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# The twiddly bits: Peripheral devices and ergonomics

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*Although the early fears that personal computers would trigger an overuse injury epidemic have receded, there are still risks involved in using them for extended periods of time. Users concerned about avoiding or minimising overuse injuries have many options available, including a wealth of "ergonomic" equipment such as mice, desks, chairs and keyboards. This article examines some of these options.*

## INTRODUCTION

Many years ago, when personal computers were new and strange, I was involved in running a survey of Australian Public Service (APS) staff to determine how many of us had succumbed to repetitive strain injury. The answer was "lots". To its credit, the APS reacted swiftly and drew up a three-point plan for dealing with the problem. The general solution was to reduce the overall time staff spent on computers, to break up work into shorter, varied tasks which used different movements, and to try and reduce the external stresses on computer users. Later it became possible to add a fourth remedy: make sure you have the best software and equipment for the job, set up specifically for your requirements.

A quarter of a century later, all this still applies. Anyone who uses a computer extensively is at risk of damaging his or her body through overuse in all sorts of nasty ways. Common sense and restraint are still the best solutions. However, there are many more gizmos and gadgets available now which claim to have ergonomic benefits. This article presents an overview of "ergonomic" equipment and peripherals. Some of them may work for you to alleviate overuse injury, prevent it or delay its onset. But if you have, or think you may be getting, overuse injuries your first steps should be to consult your supervisor and your doctor.

Overuse is an intensely personal thing. Nearly every device mentioned here has some users who claim it worked for them, and others who claim it didn't work at all or made their condition worse. Before spending serious money, trial the device if you can; if you can't, then make sure you have a money-back guarantee. Private health funds may make a contribution towards the cost. Where possible, buy equipment that can be adjusted to your own size, desk height, leg length, arm reach and working conditions – that way you have a better chance of getting it exactly right.

There are many ergonomic equipment suppliers on the web and in the Yellow Pages. Among the best-stocked is Ergonomic Office,<sup>1</sup> which handles online sales for many ergonomic devices. It has a showroom in Fyshwick, ACT.

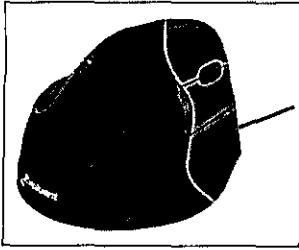
## MICE AND OTHER POINTING DEVICES

The main choice in standard computer mice today is between wireless and non-wireless. Having used both, I recommend the non-wireless; they're usually lighter (no batteries) and more responsive. For people who have trouble with standard mice, many alternatives of both kinds are available, usually involving a different angle or position for the arm and hand. One cheap alternative is to switch mouse hands, permanently or temporarily, to spread the strain.

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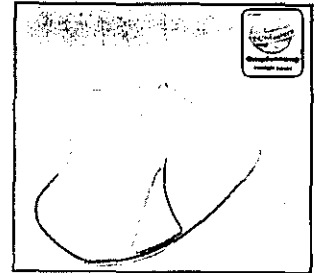
<sup>1</sup> Ergonomic Office Online, <http://www.ergonomicoffice.com/contactUs.htm>.



The Evoluent vertical mouse<sup>2</sup> is a large raised lump on which the hand lies at an angle, requiring less rotation of the wrist. The Handshoe mouse<sup>3</sup> is smaller and flatter, looking rather like a UFO about to take off. It also tilts the wrist sideways. The 3M Ergonomic Joystick mouse<sup>4</sup> goes all the way and allows the hand to grip a vertical shaft with buttons at the top and along the side. There are others with similar styles. Prices range from \$80 to about \$200.

Newer pointing technology includes finger-operated trackpads and pen-operated tablets. The current market leader is the Apple Magic Trackpad,<sup>5</sup> a sloping glass-covered surface about the size and shape of a paperback book. Although designed for Macs, it has been used successfully with some Windows systems. It is available from Apple stores in Australia for \$99.

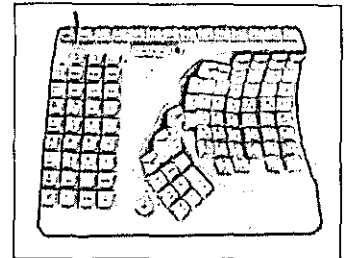
Pen-based tablets are primarily used for graphics work, although they have been put forward as ergonomic devices. Prominent in this area is Wacom, some of whose tablets double as trackpads. The Wacom website<sup>6</sup> will direct you to stores where you should be able to trial the devices.



Another type of pointing device is the trackball: essentially an old-style ball mouse flipped upside down so the ball can be rotated with fingers or thumb. These have started to go out of fashion, but some can still be found at Ergonomics Now,<sup>7</sup> at similar prices to ergonomic mice. A modern variant is the roller bar, where users move the mouse pointer by rolling and sliding a long cylinder fitted to the bottom edge of their keyboard.

## KEYBOARDS

“Ergonomic” keyboards have a long history. Microsoft, in particular, has been producing them for over 10 years. The most simple models take the form of an ordinary keyboard which is curved or split down the centre to allow the hands to separate and take on different wrist angles. More exotic models tilt the key surfaces in various directions, and some incorporate a wrist rest along the base of the keyboard. Models range in price from around \$80 up to nearly \$400, with some incorporating trackpads or trackballs.<sup>8</sup> A cheaper solution for people who enter lots of numbers may be to buy a separate numeric keypad (\$40 and up) and place it in a natural position for their right hand.



<sup>2</sup> Evoluent VerticalMouse, <http://www.evoluent.com>.

<sup>3</sup> HandShoe Mouse, Hippus – Home, <http://www.handshoemouse.com>.

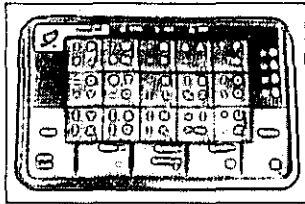
<sup>4</sup> 3M Ergonomic Joystick Mouse, <http://www.store.ergonor.com.au/store/3m-ergonomic-mouse-small-medium.html>.

<sup>5</sup> Magic Trackpad, <http://www.store.apple.com/us/product/MC380LL/A>.

<sup>6</sup> Wacom Australia Home, <http://www.wacom.com.au>.

<sup>7</sup> Ergonomics Now – Trackball Mouse, <http://www.ergonomicsnow.com.au/products/trackball-mouse>.

<sup>8</sup> Stretch Now – Ergonomic Keyboards and Ergonomic Mice, <http://www.stretchnow.com.au/products/hardware.htm>.



Users who want or need to use only one hand for keying can order a one-handed FrogPad<sup>9</sup> for \$US140 plus shipping from the US. After shutting down briefly, the company has found a sponsor and should be back in operation by the time you read this. The Twiddler 2 device<sup>10</sup> (\$US199) is a one-handed keyboard/mouse combination which uses "chording" – multiple simultaneous button presses to produce one keystroke. See the website for details.

The DataHand<sup>11</sup> system is an unconventional alternative keyboard; each hand rests on a separate unit, which gives the fingers access to a range of different buttons so the hands and wrists remain still while only the fingers move. Some users report dramatic increases in both ease of use and productivity, but sales have never been high and production has apparently ceased, although some units may still be in stock or available second-hand. Details and videos of its operation can be found on the web. The Orbitouch<sup>12</sup> device dispenses with keys altogether and uses sliding "domes" to select keystrokes. But the price is high (\$US700) and reviews are, to put it politely, mixed.

### SITTING, KNEELING, STANDING, WALKING

Ergonomic seating is widely used. It ranges from inexpensive inflatable exercise balls through to special-purpose tilted or kneeling chairs which can cost anything from \$200 to over \$1,000. One mechanically minded correspondent on a mailing list made his own computer chair out of a bucket seat from a wrecked car, since, as he pointed out, these are specifically designed to provide comfort and support over long periods of time.

I am a long-term exercise ball user and find them highly satisfactory, though it's not always easy to get the largest size (try sports stores or eBay),<sup>13</sup> they occasionally require re-inflation, and you will need a new one now and then if there are sharp edges in your working environment. At \$20-\$50 they are by far the cheapest type of alternative seating. Ball users can now purchase circular stands to keep the ball from rolling around while not in use.

The simplest "ergonomic" chairs resemble ordinary office chairs with extra supports added for the back and/or neck. The ErgoSeat,<sup>14</sup> for instance, incorporates both of these. The supports are usually padded and can be adjusted to different positions and angles.

Kneeling or "balans" chairs alter the user's posture by supporting the knees as well as the posterior. Some have backs, others don't. Some are adjustable, others are not. A common problem is that they are too high for standard computer desks, requiring the chair to be lowered or the desk raised in some way, but properly sized and adjusted they can be very effective. They can also be awkward to get up from in a hurry, eg to answer the phone. A wide range of both conventional and kneeling chairs is available from BadBacks,<sup>15</sup> and there are showrooms for their products in Sydney, Melbourne and Perth. The Kneelsit<sup>16</sup> dynamic chair is a balans chair variant imported by Adjustable Seating in Kiama. Potential buyers in NSW can try this and other products by appointment at the Independent Living Centre in Parramatta.<sup>17</sup> Other States and Territories may have similar establishments.

<sup>9</sup> FrogPad, <http://www.frogpad.com/FrogPad/Welcome.html>.

<sup>10</sup> Features, <http://www.handykey.com>.

<sup>11</sup> Ergonomic Keyboards by DataHand to Reduce Keying Stress, <http://www.datahand.com>.

<sup>12</sup> The Real Keyless Ergonomic Keyboard with an Integrated Mouse, <http://www.keybowl.com>.

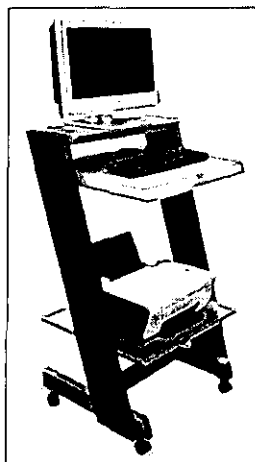
<sup>13</sup> eBay Australia, <http://www.ebay.com.au>.

<sup>14</sup> Ergonomic Chairs Melbourne – Progressive Office Furniture Melbourne, [http://www.ergochairs.com.au/ergochairs/Products/Corporate\\_pages/ergonomic\\_seating.htm](http://www.ergochairs.com.au/ergochairs/Products/Corporate_pages/ergonomic_seating.htm).

<sup>15</sup> Bad Backs: First in Pain Relief Products and Health News, <http://www.badbacks.com.au>.

<sup>16</sup> Australian Ergonomic, Computer Chair – Kneelsit, <http://www.kneelsit.com>.

<sup>17</sup> Independent Living Centre NSW, <http://www.ilcnsw.asn.au>.

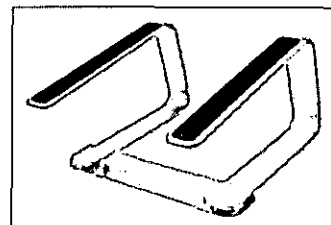


“Standing desks” have become popular recently as a cure or preventative for back problems. They range from simple boards or shelves placed at a convenient height to work on while standing, to elaborate hydraulically-powered systems that raise or lower at the touch of a button to suit the height and position of the user. Since standing for long periods raises health issues of its own, most standing desk users recommend you keep a bar stool or other seating handy in order to vary your position from time to time. Many users enjoy making their own standing desks, but they can also be purchased from StretchNow<sup>18</sup> (<http://www.stretchnow.com.au>) or other suppliers. Bear in mind that most standing desks don’t usually come with all the useful drawers and shelves that sitting desks have, and expect to pay from three to five figures depending on its complexity and features.

The next step from a standing desk is a treadmill desk. The invention of these is credited to James Levine of the Mayo Clinic, who allegedly claims that users can burn 100 calories an hour by walking slowly on a treadmill while they work at the desk above it. User evaluations seem to be fairly positive, and many people who own treadmills have constructed or installed their own standing desks above them. Australians can buy a purpose-built treadmill desk (without treadmill) from TrekDesk<sup>19</sup> via Amazon for \$479 plus shipping.

## LAPTOPS

Heavy laptop users (in both senses) may have special requirements of their own. There are many devices available which claim to make using a laptop safer and more comfortable, including supports that range from “lap tables” with cushioning underneath, like the Logitech LapDesk, to stands which tilt the laptop to a fixed or adjustable angle, like the Australian-made LazyLaptop.<sup>20</sup> Some contain fans or other cooling systems to protect the user’s knees from burns and the laptop from overheating. A wide range can be seen on the myshopping.com.au site<sup>21</sup> – search for “laptop stands”.



## LIGHTING, SCREEN USE AND THE ENVIRONMENT

Lighting guidelines for computer use suggest that diffused illumination should come from overhead. In dark areas, users may require additional illumination for their keyboard and any papers or working documents on their desk – known as “task lighting”. Try to ensure that light is not reflected off the screen. Sometimes just cleaning the screen can help too. Perception of visual contrast diminishes with age, so older users may need more light than younger ones. Fancy task lights are available for three figures and up, but there is little evidence that they are any better than standard office lamps.

Larger, high-resolution screens are generally agreed to improve productivity, but there are some issues to be aware of. Monitors, when sold, usually have the brightness and contrast settings turned up high. This looks great in the shop, but it can be overwhelming when you sit in front of it all day, so make sure you can find and use the monitor controls to turn these down. Take regular breaks to rest and exercise your eyes, and make sure you blink regularly.

Monitors in awkward locations can be mounted on moveable arms to improve their position and orientation. If you do a lot of copy typing, a document stand mounted next to the monitor can alleviate the need to keep looking up and down and adjusting your vision.

<sup>18</sup> Stretch Now – Height Adjustable Desks – Sit Stand Desks, [http://www.stretchnow.com.au/whats\\_new/ergo\\_desks.htm](http://www.stretchnow.com.au/whats_new/ergo_desks.htm).

<sup>19</sup> TrekDesk Treadmill Desks, <http://www.shop.trekdesk.com>.

<sup>20</sup> Ergonomic Laptop Stand – Notebook & Laptop Stands – Improve Posture, <http://www.lazylaptop.com.au>.

<sup>21</sup> Laptop Stand – MyShopping.com.au, [http://www.myshopping.com.au/PT-38\\_Laptop\\_Accessories\\_Stand\\_fs\\_1676\\_e\\_](http://www.myshopping.com.au/PT-38_Laptop_Accessories_Stand_fs_1676_e_).

Every major operating system and productivity application now allows you to adjust screen font sizes and "zoom factor", so if you find yourself straining to read the screen, use the control panel or program options to turn these up.

Try to keep distractions and external stress to a minimum. Some people can work effectively with music or radio programs playing in the background, others can't. Even an intrusive air conditioner can cause noise stress.

## **SOFTWARE**

The role of software in reducing stress, and hence overuse injuries, is often overlooked. After 40 years of software development there is no excuse for an irritating program. Generally the better your software, the more familiar you are with it, and the better it is set up to suit your requirements, the less stress (and more productivity) will result. If a program is persistently frustrating or annoying you, then look for a replacement, or contact someone who can alter its settings and customise it for you. This may include upgrading to a new version or even a new operating system. Consult friends, family, colleagues and the internet for advice.

## **CONCLUSION**

Some of the glamour has worn off computing since 1984 and, apart from gamers, most of us are no longer at quite such a high risk of being enthralled for long periods by the illuminated screen. However, we still need to apply commonsense and restraint to our usage, and intelligently use the technology we have to make our computer use time as pleasant and safe as possible. See your doctor and your supervisor first if you have any ergonomics queries, and try out possible technological solutions thoroughly before you commit yourself to them.