

greater than previously expected with the addition of several ohms to the resistance over the life of the device. Thus, a design that is too close to the limit at manufacture may induce a saturation in the amplifier as the resistance increases late in product life, causing significant performance loss.

SUMMARY OF THE INVENTION

It is an object of the present invention to ameliorate one or more disadvantages of the prior art.

According to one aspect of the invention there is disclosed in a magnetic data storage device having data recorded in tracks on a media surface and including at least one magnetoresistive (MR) transducer read heads, the method of adaptively controlling the read head bias current comprising determining an optimized bias current value for each MR head; storing said optimized bias current values; supplying the active MR head with a bias current in accordance with the stored value; periodically redetermining said optimized bias current value for each MR head; and revising the stored bias current values to correspond with the redetermined optimized bias current values.

According to another aspect of the invention there is disclosed in a magnetic data storage device having data recorded in tracks on a media surface and including at least one magnetoresistive (MR) transducer heads, wherein an optimized bias current value is stored with respect to each MR head/media component combination, the method of adaptively controlling the read head bias current comprising supplying the active MR head with a bias current in accordance with the respective stored bias current value; periodically redetermining the optimized bias current value for each of the plurality of MR heads; and revising said stored bias current values to correspond with the redetermined optimized bias current values.

According to still another aspect of the invention there is disclosed a magnetic disk data storage device comprising at least one magnetic disk storage medium; at least one magnetoresistive (MR) transducer read head for reading data stored in tracks on the surface of said at least one disk medium; means for determining optimized values of bias

current for each of said at least one MR read head; means for storing said optimized value(s) of bias current; means for applying a bias current to the active MR read head in accordance with the stored bias current values for that head; and means for invoking said means for determining optimized values of bias current on the occurrence of the event, whereby the stored optimized bias current values are updated with the present optimized bias current values upon each occurrence of said event.

According to still another aspect of the invention there is disclosed a magnetic disk data storage device comprising at least one rigid disk magnetic storage medium; at least one magnetoresistive (MR) transducer read head for reading data stored in tracks on the surface of said at least one storage medium; means for determining optimized values of bias current for each of said at least one MR read heads based on selected parameters; means for storing said optimized values of bias current; means for applying a bias current to the active MR read head in accordance with the stored bias current value for that head; and means for invoking said means for determining optimized values of bias current upon the occurrence of an event and altering the bias current value applied to said head in accordance therewith.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic side elevation, partially broken

CLAIMS

1. In a magnetic data storage device having data recorded in tracks on a media surface and including at least one magnetoresistive (MR) transducer read heads, the method of adaptively controlling the read head bias current comprising:

determining an optimized bias current value for each MR head;

storing said optimized bias current values;

supplying the active MR head with a bias current in accordance with the stored value;

periodically redetermining said optimized bias current value for each MR head; and

revising the stored bias current values to correspond with the redetermined optimized bias current values.

2. The adaptive control method of claim 1 wherein said step of storing bias current values comprises storing said values on a disk media surface and said method further comprises the step of transferring said bias current values from disk storage to random access memory during the power up sequence of the device.

3. The adaptive control method of claim 2 wherein said step of supplying the active MR head with a bias current comprises accessing the bias current value in said random access memory on the occasion of each head switch command and supplying a bias current in accordance with the stored value.

4. In a magnetic data storage device having data recorded in tracks on a media surface and including at least one magnetoresistive (MR) transducer heads, wherein an optimized bias current value is stored with respect to each MR head/media component combination, the method of adaptively controlling the read head bias current comprising:

supplying the active MR head with a bias current in accordance with the respective stored bias current value;

periodically redetermining the optimized bias current value for each of the plurality of MR heads; and

revising said stored bias current values to correspond with the redetermined optimized bias current values.

5. The adaptive control method of claim 4 wherein said data storage device has said optimized bias current values stored on a disk media surface and further comprising the step of transferring the bias current values from the disk surface to active storage within said storage device during the power up operation.

6. The adaptive control method of claim 4 wherein the step of redetermining the optimized bias current values is invoked after ascertaining that a predetermined period of power on operation of said device has elapsed since the immediately preceding reoptimization step occurred.

7. A magnetic disk data storage device comprising
at least one magnetic disk storage medium:

at least one magnetoresistive (MR) transducer read head for reading data stored in tracks on the surface of said at least one disk medium;

means for determining optimized values of bias current for each of said at least one MR read head:

means for storing said optimized value(s) of bias current;

means for applying a bias current to the active MR read head in accordance with the stored bias current value for that head; and

means for invoking said means for determining optimized values of bias current on the occurrence of the event, whereby the stored optimized bias current values are updated with the present optimized bias current values upon each occurrence of said event.

8. The magnetic disk data storage device of claim 7 wherein said event comprises a predetermined duration of power on operation of said storage device subsequent to the immediately prior optimization sequence.

9. The magnetic disk data storage device of claim 7 wherein said means for storing optimized values of bias current comprises storing said optimized values on a disk surface

portion containing device control information and said device further comprises means for transferring said optimized values of bias current from the disk surface storage to random access memory within said device during the power up procedure.

10. The magnetic disk data storage device of claim 7 wherein said means for determining optimized values of bias current comprises a general error measurement circuit which is invoked for bias current optimization during the first idle period following the occurrence of said event.

11. A magnetic disk data storage device comprising
at least one rigid disk magnetic storage medium;
at least one magnetoresistive (MR) transducer read head for reading data stored in tracks on the surface of said at least one storage medium;
means for determining optimized values of bias current for each of said at least one MR read heads based on selected parameters;
means for storing said optimized values of bias current;
means for applying a bias current to the active MR read head in accordance with the stored bias current value for that head; and
means for invoking said means for determining optimized values of bias current upon the occurrence of an event and altering the bias current value applied to said head in accordance therewith.

12. The magnetic disk data storage device of claim 11 wherein said event comprises a read error condition.

13. The magnetic disk data storage device of claim 12 wherein said means for storing optimized values of bias current comprises storing said optimized values on a disk surface portion containing device control information and said device further comprises means for transferring said optimized values of bias current from the disk surface storage to random access memory within said device during the power up procedure.

ABSTRACT

INDIVIDUAL MR TRANSDUCER HEAD/DISK/CHANNEL
ADAPTIVE BIAS CURRENT SYSTEM

A method and apparatus is disclosed for adaptively controlling the biasing current applied to magnetoresistive (MR) read heads within a magnetic disk drive to provide optimized bias for each head/disk/channel component combination. An optimized bias current for each head is ascertained and stored on the disk surface at the time of manufacture. During each power up operation the values are transferred to random access memory which is accessed during the execution of each head switch command to apply bias current in accordance with the optimized value to the active MR head. Periodic reoptimization and updating of the stored values is effected by general error measurement circuitry that forms a part of the device control system and is invoked to perform the reoptimization upon the occurrence of an event such as a predetermined duration of power on operation subsequent to the last reoptimization procedure.

Figure n° 1