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PRESS CUTTINGS

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up to 70Hz, at which point nobody should be able to notice a flicker.

Other parameters which affect a monitor's performance include the dot pitch of a screen and its resolution. The dot pitch refers to the size of a spot, or pixel, of colour on a screen, while the resolution is the measurement of the number of dots that can be shown on a screen. Like a home TV set, the resolution of a computer screen is clearer when there are more dots of a smaller size.

The Swedish National Council for Metrology and Testing (MPR) has laid down the most rigorous test procedures so far for characteristics like dot pitch, jitter and resolution. It has published a guide for testing VDUs that also covers ergonomic factors like the angle of a keyboard and the degree of response of keys.

In the UK, an organisation called City Centre has been running a VDU Workers Rights Campaign since 1985. It reports that up to 80 per cent of VDU workers have problems with their eyesight. The problems include blurred vision, double vision, burning or sore eyes, migraines and discomfort with contact lenses.

While critics may complain that it is far more likely to be the lighting and dry atmosphere of the typical office building that cause such problems, the very work involved in staring at a lit screen all day is hardly likely to relax the eye muscles. Under the EC directive, employers will be asked to make sure that the image on a screen is as stable as possible, that brightness and contrast should be easily adjustable, and that the screen should be free of reflective glare.

The equipment section of the directive also mentions that work chairs should be adjustable, work desks should be large and the angle of the keyboard in relation to the desk should be adjustable. The cost of upgrading an office to meet these requirements will depend very much on how

Photography: Tom Starch

s of computer safety

safe for people to use. Judith Massey diagnoses the ruling's implications.

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From New Year's Day 1993, all businesses operating in the European Community (EC) will be obliged by law to install computer systems that satisfy minimum standards of safety and ergonomic design. The EC spelled this out in a directive published in May this year. What is less clear is what exactly those standards will be, or how companies should be acting now to protect current and future investment in the systems they install.

The EC issued its directive in response to fears about how computer systems affect the health of the people who have to use them every day. The directive may be vague in its wording, but it does require that EC governments incorporate its recommendations into law by the end of 1992. In the UK, it will be the Health and Safety Executive (HSE) that implements the directive and a working party will be set up in 1991 to work out how this should be done.

Though, in the early part of 1991, the HSE is supposed to publish a consultative document for businesses to follow, it cannot currently say exactly what regulations will be passed, or how they will be enforced. For example, the EC directive targets businesses whose workers regularly use computers as part of their normal work. The problem the HSE will have is how to define 'regularly'.

Another uncertainty is whether home or teleworkers will be covered by the new laws. It seems likely that a company which provides computer equipment to home workers will have to ensure that it meets safety requirements, but may not have to pay for lighting or other environmental improvements.

It is likely that the HSE will look to emerging standards for ergonomics and safety at work currently being worked out by the International Standards Organisation (ISO), and to a parallel set of guidelines to be released by the British Standards Institution

(BSI) next year. However, the BSI rules relate to computer equipment, rather than conditions for their use.

Many UK businesses rely on computer systems, yet there has never been an overall initiative to discover what harmful effects they may have on human beings. So to date there have been no regulations governing the permitted levels of radiation emitted by monitors or how workers should use computers.

Another problem is that much of the evidence concerning the safety of computer equipment that does exist is circumstantial and unsubstantiated. And there is some confusion about just what problems computers can cause.

The EC directive goes far beyond recommending minimum radiation levels for computer monitors. It is controversial, in the UK Government's opinion, in its statement that workers must be given eye tests before commencing screen work, at regular intervals thereafter, and if they experience any difficulties which may be attributable to working with VDUs (Visual Display Units).

It is not yet clear who will be expected to pay for eye tests. But with the price of a test currently running at anywhere between £12 and £20, the extra cost of such an initiative for larger organisations could run into thousands of pounds if they, not the Government, are called upon to pay.

Employers will also be called upon to examine computer workstations (defined by the Commission as both the equipment and the immediate environment, eg. seating, lighting, etc.), take appropriate measures to remedy any problems found and install only systems that meet minimum requirements after 1992. Minimum requirements have yet to be specified in any detail, but broadly speaking they will cover three areas: computer equipment, work environment and the operator/computer interface.

The equipment section of the EC directive looks at the quality of computer screens, how systems are set up in the first place and even the furniture that employees should be given.

MOST PEOPLE THINK that the only health dangers associated with computer screens result from radiation leaking from monitors. But the quality of the image is just as important. One missive from the HSE - entitled *Working with VDUs* - stresses that problems can be caused by "drifting, flickering or jittering images" on a computer screen. It recommends that these problems should be corrected, and that jobs should be designed to allow employees to take regular breaks from work.

System manufacturers claim they work continuously to improve the quality of their computer screens. Hitachi New Media's general manager, Nick Rogers, says that research suggests that eye fatigue can be caused just by the colour of a screen. Black letters and images on a white background are more restful than the other way round.

But if the image does not reach the corners of the screen, there can be a black border around the edge of a white screen. The contrast between border and white screen can be a cause of eyestrain in itself, adds Rogers.

Another problem is the refresh rate of a screen, or how often the monitor redraws lines making up an image on the phosphor behind a display. The quicker the refresh rate, measured in cycles per second, or Hertz (Hz), the smaller the difference between one frame and the next. The slower the refresh rate, the more the screen appears to flicker. According to Rogers, some people can still see a flicker with a refresh rate of 50Hz, which is at the bottom end of the VGA graphics standard prevalent in business computers. Hitachi has introduced a graphics board that provides a refresh rate

The financial hazard

An EC directive says that companies must make their computer system

responsible a business has been in the past, says independent health and safety consultant Jill Bird, who also works on ISO standards committees.

"It is difficult to quantify just what will need to be done," she explains. "Companies which have already taken it upon themselves to provide good working environments should not have too much extra to install. Others will need to look much more carefully at work spaces."

Some of the items that companies will be required to install under the EC directive include: document holders, window blinds, desks of a certain specification, adjustable chairs, lights with diffusers (or uplights) and footrests.

THE SMALL PROPORTION of UK companies that have considered providing ergonomically correct work spaces tend to be shocked by the costs involved. Mike Aldrich, managing director of Rogc Computers, says that a working figure for most organisations is £1500 per employee (or workstation, to use the term chosen by the EC directive). This excludes any actual computer systems and just covers lighting and furniture. "The immediate reaction when we tell people is: 'Oh my God'," he relates.

Aldrich believes that the EC directive does not go far enough to educate people about the damage that working at a computer can have. The very nature of the work involved in sitting in front of a screen all day has never been properly thought out.

Aldrich says that studies as long ago as 1948 predicted that repetitive strain injury

(RSI) would prove to be a real problem for office workers. RSI is not a new disorder, but it is a disease to which computer workers can be highly susceptible. RSI results from repeatedly using muscles in the upper body for the same tasks, particularly tasks that are not too easy, such as speed typing.

People who suffer from RSI experience pain in their wrists, arms and neck. Not only is the condition painful, but it can make it impossible for those affected to work productively, if at all. RSI covers a variety of so-called soft-tissue ailments, such as tendinitis, tenosynovitis, rheumatism and Carpal Tunnel Syndrome. Research is still going on to find out how much working at computers is to blame for these conditions, but there have already been some test cases where workers have successfully sued employers after developing RSI.

Cynics suggest that such lawsuits may prove more of a spur to companies to improve work environments than legislation itself. An added financial incentive is the fact that insurance companies are beginning to train policy assessors to check up on the quality of work areas. Companies who are less likely to sustain lawsuits for industrial accidents may expect more reasonable insurance premiums, says Aldrich.

From the manufacturers' point of view, there is often not enough market demand for items like low-radiation screens. Until now there has been little pressure from the UK user base or the Government to justify developing and marketing more expensive (but safer) systems. And as long as companies have been under no compulsion, they have been unwilling to pay

the additional price for ergonomic workspaces or low-radiation screens. Opinion is sharply divided over how truthful or realistic survey findings really are. One monitor manufacturer even said: "The whole thing is nonsense. There is no evidence to support the theory that terminals can cause illness. The only proof that they have is that massive doses of radiation made pregnant rats abort." A partial but not uncommon view.

Hitachi's Rogers adds that manufacturers who do claim to offer low-radiation monitors tend to be accused of scare-mongering, as though by telling people that there is a choice, the demand will fall for anything but the low-radiation model. "Our position is that the link between screens and sickness is yet to be proved. But we do sell a low-radiation monitor. The problem in the UK is that despite advertising, there was little response to that product," he says.

TAXAN IS PROBABLY the best known low-radiation monitor manufacturer in the UK. Its marketing director, Hugh Chappell, has also had to face accusations of scare-mongering. Perhaps for that reason, he is not prepared to say that there is an open and shut case against using non-low radiation screens. "I am not a doctor," he says. "I am not in a position to say whether these studies are conclusive or not. And it would be wrong of Taxan to say all monitors except the low-radiation variety are harmful. After all, we sell both types ourselves."

But sales of Taxan's low-radiation monitors are growing and now account for ten per cent of its overall total sales in the UK. It is likely that Taxan will eventually merge product ranges as 1992 approaches, since it will make no sense to continue manufacturing two types of the same monitor for a prolonged period, especially when the EC directive comes into force. And as the price difference falls even further, users will be more tempted to hedge their bets against

The EC directive: the main points

- Workstations are defined as including both the computer equipment used by a worker as well as the worker's immediate environment.
- Workstations put into service for the first time after December 31 1992 must meet the minimum standards of the directive.
- Workstations put into service on or before December 31 1992 must be adapted to comply with the same standards not later than four years after that date.
- Employers must perform an analysis of workstations in order to evaluate the risks they may be causing to workers, including risks to eyesight, other physical problems and problems of mental stress.
- Workers must be consulted on these matters.
- Workers shall be entitled to an appropriate eye and eyesight test before carrying out display screen work, at regular intervals thereafter, and if they experience visual difficulties.
- States of the EC must bring into force the laws, regulations and administrative provisions necessary to comply with the directive by December 31 1992.



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radiation problems.

Again, the pragmatic approach will prevail. If the technology is available at a reasonable cost, demand will increase. The current difference in price between a Taxan low-radiation monitor and a normal monitor is just £30. Six months ago it was £50.

That extra £30 could have a tremendous effect on the IT budget of a large company with over 1000 employees. And organisations may not want to get monitors from a third-party company, instead preferring to buy all their personal computer equipment from a single source.

THE ENVIRONMENT SECTION of the EC directive says that employers must make sure that all radiation from computer screens should be reduced to negligible levels from the 1992 deadline. The actual levels considered negligible are open to interpretation, says Chappell. There are also

two problems to consider: static electricity and electromagnetic radiation. Static builds on the glass of a screen. This attracts dust, which can cause skin and eye irritation. Electromagnetic radiation is a different matter. It is an inherent product of the cathode ray tube (CRT) that forms the bulk of every VDU. The CRT emits radiation in the form of high frequency, ultra-violet light and soft X-rays into the atmosphere around the operator.

A CRT-alternative could emerge from ongoing research into liquid crystal display (LCD) monitors. To date such screens have been found in laptop and portable computers. But they could also become standard equipment on the desktop. Two pioneers here are Philips and Nokia Data.

Philips launched a mono desktop LCD monitor earlier this year, while Swedish IT company Nokia will shortly begin to market a very impressive colour LCD screen. Such

screens do not emit electromagnetic radiation, but they will probably be expensive for some time to come.

THE EC DIRECTIVE's third chapter covers the operator, computer interface. This will possibly be the hardest section for the HSE to translate into law, because research is still going on into what makes software productive and easy to use. For example, the directive says that the principles of software ergonomics should be applied. It does not say whose principles, or how they should be interpreted. But the directive also specifies a more useful guideline

that says software should be suitable for the task.

According to Dr John Brook, who sits on an ISO working group for software ergonomics, and works for DEC's Advanced Software Group, suitability for the task is the most important factor. "Usability is not a simple issue," he says. "There is no key to usability, such as a new whizz-bang user interface. It depends on factors like the past experience of the user, the task that the software is designed to be used for and how users need to interact with a system. The principles of designing software for an automated teller machine and a system for chemical processing are completely different."

WHATEVER THE FINAL outcome of the EC directive, there is a breathing space for companies who face increased financial outlay to make sure their computer systems are legal. Any systems installed after the EC's deadline will have to meet minimum standards. Any installed before that time will need to be modified to meet the same standards within four years, which is the average write-off time for personal computers in UK business anyway.

Responsible businesses looking at the longer-term view of efficient investment in staff will not see the EC directive as a threat. They should see it as a way in which they can focus on-going efforts to improve health and safety efforts in-house. ❧