The Which? scientists explain what happens inside your gadgets

We explain DVD recorders

DVD RECORDERS

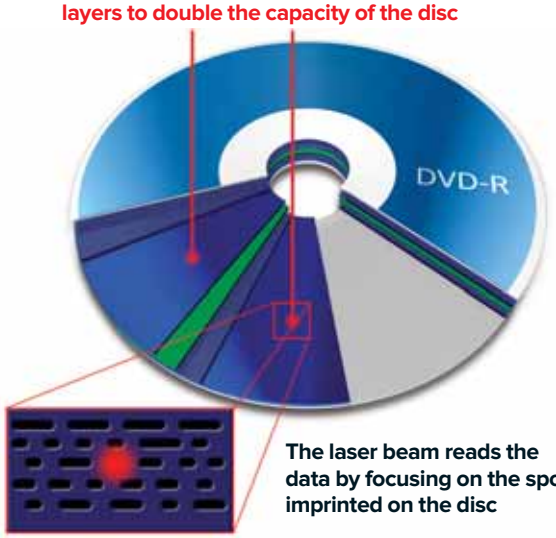
Recording TV programmes to a blank DVD is becoming increasingly popular, but how do your favourite shows end up on those shiny discs?

Recording broadcast-quality video requires a lot of storage space, so the signal has to be compressed for the programme to fit on the DVD. Sophisticated mathematical techniques are used to do this – something the person watching the recording shouldn't even notice – reducing the amount of storage space needed. It's this information that gets written on to your disc.

Discs that can be written to only once (DVD-R and DVD+R) contain a dye that becomes darker when heated by the laser in 'write' mode. Rewriteable discs (DVD-RW, DVD+RW and DVD-Ram), which can be written to again and again, contain a reflective alloy that can change its appearance when heated by the laser. These changes allow the video data to be 'burned' to the disc's recording layer as tiny spots, and later read back by the laser in 'read' mode.

A DVD recorder's laser beam can focus into a space well under 1/1000mm across to read and write the tiny spots that make up the data. Blu-ray players use a blue laser with a shorter wave length; this enables it to be focused into a spot ten times narrower than that of a standard DVD player – so the discs can hold more data.

Dual-layer DVDs, like this one, have two recording layers to double the capacity of the disc



The laser beam reads the data by focusing on the spots imprinted on the disc

Back to the future Printers

THEN

In 1980 Epson launched the MX-80 printer. Characters were made up of a combination of dots, which meant the MX-80 could print different fonts and even basic graphics, and were printed on to a continuous sheet of paper that was eight and a half inches wide.

NOW

Today's inkjet printers are really flexible, allowing you to print colour graphics, photos and text documents on different-sized paper. Most allow you to bypass a computer completely, as you can now print photos directly from your digital camera.

AND BEYOND

Toshiba has unveiled a device that can print, erase and reprint on the same piece of plastic up to 500 times. At a cost of £5,000 for the machine and £5 per piece of plastic, the B-SX8R is currently aimed only at businesses – who knows whether this will still be the case 20 years from now?

We learn about the telephones of tomorrow

The future's calling

FUTURE

BT futurologist Ian Pearson says that, although his job title sounds wacky, he's 'just an engineer making logical deductions for tomorrow based on things we can already see'. We interviewed him to find out what the future might hold for telecoms.

Ian predicts that mobile phones will disappear in about 15 years. Instead, we'll all be using digital jewellery to make phone calls and surf the web. 'The key factor with electronic products is that they are continually shrinking and that trend is set to continue,' explains Ian. 'For the last 20 years we've had huge design constraints, such as huge batteries or long antennae. In the future the electronics won't need to affect the shape and size of products at all.'

Ian Pearson, official crystal-ball gazer for BT

Ian also believes products linking telecoms technology and the nervous system will be developed. 'Today the bee's knees is having a video phone and sending video clips,' he says. 'Tomorrow there's no reason why you couldn't play people the bungee jump you've just done, complete with the sensation of the jump itself.'

The ability to record and transmit sensations will mean we can create virtual experiences, similar to those seen in sci-fi films, such as *Star Trek*. As a famous crew member from the Starship Enterprise once said: 'It's life, but not as we know it.'

PHOTOGRAPHY: APPLE, ALAMY, GETTY IMAGES, JOHN TRENHOLM ILLUSTRATION PAUL WOOTTON

50,000,000
tonnes of waste from discarded electronic goods produced across the world every year
UNITED NATIONS ENVIRONMENT PROGRAMME

27%
of UK consumers own an MP3 player
NVISION

Will UK digital radios soon be obsolete? We investigate

Digital radio dispute

RADIO

Digital radios are one of the greatest electronic success stories of recent years. Last year more than a quarter of all radios sold in the UK were digital and a recent online survey of 2,191 Which? members found that 42 per cent of you have a digital radio in your home.

Last year the World DAB organisation announced a new broadcast standard, DAB+, which offers better sound quality than the DAB standard used in the UK. However, judging by the phone calls and letters we have received, this has left some of you concerned that your digital radio will soon become obsolete.

Communications regulator Ofcom has no plans to allow broadcasters to adopt the new DAB+ standard in the UK at the moment, but this could change in the future. So what would it mean to digital radio fans in the UK if the broadcasters and regulators suddenly dropped DAB in favour of DAB+?

Well, the good news is that when the DAB+ standard was developed, the boffins behind it kept to a minimum any mucking about with the technology for processing the signal. This should allow as many current digital radios as possible to be upgraded. So if you already own a digital radio, it's possible that your model could be upgraded to receive a DAB+ signal.

Is time running out for UK DAB radios? Read on to find out

Don't be put off buying a DAB radio

If you're planning to buy a new digital radio, don't let the news about DAB+ put you off. New digital radios will be developed with the DAB+ signal in mind – so they are also likely to be easily upgradeable.

Our discussions with broadcasters and regulators indicate that there is currently no deadline in place for the wholesale adoption of DAB+. This may not please everyone, as the current DAB standard has its critics – see 'DAB sound quality', left.

VERDICT Technology changes over time. This is the case with all products and not just digital radio. However, most technology develops gradually and also experiences periods of transition.

It's likely that if DAB+ were adopted in the UK, there would be a period when the two digital systems would run alongside one another. This would allow some stations to be broadcast in the new format and some in the old, which would give listeners time to switch to the new standard.

DAB sound quality

Despite its popularity, there are concerns about the sound quality of DAB radio. Broadcasters use compression techniques to reduce the size of the DAB signal, which inevitably leads to some loss of sound quality.

We think the main advantage of digital radio is more station choice.

If you have concerns about sound quality, we advise you to buy a Best Buy model that can receive an FM and a DAB signal, such as the Pure Evoke-2 or the Dualit DAB Kitchen Radio.

News in brief

Scalextric motorways

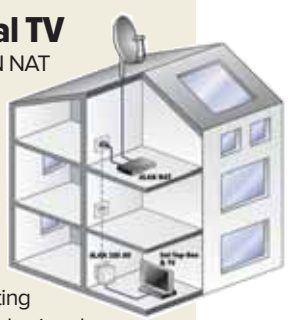
Computer-controlled motorways may be a step closer to reality. An award-winning paper by the University of Manchester details how cars could be controlled via information beamed from roadside transmitters, increasing capacity on the roads and reducing congestion. Intelligent bumpers would prevent accidents in the event of system failure.

BBC on YouTube

The BBC has created its own online channel on the video website YouTube. Clips of popular programmes, including *Doctor Who* and *Top Gear*, are now available for everyone to view at www.youtube.com/BBC.

Share digital TV

The Devolo dLAN NAT (network attached tuner) allows you to receive a digital TV signal from any power point in your home. It works by distributing the satellite or cable signal through existing power lines. The device is only a prototype at the moment but should be available in UK shops in 2008.



Virtual Vision

Rimax Virtual Vision 4.0 XL Professional, £180, offers more than the usual pair of specs. The glasses connect to a DVD player, games console or TV and have a built-in LCD display that provides an image comparable to watching a 40-inch screen – ideal if you don't have space for a huge TV.