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Description of Invention

"A write-protect device for flexible magnetic disks."

THIS INVENTION relates to improvements concerning flexible magnetic disks and more particularly concerns a write-protect device for use with the standard write-enable notch found on the jacket edge of such flexible magnetic disk assemblies.

The flexible magnetic disk popularly known as a "Diskette" or Floppy" disk,, has become the most popular means of storing, in binary form, files used with word processors and personal computers. A necessary feature of the floppy disk drives used to read and write the binary information on the flexible magnetic disk is that of providing a means of protecting data resident on a disk from accidental erasure or re-recording.

The accepted method for accomplishing this write-protection is for the manufacturers of the flexible magnetic disks to provide a specifically located and dimensioned notch on the edge of the jacket enclosing the magnetic disk, and the manufacturers of the magnetic disk drives provide a means of sensing the presence of this notch before enabling the erase or record functions.

The most popular method used by the disk drive manufacturers to accomplish notch-sensing is by use of a microswitch and arm as described and shown in Figure 2 of U.S. Patent Specification No. 4,040,106, entitled "Flexible Magnetic Disk Drive Apparatus", by Harold C. Medley, although other detection techniques, such as light sensing, are currently in use.

To preclude the inadvertent loss of recorded data, operators of systems utilising flexible magnetic disks cover the notch with an adhesive tape. When operators wish to add new data to the magnetic disk or alter or remove existing recorded data they must peel off this adhesive tape before their system will enable the erase or write functions.

Typical operators perform this application and removal of adhesive tape many times on their disks and as a result the adhesive makes a sticky mess on the jacket of the disk or depending upon temperature, time, humidity and other environmental factors, the adhesive either sticks so tenaciously it is difficult to remove the tape or sticks so poorly that the tape falls off.

The object of the present invention is to provide a more satisfactory solution to users of word processors and personal computers who must maintain write-protection on their data disks and periodically are required to alter, erase or add data to the flexible magnetic disk.

Accordingly, the present invention provides a write-protect pin device for masking a notch formed in one edge of a jacket of a flexible magnetic disk to protect data resident on the disk from accidental erasure or re-recording by preventing the sensing of the notch by the erase and record mechanisms of the apparatus with which the disk is used, said pin device comprising an elongate stem insertable into the jacket between the walls of the jacket so as to extend within the jacket along the one edge of the jacket in order to position and hold a masking portion of the pin device within the notch of the jacket and thereby prevent sensing of the notch by the erase and record mechanism of the apparatus with which the disk is used the stem being retractable from within the jacket to remove the masking portion from the notch of the jacket and thereby enable the erase and record mechanism to sense the notch.

In the preferred form of the invention, the pin device is configured such that, when it is inserted into the notch in the edge of the flexible magnetic disk jacket, the masking portion of the pin completely fills the notch, thereby effectively disabling the erase and write functions of all flexible magnetic disk drives that detect, by whatever means, an open notch before their erase or write functions are enabled.

The write-protect pin device can be easily inserted and withdrawn and has a life dependent mostly upon the properties of the material from

which it is made. A variety of materials and fabrication techniques may be used to accomplish the configuration required; however, magnetic materials should be avoided.

The configuration of one embodiment of the write-protect pin device according to the invention can be likened to a miniature carving knife in that the masking portion of the write-protect pin is analogous to the handle of the knife and the stem of the write-protect pin analogous to the blade of the knife. The blade of the write-protect pin is inserted into the jacket at the small side of the rectangular write-enable notch most distant from the centre of the magnetic disk. The orientation of the write-protect pin is such that the longest edge of the blade is parallel and adjacent to the inside edge of the jacket. The pin is inserted until the masking portion of the pin snaps into the notch and the point of the pin just protrudes through the corner hole of the jacket sufficiently to serve as a visual indicator to the operator that the disk in the disk drive is write-protected.

In order that the invention may be more readily understood, embodiments thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a flexible magnetic disk with a write-protect pin device displaced vertically below the write enable notch;

Figure 2 is detail 2 of Figure 1 and shows a close-up view of the write-enable notch and write-protect pin device;

Figure 3 shows the write-protect pin device installed in the write-enable notch with dotted lines indicating the shape and position of the pin without the envelope of the flexible magnetic disk;

Figure 4 illustrates another configuration of write-protect pin device that can be installed in the flexible magnetic disk envelope at its corner; and

Figure 5 shows still another configuration which utilises a write-protect pin as shown in Figure 4 with a notch-closing bushing.

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As previously pointed out, commercially available flexible magnetic disks (see Figure 1) have a notch 10 precisely located in one edge of a disk envelope 11 so that devices embodied in disk drives can detect the presence of said notch before enabling write or erase functions.

In accordance with the present invention, a device in the form of a non-magnetic pin 12 is designed and employed to prevent notch-detection by the techniques currently employed by popular flexible magnetic disk drives.

In the preferred embodiment shown in Figures 1 to 3, a head 13 of the write-protect pin device completely fills the volume of the notch; that is to say the thickness, length and width of the notch are duplicated as head dimensions for the pin. The standard notch size for the 5.25 inch (13.33 cm) floppy disk is 0.250 inches (0.64 cm) along the edge of the jacket and 0.140 inches (0.36 cm) wide.

The width of the blade 14 of the write-protect pin is a continuation of the notch width, as is the pin head 13 described above. The length of a long edge 17 of the pin is sufficient for a tip 20 of the pin to just protrude 20 at (Figure 3) from a construction joint hole 18 at the corner of the disk envelope 11. The standard dimension for this short portion 19 of the edge of the jacket is 1.20 inches (3.05 cm) for the 5.25 inch (13.33 cm) floppy disk. The protrusion of the tip of the pin through the corner hole provides the operator a visual indication that a diskette installed and operating in a drive is write-protected.

The thickness of the blade 14 is not critical except that it should not exceed about one third of the thickness of the head 13.

A point is established at the tip of the blade by the intersection of the long edge 17 and a biassed edge 16 of the blade. The length of the biassed edge is approximately one and a half times the width of the blade. It is not desirable that the point of the blade be sharp, so in order to preclude injury to the fingers of the operator the point should be blunted by a radius of approximately 0.020 inches (0.05 cm). In order to take proper advantage of the protruding pin tip as a visual indicator of write-protection, it should be of a colour in high contrast with the colour of the jacket of the

magnetic disk. The radius 15 is desirable, but not necessary.

To install the head 13 in the notch 10, the point of the blade 14 is inserted into the jacket at the small side of the rectangular write-enable notch which is most distant from the centre of the magnetic disk. That is, the rounded point of the blade is inserted into the notch and between the space between the top and bottom walls of the jacket; and the pin is then pushed forward until the rounded tip of the blade 14 projects from the corner hole 18 at the corner of the jacket. In this position the head 15 fits within the notch 10, and the curved surface 15 engages the side of the notch which is most distant from the corner hole 18 so as to retain the pin 12 in place.

Alternative configurations of the write-protect pin are shown in Figure 4 and Figure 5. A pin 21 in the form of a rod is common to both of these embodiments and, in Figure 4, is shown both inserted into the floppy disk jacket and below the jacket before insertion. The pin is fabricated from non-magnetic material, has a head 22 approximately 0.060 inches (0.15 cm) in diameter and in a colour contrasting highly with the disk jacket so that it can serve as a visual indication that write-protection is installed. The diameter of the body of the pin 21 is approximately 0.040 inches (0.10 cm) and the pin has a total length capable of spanning the distance from the corner of the disk jacket, through the write-enable notch and extending by its tip 23 into the inside of the jacket edge sufficiently to provide a stable bridging of the notch. For the 5.25 inch (13.33 cm) floppy disk a suitable overall pin length would be approximately 1.60 (4.06 cm). The radius of the pin point should be approximately 0.010 inches (0.025 cm).

For disk drives utilising the type of notch sensor described in U.S. Patent Specification No. 4,040,106, the pin configuration just described will prevent the notch sensor from detecting the notch and thereby inhibit the write-or erase-enable function of the drive.

For disk drives utilising light-beam detection, it is necessary to completely close the write-enable notch. Figure 5 shows a load member which comprises a flat portion or blade 25 and a mounting portion 24 in the form of a bush, both inserted in the notch and un-inserted below the notch.

The member 24 is inserted into the notch such that a tongue portion of its blade 25, which is approximately 0.250 inches (0.64 cm) long,is supported between the two inner surfaces of the jacket. The pin is then inserted into the jacket corner hole 18 as in Figure 4, but in this case capturing the bush 24 on a shaft portion of the pin 21 in the write-enable notch, thereby preventing notch detection by all notch detect methods currently in use by disk drive manufacturers. Since the head of the pin 22 is as described above, the feature of visual indicator of write-protection is preserved.

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CLAIMS:

1. A write-protect pin device for masking a notch formed in one edge of a jacket of a flexible magnetic disk to protect data resident on the disk from accidental erasure or re-recording by preventing the sensing of the notch by the erase and record mechanisms of the apparatus with which the disk is used, said pin device comprising an elongate stem insertable into the jacket between the walls of the jacket so as to extend within the jacket along the one edge of the jacket in order to position and hold a masking portion of the pin device within the notch of the jacket and thereby prevent sensing of the notch by the erase and record mechanism of the apparatus with which the disk is used the stem being retractable from within the jacket to remove the masking portion from the notch of the jacket and thereby enable the erase and record mechanism to sense the notch.

2. A pin device according to claim 1, wherein the stem of the pin device comprises a generally rectangular thin blade and the masking portion comprises a rectangular-shaped head which substantially fills the notch in the jacket.

3. A pin device according to claim 1, wherein the stem of the pin device comprises a rod which extends along the edge of the jacket from the notch to an adjacent corner of the jacket.

4. A pin device according to claim 3, wherein the masking portion of the pin device has a flat portion large enough to block the area of the opening of the notch and a mounting portion for receiving on a shaft portion of the rod which extends along the length of the notch, and wherein the flat portion of the masking portion includes a tongue portion which slips between the walls of the jacket along the inner edge of the notch to hold the masking portion in place in the notch.

5. A pin device according to any preceding claim, which pin device is insertable into existing openings in the disk jacket.

6. A pin device according to any one of claims 1 to 4, wherein the pin device is retained in position by the physical configuration of the standard disk jacket to eliminate the need for adhesives or clips.

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7. A pin device according to any preceding claim, including visual indication means which protrude from a corner of the jacket to indicate to the operator that the installed magnetic disk is write protected.

8. A pin device substantially as hereinbefore described with reference to Figures 1 to 3 of the accompanying drawings.

9. A pin device substantially as hereinbefore described with reference to Figure 4 of the accompanying drawings.

10. A pin device substantially as hereinbefore described with reference to Figure 5 of the accompanying drawings.

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