Title: METHOD AND APPARATUS FOR ENABLING/DISABLING DRIVE FEATURES

Abstract

An apparatus and method for enabling/disabling selective features of a disk drive is provided. A data structure contained on a disk is read by the drive and based on this data structure, selective features of the drive are manipulated to improve the performance of the disk drive. The data structure is preferably disposed on a portion of the disk that is inaccessible to the host computer system. Additionally, the data structure preferably is read by the drive during disk insertion or activation and used to enable and/or disable features of the drive.
### FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>Albania</td>
<td>ES</td>
<td>Spain</td>
<td>LS</td>
<td>Lesotho</td>
<td>SI</td>
<td>Slovenia</td>
</tr>
<tr>
<td>AM</td>
<td>Armenia</td>
<td>FI</td>
<td>Finland</td>
<td>LT</td>
<td>Lithuania</td>
<td>SK</td>
<td>Slovakia</td>
</tr>
<tr>
<td>AT</td>
<td>Austria</td>
<td>FR</td>
<td>France</td>
<td>LU</td>
<td>Luxembourg</td>
<td>SN</td>
<td>Senegal</td>
</tr>
<tr>
<td>AU</td>
<td>Australia</td>
<td>GA</td>
<td>Gabon</td>
<td>LV</td>
<td>Latvia</td>
<td>SZ</td>
<td>Swaziland</td>
</tr>
<tr>
<td>AZ</td>
<td>Azerbaijan</td>
<td>GB</td>
<td>United Kingdom</td>
<td>MC</td>
<td>Monaco</td>
<td>TD</td>
<td>Chad</td>
</tr>
<tr>
<td>BA</td>
<td>Bosnia and Herzegovina</td>
<td>GE</td>
<td>Georgia</td>
<td>MD</td>
<td>Republic of Moldova</td>
<td>TG</td>
<td>Togo</td>
</tr>
<tr>
<td>BB</td>
<td>Barbados</td>
<td>GH</td>
<td>Ghana</td>
<td>MG</td>
<td>Madagascar</td>
<td>TJ</td>
<td>Tajikistan</td>
</tr>
<tr>
<td>BE</td>
<td>Belgium</td>
<td>GN</td>
<td>Guinea</td>
<td>MK</td>
<td>The former Yugoslav</td>
<td>TM</td>
<td>Turkmenistan</td>
</tr>
<tr>
<td>BF</td>
<td>Burkina Faso</td>
<td>GR</td>
<td>Greece</td>
<td>ML</td>
<td>Mali</td>
<td>TR</td>
<td>Turkey</td>
</tr>
<tr>
<td>BG</td>
<td>Bulgaria</td>
<td>HU</td>
<td>Hungary</td>
<td>MN</td>
<td>Mongolia</td>
<td>TT</td>
<td>Trinidad and Tobago</td>
</tr>
<tr>
<td>BJ</td>
<td>Benin</td>
<td>IE</td>
<td>Ireland</td>
<td>MR</td>
<td>Mauritania</td>
<td>UA</td>
<td>Ukraine</td>
</tr>
<tr>
<td>BR</td>
<td>Brazil</td>
<td>IL</td>
<td>Israel</td>
<td>MW</td>
<td>Malawi</td>
<td>UG</td>
<td>Uganda</td>
</tr>
<tr>
<td>BY</td>
<td>Belarus</td>
<td>IS</td>
<td>Iceland</td>
<td>MX</td>
<td>Mexico</td>
<td>US</td>
<td>United States of America</td>
</tr>
<tr>
<td>CA</td>
<td>Canada</td>
<td>IT</td>
<td>Italy</td>
<td>NE</td>
<td>Niger</td>
<td>UZ</td>
<td>Uzbekistan</td>
</tr>
<tr>
<td>CF</td>
<td>Central African Republic</td>
<td>JP</td>
<td>Japan</td>
<td>NL</td>
<td>Netherlands</td>
<td>VN</td>
<td>Viet Nam</td>
</tr>
<tr>
<td>CG</td>
<td>Congo</td>
<td>KE</td>
<td>Kenya</td>
<td>NO</td>
<td>Norway</td>
<td>YU</td>
<td>Yugoslavia</td>
</tr>
<tr>
<td>CH</td>
<td>Switzerland</td>
<td>KG</td>
<td>Kyrgyzstan</td>
<td>NZ</td>
<td>New Zealand</td>
<td>ZW</td>
<td>Zimbabwe</td>
</tr>
<tr>
<td>CI</td>
<td>Côte d’Ivoire</td>
<td>KP</td>
<td>Democratic People’s Republic of Korea</td>
<td>PL</td>
<td>Poland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CM</td>
<td>Cameroon</td>
<td>KR</td>
<td>Republic of Korea</td>
<td>PT</td>
<td>Portugal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN</td>
<td>China</td>
<td>KZ</td>
<td>Kazakhstan</td>
<td>RO</td>
<td>Romania</td>
<td>RU</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>CU</td>
<td>Cuba</td>
<td>LC</td>
<td>Saint Lucia</td>
<td>RD</td>
<td>Russia</td>
<td>SD</td>
<td>Sudan</td>
</tr>
<tr>
<td>CZ</td>
<td>Czech Republic</td>
<td>LK</td>
<td>Sri Lanka</td>
<td>SE</td>
<td>Sweden</td>
<td>SG</td>
<td>Singapore</td>
</tr>
<tr>
<td>DE</td>
<td>Germany</td>
<td>LR</td>
<td>Liberia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DK</td>
<td>Denmark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td>Estonia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
METHOD AND APPARATUS FOR ENABLING/DISABLING
DRIVE FEATURES

FIELD OF THE INVENTION

This invention relates generally to data storage devices, or disk drives, of the type that receive a removable disk or disk cartridge. More particularly, this invention relates to a data structure on a media of the disk for enabling and/or disabling a feature of a disk drive.

BACKGROUND OF THE INVENTION

Disk based data storage devices for storing digital electronic information have been in use in the computer industry for several decades. The storage devices operate by storing digital information on a disk media, such as magnetic or optical media. The disk media can be either rigid or flexible and is mounted on a rotating hub. The storage devices are commonly referred to as disk drives, and typically accommodate removable media or fixed media.
Regarding disk drives that accommodate removable disk media, different types or generations of media, of varying quality, may be inserted into the drive. The type of media that is inserted into the drive may or may not need or take advantage of the features of the drive that are to be used on the media, thereby affecting the performance of the drive. In other words, responsive to the type of media inserted into the drive, a drive feature may or may not be used or needed. It may be desirable not to use a drive feature due to non-compatibility of the media with the drive.

Disk media quality can vary tremendously depending on the materials used to manufacture the disk, the manufacturing process, and the like. Accordingly, drives are typically designed to accommodate the poorest quality media expected to be used in the drive. As a result, disk drives typically have various features to assist the drive in using the media. For example, error correction processes are often implemented to account for and correct errors in all media types, even though only a portion of the media may suffer from the particular problems that the error correction processes are meant to correct. However, error correction, and other features, affect the performance speed of the drive. Thus, if a feature is not needed, and unnecessarily used, the performance of the drive is needlessly affected.

Although the art of removable disk cartridge disk drives is well developed, there remain some problems inherent in this technology, particularly with the lack of ability to enable and/or disable features of the disk drive in response to the type of media that has been inserted into the disk drive. Therefore, the need exists for a method and apparatus of enabling and disabling specific features of the disk drive.

**SUMMARY OF THE INVENTION**

The present invention is directed to a disk cartridge for use in a drive, the disk cartridge comprising a storage media, and a data structure disposed on the storage media and containing data indicative of a feature of the drive. Preferably, the data structure is disposed on a portion of the storage media that is inaccessible to a host computer system, such as a Z-track.

According to one aspect of the present invention, the feature of the drive is error correcting code or read after write verification.
In a further embodiment within the scope of the present invention, a disk cartridge of the type comprising a storage media and for use in a drive is provided. The disk cartridge comprises at least one pointer disposed on a portion of the media inaccessible to a host computer system, and at least one drive code disposed on the media pointed to by the pointer. The drive code contains data indicative of a feature of the drive.

Another embodiment within the scope of this invention includes a combination of a data storage cartridge and a drive for the data storage cartridge. The data storage cartridge comprises a storage media and a data structure disposed on the storage media and containing data indicative of a feature of the drive. The drive comprises a head for retrieving the data structure from the storage media, and a microprocessor for providing a comparison between the data structure and a predetermined value. The microprocessor also enables or disables the feature responsive to the comparison.

Another embodiment within the scope of this invention includes a method of enabling and disabling a feature of a disk drive, comprising the steps of: inserting a disk having a storage media into the disk drive; reading a data structure disposed on a portion of the media of the disk, the data structure containing data indicative of a feature of the drive; and enabling or disabling the feature responsive to the data structure. The data structure is preferably inaccessible to a host computer system.

In accordance with an aspect of the present invention, the step of reading a data structure further comprises first reading a pointer on the media, the pointer pointing to a drive code on the media, and reading the drive code.

In accordance with another aspect of the present invention, the step of enabling and disabling the feature comprises comparing the data structure to a predetermined value.

In accordance with another aspect of the present invention, the method further comprises the step of performing a CRC on the data structure.

In accordance with another aspect of the present invention, the method further comprises the steps of detecting an ECC error in the data structure, and attempting to correct the ECC error.

BRIEF DESCRIPTION OF THE DRAWINGS
The foregoing summary, as well as the following detailed description of the preferred embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings embodiments that are presently preferred, it being understood, however, that the invention is not limited to the specific methods and instrumentalities disclosed. In the drawings:

Figure 1 is a perspective view of an exemplary disk drive and an exemplary disk cartridge in which the present invention is embodied;

Figure 2 is a top plan view of the disk drive of Figure 1;

Figure 3 is a block diagram illustrating further details of the disk drive of Figure 1 in accordance with the present invention;

Figures 4A and 4B are top and bottom views of the disk cartridge of Figure 1;

Figure 5 shows a disk-shaped storage media of the disk cartridge of Figure 4A containing an exemplary data structure;

Figure 6 is a flow diagram illustrating an exemplary method of enabling/disabling a feature of a disk drive in accordance with the present invention;

Figure 7 is a block diagram of an exemplary data structure in accordance with the present invention;

Figure 8 is a flow diagram illustrating another exemplary method of enabling/disabling a feature of a disk drive in accordance with the present invention; and

Figure 9 is a flow diagram illustrating another exemplary method of enabling/disabling a feature of a disk drive in accordance with the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS AND BEST MODE

A method and apparatus for enabling/disabling selective drive features that solves the above-mentioned problems in the prior art and provides other beneficial features in accordance with the presently preferred exemplary embodiments of the invention will be described below with reference to Figures 1-9. Those skilled in the art will readily appreciate that the description given herein with respect to those figures is for explanatory purposes only and is not intended in any way to limit the scope of the invention.
Throughout the description, the invention is described in connection with a removable media disk drive. However, the particular disk drive and cartridge shown only illustrate the operation of the present invention and are not intended as limitations. Aspects of the invention are equally applicable to other disk drives including linear actuator disk drives, fixed medium drives, and removable medium disk drives as well as differently sized and shaped disks and disk cartridges. Accordingly, the invention should not be limited to the particular drive or disk embodiment shown as the invention contemplates the application to other drive and disk types and configurations. Throughout the following detailed description similar reference numbers refer to similar elements in the figures of the drawings.

The present invention is directed to a method and apparatus for manipulating (i.e., enabling and/or disabling) selective features of a data storage device or disk drive. As described in further detail below, a data structure (e.g., a byte) is disposed on a media of a disk or data storage cartridge. The disk having the media thereon is inserted into a disk drive and the disk drive reads the data structure. Responsive to the contents of the data structure, a feature of the drive is enabled or disabled.

Figure 1 is a perspective drawing of an exemplary disk drive device 50 and a disk cartridge 10 for use with the present invention. The drive 50 may be adapted for removable connection to a computer device or may be built-in to a computer device (not shown). The drive 50 may have a protective case, such as protective case 53, having an upper case 54 and a lower case 55, which forms an interior space for accepting disk cartridge 10 or a cartridgeless media, such as an optical compact disk (CD). The upper case 54 and lower case 55 are preferably formed from sheet material. The lower case 55 has a bottom surface and side surfaces, and upper case 54 is formed so that it covers the top of lower case 54. The upper case 54 may also have a raised surface 54a, which projects upward across a width W of the upper case 54. Width W is sized accordingly such that space is available within case 53 to accommodate a disk cartridge 10 as well as a disk drive mechanism and an electronics system.

Figure 2 is a top plan view of the internal components of the exemplary disk drive 50 of Figure 1 with the upper case 54 removed for clarity. The drive 50 further comprises a chassis 57, an actuator 49, a spindle motor 52 and a spindle 40, and load ramps
47. The actuator comprises three major components: (1) a pair of load beams 44 with (2) a read/write head 46 disposed at the distal end of each load beam 44, and (3) a coil 43. Actuator 49 is driven by a voice coil to pivot about point 11. When actuator 49 is not in use, it is generally retracted to the parked position (as shown).

A disk cartridge 10 can be inserted into an opening 48 in the front of drive 50 in the direction indicated by the arrow. During insertion, the disk 10 slides linearly along the top surface of chassis 57 and the spindle motor 52 for engagement with the read/write heads 46.

Figure 3 is a block diagram of the electronic components of an exemplary disk drive 50 in accordance with the present invention. As shown, the disk drive 50 comprises a spindle motor 52, motor controller/driver 76, read/write heads 46, read/write pre-amp 80, read channel 84, actuator 49, actuator servo/driver 86, digital controller 88, random-access memory buffer 90, microprocessor 92 and user interface components 94. The disk drive 50 connects to a user's host device 96 through an interface bus 98.

The motor controller/driver 76 and spindle motor 52 rotate the storage media of the cartridge 10 at a constant speed, allowing the read/write heads 46 to "fly" close to the rotating storage media for a stable recording environment.

The read/write pre-amp 80 amplifies the signals picked up by the heads 46 during read operations and switches current in the heads 46 during write operations. The read channel 84 shapes the pulses from the pre-amp 80, qualifies the peaks that represent the user data and special information, and generates a clock that is synchronous with the data coming off the storage media.

The actuator servo/driver 86 demodulates servo information recorded on storage media and compensates to position the read/write heads 46 precisely on a selected track of the data storage media.

The digital controller 88 decodes and error checks the data from the read channel 84 and stores the data temporarily in a buffer memory. The controller 88 also ensures that data is written to, or read from, the correct track and sector of storage media. The controller 88, when directed by the microprocessor 92, sends data from the buffer 90 to the host device 96, or from the host device 96 to the buffer 90, in accordance with a predefined protocol, such as ATAPI (AT Attachment Packet Interface).
The microprocessor 92 controls and monitors the functions in the drive 50. The program code is preferably stored in a read-only memory (ROM), while a random access memory (RAM) is preferred for storing variables, flags, status information, etc. The microprocessor 92 is responsible, in large part, for controlling the disk drive in accordance with the present invention. A significant function of the microprocessor 92 is to manipulate selective features, i.e., enabling and disenabling, of the disk drive 50 in accordance with the information indicated by the data structure or code stored, or written, in a predetermined location on the storage media, i.e., the code written in a predetermined data storage location (e.g., bit(s) or byte(s)). Any suitable microprocessor can be employed, such as, for example, a Motorola 68HC16 microprocessor or an Intel 8032 microprocessor.

Figures 4A and 4B present top and bottom views, respectively, of an exemplary disk cartridge 10 for use with the drive 50. The disk cartridge 10 comprises a flexible magnetic storage media 14, a storage media hub 12, top and bottom cartridge shell halves 18a and 18b, a rotary shutter 16, and a shutter pivot pin 20. The shutter 16 is rotatably disposed in cartridge 10 to selectively cover and expose disk access opening 13. In the open position, shutter 16 is rotated away from a generally wedge shaped disk access opening 13 that is formed in cartridge shell 18, exposing the top and bottom surfaces of media 14 for access by a read/write head or heads 46 contained within the disk drive 50. In the closed position, shutter 16 is rotated over disk access opening 13, sealing disk cartridge 10 and protecting media 14. The flexible magnetic storage media 14 is preferably formed of a thin polymer film, such as MYLAR, and has a thin magnetic layer uniformly dispersed on the top and bottom surfaces. The magnetic surfaces magnetically sensitize the flexible storage media 14 and enable the storage of digital data when the surface is brought into magnetic communication with a magnetic transducer of the type commonly found in disk drives. Storage media 14 is generally circular with a circular hole proximate its center.

The media hub 12 is firmly secured to storage media 14 such that the center of hub 12 is aligned proximate the center of media 14. The media hub 12 is preferably attached to storage media 14 via a conventional adhesive process. The storage media and hub assembly are rotatably disposed between upper and lower cartridge shell halves 18a,
18b. Lower cartridge shell half 18b has a substantially circular spindle access opening 18c such that a disk drive 50 can provide rotational power to storage media 14 via hub 12.

Referring now to Figure 5, an exemplary disk-shaped storage media 14 in accordance with the present invention is depicted. The storage media 14 comprises a disk having a magnetic coating for writing and reading information to and from the storage media 14. Preferably, information can be written on both sides of the storage media 14. While magnetic media is preferred, other media can be employed, and the present invention is by no means limited to use of magnetic storage media. For example, the storage media 14 can be a re-writeable optical storage media or a magnet-optical storage media.

In a preferred embodiment, the storage media 14 has a band of concentric data tracks 25 which can be written to, and read from, a user's host computer device, such as a computer, a digital camera, or the like. The concentric data tracks 25 may have a variety of track densities. In addition to the data tracks 25, preferably there are at least two special information tracks 26a, 26b on each side of the storage media (only one side is shown in Figure 5), called Z-tracks, that contain information, such as the defect characteristics of that particular storage media. The information contained on these tracks is preferably identical and, in fact, is preferably repeated in at least two separate locations on each track 26a, 26b. This redundancy helps to ensure that the information is available, even if some areas of the storage media 14 become damaged and unreadable.

On each side of the storage media 14, one Z-track 26a is located at the outside of the band of data tracks 25, and the other Z-track 26b is located to the inside of the band of data tracks 25. Preferably, none of the special information Z-tracks 26a, 26b can be accessed by a host computer device (not shown) to which the disk drive 50 is interfaced. Only the disk drive 50, and in particular, a microprocessor 92 within the disk drive 50, can access the information written on the tracks 26a, 26b. Preferably, at least the outer special information track 26a on at least one side of the storage media includes at least one special sector 34 that comprises an ID field 36 and a data field 38. The ID field 36 is used to identify special sector 34 and to distinguish that sector from other sectors in the Z-track 26a. Preferably, the data field 38 comprises 512 bytes; however, in other embodiments, the data field 38 can comprise a different number of bytes.
The data field 38 preferably comprises a data structure (e.g., one or more bits or bytes) that stores a value that indicates whether or not a particular function of the disk drive (e.g., "error correcting code (ECC)" or "read after write verification") should be enabled or disabled within the disk drive. The disk drive reads the value in the data structure, and responsive to this value, enables or disables the appropriate function. It should be noted that the data structure can be located anywhere on the media 14 and is not limited to the Z-tracks 26a, 26b.

An exemplary method of enabling / disabling a feature of a disk drive in accordance with the present invention is illustrated in Figure 6. A data structure, such as the one described above with respect to Figure 5, is read by the disk drive at step 105. The contents or value of the data structure is compared to a predetermined value or data string at step 110. If the contents or value of the data structure does not substantially equal the predetermined value or data string, then a feature of the drive is disabled at step 115. If the contents or value of the data structure substantially equals the predetermined value or data string, then the feature of the drive is enabled at step 120. After the feature is enabled or disabled, the drive continues normal operation at step 125. Thus, the disk has a data structure thereon, and depending on the contents or value of the data structure, a feature of the drive is enabled or disabled.

It should be noted that in the above description, the step of disabling can be responsive to the contents or value of the data structure being equal to the predetermined value at step 110, and the step of enabling can be responsive to the contents or value of the data structure not being equal to the predetermined value at step 110, depending on the particular arrangement and implementation of the disk drive. A number of features of the disk drive can be enabled or disabled, including, for example, ECC and read after write verification. These types of verification, if enabled, reduce the performance speed of the disk drive, but allow lower quality media to be used with the disk drive. Superior quality media desirably will not activate these performance reducing verification schemes, thereby leading to increased drive performance with very little, if any, effect on the integrity of the data stored on the media.

An exemplary data structure 200 in accordance with the present invention is shown in Figure 7. Preferably, the data structure 200 is stored in an area of the disk
cartridge 10 that is inaccessible to a user, such as the Z-tracks of the media 14. Preferably, the structure 200 contains a pointer 220 that contains an address of the remaining portion of the structure 200, such as drive code 240. Drive code 240 preferably contains a predefined number of bytes that could either be a fixed number of bytes, or a number of bytes as indicated by the first byte. By way of example, the data structure 200 could contain a code for enabling or disabling the error correction of the cartridge, and may contain a string such as "ECC Enable." In this way, more superior quality media, which do not need as robust an error correction, could disable the error correction and speed up the performance of the drive. Consequently, cartridges that do not contain the appropriate code would not enable this particular feature of the drive 50.

An exemplary method of operation in accordance with the present invention and the data structure of Figure 7 is shown in Figure 8. In Figure 8, the ECC feature of the drive 50 is enabled or disabled. However, it should be noted that any feature of the drive (e.g., write verify) can be enabled or disabled in accordance with the invention. At step 251, a host computer (not shown) accesses a disk drive. At step 252, the disk drive reads a data structure pointer (similar to data structure pointer 220 in Figure 7). The drive reads the drive code 240 pointed to by pointer 220 (e.g., "ECC Enable") at step 254. The drive checks for a valid code at step 256, preferably by performing a cyclic redundancy check (CRC), using for example a standard 8-bit CRC algorithm. If the CRC checksum matches the expected value at step 258, ECC error correction by the drive on any data read from the disk cartridge 10 will be turned on at step 260. If any of the bytes in the drive code 240 differ from their expected values, the resultant CRC checksum will fail, thereby resulting in the drive disabling ECC error correction on all data read from the drive at step 262. The routine then ends at step 265 and the drive continues to operate.

Another exemplary method in accordance with the present invention is shown in Figure 9. In this example, "errors" are written at at least one data storage location. If the errors are detected and correctable, it is determined that the circuitry (i.e., the error correction code and circuitry) is operable, and the error correction code and circuitry remain enabled. If the errors are not detected and/or are not correctable, it is determined that the error correction code and circuitry is not operating correctly, and thus, the error correction code and circuit are disabled. In particular, at step 300, a cartridge 10 is
introduced into the disk drive 50, and the disk drive 50 then reads the data structure from the media (e.g., the media Z-track 26a or 26b), at step 302. Preferably, in this embodiment, the data structure contains an "error". It is determined at step 304 if the error was detected in the data structure. If not, the drive feature (in this case, ECC) is disabled at step 320, and the drive resumes operation at step 330.

If the error was detected at step 304, it is determined if the error is correctable, at step 306. If the error is correctable, the ECC drive feature remains enabled (or is enabled, depending on the particular arrangement and implementation of the disk drive), at step 312, and the drive resumes operation at step 330.

If the error was not correctable at step 306, it is determined if other predetermined data structures (which can be located in other sectors read from the same Z-track or different Z-tracks) or data fields in the data structure containing the predetermined "error" exist, at step 308. If the error was not correctable, and all the predetermined "errors" have been read, then the drive feature (in this case, ECC) is disabled at step 320, and the drive resumes operation at step 330. If, however, all the predetermined "errors" have not been read, the drive moves to read the next "error" at step 310, and processing continues at step 302.

Although the above examples use ECC as the drive feature that is being enabled / disabled, it should be noted that any drive feature can be enabled / disabled in accordance with the present invention. For example, a feature such as the disk drive's "read after write" mode may be manipulated by either enabling or not disabling this feature if it is determined that a predetermined data structure (e.g., bit(s) or byte(s)) is set or not set. The "read after write" mode allows the drive 50 to perform additional verification, which leads to a slower disk drive performance, but higher data integrity on the disk. If the data structure is determined not to be set, then this drive feature is either disabled or not enabled and the drive would operate in the "regular" mode, i.e., there would be no additional verification, and the drive would operate faster. Other features that could be enabled / disabled include drive fan, virus detection, and drive engagement, etc.

While the invention has been described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the
scope of the invention. In addition, many modifications can be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.
What is Claimed is:

1. A disk cartridge for use in a drive, said disk cartridge comprising:
   a storage media; and
   a data structure disposed on said storage media and containing data indicative
   of a feature of said drive.

2. The disk cartridge of claim 1, wherein said data structure is disposed
   on a portion of said storage media that is inaccessible to a host computer system.

3. The disk cartridge of claim 1, wherein said storage media comprises
   a Z-track, and said data structure is disposed on said Z-track.

4. The disk cartridge of claim 1, wherein said feature of said drive is
   one of error correcting code and read after write verification.

5. A disk cartridge of the type comprising a storage media and for use
   in a drive, said disk cartridge comprising:
   a pointer disposed on a portion of said media inaccessible to a host
   computer system; and
   a drive code disposed on said media pointed to by said pointer, said
   drive code containing data indicative of a feature of said drive.

6. The disk of claim 5, wherein said inaccessible portion of said media
   comprises at least one Z-track.

7. The disk of claim 6, wherein said pointer is disposed on said Z-track
   of said media.

8. The disk cartridge of claim 5, wherein said feature of said drive is
   one of error correcting code and read after write verification.
9. The combination of a data storage cartridge and a drive for said data storage cartridge, said data storage cartridge comprising:
   a storage media; and
   a data structure disposed on said storage media and containing data indicative of a feature of said drive,
   said drive comprising:
   a head for retrieving said data structure from said storage media; and
   a microprocessor for providing a comparison between said data structure and a predetermined value and one of enabling and disabling said feature responsive to said comparison.

10. The combination of claim 9, wherein said data structure is disposed on a portion of said storage media that is inaccessible to a host computer system.

11. The combination of claim 9, wherein said storage media comprises a Z-track, and said data structure is disposed on said Z-track.

12. The disk cartridge of claim 9, wherein said feature of said drive is one of error correcting code and read after write verification.

13. A method of enabling and disabling a feature of a disk drive, comprising the steps of:
   inserting a disk having a storage media into said disk drive;
   reading a data structure disposed on a portion of said media of said disk, said data structure containing data indicative of a feature of said drive; and
   one of enabling and disabling said feature responsive to said data structure.

14. The method of claim 13, wherein said step of reading a data structure further comprises reading a pointer on said media, said pointer pointing to a drive code on said media, and reading said drive code.
15. The method of claim 13, wherein said step of enabling and disabling said feature comprises comparing said data structure to a predetermined value.

16. The method of claim 13, further comprising the step of performing a CRC on said data structure.

17. The method of claim 13, further comprising the steps of detecting an ECC error in said data structure, and attempting to correct said ECC error.

18. The method of claim 13, wherein said feature comprises one of ECC and read after write verification.
Figure 6
Figure 7
Start

Read Pointer

Index into code

Perform CRC on code

CRC Match?

Enable ECC

Disable ECC

END

Figure 8
Start

Read ECC test sector.

ECC error detected?

No

Error correctable?

Yes

Go to next ECC test sector.

No

Have all redundancies been read?

Yes

End

Disable ECC

Allow ECC

300

302

304

306

308

310

312

320

330

Figure 9
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

<table>
<thead>
<tr>
<th>IPC 6</th>
<th>G11B19/12</th>
<th>G11B33/00</th>
<th>G11B23/00</th>
<th>G11B23/28</th>
<th>G11B23/30</th>
</tr>
</thead>
</table>

According to International Patent Classification (IPC) or to both national classification and IPC.

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

<table>
<thead>
<tr>
<th>IPC 6</th>
<th>G11B</th>
</tr>
</thead>
</table>

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched:

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>WO 98 07144 A (IOMEGA CORP) 19 February 1998 (1998-02-19) page 5, line 32 - page 14, line 8; figures 1,2</td>
<td>1-3, 5-7, 9-11, 13-15</td>
</tr>
<tr>
<td>X</td>
<td>EP 0 484 775 A (INSITE PERIPHERALS) 13 May 1992 (1992-05-13) the whole document</td>
<td>1, 2, 5, 9, 10, 13-15</td>
</tr>
<tr>
<td>X</td>
<td>EP 0 798 711 A (TOKYO SHIBAURA ELECTRIC CO) 1 October 1997 (1997-10-01) page 8, line 17 - page 11, line 5 page 15, line 54 - page 16, line 28; figures 5,12,13,1422</td>
<td>1, 5, 13</td>
</tr>
</tbody>
</table>

* Further documents are listed in the continuation of box C.

**Patent family members are listed in annex.**

- "A" - document defining the general state of the art which is not considered to be of particular relevance
- "E" - earlier document but published on or after the international filing date
- "L" - document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" - document referring to an oral disclosure, use, exhibition or other means
- "P" - document published prior to the international filing date but later than the priority date claimed
- "T" - later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" - document of particular relevance; the claimed invention cannot be considered prior art
- "Y" - document of particular relevance; the claimed invention cannot be considered prior art
- "Z" - document of particular relevance; the claimed invention cannot be considered prior art

Date of the actual completion of the international search: 20 August 1999

Date of mailing of the international search report: 30/08/1999

Name and mailing address of the ISA

**European Patent Office, P.B. 5918 Patentlaan 2 NL - 2280 HV Rijswijk**

Tel. (+31-70) 340-2060, Tx. 31 651 apo nl, Fac. (+31-70) 340-3016

Authorized officer: Moje, A

Form PCT/ISA/215 (second sheet) (July 1992)
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>JP 4265567 A</td>
<td>21-09-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5363255 A</td>
<td>08-11-1994</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1164732 A</td>
<td>12-11-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5878020 A</td>
<td>02-03-1999</td>
</tr>
</tbody>
</table>