

DEFENDANTS' PRELIMINARY INVALIDITY CONTENTIONS

EXHIBIT 832-1

Prior Art Reference: Wolf '363

U.S. Patent No. 5,287,363 ("Wolf '363") anticipates all claims under at least 35 U.S.C. §§ 102(a), (b), (e) and/or (g), and renders obvious all claims under § 103. Although Defendants' investigation continues, information available to date indicates that such publications: were (1) published in this country or a foreign country before the alleged invention of the claimed subject matter of the asserted claims, (2) were published in this country more than one year before the filing date of the patent, and/or (3) were invented by another who did not abandon, suppress, or conceal, before the alleged invention of the claimed subject matter of the asserted claim. Upon information and belief, these prior art publications and the associated products and systems anticipate and/or render obvious each of the asserted claims.

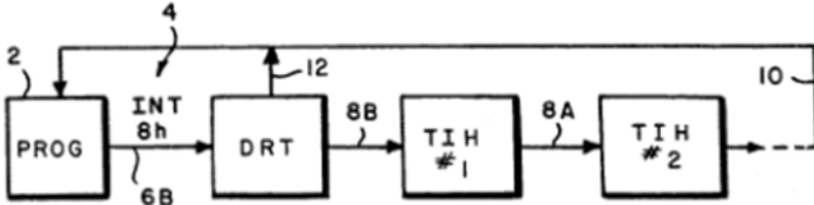
With respect to the obviousness of the asserted claims under 35 U.S.C. § 103, one or more of the principles enumerated by the United States Supreme Court in *KSR v. Teleflex*, 550 U.S. 398 (2007) apply, including: (a) combining various claimed elements known in the prior art according to known methods to yield a predictable result; and/or (b) making a simple substitution of one or more known elements for another to obtain a predictable result; and/or (c) using a known technique to improve a similar device or method in the same way; and/or (d) applying a known technique to a known device or method ready for improvement to yield a predictable result; and/or (e) choosing from a finite number of identified, predictable solutions with a reasonable expectation of success or, in other words, the solution was one which was "obvious to try"; and/or (f) a known work in one field of endeavor prompting variations of it for use either in the same field or a different field based on given design incentives or other market forces in which the variations were predictable to one of ordinary skill in the art; and/or (g) a teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine the teachings of various prior art references to arrive at the claimed invention. It therefore would have been obvious to one of ordinary skill in the art to combine the disclosures of these references in accordance with the principles and rationales set forth above.

Defendants note that Plaintiffs appear in many instances to be pursuing overly broad constructions of various limitations of the asserted claims of the '832 patent in an effort to piece together an infringement claim where none exists and to accuse products that do not practice the claims. This claim chart takes into account Plaintiffs' overly broad construction of the claim limitations. Any assertion that a particular limitation is disclosed by a prior art reference or references may be based on Plaintiffs' apparent constructions and is not intended to be, and is not, an admission that such constructions are supportable or proper. To the extent that any of the prior art discloses the same or similar functionality or feature(s) of any of the accused products, Defendants reserve the right to argue that said feature or functionality does not practice any limitation of any of the asserted claims, and to argue, in the alternative, that if said feature or functionality is found to practice any limitation of any of the asserted claims of the '832 patent, then the prior art reference teaches the limitation and that the claim is not patentable.

The citations to portions of any reference in this chart are exemplary only. For example, a citation that refers to or discusses a figure or figure item should be understood to also incorporate by reference that figure and any additional descriptions of that figure as if set forth fully therein. Defendants reserve the right to rely on the entirety of the reference cited in this chart to show that the Asserted Claims are invalid. Citations presented for one claim limitation are expressly incorporated by reference into all other limitations for that claim as well as all limitations of all claims on which that claim depends. Defendants also reserve the right to rely on additional citations or sources of evidence that also may be applicable, or that may become applicable in light of claim construction, changes in Plaintiffs' infringement contentions, and/or information obtained during discovery as the case progresses.

Claims	Exemplary citations to Wolf '363
1[pre]. A method for monitoring performance of a storage device, comprising:	To the extent the preamble is limiting, Wolf '363 discloses “[a] method for monitoring performance of a storage device.” For example: Wolf '363 at Abstract Method and apparatus for use in a computer having peripheral data storage, to monitor data transfers to detect defective or marginally defective storage areas. Wolf '363 at Abstract For each monitored address, when its contents first change, the second component stores the current interrupt accumulation. Following the operation, the first component applies algorithms to the accumulations and decides thereby whether to log an error indicator. Wolf '363 at 1:15–20 This invention relates in general to systems which operate in real time to monitor data retrieval operations of peripheral storage media and log events indicating the occurrence of any difficulty in retrieving data, and which subsequently, not in real time, take remedial action based on analysis of the logged data. The Wolf '363 at 3:22–29 According to a first aspect, the invention presents a system (i.e., apparatus, and application provided on a tangible medium, such as a disk, for use with a computer system to form the apparatus and practice the related method) which has a memory resident part that monitors data retrieval from a peripheral storage medium concurrently with the normal operation of the computer. Wolf '363 at 6:57–58 it is the general function of the resident components to monitor disk reads. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still

Claims	Exemplary citations to Wolf '363
	considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.

Claims	Exemplary citations to Wolf '363
[1a] intercepting communications between a computer system and said storage device;	Wolf '363 discloses “intercepting communications between a computer system and said storage device.” For example: Wolf '363 at Abstract Method and apparatus for use in a computer having peripheral data storage, to monitor data transfers to detect defective or marginally defective storage areas. Wolf '363 at Abstract The resident component is in the computer's interrupt chain, to be invoked during both the initiation and conclusion of storage operations. When a data access is called, a timer (e.g., the system timer) provides interrupts at a suitably high rate, and informs a second component of the operation. At the conclusion of the operation, error indications are logged into a log file. Wolf '363 at Figure 5  FIG. 5 Wolf '363 at 3:22–29 According to a first aspect, the invention presents a system (i.e., apparatus, and application provided on a tangible medium, such as a disk, for use with a computer system to form the apparatus and practice the related method) which has a memory resident part that monitors data retrieval from a peripheral storage medium concurrently with the normal operation of the computer. Wolf '363 at 3:29–33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error

Claims	Exemplary citations to Wolf '363
	correction has taken place. Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 7:42–49 The disk-call interceptor needs to be in the disk-call chain in order to distinguish disk read operations from other disk operations before they start, and in order to obtain the status information concerning the disk-read operations which is available at their conclusion or abortion. Once the disk-call interceptor is properly placed within the disk-call chain, the disk-call trapper is no longer needed. Wolf '363 at 7:55–58 As previously discussed, one component of the system according to this invention is the disk-read timer which measures which the duration of data transfers during disk read operations. Wolf '363 at 12:20–45 At 22, if upon entry, the fast-tick flag is true, this indicates that the disk call interceptor has received a call for a disk read operation and has set the flag. The disk-read timer then undertakes at 46 to measure time by accumulating ticks. While accumulating ticks, the disk-read timer inspects specified memory addresses for changes in their respective contents from their respective initial values. For each such specified memory address, the disk-read timer will record the number of accumulated ticks if and at the time a change from the initial value occurs. The number of specified memory addresses which the disk read timer so monitors can be one address or an array of addresses. The disk-read timer records these tick

Claims	Exemplary citations to Wolf '363
	counts in the shared variable memory (MI of FIG. 3). When the disk-read timer is to monitor the addresses as within the memory buffer which are to receive the data from the disk, the addresses as are obtainable from known memory locations which were set to the addresses by the disk-call interceptor since, being in the disk call chain, the disk-call interceptor has an opportunity to examine the disk call parameters and learn the buffer address. If the disk-read timer is to monitor an array of memory addresses, the array will typically be supplied by a transient program, such as the analysis program, via the shared structured memory block (M2 of FIG. 3). Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these

Claims	Exemplary citations to Wolf '363
	systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 20:24–41 In order to determine from the raw time information received by the disk call interceptor from the disk-read timer, whether an error condition has occurred, the disk call interceptor must compare the raw time information with a table of acceptable times. Such a table may be built up at setup time, for example, by performing several series of successive reads of one sector, then two sectors, then three sectors, up to 255 sectors, and logging in the table the average times for each of these read operations. Thus, when the operating system issues a call for a read operation containing one of those numbers of sectors stored in the table, a simple comparison can determine if a reasonable time has been taken for the read. The criteria for making the determination can be established by the user; for example only, a "reasonable time" may be defined as one which is no more than one standard deviation greater than the mean, or no more than fifty-percent greater than the mean. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 24:13–21 responsive to the signaling of a possible error to request a retry of the operation for retrieving data from the medium; and means for comparing the original elapsed time of the operation to the elapsed time of the retrial of the

Claims	Exemplary citations to Wolf '363
	operation and for signalling an occurrence of an error condition if both the original elapsed time and the elapsed time of the retrial exceed the acceptable time limit. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
[1b] analyzing said intercepted communications relative to a threshold value for the performance of said storage device; and	Wolf '363 discloses “analyzing said intercepted communications relative to a threshold value for the performance of said storage device.” For example: Wolf '363 at Abstract Method and apparatus for use in a computer having peripheral data storage, to monitor data transfers to detect defective or marginally defective storage areas. Wolf '363 at Abstract For each monitored address, when its contents first change, the second component stores the current interrupt accumulation. Following the operation, the first component applies algorithms to the accumulations and decides thereby whether to log an error indicator. Wolf '363 at Abstract An analysis program retrieves the log entries, clears the log for future entries, adds the entries to a history of the storage, and applies algorithms to the history to determine whether storage areas are defective. It also takes remedial action such as marking a defective storage area bad and relocating the data to a usable area. Wolf '363 at 3:29–33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error correction has taken place. Wolf '363 at 3:40–53 Another, non memory resident part of the system of this invention retrieves data logged by the memory

Claims	Exemplary citations to Wolf '363
	resident part, assembles the logged data into a history of the medium per unit area, e.g., per sector, and analyzes the historical data to determine whether there are any areas of the storage medium that are unable to store data with integrity or are tending to lose the ability to store data with integrity. If any areas are determined to be bad or to be marginally bad as a result of the analysis performed by this part, the non memory resident part relocates to other areas the data stored in these areas, if possible, and marks original areas bad according to the procedures of the operating system under which the non-memory resident part is running. Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 7:42–49 The disk-call interceptor needs to be in the disk-call chain in order to distinguish disk read operations from other disk operations before they start, and in order to obtain the status information concerning the disk-read operations which is available at their conclusion or abortion. Once the disk-call interceptor is properly placed within the disk-call chain, the disk-call trapper is no longer needed. Wolf '363 at 7:55–58 As previously discussed, one component of the system according to this invention is the disk-read timer which measures which the duration of data transfers during disk read operations. Wolf '363 at 12:20–45 At 22, if upon entry, the fast-tick flag is true, this indicates that the disk call interceptor has received a call

Claims	Exemplary citations to Wolf '363
	for a disk read operation and has set the flag. The disk-read timer then undertakes at 46 to measure time by accumulating ticks. While accumulating ticks, the disk-read timer inspects specified memory addresses for changes in their respective contents from their respective initial values. For each such specified memory address, the disk-read timer will record the number of accumulated ticks if and at the time a change from the initial value occurs. The number of specified memory addresses which the disk read timer so monitors can be one address or an array of addresses. The disk-read timer records these tick counts in the shared variable memory (MI of FIG. 3). When the disk-read timer is to monitor the addresses as within the memory buffer which are to receive the data from the disk, the addresses as are obtainable from known memory locations which were set to the addresses by the disk-call interceptor since, being in the disk call chain, the disk-call interceptor has an opportunity to examine the disk call parameters and learn the buffer address. If the disk-read timer is to monitor an array of memory addresses, the array will typically be supplied by a transient program, such as the analysis program, via the shared structured memory block (M2 of FIG. 3). Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 17:4–7 The analysis program determines on the basis of the historical data whether any disk areas are defective to the point where they should be designated to the operating system as unusable, and the data relocated. Wolf '363 at 17:15–18 If the analysis program detects that any new errors have occurred since the analysis program was last run, a procedure to confirm and correct bad locations is undertaken.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 20:24–41 In order to determine from the raw time information received by the disk call interceptor from the disk-read timer, whether an error condition has occurred, the disk call interceptor must compare the raw time information with a table of acceptable times. Such a table may be built up at setup time, for example, by performing several series of successive reads of one sector, then two sectors, then three sectors, up to 255 sectors, and logging in the table the average times for each of these read operations. Thus, when the operating system issues a call for a read operation containing one of those numbers of sectors stored in the table, a simple comparison can determine if a reasonable time has been taken for the read. The criteria for making the determination can be established by the user; for example only, a "reasonable time" may be defined as one which is no more than one standard deviation greater than the mean, or no more than fifty-percent greater than the mean.

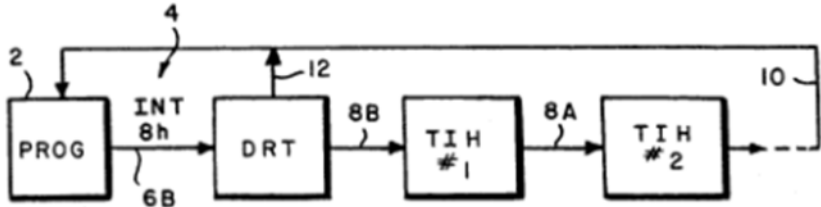
Claims	Exemplary citations to Wolf '363
	Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 24:3–11 means for determining an acceptable time limit for the retrieval of the requested data independently of whether an error condition is otherwise reported, and means for comparing the elapsed time of the operation to the acceptable time limit for the retrieval and for signaling an occurrence of a possible error when the elapsed time exceeds the acceptable time limit. Wolf '363 at 24:13–21 responsive to the signaling of a possible error to request a retry of the operation for retrieving data from the medium; and means for comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation and for signalling an occurrence of an error condition if both the original elapsed time and the elapsed time of the retrial exceed the acceptable time limit. Wolf '363 at 28:1–9 responsive to the signaling of a possible error, requesting a retry of the operation for retrieving data from the medium; comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation; and signalling an occurrence of an error condition if both the original elapsed tim and the elapsed time of the retrial exceed the acceptable time limit. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may

Claims	Exemplary citations to Wolf '363
	come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
[1c] responding to a decline in the performance of said storage device based on said analyzed intercepted communications by automatically reallocating at least some data on said storage device to enhance continued operation of the storage device.	Wolf '363 discloses “responding to a decline in the performance of said storage device based on said analyzed intercepted communications by automatically reallocating at least some data on said storage device to enhance continued operation of the storage device.” For example: Wolf '363 at Abstract An analysis program retrieves the log entries, clears the log for future entries, adds the entries to a history of the storage, and applies algorithms to the history to determine whether storage areas are defective. It also takes remedial action such as marking a defective storage area bad and relocating the data to a usable area. Wolf '363 at 3:40–53 Another, non memory resident part of the system of this invention retrieves data logged by the memory resident part, assembles the logged data into a history of the medium per unit area, e.g., per sector, and analyzes the historical data to determine whether there are any areas of the storage medium that are unable to store data with integrity or are tending to lose the ability to store data with integrity. If any areas are determined to be bad or to be marginally bad as a result of the analysis performed by this part, the non memory resident part relocates to other areas the data stored in these areas, if possible, and marks original areas bad according to the procedures of the operating system under which the non-memory resident part is running. Wolf '363 at 7:12–25 Referring again to FIG. 3, a primary function of the analysis program is to take the events recorded by the disk-call interceptor on the log file, build and maintain a history of such events sorted by disk unit areas, such as sectors, apply certain algorithms to the historical data, take remedial measures and/or communicate with a computer operator whenever application of the algorithms to the historical data indicates a failure mode, an unknown defective area or an area that has become marginally defective. Remedial action can include moving to a good area the data, which was stored in an area accessible to the analysis program by the disk-call interceptor, as described above, and marking the bad or marginally defective area in the disk's list of such areas. Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log

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	file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 16:65–17:3 The recovered data and log file locations are known to the analysis program by communication with the log file locator, both of which are preferably processes within a single, transient program, as indicated above. Thus, if necessary, data recovered from a faulty sector may be relocated to a safe location, as is described hereinbelow. Wolf '363 at 17:4–7 The analysis program determines on the basis of the historical data whether any disk areas are defective to the point where they should be designated to the operating system as unusable, and the data relocated. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 22:29–31 means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 22:44–52 for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:17–25 means for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:39–47 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:1–9 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:23–31 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored i said indicated defective locations to other location on the data storage device which are not defective. Wolf '363 at 26:66–27:5 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective,

Claims	Exemplary citations to Wolf '363
	indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device that are not defective. Wolf '363 at 27:19–26 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 28:50–57 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
2. A method as in claim 1, further comprising measuring access time for said storage device.	Wolf '363 discloses “[a] method as in claim 1, further comprising measuring access time for said storage device.” For example: Wolf '363 at Abstract The resident component is in the computer's interrupt chain, to be invoked during both the initiation and conclusion of storage operations. When a data access is called, a timer (e.g., the system timer) provides interrupts at a suitably high rate, and informs a second component of the operation. At the conclusion of the operation, error indications are logged into a log file.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at Figure 5  <pre> graph LR 2 --> PROG PROG -- 6B --> DRT DRT -- 8B --> TIH1[TIH #1] TIH1 -- 8A --> TIH2[TIH #2] TIH2 -- 10 --> 4 4 --> 2 DRT -- 12 --> 4 </pre> FIG. 5 Wolf '363 at 2:8–10 it has been found that read retries can very often be detected by a program by making certain time measurements of data retrieval operations. Wolf '363 at 2:22–33 In an attempt to make more accurate measurements, some conventional test programs read the contents of the system timer counter at the start and end of an operation. These programs may first disable the system timer, look at the contents of the timer counter, start the data retrieval operation, and at the end of the data retrieval operation will again look at the contents of the timer counter. This method may provide more accurate timing information than simply counting conventional system timer interrupts, but only the total elapsed time of the data retrieval operation can be measured in this manner. Wolf '363 at 3:29–33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error correction has taken place. Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer

Claims	Exemplary citations to Wolf '363
	time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 9:17–20 The disk-read timer measures the duration of data transfers by counting system timer ticks, so that it must be in the timer interrupt chain as a TIH with other TIH's, if any. Wolf '363 at 12:20–45 At 22, if upon entry, the fast-tick flag is true, this indicates that the disk call interceptor has received a call for a disk read operation and has set the flag. The disk-read timer then undertakes at 46 to measure time by accumulating ticks. While accumulating ticks, the disk-read timer inspects specified memory addresses for changes in their respective contents from their respective initial values. For each such specified memory address, the disk-read timer will record the number of accumulated ticks if and at the time a change from the initial value occurs. The number of specified memory addresses which the disk read timer so monitors can be one address or an array of addresses. The disk-read timer records these tick counts in the shared variable memory (MI of FIG. 3). When the disk-read timer is to monitor the addresses as within the memory buffer which are to receive the data from the disk, the addresses as are obtainable from known memory locations which were set to the addresses by the disk-call interceptor since, being in the disk call chain, the disk-call interceptor has an opportunity to examine the disk call parameters and learn the buffer address. If the disk-read timer is to monitor an array of memory addresses, the array will typically be supplied by a transient program, such as the analysis program, via the shared structured memory block (M2 of FIG. 3). Wolf '363 at 12:58–13:8 All of the sub totals of the accumulated ticks and final total of accumulated ticks are passed to the disk-call interceptor through the shared variable memory (MI of FIG. 3). With this information, the disk call interceptor can then subtract the tick count up to the change in the contents of the first address of the memory buffer from the total tick count and arrive at an adjusted tick count which more accurately reflects the actual data transfer time, and thereby eliminate any seek and rotational latency time preceding the actual transfer of the data.

Claims	Exemplary citations to Wolf '363
	If the contents of the addresses within the memory buffer do not change, then the disk-call interceptor may log that fact, which will become part of the historical data gathered by the analysis program for the particular areas of the storage read during that operation. Along with other historical data for the same areas, the analysis program will subsequently discern that as an anomaly and will treat it as such. Wolf '363 at 20:24–41 In order to determine from the raw time information received by the disk call interceptor from the disk-read timer, whether an error condition has occurred, the disk call interceptor must compare the raw time information with a table of acceptable times. Such a table may be built up at setup time, for example, by performing several series of successive reads of one sector, then two sectors, then three sectors, up to 255 sectors, and logging in the table the average times for each of these read operations. Thus, when the operating system issues a call for a read operation containing one of those numbers of sectors stored in the table, a simple comparison can determine if a reasonable time has been taken for the read. The criteria for making the determination can be established by the user; for example only, a "reasonable time" may be defined as one which is no more than one standard deviation greater than the mean, or no more than fifty-percent greater than the mean. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 24:3–11 means for determining an acceptable time limit for the retrieval of the requested data independently of whether an error condition is otherwise reported, and means for comparing the elapsed time of the operation to the acceptable time limit for the retrieval and for signaling an occurrence of a possible error when the elapsed time exceeds the acceptable time limit.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 25:15–24 determining, in response to an interception of a request, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information; and determining from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operation for retrieving data from the rotation storage medium. Wolf '363 at 28:1–9 responsive to the signaling of a possible error, requesting a retry of the operation for retrieving data from the medium; comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation; and signalling an occurrence of an error condition if both the original elapsed tim and the elapsed time of the retrial exceed the acceptable time limit. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
3. A method as in claim 2, further comprising correcting said measured access time for system overhead.	Wolf '363 discloses “[a] method as in claim 2, further comprising correcting said measured access time for system overhead.” For example: Wolf '363 at 2:22–33 In an attempt to make more accurate measurements, some conventional test programs read the contents of the system timer counter at the start and end of an operation. These programs may first disable the system timer, look at the contents of the timer counter, start the data retrieval operation, and at the end of the data retrieval operation will again look at the contents of the timer counter. This method may provide more accurate timing information than simply counting conventional system timer interrupts, but only the total elapsed time of the data retrieval operation can be measured in this manner. Wolf '363 at 3:29–33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error

Claims	Exemplary citations to Wolf '363
	correction has taken place. Wolf '363 at 12:58–13:8 All of the sub totals of the accumulated ticks and final total of accumulated ticks are passed to the disk-call interceptor through the shared variable memory (MI of FIG. 3). With this information, the disk call interceptor can then subtract the tick count up to the change in the contents of the first address of the memory buffer from the total tick count and arrive at an adjusted tick count which more accurately reflects the actual data transfer time, and thereby eliminate any seek and rotational latency time preceding the actual transfer of the data. If the contents of the addresses within the memory buffer do not change, then the disk-call interceptor may log that fact, which will become part of the historical data gathered by the analysis program for the particular areas of the storage read during that operation. Along with other historical data for the same areas, the analysis program will subsequently discern that as an anomaly and will treat it as such. Wolf '363 at 16:14–17 It is also via this structured memory area that the analysis program can set the factor by which the system timer rate is increased during the disk read operations. Wolf '363 at 21:45–59 The apparatus of claim 1 wherein the timer is a programmable timer which generates timer interrupts at a first rate for use by a system resource which expects interrupts at said first rate, wherein the disk call interceptor includes: detecting means for detecting the start of an operation for retrieving data from the data storage device, means, responsive to said detecting means detecting the start of an operation for retrieving data, for programming the timer to generate interrupts at a second rate which is increased from the first rate by a predetermined factor, and means for accumulating timer interrupts at the second rate during the data retrieval operation. Wolf '363 at 22:1–4 means for determining from the indication of whether the error correcting code was applied to obtain correct read data, whether an error condition occurred during the operation for retrieving data. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the

Claims	Exemplary citations to Wolf '363
	Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
4. A method as in claim 1, wherein intercepting said communications comprises intercepting an error reported by said storage device.	Wolf '363 discloses “[a] method as in claim 1, wherein intercepting said communications comprises intercepting an error reported by said storage device.” For example: Wolf '363 at Abstract The resident component is in the computer's interrupt chain, to be invoked during both the initiation and conclusion of storage operations. When a data access is called, a timer (e.g., the system timer) provides interrupts at a suitably high rate, and informs a second component of the operation. At the conclusion of the operation, error indications are logged into a log file. Wolf '363 at Abstract For each monitored address, when its contents first change, the second component stores the current interrupt accumulation. Following the operation, the first component applies algorithms to the accumulations and decides thereby whether to log an error indicator. Wolf '363 at Abstract An analysis program retrieves the log entries, clears the log for future entries, adds the entries to a history of the storage, and applies algorithms to the history to determine whether storage areas are defective. It also takes remedial action such as marking a defective storage area bad and relocating the data to a usable area. Wolf '363 at 2:62-3:8 Some conventional storage medium controllers have the capability of correcting a limited number of data errors. Typically they employ an error correction code (ECC) which is recorded along with the data. When the data is retrieved, this code is used to correct data errors within its capability. The fact that the controller had to employ the error correction code to correct data during a data retrieval operation may, for disk drives, be a very strong indication that the area or areas from which the data was read are defective or marginally defective; for other disk drives, the ECC is invoked very frequently, as a routine matter, and the fact that it was employed on a particular read operation is of no consequence. Controllers employing ECC typically report to the operating system that an error correction has taken place,

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 3:29–33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error correction has taken place. Wolf '363 at 3:33–39 If there are any un correctable errors, corrected errors, retries, or such, the system of the present invention logs them into a file for later analysis by a non memory resident part of the system. This monitoring and logging is transparent to normal operations of the computer system and does not interfere with normal computer operations. Wolf '363 at 15:6–27 Program control will eventually return to the disk-call trapper (at the completion of the disk operation requested by it) and at that point, the disk-call trapper examines the contents of memory working backward (i.e., in descending address order) from the call return address stored by the trace interrupt handler until it recognizes one of the CPU call codes. The disk-call trapper then computes the address of the operand of the call according to the same procedure used by the CPU to determine the operand address for the call instruction. After computing its address, the disk call trapper then retrieves the call instruction's operand which in reality is the vector through which the operating system makes disk operation calls. The disk-call trapper then stores that vector and replaces it with a vector pointing to the disk-call interceptor. The stored operating system vector is also communicated through a memory location (see M2 in FIG. 3) to the disk-call interceptor. From that point on, whenever a program or the operating system thinks it is making a call to its low-level disk interface routine, it will actually be making a call to the disk-call interceptor Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to

Claims	Exemplary citations to Wolf '363
	a temporary location for holding recovered data. Wolf '363 at 16:58–61 The analysis program functions to retrieve the information logged by the disk call interceptor in the log file and integrate that into a continuously updated history of the storage media. Wolf '363 at 17:15–18 If the analysis program detects that any new errors have occurred since the analysis program was last run, a procedure to confirm and correct bad locations is undertaken. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 22:1–4 means for determining from the indication of whether the error correcting code was applied to obtain

Claims	Exemplary citations to Wolf '363
	correct read data, whether an error condition occurred during the operation for retrieving data. Wolf '363 at 23:17–25 means for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:23–31 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored i said indicated defective locations to other location on the data storage device which are not defective. Wolf '363 at 26:66–27:5 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device that are not defective. Wolf '363 at 27:19–26 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 28:50–57 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective.

Claims	Exemplary citations to Wolf '363
	To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
5. A method as in claim 1, further comprising determining an access location on said storage device and an access frequency for data stored thereon, based on said intercepted communications.	Wolf '363 discloses “[a] method as in claim 1, further comprising determining an access location on said storage device and an access frequency for data stored thereon, based on said intercepted communications.” For example: Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 7:12–25 Referring again to FIG. 3, a primary function of the analysis program is to take the events recorded by the disk-call interceptor on the log file, build and maintain a history of such events sorted by disk unit areas, such as sectors, apply certain algorithms to the historical data, take remedial measures and/or communicate with a computer operator whenever application of the algorithms to the historical data indicates a failure mode, an unknown defective area or an area that has become marginally defective. Remedial action can include moving to a good area the data, which was stored in an area accessible to the analysis program by the disk-call interceptor, as described above, and marking the bad or marginally defective area in the disk's list of such areas.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 7:26–28 Referring again to FIG. 3, a primary function of the log file locator is to provide the absolute disk address of the log file to the memory-resident components. Wolf '363 at 13:49–52 As is conventionally done during execution of a call instruction, the address of the instruction immediately following the call instruction is saved, for example in a last in, first-out memory called a "stack". Wolf '363 at 14:46–56 Execution of the call instruction, by definition, will cause the call return address to be stored, e.g., on the stack. The trace interrupt following execution of the call will cause the address of the next instruction to be executed to be stored also. So at that point both the next instruction to be executed and the return address of the call are stored, and available to the trace interrupt handler. A stack will contain the address of the next instruction to be executed at the last address pushed onto the stack and the call return address one level deeper. Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 16:49–55 It should be noted that all other transient components of this invention can learn the starting address of the structured memory block (M2 of FIG. 3) by calling the device driver, which comprises the disk-read timer and the disk-call interceptor, with a "read" command in response to which the device driver returns a pointer to the structured memory.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 22:44–52 for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:17–25 means for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 23:39–47 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:1–9 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:23–31 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored i said indicated defective locations to other location on the data storage device which are not defective. Wolf '363 at 26:66–27:5 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device that are not defective. Wolf '363 at 27:19–26 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 28:50–57 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective,

Claims	Exemplary citations to Wolf '363
	indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
6. A method as in claim 1, further comprising determining an access location on said storage device and an access duration for data stored thereon, based on said intercepted communications.	Wolf '363 discloses “[a] method as in claim 1, further comprising determining an access location on said storage device and an access duration for data stored thereon, based on said intercepted communications.” For example: Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 7:12–25 Referring again to FIG. 3, a primary function of the analysis program is to take the events recorded by the disk-call interceptor on the log file, build and maintain a history of such events sorted by disk unit areas, such as sectors, apply certain algorithms to the historical data, take remedial measures and/or communicate with a computer operator whenever application of the algorithms to the historical data indicates a failure mode, an unknown defective area or an area that has become marginally defective. Remedial action can include moving to a good area the data, which was stored in an area accessible to the analysis program by the disk-call interceptor, as described above, and marking the bad or marginally

Claims	Exemplary citations to Wolf '363
	defective area in the disk's list of such areas. Wolf '363 at 7:26–28 Referring again to FIG. 3, a primary function of the log file locator is to provide the absolute disk address of the log file to the memory-resident components. Wolf '363 at 7:55–58 As previously discussed, one component of the system according to this invention is the disk-read timer which measures which the duration of data transfers during disk read operations. Wolf '363 at 7:68–8:10 Conventionally associated with the timer interrupt is a known, fixed memory location for containing a preset timer interrupt vector ("TIV"). When a timer interrupt occurs and is not masked, the CPU suspends execution of the currently executing program, and program control is transferred to a memory address which uniquely corresponds to the contents of the timer interrupt vector. Under normal conditions the contents of the vector is a pointer to an entry point of a timer interrupt handler ("TIH") routine. Wolf '363 at 9:17–20 The disk-read timer measures the duration of data transfers by counting system timer ticks, so that it must be in the timer interrupt chain as a TIH with other TIH's, if any. Wolf '363 at 12:20–45 At 22, if upon entry, the fast-tick flag is true, this indicates that the disk call interceptor has received a call for a disk read operation and has set the flag. The disk-read timer then undertakes at 46 to measure time by accumulating ticks. While accumulating ticks, the disk-read timer inspects specified memory addresses for changes in their respective contents from their respective initial values. For each such specified memory address, the disk-read timer will record the number of accumulated ticks if and at the time a change from the initial value occurs. The number of specified memory addresses which the disk read timer so monitors can be one address or an array of addresses. The disk-read timer records these tick counts in the shared variable memory (MI of FIG. 3). When the disk-read timer is to monitor the addresses as within the memory buffer which are to receive the data from the disk, the addresses as are obtainable from known memory locations which were set to the addresses by the disk-call interceptor since, being in the disk call chain, the disk-call interceptor has an opportunity to examine the disk call

Claims	Exemplary citations to Wolf '363
	parameters and learn the buffer address. If the disk-read timer is to monitor an array of memory addresses, the array will typically be supplied by a transient program, such as the analysis program, via the shared structured memory block (M2 of FIG. 3). Wolf '363 at 12:58–13:8 All of the sub totals of the accumulated ticks and final total of accumulated ticks are passed to the disk-call interceptor through the shared variable memory (MI of FIG. 3). With this information, the disk call interceptor can then subtract the tick count up to the change in the contents of the first address of the memory buffer from the total tick count and arrive at an adjusted tick count which more accurately reflects the actual data transfer time, and thereby eliminate any seek and rotational latency time preceding the actual transfer of the data. If the contents of the addresses within the memory buffer do not change, then the disk-call interceptor may log that fact, which will become part of the historical data gathered by the analysis program for the particular areas of the storage read during that operation. Along with other historical data for the same areas, the analysis program will subsequently discern that as an anomaly and will treat it as such. Wolf '363 at 13:49–52 As is conventionally done during execution of a call instruction, the address of the instruction immediately following the call instruction is saved, for example in a last in, first-out memory called a "stack". Wolf '363 at 14:46–56 Execution of the call instruction, by definition, will cause the call return address to be stored, e.g., on the stack. The trace interrupt following execution of the call will cause the address of the next instruction to be executed to be stored also. So at that point both the next instruction to be executed and the return address of the call are stored, and available to the trace interrupt handler. A stack will contain the address of the next instruction to be executed at the last address pushed onto the stack and the call return address one level deeper. Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call

Claims	Exemplary citations to Wolf '363
	interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 16:49–55 It should be noted that all other transient components of this invention can learn the starting address of the structured memory block (M2 of FIG. 3) by calling the device driver, which comprises the disk-read timer and the disk-call interceptor, with a "read" command in response to which the device driver returns a pointer to the structured memory. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 20:24–41 In order to determine from the raw time information received by the disk call interceptor from the disk-read timer, whether an error condition has occurred, the disk call interceptor must compare the raw time information with a table of acceptable times. Such a table may be built up at setup time, for example, by performing several series of successive reads of one sector, then two sectors, then three sectors, up to 255 sectors, and logging in the table the average times for each of these read operations. Thus, when the operating system issues a call for a read operation containing one of those numbers of sectors stored in the table, a simple comparison can determine if a reasonable time has been taken for the read. The criteria for making the determination can be established by the user; for example only, a "reasonable time" may be defined as one which is no more than one standard deviation greater than the mean, or no more than fifty-percent greater than the mean. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 22:44–52 for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:17–25 means for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and

Claims	Exemplary citations to Wolf '363
	means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:39–47 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 24:3–11 means for determining an acceptable time limit for the retrieval of the requested data independently of whether an error condition is otherwise reported, and means for comparing the elapsed time of the operation to the acceptable time limit for the retrieval and for signaling an occurrence of a possible error when the elapsed time exceeds the acceptable time limit. Wolf '363 at 25:15–24 determining, in response to an interception of a request, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information; and determining from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operation for retrieving data from the rotation storage medium. Wolf '363 at 26:1–9 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:23–31 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored i said indicated defective locations to other location on the data storage device which are not defective. Wolf '363 at 26:66–27:5 determining from the historical organization of logged information whether there are any locations on the

Claims	Exemplary citations to Wolf '363
	data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device that are not defective. Wolf '363 at 27:19–26 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 28:1–9 responsive to the signaling of a possible error, requesting a retry of the operation for retrieving data from the medium; comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation; and signalling an occurrence of an error condition if both the original elapsed tim and the elapsed time of the retrial exceed the acceptable time limit. Wolf '363 at 28:50–57 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not detective. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
7. A method as in claim 1, further comprising logging said communications over time.	Wolf '363 discloses “[a] method as in claim 1, further comprising logging said communications over time.” For example: Wolf '363 at Abstract The resident component is in the computer's interrupt chain, to be invoked during both the initiation and

Claims	Exemplary citations to Wolf '363
	conclusion of storage operations. When a data access is called, a timer (e.g., the system timer) provides interrupts at a suitably high rate, and informs a second component of the operation. At the conclusion of the operation, error indications are logged into a log file. Wolf '363 at Abstract For each monitored address, when its contents first change, the second component stores the current interrupt accumulation. Following the operation, the first component applies algorithms to the accumulations and decides thereby whether to log an error indicator. Wolf '363 at 3:33–39 If there are any un correctable errors, corrected errors, retries, or such, the system of the present invention logs them into a file for later analysis by a non memory resident part of the system. This monitoring and logging is transparent to normal operations of the computer system and does not interfere with normal computer operations. Wolf '363 at 12:58–13:8 All of the sub totals of the accumulated ticks and final total of accumulated ticks are passed to the disk-call interceptor through the shared variable memory (MI of FIG. 3). With this information, the disk call interceptor can then subtract the tick count up to the change in the contents of the first address of the memory buffer from the total tick count and arrive at an adjusted tick count which more accurately reflects the actual data transfer time, and thereby eliminate any seek and rotational latency time preceding the actual transfer of the data. If the contents of the addresses within the memory buffer do not change, then the disk-call interceptor may log that fact, which will become part of the historical data gathered by the analysis program for the particular areas of the storage read during that operation. Along with other historical data for the same areas, the analysis program will subsequently discern that as an anomaly and will treat it as such. Wolf '363 at 15:28–38 When called, the disk-call interceptor will perform certain disk call processing and thereafter will execute the call that the operating system tried to make, to the low-level disk interface routine, via the appropriated operating system vector passed to it by the disk-call trapper. Program control will be returned to the disk-call interceptor when the disk operation is completed. The disk call interceptor will then make some checks and log reportable events, if any, and return program control to the operating

Claims	Exemplary citations to Wolf '363
	system along with the disk status it received from the disk interface routine. Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 16:58–61 The analysis program functions to retrieve the information logged by the disk call interceptor in the log file and integrate that into a continuously updated history of the storage media. Wolf '363 at 17:15–18 If the analysis program detects that any new errors have occurred since the analysis program was last run, a procedure to confirm and correct bad locations is undertaken. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential

Claims	Exemplary citations to Wolf '363
	catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 22:12–16 means for logging information concerning each operation for retrieving data during which an error condition occurred, the information including the location on the medium from which data was retrieved. Wolf '363 at 23:17–25 means for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:39–47 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective,

Claims	Exemplary citations to Wolf '363
	means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:1–9 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
8. A method as in claim 7, wherein analyzing said communications comprises deriving said threshold value based on said logged communications.	Wolf '363 discloses “[a] method as in claim 7, wherein analyzing said communications comprises deriving said threshold value based on said logged communications.” For example: Wolf '363 at Abstract For each monitored address, when its contents first change, the second component stores the current interrupt accumulation. Following the operation, the first component applies algorithms to the accumulations and decides thereby whether to log an error indicator. Wolf '363 at 3:40–53 Another, non memory resident part of the system of this invention retrieves data logged by the memory resident part, assembles the logged data into a history of the medium per unit area, e.g., per sector, and analyzes the historical data to determine whether there are any areas of the storage medium that are unable to store data with integrity or are tending to lose the ability to store data with integrity. If any areas are determined to be bad or to be marginally bad as a result of the analysis performed by this part, the non memory resident part relocates to other areas the data stored in these areas, if possible, and marks original areas bad according to the procedures of the operating system under which the non-memory resident part is running.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 12:58–13:8 All of the sub totals of the accumulated ticks and final total of accumulated ticks are passed to the disk-call interceptor through the shared variable memory (MI of FIG. 3). With this information, the disk call interceptor can then subtract the tick count up to the change in the contents of the first address of the memory buffer from the total tick count and arrive at an adjusted tick count which more accurately reflects the actual data transfer time, and thereby eliminate any seek and rotational latency time preceding the actual transfer of the data. If the contents of the addresses within the memory buffer do not change, then the disk-call interceptor may log that fact, which will become part of the historical data gathered by the analysis program for the particular areas of the storage read during that operation. Along with other historical data for the same areas, the analysis program will subsequently discern that as an anomaly and will treat it as such. Wolf '363 at 17:15–18 If the analysis program detects that any new errors have occurred since the analysis program was last run, a procedure to confirm and correct bad locations is undertaken. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 24:13–21 responsive to the signaling of a possible error to request a retry of the operation for retrieving data from the medium; and means for comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation and for signalling an occurrence of an error condition if both the original elapsed time and the elapsed time of the retrial exceed the acceptable time limit.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 25:15–24 determining, in response to an interception of a request, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information; and determining from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operation for retrieving data from the rotation storage medium. Wolf '363 at 28:1–9 responsive to the signaling of a possible error, requesting a retry of the operation for retrieving data from the medium; comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation; and signalling an occurrence of an error condition if both the original elapsed tim and the elapsed time of the retrial exceed the acceptable time limit. Wolf '363 at 28:10–15 57. The method of claim 55 wherein the step of determining an acceptable time limit includes the step of retrieving an acceptable time limit from a memory containing a table of acceptable time limits, wherein the table is accessed according to the amount of data whose retrieval is requested in the operation. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
9. A method as in claim 1, wherein responding to said declining performance of said storage device further comprises automatically backing-up data stored on said storage device.	Wolf '363 discloses “[a] method as in claim 1, wherein responding to said declining performance of said storage device further comprises automatically backing-up data stored on said storage device.” For example: Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so

Claims	Exemplary citations to Wolf '363
	that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
10. A method as in claim 1, wherein reallocating at least some data on said storage device is based on usage patterns of said data.	Wolf '363 discloses “[a] method as in claim 1, wherein reallocating at least some data on said storage device is based on usage patterns of said data.” For example: Wolf '363 at Abstract An analysis program retrieves the log entries, clears the log for future entries, adds the entries to a history of the storage, and applies algorithms to the history to determine whether storage areas are defective. It also takes remedial action such as marking a defective storage area bad and relocating the data to a usable area. Wolf '363 at 16:65–17:3 The recovered data and log file locations are known to the analysis program by communication with the log file locator, both of which are preferably processes within a single, transient program, as indicated above. Thus, if necessary, data recovered from a faulty sector may be relocated to a safe location, as is described hereinbelow. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still

Claims	Exemplary citations to Wolf '363
	considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
11. A method as in claim 1, wherein responding to said declining performance of said storage device further comprises defragmenting at least a portion of said storage device.	Wolf '363 discloses “[a] method as in claim 1, wherein responding to said declining performance of said storage device further comprises defragmenting at least a portion of said storage device.” For example: To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
25[pre]. A method for monitoring performance of a storage device, comprising:	To the extent the preamble is limiting, Wolf '363 discloses “[a] method for monitoring performance of a storage device.” For example: See above at row 1[pre].

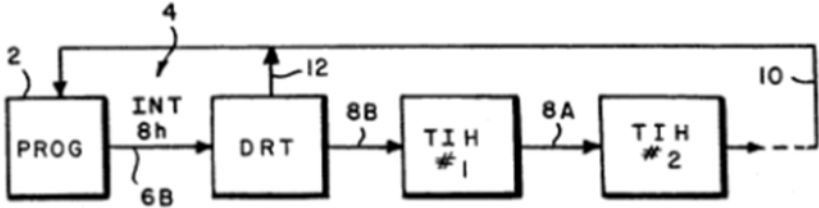
Claims	Exemplary citations to Wolf '363
	To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
[25a] intercepting communications between a computer system and said storage device;	Wolf '363 discloses “intercepting communications between a computer system and said storage device.” For example: See above at row [1a]. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832-18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
[25b] analyzing said intercepted communications; and	Wolf '363 discloses “analyzing said intercepted communications.” For example: Wolf '363 at Abstract Method and apparatus for use in a computer having peripheral data storage, to monitor data transfers to detect defective or marginally defective storage areas. Wolf '363 at Abstract An analysis program retrieves the log entries, clears the log for future entries, adds the entries to a history of the storage, and applies algorithms to the history to determine whether storage areas are defective. It also takes remedial action such as marking a defective storage area bad and relocating the data to a usable area. Wolf '363 at 3:29-33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error correction has taken place.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 3:40–53 Another, non memory resident part of the system of this invention retrieves data logged by the memory resident part, assembles the logged data into a history of the medium per unit area, e.g., per sector, and analyzes the historical data to determine whether there are any areas of the storage medium that are unable to store data with integrity or are tending to lose the ability to store data with integrity. If any areas are determined to be bad or to be marginally bad as a result of the analysis performed by this part, the non memory resident part relocates to other areas the data stored in these areas, if possible, and marks original areas bad according to the procedures of the operating system under which the non-memory resident part is running. Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 7:42–49 The disk-call interceptor needs to be in the disk-call chain in order to distinguish disk read operations from other disk operations before they start, and in order to obtain the status information concerning the disk-read operations which is available at their conclusion or abortion. Once the disk-call interceptor is properly placed within the disk-call chain, the disk-call trapper is no longer needed. Wolf '363 at 7:55–58 As previously discussed, one component of the system according to this invention is the disk-read timer which measures which the duration of data transfers during disk read operations.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 12:20–45 At 22, if upon entry, the fast-tick flag is true, this indicates that the disk call interceptor has received a call for a disk read operation and has set the flag. The disk-read timer then undertakes at 46 to measure time by accumulating ticks. While accumulating ticks, the disk-read timer inspects specified memory addresses for changes in their respective contents from their respective initial values. For each such specified memory address, the disk-read timer will record the number of accumulated ticks if and at the time a change from the initial value occurs. The number of specified memory addresses which the disk read timer so monitors can be one address or an array of addresses. The disk-read timer records these tick counts in the shared variable memory (MI of FIG. 3). When the disk-read timer is to monitor the addresses as within the memory buffer which are to receive the data from the disk, the addresses as are obtainable from known memory locations which were set to the addresses by the disk-call interceptor since, being in the disk call chain, the disk-call interceptor has an opportunity to examine the disk call parameters and learn the buffer address. If the disk-read timer is to monitor an array of memory addresses, the array will typically be supplied by a transient program, such as the analysis program, via the shared structured memory block (M2 of FIG. 3). Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 17:4–7 The analysis program determines on the basis of the historical data whether any disk areas are defective to the point where they should be designated to the operating system as unusable, and the data relocated. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call

Claims	Exemplary citations to Wolf '363
	interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 20:24–41 In order to determine from the raw time information received by the disk call interceptor from the disk-read timer, whether an error condition has occurred, the disk call interceptor must compare the raw time information with a table of acceptable times. Such a table may be built up at setup time, for example, by performing several series of successive reads of one sector, then two sectors, then three sectors, up to 255 sectors, and logging in the table the average times for each of these read operations. Thus, when the operating system issues a call for a read operation containing one of those numbers of sectors stored in the table, a simple comparison can determine if a reasonable time has been taken for the read. The criteria for making the determination can be established by the user; for example only, a "reasonable time" may be defined as one which is no more than one standard deviation greater than the mean, or no more than fifty-percent greater than the mean. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and

Claims	Exemplary citations to Wolf '363
	a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 24:13–21 responsive to the signaling of a possible error to request a retry of the operation for retrieving data from the medium; and means for comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation and for signalling an occurrence of an error condition if both the original elapsed time and the elapsed time of the retrial exceed the acceptable time limit. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
[25c] reallocating at least some of said data on said storage device to enhance the performance of said storage device based on said analyzed communications.	Wolf '363 discloses “reallocating at least some of said data on said storage device to enhance the performance of said storage device based on said analyzed communications.” For example: See above at row [1c]. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.
26. A method as in claim 25, wherein intercepting said communications comprises determining access location,	Wolf '363 discloses “[a] method as in claim 25, wherein intercepting said communications comprises determining access location, access frequency, and access duration for said data on said storage device.” For example:

Claims	Exemplary citations to Wolf '363
access frequency, and access duration for said data on said storage device.	Wolf '363 at Abstract The resident component is in the computer's interrupt chain, to be invoked during both the initiation and conclusion of storage operations. When a data access is called, a timer (e.g., the system timer) provides interrupts at a suitably high rate, and informs a second component of the operation. At the conclusion of the operation, error indications are logged into a log file. Wolf '363 at Figure 5  FIG. 5 Wolf '363 at 2:8–10 it has been found that read retries can very often be detected by a program by making certain time measurements of data retrieval operations. Wolf '363 at 2:22–33 In an attempt to make more accurate measurements, some conventional test programs read the contents of the system timer counter at the start and end of an operation. These programs may first disable the system timer, look at the contents of the timer counter, start the data retrieval operation, and at the end of the data retrieval operation will again look at the contents of the timer counter. This method may provide more accurate timing information than simply counting conventional system timer interrupts, but only the total elapsed time of the data retrieval operation can be measured in this manner. Wolf '363 at 3:29–33 The monitoring includes, without limitation, making time measurements of data retrievals much more accurately than conventional test programs, and may also include checking for indications that an error correction has taken place.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 6:58–7:11 A primary function of the disk-read timer is to measure the time duration of data transfer during disk read operations. In order to accomplish the above, primary function, the disk read timer will "place" itself at the "head" of a system timer interrupt chain and maintain that position against other programs that may try to supplant it. A primary function of the disk-call interceptor is to gather information indicative of disk data read problems and to log that information onto the log file. It principally gathers the data transfer time measurements from the disk-read timer and information from the status returned by the disk low level interface routine. From the time measurements it detects data transfers that took an excessive amount of time which would indicate that the data was not successfully read on a first attempt, and one or more retries at reading the data was conducted by the disk controller and/or the operating system's low-level interface to the disk. Secondly, the disk-call interceptor may temporarily relocate to a location accessible to the analysis program data which took an excessive time to read. Wolf '363 at 7:12–25 Referring again to FIG. 3, a primary function of the analysis program is to take the events recorded by the disk-call interceptor on the log file, build and maintain a history of such events sorted by disk unit areas, such as sectors, apply certain algorithms to the historical data, take remedial measures and/or communicate with a computer operator whenever application of the algorithms to the historical data indicates a failure mode, an unknown defective area or an area that has become marginally defective. Remedial action can include moving to a good area the data, which was stored in an area accessible to the analysis program by the disk-call interceptor, as described above, and marking the bad or marginally defective area in the disk's list of such areas. Wolf '363 at 7:26–28 Referring again to FIG. 3, a primary function of the log file locator is to provide the absolute disk address of the log file to the memory-resident components. Wolf '363 at 7:55–58 As previously discussed, one component of the system according to this invention is the disk-read timer which measures which the duration of data transfers during disk read operations. Wolf '363 at 7:68–8:10 Conventionally associated with the timer interrupt is a known, fixed memory location for containing a

Claims	Exemplary citations to Wolf '363
	preset timer interrupt vector ("TIV"). When a timer interrupt occurs and is not masked, the CPU suspends execution of the currently executing program, and program control is transferred to a memory address which uniquely corresponds to the contents of the timer interrupt vector. Under normal conditions the contents of the vector is a pointer to an entry point of a timer interrupt handler ("TIH") routine. Wolf '363 at 9:17–20 The disk-read timer measures the duration of data transfers by counting system timer ticks, so that it must be in the timer interrupt chain as a TIH with other TIH's, if any. Wolf '363 at 12:20–45 At 22, if upon entry, the fast-tick flag is true, this indicates that the disk call interceptor has received a call for a disk read operation and has set the flag. The disk-read timer then undertakes at 46 to measure time by accumulating ticks. While accumulating ticks, the disk-read timer inspects specified memory addresses for changes in their respective contents from their respective initial values. For each such specified memory address, the disk-read timer will record the number of accumulated ticks if and at the time a change from the initial value occurs. The number of specified memory addresses which the disk read timer so monitors can be one address or an array of addresses. The disk-read timer records these tick counts in the shared variable memory (MI of FIG. 3). When the disk-read timer is to monitor the addresses as within the memory buffer which are to receive the data from the disk, the addresses as are obtainable from known memory locations which were set to the addresses by the disk-call interceptor since, being in the disk call chain, the disk-call interceptor has an opportunity to examine the disk call parameters and learn the buffer address. If the disk-read timer is to monitor an array of memory addresses, the array will typically be supplied by a transient program, such as the analysis program, via the shared structured memory block (M2 of FIG. 3). Wolf '363 at 12:58–13:8 All of the sub totals of the accumulated ticks and final total of accumulated ticks are passed to the disk-call interceptor through the shared variable memory (MI of FIG. 3). With this information, the disk call interceptor can then subtract the tick count up to the change in the contents of the first address of the memory buffer from the total tick count and arrive at an adjusted tick count which more accurately reflects the actual data transfer time, and thereby eliminate any seek and rotational latency time preceding the actual transfer of the data. If the contents of the addresses within the memory buffer do not change, then the disk-call interceptor may log that fact, which will become part of the historical data gathered by the analysis program for the

Claims	Exemplary citations to Wolf '363
	particular areas of the storage read during that operation. Along with other historical data for the same areas, the analysis program will subsequently discern that as an anomaly and will treat it as such. Wolf '363 at 13:49–52 As is conventionally done during execution of a call instruction, the address of the instruction immediately following the call instruction is saved, for example in a last in, first-out memory called a "stack". Wolf '363 at 14:46–56 Execution of the call instruction, by definition, will cause the call return address to be stored, e.g., on the stack. The trace interrupt following execution of the call will cause the address of the next instruction to be executed to be stored also. So at that point both the next instruction to be executed and the return address of the call are stored, and available to the trace interrupt handler. A stack will contain the address of the next instruction to be executed at the last address pushed onto the stack and the call return address one level deeper. Wolf '363 at 15:51–65 However, as explained herein one function of the disk-call interceptor is to record certain events in the log file on disk. Therefore, the log file locator functions to provide absolute disk file location information to the disk-call interceptor to enable the disk-call interceptor to do direct writes to the log file, these direct writes being the logging function performed by the disk-call interceptor. Another function of the disk-call interceptor is to temporarily relocate data for which an error occurrence is suspected, to a location accessible by the analysis program. Therefore, the log file locator functions to also provide absolute disk file location information to the disk-call interceptor to enable the disk call interceptor to do direct writes to a temporary location for holding recovered data. Wolf '363 at 16:49–55 It should be noted that all other transient components of this invention can learn the starting address of the structured memory block (M2 of FIG. 3) by calling the device driver, which comprises the disk-read timer and the disk-call interceptor, with a "read" command in response to which the device driver returns a pointer to the structured memory. Wolf '363 at 17:23–38 If an error recurs, the location at which the error occurred is identified to the operating system as bad, and

Claims	Exemplary citations to Wolf '363
	the data which had been stored there is relocated to a good location. The data which had been stored in the bad location was previously recovered to a location known to the analysis program, by the disk-call interceptor. If the error does not recur, the history for that location is checked to determine if the error is part of a pattern of intermittent errors at that location. If so, the location is identified to the operating system as bad and the data relocated as was done for a recurring error. If a non recurring error occurs for a location that has no history of errors, then the error is considered to be spurious, and the location is still considered good. Therefore, the data which had been stored there is returned to that location. Wolf '363 at 17:39–55 Finally, the historical pattern of errors may be analyzed by an expert system which is part of the analysis program. The expert system determines whether the current pattern of errors indicates a potential catastrophic failure of the disk drive. For example, significant numbers of errors near the inner radius of the storage surface may indicate a fault in the read/write system, while significant numbers of errors near the outer radius of the storage surface may indicate imminent spindle bearing failure. Failures in these systems would be catastrophic, if they occurred with no warning. However, they are problems which generally cannot be fixed by the computer owner or user. Therefore, a warning is issued to the user, so that appropriate action may be taken, such as backing up the entire hard disk and taking the machine to a repair facility, where the hard disk might be replaced. Wolf '363 at 20:24–41 In order to determine from the raw time information received by the disk call interceptor from the disk-read timer, whether an error condition has occurred, the disk call interceptor must compare the raw time information with a table of acceptable times. Such a table may be built up at setup time, for example, by performing several series of successive reads of one sector, then two sectors, then three sectors, up to 255 sectors, and logging in the table the average times for each of these read operations. Thus, when the operating system issues a call for a read operation containing one of those numbers of sectors stored in the table, a simple comparison can determine if a reasonable time has been taken for the read. The criteria for making the determination can be established by the user; for example only, a "reasonable time" may be defined as one which is no more than one standard deviation greater than the mean, or no more than fifty-percent greater than the mean. Wolf '363 at 21:24–43 data storage device capable of storing data on a rotating medium in a plurality of storage locations and which is responsive to a request to retrieve data from the medium to perform an operation for retrieving at

Claims	Exemplary citations to Wolf '363
	least a portion of the data from the rotating storage medium, comprising: a timer which provides timing information; and a disk call interceptor which intercepts requests to retrieve data from the medium, and which determines, in response to an interception of a request to retrieve data from the rotating storage medium, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information, and which includes means for determining, from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operations for retrieving data from the rotating storage medium. Wolf '363 at 22:44–52 for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:17–25 means for determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 23:39–47 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, means for indicating to the computer that such locations are defective, and means for relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 24:3–11 means for determining an acceptable time limit for the retrieval of the requested data independently of whether an error condition is otherwise reported, and means for comparing the elapsed time of the operation to the acceptable time limit for the retrieval and for signaling an occurrence of a possible error when the elapsed time exceeds the acceptable time limit.

Claims	Exemplary citations to Wolf '363
	Wolf '363 at 25:15–24 determining, in response to an interception of a request, an elapsed time of the operation performed for retrieving the data from the rotating storage medium using the timing information; and determining from the elapsed time for the operation performed, whether an error condition occurred during the operation, by comparing the elapsed time to an elapsed time for one or more previously performed operation for retrieving data from the rotation storage medium. Wolf '363 at 26:1–9 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 26:23–31 determining from the historical organization of logged information whether there are any locations on the medium of the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored i said indicated defective locations to other location on the data storage device which are not defective. Wolf '363 at 26:66–27:5 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device that are not defective. Wolf '363 at 27:19–26 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not defective. Wolf '363 at 28:1–9 responsive to the signaling of a possible error, requesting a retry of the operation for retrieving data from the medium;

Claims	Exemplary citations to Wolf '363
	comparing the original elapsed time of the operation to the elapsed time of the retrial of the operation; and signalling an occurrence of an error condition if both the original elapsed tim and the elapsed time of the retrial exceed the acceptable time limit. Wolf '363 at 28:50–57 determining from the historical organization of logged information whether there are any locations on the data storage device that are defective, indicating to the computer that such locations are defective, and relocating any data stored in said indicated defective locations to other locations on the data storage device which are not detective. To the extent that this limitation is not explicitly disclosed by this reference, this claim element is obvious in light of Wolf '363 itself. It would have been obvious to modify Wolf '363 to meet this limitation, based on the knowledge of a person of ordinary skill in the art and the teachings of the references disclosed in the Cover Pleading and the corresponding sections of Exhibits 832-1 to 832–18. Motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from the known problems and predictable solutions as embodied in these references.