

Fully Loaded

Hard disks need scrupulously clean conditions in which to operate. The Winchester disk, sealed inside its own casing, makes high capacity and fast access available to the home user

Although home computers have assimilated many of the features of small business machines over recent years, there is one area of computer technology in which they remain relatively unsophisticated: disk storage space. While a home computer user would be grateful to have a single floppy disk capable of holding 100 Kbytes of data, business machine requirements demand considerably more space. A pile of floppy disks, with all the business information scattered between them, is no solution to these large storage needs; and consequently, rigid disks capable of storing far greater amounts of data were developed. The pioneering work on these rigid disks began at IBM in the 1960's. Because the original disks contained a 30 Megabyte storage capacity on each drive, they were dubbed the '30/30', and hence, by analogy to the rifle, 'Winchester' disks.

Winchester disks use rigid platters rather than the flexible pieces of plastic used in floppy disks. This allows the number of tracks on the disk to be increased from a typical working maximum of 96 tracks per inch (tpi) for floppy disks to several hundreds of tpi for Winchester disks. With increasing sophistication in disk technology it has become commonplace to fit five, 10 or even 20 Megabytes of storage into the same sized box as a 5¼" floppy disk drive.

Home computer users are now beginning to benefit from the trend towards rigid disks with the availability of Sony 3½" and Hitachi 3" micro floppies. These are semi-rigid disks and are capable of storing as much information as any 5¼" floppy disk. The BBC Micro and the Oric-1 are among the first to have such devices available as

add-ons, while computers like ACT's Apricot are fitted with them as standard.

This increase in storage density, however, has created other problems. The accuracy demanded by the head positioning mechanism, for example, required a completely new method of moving the head. The solution to this problem was found in the audio industry: Winchester heads are often driven into position by an electromagnetic coil of the type found in loudspeakers. Passing an electric current through a coil creates a magnetic field and this in turn causes a soft iron plug in the centre of the coil to move a precise distance. By attaching the head to the end of the plug (suitably isolated from any magnetic effects, of course) it can be moved across the disk surface very quickly and accurately.

The head 'flies' across the surface of the disk on a cushion of air, never actually touching it. This significantly reduces wear and tear on the disks, but means that they must be sealed in airtight boxes to prevent problems caused by dust and other foreign bodies. Generally, this means that the disk is fixed inside the drive and cannot be removed, though Winchester disks with removable cartridges are now starting to become available. These cartridges are usually self-sealing and open only to allow the head access to the disk surface when the cartridge is inserted into the drive. To prevent any dust getting in, the air pressure inside the cartridge is often kept higher than that outside, and all the air pumped into the unit is filtered first.

Another advantage of rigid disks is that multiple platters can be used. A 10 Megabyte Winchester disk is simply constructed from two

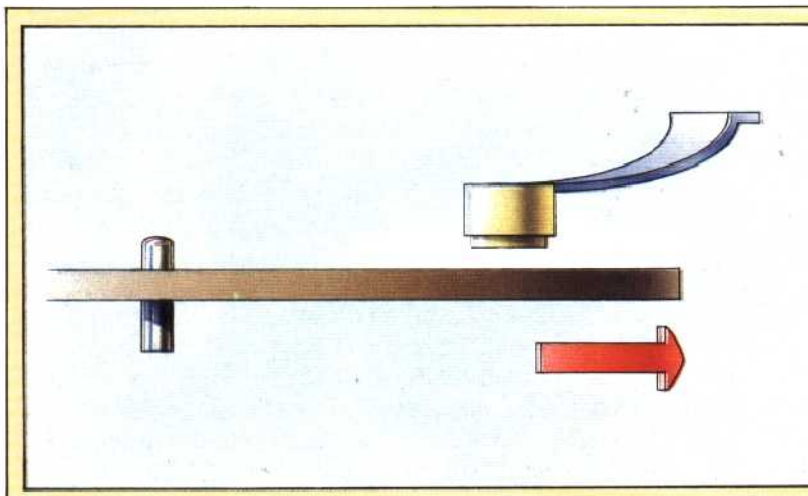
Casing

Most Winchester units are contained in a die-cast alloy casing, which partly accounts for their weight. This is needed to keep the components accurately aligned



Platters

Higher capacity Winchester simply feature more platters, or discs, on the same spindle. The disk illustrated has five, but most disks have two or three. The read/write heads are connected together, so only one block can be read at a time



Floating Heads

Unlike a floppy disk drive, on which the head rubs against the recording surface, on a Winchester drive it 'flies' very close to it. The disk rotates so fast that the 'skin effect' creates a cushion of air that supports the head. If the head 'crashed' against the disk, it would probably remove the magnetic recording surface

Hermetic Seal

The mechanics of the drive are completely sealed against the atmosphere, to prevent dust or smoke particles from 'crashing' the head

KEVIN JONES