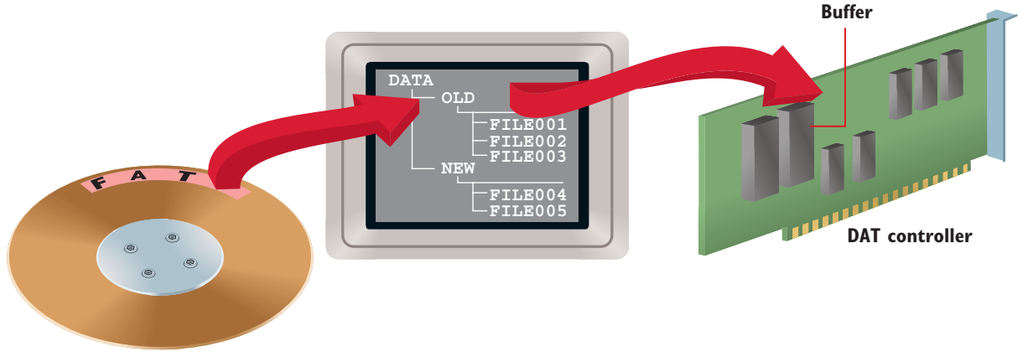
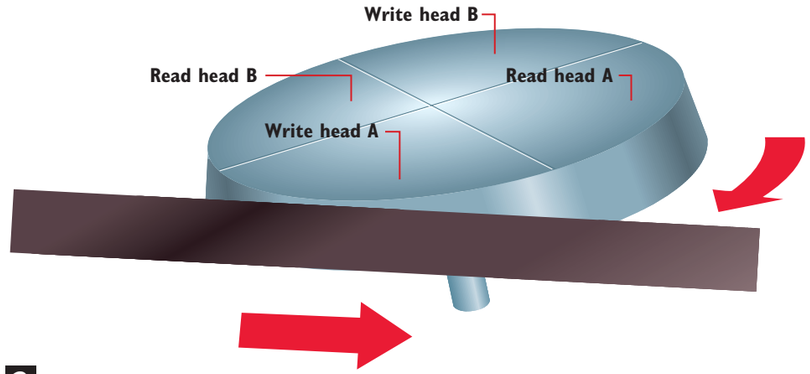
Digital Audio Tape (DAT) Backup Drive

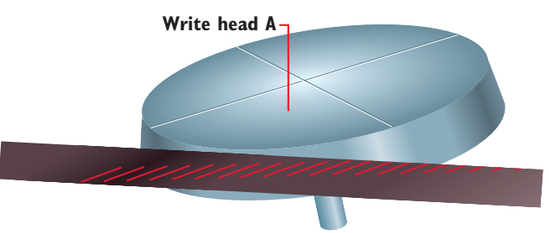
1 When you issue a backup command from your software, the program checks your hard disk's file allocation table to find the files to back up. Then it copies the data, file by file, into the DAT drive's buffer, which usually has room for 512K to 1MB of data. Like a QIC tape drive, the DAT drive performs an algorithm on the data to create error-correction code that it adds to the data in the buffer.



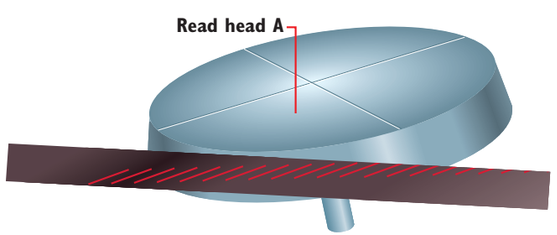
2 The distinctive design of the DAT drive's read/write head is what allows it to back up huge amounts of data onto a tape cartridge about the size of a matchbox. The mechanism is a rotating cylinder with four heads 90 degrees apart. Two of these heads, write heads A and B, write backup data, and two corresponding read heads verify the data. The cylinder tilts slightly so it rotates at an angle to the tape. The cylinder spins 2,000 times a minute while the tape, at a rate of half an inch a second, passes in front of the cylinder in the opposite direction of the cylinder's spin.

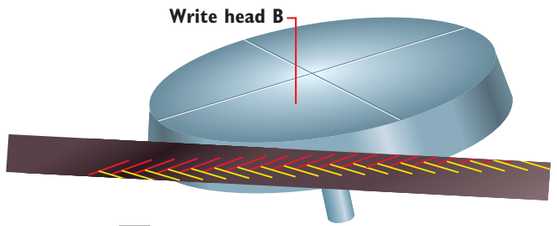


3 During the time that write head A is in contact with the tape, it writes about 128K of data and error-correction codes from the drive's buffer to a track on the tape. Because the cylinder is tilted, the head encounters one edge of the tape at the beginning of the write head and moves diagonally across the tape until it reaches the other side. This results in a narrow diagonal track about eight times longer than the width of the tape.

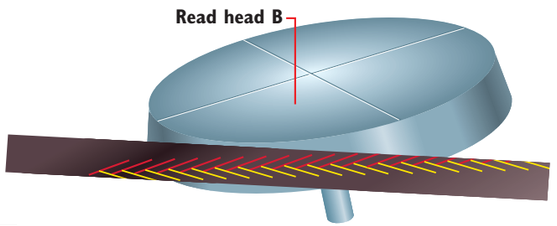


4 Read head A reads back and verifies the data in track A, bit by bit, against the data still in the buffer. If the data on the tape checks out, it's flushed from the buffer, and more data is read from the hard disk. If the data in track A contains errors, the data will be rewritten on the next pass.





5 As write head B passes over the tape, it writes data in a track at a 40-degree angle to track A, making a crisscross pattern that overlaps track A. The overlapping data packs more information per inch of tape; it isn't misread later because the magnetic bits written by the two write heads have different polarities, and the different read heads read data only from properly aligned tracks.



6 Read head B and write head B go through the same steps, alternating with the A heads until all the data is backed up. Then the drive rewinds the tape and writes a directory of stored files either in a special partition at the front of the tape or in a file on the hard disk.

Restoring Files

When you restore files from the DAT drive, the software reads the directory, winds the tape to the spot where the requested files begin, and copies the files to the hard disk.