

The Swing-Arm Hard Disk Actuator

An innovation invented and developed by IBM Hursley engineers and one that has underpinned hard disk technology since mid-1970s, is the swing-arm, recording head actuator which is now incorporated into all hard disk assemblies.

Originally developed with the potential of having a lower manufacturing cost, lower mass, increased reliability and compactness, the new approach compared very favourably to head positioners which up to then had used complex hydraulic, stepper and voice coil motors to control linear motion.

Unfortunately, the proposed innovation didn't find favour within the sponsoring IBM business division as the potential capacity of the proposal was a few percentage points lower than what was demanded by the division at the time.

The IBM Hursley engineers persisted nonetheless and developed the rotary actuator technology to carry and position the recently implemented Winchester head technology and included the development of a new electronic means by which the head can follow the recorded track.

Incidentally, the "Winchester" product name was given to the IBM 3340 product as it included two 30Mb hard disk units and although it has often been associated with the City of Winchester in Hampshire, it actually owes its association to the 30/30 Winchester rifle.

Despite the initial reluctance of IBM to pursue the innovative approach, the first IBM Hursley developed product released with the rotary, "swing-arm" actuator in the mid-70s was known as the 62GV or "Gulliver" head disk assembly which had an initial capacity 5mb subsequently rising to 15mb in later models. Gulliver proved to be a resounding success and shipped over 170,000 units, many of which were manufactured in the IBM Havant plant in Hampshire.

Although initially overlooked by IBM, the patent filed in the early 70s, however, was noticed and duly licenced by other hard disk manufacturers who, following on from Hursley's introduction of smaller disks, went on to produce the reliable, sealed hard disk assemblies for the mid-range market and the upcoming Personal Computer market in the 1980s.

The innovation, IBM's most prolific electro-mechanical patent, has since been licenced worldwide and upwards of 10 billion hard disk units have been produced employing the rotary arm and associated technologies which today, unloved and unseen, underpins our entire digital society through its deployment in server farms, millions of personal computers and games consoles around the world.

The inventors, John Heath and David Cuzner were awarded by IBM for their outstanding contributions to innovation in IBM. David was made an IBM Fellow and John was awarded Membership of the IBM Academy of Technology. John is a Fellow of the Institute of Mechanical Engineers.