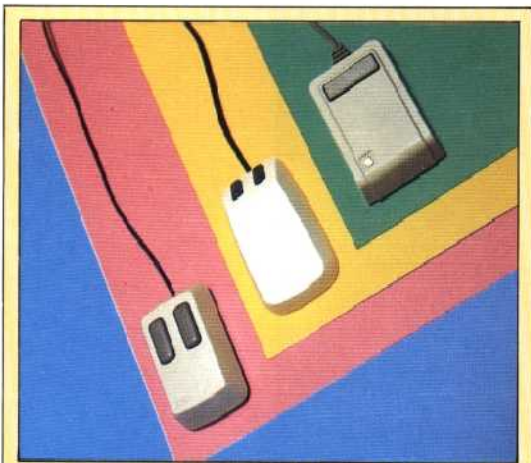


Mice And Men

Computer designers want to abandon the keyboard in favour of something easier to use. One approach is the mouse

Not long ago computers could only be accessed through large electromechanical typewriters called 'teletypes'. These were noisy, cumbersome and unreliable devices that have since been replaced by the swift and silent Visual Display Unit (VDU) with keyboard. The VDU eliminated many of the problems associated with the teletypes — not least of which was the production of large amounts of punched tape waste paper as the information was keyed in. However, both the mechanical terminal and the VDU-plus-keyboard are restricted by their character-by-character, line-by-line format. The user cannot move quickly around the screen — selecting items from a menu here, altering data there, or changing files and programs — without being faced with the limitations of the keyed cursor format. Freedom from the keyboard is attained when using graphics terminals or playing computer games with trackballs and joysticks, but how can a serious user benefit from these?

Most of the home computers currently available are equipped with four direction cursor controls that can be moved around a program listing or a text document to the position where an amendment needs to be made. But the cursor can be moved only in character- or line-sized steps; the user cannot move it directly to its destination. If the text cursor could be moved like a graphics cursor, which can be freely manipulated under the control of a joystick or trackball, movement of data would be considerably faster.



Three Blind Mice

Many of the most recent business microcomputers feature a mouse as standard, and some companies offer units as add-ons to existing machines. Most work by means of a rotating ball on the underside, and feature either one, two or three 'SELECT' buttons on the top

IAN MCKINNELL, MICE COURTESY OF MICROSOFT, APPLE & XEROX

Main Ball

A large steel ball-bearing rests on the surface across which the mouse is moved. On some mice the ball is made from hard rubber to prevent it from slipping

Encoding Wheels

These two wheels make constant contact with the ball to pick up its movement in two directions. The wheels are mounted on shafts; at the end of these shafts are encoding devices that produce electrical pulses as the shafts are turned

Buttons

The function of the two buttons will depend on the software package in use. Usually, one is used to select an item, and the other to move objects around the screen

Microswitches

These are mounted on the PCB beneath the buttons, and require only a tiny movement to make or break the circuit

Rubber Grommet

The mouse must be free to be moved around the desk, and the rubber grommet is particularly important in preventing strain on the connection between the cable and PCB

A solution to this problem was first explored in the 1960's at the Stanford Research Institute in California; and the first 'mouse' — as the new kind of controller that was developed was called — was patented in 1970. The device was given the name 'mouse' because of its appearance: a mouse is small enough to fit into the palm of the hand; it has a 'tail' (the cable); and the first devices usually had two 'ears' (control buttons). Conventional trackballs and joysticks aren't used because the precision that they provide in positioning the cursor isn't needed.

The mouse operates by detecting its motion across any flat surface in the up/down and left/right directions, as well as combinations of the two. These movements are directly converted to movements of the cursor — or pointer, as it is often called — on the screen. There are two main methods of generating the electrical signals from the movement of the mouse. In both cases, the underside of the mouse features a large ball that rests on the surface across which the mouse is being moved.

The rotation of the mouse's ball-bearing is transferred to internal cylindrical rollers. In one system, the ends of these cylinders are fitted with code wheels that have alternating tracks of conducting and non-conducting material. The pulses received are counted by the mouse's operating software and enable it to give a direct reading for the cursor's position on the screen. In