side of each track used for recording in the particular area, and relax the threshold for detecting end-of-seek in the particular area, as compared with non-particular areas.

[0049]

Incidentally, during recording, besides executing the track following control described above, the device also executes recording inhibition processing when the position of the head 6 departs from the target track.

[0050]

This recording inhibition processing is carried out by inhibiting recording when the PES detected as described above is equal to or greater than a predetermined threshold value (Cp), or when the temporal change in the PES is greater than a predetermined threshold (Cv).

[0051]

In this disk drive device, these thresholds are switched depending on whether the target track belongs to the particular area or not.

[0052]

Specifically, in track following control, processing similar to the processing shown above in FIG. 6 is carried

out, and the values of the thresholds Cp and Cv for deciding whether to inhibit recording are set appropriately, depending on whether the target track belongs to the particular area or not.

[0053]

Because the values of the thresholds Cp and Cv for deciding whether to inhibit recording are set in this way, even in cases in which recording would be inhibited in a non-particular area, as shown in FIG. 5, recording can be carried out in the particular area if the PES and the temporal change of the PES are within the allowable ranges. Recording performance can thereby be enhanced on tracks in the particular area.

[0054]

Incidentally, in the reproducing of a track in the particular area, reproducing can be carried out even if the head 6 is somewhat out of position, because unused tracks are provided on both sides of the track used for recording. An error correction code (ECC) is added to the recorded data in each predetermined sector. If the data can be reproduced by means of the ECC, it suffices to regard the reproduced data as valid; inhibition processing responsive to the PES or the temporal change of the PES does not have to be carried out as in recording.

[0055]

When there are plural recording surfaces, there are cases in which access is carried out by sequentially changing the cylinder ID after access to the tracks (cylinder) having the same cylinder ID on each recording surface, as shown in FIG. 8, and there are cases in which, after access is carried out by sequentially changing the cylinder ID on the same recording surface, access is carried out on another recording surface, as shown in FIG. 9.

[0056]

When access is carried out as shown in FIG. 8, a bad cylinder table may be provided on a cylinder basis, instead of a bad track table on a track basis, and defective tracks and unused tracks may be managed on a cylinder basis.

[0057]

When access is carried out as shown in FIG. 9, a bad track table as described above may be provided for each recording surface, and management of unused tracks similar to that described above may be carried out for each recording surface.

[0058]

During the fabrication of the type of disk drive device described above, the processes of detecting servo sectors and defective tracks, recording the bad track table, and so on are carried out in the state in which the magnetic disk 1, head 6, etc. are mounted in the housing.

[0059]

FIG. 10 shows the configuration of a test apparatus for carrying out this type of test.

[0060]

This test apparatus is coupled to the above-described disk drive device and used after fabrication has ended; it comprises a memory 22 and HIC 23 coupled to the data bus y_1 in FIG. 1 above, an MPU 24 coupled to the control bus y_2 and HIC 23, and an information processing device 20 coupled to the HIC 23.

[0061]

The information processing device 20 or MPU 24 executes recording and reproducing on the magnetic disk 1 through the HIC 23, designates tracks on which recording was not carried out normally as defective tracks, and lists them in the bad track table shown in FIG. 3 above. The information processing device 20 also provides unused tracks on both sides of the tracks used for recording in the aforesaid

25 JUL 2002

particular area, and similarly lists them in the bad track table.

[0062]

These listing processes are carried out according to the flowchart shown in FIG. 11.

[0063]

It will be assumed that the particular area is specified in advance as the area with logical cylinder numbers from S to T.

[0064]

First, an initial setting of variables is executed in step ST11, and the process proceeds to step ST12. Specifically, a variable n for counting physical track numbers (cylinder IDs) and a variable m for counting logical track numbers are initialized to zero, and the value of a flag indicating whether the track corresponding to the immediately preceding physical track number has been listed in the bad track table is initialized to zero, indicating that it has not been listed.

[0065]

Step ST12 detects whether or not the current logical track number m is inside the particular area or adjacent the particular area, that is, whether or not the current track number m is equal to or greater than S - 1 and equal to or less than T + 1.

[0066]

If this condition is not satisfied, the process proceeds to step ST13, because the track corresponding to the current logical track number is not in the particular area or adjacent the particular area; if the condition is satisfied, the process proceeds to step ST18, because the track corresponding to the current logical track number is in the particular area or adjacent the particular area.

[0067]

Step ST13 executes a test by recording and reproducing etc. on the track corresponding to physical track number n, to detect whether this track is a defective track or not; then the process proceeds to step ST14.

[0068]

Step ST14 decides whether or not it is necessary to list the track in the bad track table, proceeding to step ST19 if the track corresponding to the current physical track number n is defective and needs to be listed, and to step ST15 if the track is normal and does not need to be listed.

[0069]

Step ST15 sets the value of the flag to the value zero, indicating that the track corresponding to physical track number n is not listed in the bad track table, and proceeds to step ST16.

[0070]

Step ST16 increments the value of the variable m by one and proceeds to step ST17; step ST17 increments the value of the variable n by one and returns to step ST12. Processing similar to that described above is thereby repeated for the track corresponding to the next physical track number.

[0071]

Step ST18 decides whether or not the value of the flag is one, indicating that the track corresponding to the immediately preceding physical track number is listed in the bad track table; proceeds to step ST13 if it is; and proceeds to step ST19 if it is not.

[0072]

Step ST19 erases all but the servo sectors of the track corresponding to physical track number n, and proceeds to step ST20. Specifically, it supplies direct current to the recording head 6, and places all of the track except for the servo sectors in a particular magnetic state.

[0073]

Step ST20 lists physical track number n in the bad track table shown in FIG. 3 above; the next step ST21 sets the value of the flag to one, which is the value indicating that the track corresponding to physical track number n has been listed in the bad track table, and proceeds to step ST17. Thus it causes the value of the variable n to be incremented by one in step ST17 and returns to step ST12, and processing similar to the above is repeated for the track corresponding to the next physical track number.

[0074]

By repetition of the processing described above until a predetermined logical cylinder number is reached, regarding tracks in the particular area, the processing of step ST19 and subsequent steps is executed, listing them in the bad track table, only when they are defective tracks.

[0075]

Regarding tracks in the particular area, however, the processing of step ST19 and the subsequent steps is also executed, listing them in the bad track table, when the aforesaid flag is zero; that is, when the track corresponding to the immediately preceding physical track number is not listed in the bad track table.

[0076]

Thus, at least one unused track comes to exist between the tracks used for recording in the particular area; that is, between tracks not listed in the bad track table.

[0077]

When the predetermined logical cylinder number is reached, the processing shown in FIG. 11 ends, the bad track table that has been formed is recorded in a predetermined area on the magnetic disk 1, and the test ends. The bad track table recorded in this way is read into the memory 2

and used as described above when the disk drive device is used.

[0078]

However, when access is carried out as shown in FIG. 8 above, a table that manages unused tracks on a cylinder basis is employed instead of the bad track table shown in FIG. 3, and the above-described test in step ST13 is carried out on a cylinder basis.

[0079]

Moreover, when access is carried out as shown in FIG. 9, a number of bad track tables are provided, matching the number of recording surfaces, and the processing shown in FIG. 11 is executed a number of times equal to the number of recording surfaces.

[0080]

The present invention is not limited to the embodiment described above; for example, the above-described embodiment described a case in which the present invention was applied to a disk drive device, but the applicability of the present invention is not limited to the disk drive device described above; it can be applied to other disk-shaped recording media such as magneto-optical disks and the like, for example, provided they have a predetermined area that is accessed frequently, and other suitable changes can be made within the scope of the technical concepts of the present invention.

[0081]

A file management area was described as an example in the above-described embodiment, but there are other areas that are frequently accessed, such as the area storing the OS itself, areas storing library files that are used frequently by the OS, applications, and so forth, and so on. Or in a disk drive device employed for uses in which

performance has priority, such as storage areas for moving pictures, all of the areas may have a similar configuration.

[0082]

Effect of the Invention:

By arranging tracks used for recording and tracks not used for recording alternately in a predetermined area on the recording surface of a disk drive device, the present invention can relax the conditions of the end-of-seek criteria etc. It can, accordingly, contribute to an enhancement of the performance of the disk drive device while maintaining reliability.

Brief Description of the Drawings:

FIG. 1 is a block diagram showing the configuration of a disk drive device embodying the present invention.

FIG. 2 is a diagram showing recording areas on a magnetic disk.

FIG. 3 is a diagram showing a bad track table for listing defective tracks.

FIG. 4 is a diagram showing position error and the switching of operating modes in a seek operation.

FIG. 5 is a diagram showing the switching of operating modes.

FIG. 6 is a flowchart showing the process of setting off-track criteria.

FIG. 7 is a diagram for explaining the method of setting thresholds Cp1 and Cp2.

FIG. 8 is a diagram showing an example of access to the magnetic disk 1 .

FIG. 9 is a diagram showing another example of access to the magnetic disk 1.

FIG. 10 is a diagram showing the configuration of a disk drive test apparatus.

25 JUL 2002

FIG. 11 is a flowchart showing the process of listing defective tracks and unused tracks.

Reference Characters:

1 magnetic disk
2 memory
3 control unit
4 (channel)
5 servo system
6 head
7 arm
8 HIC
10, 20 information processing device

Claims:

1. A disk drive device, comprising:

a disk-shaped recording medium with a recording surface on which tracks having a predetermined width in a radial direction are formed, tracks used for recording and tracks not used for recording being arranged alternately in a predetermined area in the radial direction of the recording surface;

wherein servo sectors are recorded in said tracks, and areas other than the servo sections of said tracks not used for recording are placed in a predetermined magnetic state.

2. The disk drive device of claim 1, further comprising:

a recording means recording information on said disk-shaped recording medium;

a position error detecting means detecting position error from a track (target track) to be recorded on;

a seek means moving said recording means to the target track according to said position error; and

an end-of-seek detection means detecting end of motion if said position error is equal to or less than a first threshold, when said recording means is moved to a target track inside said predetermined area, and detecting end of motion if said position error is equal to or less than a second threshold smaller than said first threshold, when said recording mean is moved to a target track outside said predetermined area.

3. The disk drive device of claim 1, further comprising:

a recording means recording information on said disk-shaped recording medium;

a position error detecting means detecting position error from a track (target track) to be recorded on; and

a recording inhibition means inhibiting recording if said position error is equal to or greater than a first threshold, when said target track is inside said predetermined area, and inhibiting recording if said position error is equal to or greater than a second threshold smaller than said first threshold, when said target track is outside said predetermined area.

4. A method of fabricating a disk drive device, comprising the steps of:

forming tracks having a predetermined width in a radial direction on a recording surface of a disk-shaped recording medium;

arranging tracks used for recording and tracks not used for recording alternately in a predetermined area in the radial direction of said recording surface;

recording servo sections on the tracks when said tracks are formed; and

placing areas other than the servo sections of said tracks not used for recording in a predetermined magnetic state.

5. The method of fabricating a disk drive device of claim 4, further comprising the steps of:

recording a table indicating said tracks not used for recording in a predetermined area of said recording surface.

6. The method of fabricating a disk drive device of claim 4, further comprising the steps of:

detecting whether said tracks that are formed are defective or not; and

making a non-defective track one of said tracks not used for recording, if the non-defective track is adjacent a track used for recording in said predetermined area, and making a defective track one of said tracks not used for recording, if the defective track is adjacent one of said tracks used for recording in said predetermined area.

7. A seek control method for a disk drive device provided with a disk-shaped recording medium with a recording surface on which tracks having a predetermined width in a radial direction are formed, tracks used for recording and tracks not used for recording being arranged alternately in a predetermined area in the radial direction of the recording surface, comprising the steps of:

detecting position error from a track (target track) to be recorded on;

moving a recording means that records information on said disk-shaped recording medium to the target track according to the detected position error; and

detecting end of motion if said position error is equal to or less than a first threshold, when said recording means is moved to a target track inside said

predetermined area, and detecting end of motion if said position error is equal to or less than a second threshold smaller than said first threshold, when said recording means is moved to target track outside said predetermined area.

8. A disk drive control device controlling a disk drive device employing a disk-shaped recording medium with a recording surface on which tracks having a predetermined width in a radial direction are formed, tracks used for recording and tracks not used for recording being arranged alternately in a predetermined area in the radial direction of the recording surface, comprising:

position error detection means detecting position error from a track (target track) to be recorded on;

seek means moving a recording means that records information on said disk-shaped recording medium to the target track according to said position error; and

a seek end detection means detecting end of motion if said position error is equal to or less than a first threshold, when said recording means is moved to a target track inside said predetermined area, and detecting end of motion if said position error is equal to or less than a second threshold smaller than said first threshold, when said recording means is moved to a target track outside said predetermined area.

9. The disk drive control device of claim 8, further comprising:

a recording inhibition means inhibiting recording if said position error is equal to or greater than a first threshold, when said target track is inside said predetermined area, and inhibiting recording if said position error is equal to or greater than a second threshold smaller than said first threshold, when said target track is outside said predetermined area.