Technofile: DVD drives

While many of us have heard of the DVD format, few of us are familiar with all the complexities associated with it. To demystify DVD, and explain how the standard has evolved since its introduction in the late 90s, Gordon Laing explores just what DVD has to offer, and how you can make the most of it

DVD has come a long way since its launch in 1997. It's now officially the fastest-selling consumer electronics format, gaining acceptance much faster than CD or VHS ever did. The shops are packed with DVD movies and the official DVD Forum (www.dvdforum.org) confidently predicts that DVD will replace video cassettes within the next five years. It's also hard to buy a new PC without a DVD-ROM drive fitted as standard, and every month an alternative edition of *PC Advisor* carries a DVD version of the cover disc instead of the CD-ROM.

All in all, it's not a bad success story for the 5in shiny disc that looks virtually identical to a conventional CD, but can store up to 25 times more information than its doppleganger. This increased capacity is achieved through miniaturisation. The capacity of a standard CD is 700MB but, thanks to finer grooves, smaller markings and a special laser to read them, DVDs can squeeze in 4.7GB on to one side of a disc – often called DVD-5. DVDs can also be manufactured to use both sides, doubling their capacity to 9.4GB (also known as DVD-10).

PHOTOGRAPHY: ROBERT HOLMES

→ Claims that the DVD+RW format is compatible with all drives have yet to be proven

More cunning still is an optional semi-transparent layer, which can almost double their capacity again. A single-sided, dual-layer disc can store 8.5GB (also known as DVD-9), while using both sides of the disc results in a gargantuan 17GB (also known as DVD-18). You have to turn double-sided DVDs over yourself, but the laser in a DVD drive can switch between layers in a fraction of a second, without any manual intervention – it's clever stuff.

It's not all good news for DVD though. The vast majority of PC software is still supplied on old-fashioned CD-ROMs, and this looks unlikely to change (see *DVD software* on page 79). Then there's the thorny rewritable DVD market, which currently sees three main competing formats slugging it out to become ultimate PC storage system.

In this month's *Technofile,* we'll explain the pros and cons of each rewritable DVD format, and predict which one is likely to come out tops. We'll also look at what you can do with a DVD writer, from backing up your PC to making your own movies, along with an explanation of how to install it in the first place.

The write stuff

Before we dive into the benefits of DVD, it's worth explaining what all the different rewritable standards mean. The first rewritable DVD format, DVD-RAM, commonly houses its discs in protective caddies like a large floppy. DVD-RAM discs are currently available in single-sided 4.7GB capacity for £15 or double-sided 9.4GB capacity for £26.

Your PC treats DVD-RAM drives as both optical and removable drives. It's therefore possible to drag files on and off a DVD-RAM in Windows Explorer as if it were a huge Zip disk, without the inconvenience of a dedicated writing process. You can rewrite the media up to 100,000 times.

The caddies may offer excellent protection, but they obviously can't be slotted into normal DVD drives. More recent DVD-RAM discs can be removed from their caddies, but the makers encourage careful subsequent handling. Even if you do take the disc out of the caddie (or use newer, cartridge-free versions), only the latest generation of ROM drives developed by the format's supporters will read them.

A single-sided, dual-layer disc can store 8.5GB (called DVD-9), and using both sides of the disc results in a gargantuan 17GB (DVD-18)

The most recent rewritable DVD formats are DVD-RW and DVD+RW, the former pronounced 'minus RW'. Both use bare discs that can store up to 4.7GB on one side only, and require writing software – just like a higher-capacity version of CD-RW. At the time of writing, DVD-RW and DVD+RW media cost £17 and £10 respectively, although they're likely to even out by the middle of the year.

With no caddy, both DVD-RW and DVD+RW will physically fit any drive and, according to their supporters, should be readable by most drives. The down side compared to DVD-RAM is that DVD-RW and DVD+RW are currently single-sided only, both formats require writing software and they both support fewer rewrites, with a maximum of 1,000. It's also very early days in terms of testing their compatibility, and we wouldn't put much faith in claims that these discs will cause no problems no matter which drive you choose to play them in.

We should finally mention the write-once format. DVD-R is essentially just a higher capacity version of CD-R, and its blank discs can store up to 4.7GB each. Like CD-R you can only use one side and record on them once, but the big bonus is that thanks to higher reflectivity, they appear to work in virtually all DVD-ROM

The supporters

In case you're in any doubt, you can rest assured that the big boys are completely behind the new medium. The various companies backing each of the rewritable DVD formats reads like a who's who of the consumer electronics and PC industry. DVD-RAM is backed by Hitachi, Toshiba, Panasonic and Samsung, and is also endorsed by the official DVD Forum (www.dvdforum.org). The forum, basically an association of the industry leaders who have contributed the development of the technology, also endorses a second format, DVD-RW, backed by Pioneer, NEC, Sharp and Thomson, and additionally featured in systems by Apple and Compaq.

Completing the picture is DVD+RW. While not recognised by the DVD Forum, this format is at any rate backed by Sony, Philips, Ricoh, Yamaha, HP, Verbatim and Thomson, and it has a foot in both RW camps. Interestingly, a new write-once format called DVD+R is currently in development by the companies in the DVD+RW camp. This claims to offer a similar level of drive compatibility as DVD-R, though this obviously can't be tested until release. Note that without DVD Forum recognition, neither DVD+RW nor DVD+R can use the official DVD logo.

↓ DVD-RAM has the advantage of being treated as both an optical and a removable drive, so you can drag and drop files from your desktop

If you don't already have FireWire, you may as well save money and go for an internal drive, as you're going to have to open your PC anyway

drives and domestic players. The price of individual DVD-R blanks is currently around £10 each, with packs of 10 available for around £50.

Internal or external?

Installing an internal DVD writer is no different from fitting a conventional CD drive. If you don't have room inside your PC, or dislike the idea of opening it, you can buy an external model instead. La Cie is the leader in external models and offers either DVD-RW or DVD-RAM drives housed in their own boxes, with a FireWire connection to the computer. Most Macs have FireWire as standard, but PCs will generally need a FireWire PCI card, which will cost around £40, although Creative Labs' latest Audigy sound cards also include FireWire connectivity.

External drives are convenient and can be shared between multiple machines. Typically they cost £100 more than bare internal drives and require a FireWire interface. If you don't already have FireWire, you may as well save money and go for an internal drive, as you're going to have to open your PC anyway.

Installing a DVD writer

Our advice is based on installing an internal writer into a modern PC with one hard disk and one CD/DVD-ROM drive. If you already have an internal CD writer, you may wish to save space and swap it for the DVD writer as all but DVD-RAM drives will also write CDs.

To fit your drive the first thing you must do is change a small connector on the back of the DVD writer to Slave – it will probably be set at Master. Next, open your case, unclip the plastic panel underneath the existing CD- or DVD-ROM drive at the front, and slide in the DVD writer, screwing it securely in place.

The flat wide cable which plugs into the back of the existing ROM drive should have a spare connector on it – insert this into the back of the DVD writer and connect a spare four-pin white power plug.

Close the case, power up your PC and install the software that came with the writer. Once this is complete your drive should be ready to use. If you have opted for a DVD-RAM drive, and you're running Windows XP, you can simply drag files straight on to the disc. However, DVD-R, DVD-RW and DVD+RW discs require writing software that may or may not come bundled with the writer.

→ An internal drive is cheap and easy to fit, as long as you have the space for it

A word of warning…

All writing packages will let you back up data and copy unprotected discs, but you'll normally need special software to make your own DVD videos, which again may or may not have come with your DVD writer.

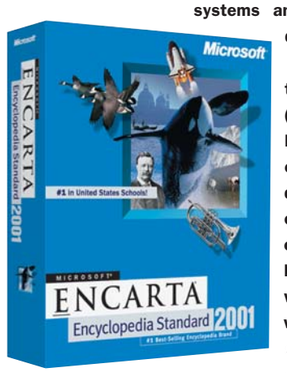
The big question, though, is whether you can make copies of commercial DVDs. The answer is yes, so long as they don't have copy protection and you've got sufficient space on your disc. Remember that all the recordable DVD formats are limited to 4.7GB per side and most DVD videos these days employ the full 8.4GB capacity of a dual-layer disc. In short, there's simply not enough room to copy most commercial video titles. We would also remind you that it is illegal to make copies of commercial software.

Features comparison

Product	Telephone	Website	Price (ex VAT)	Drive	Rewritable DVD format	Rewrite DVD speed	Write DVD-R speed	Read DVD-ROM speed	Rewrite CD-RW speed	Write CD-R speed	Read CD-ROM speed	Interface	DVD data writing software	DVD video writing software
HP DVD100i	08705 474 747	www.hp.com	£345	Internal	DVD+RW	2.4x	N/A	8x	10x	12x	32x	IDE	Veritas RecordNow	Sonic MyDVD
La Cie DVD-RAM/R	020 7872 8000	www.lacie.co.uk	£499	External	DVD-RAM	2x	1x	6x	N/A	N/A	24x	FireWire	Veritas Primo DVD	None
La Cie DVD-RW/R/CD-R/RW	020 7872 8000	www.lacie.co.uk	£499	External	DVD-RW	1x	2x	4x	4x	8x	24x	FireWire	Veritas Primo DVD	None
Panasonic LF-D311	0845 600 3535	www.panasonic-industrial.com/dvdburner	£412	Internal	DVD-RAM	2x	1x	6x	N/A	N/A	24x	IDE	Veritas Primo DVD	Sonic DVD It
Pioneer DVR-A03	01753 789 789	www.pioneerdvdrw.co.uk	£364	Internal	DVD-RW	1x	2x	4x	4x	8x	24x	IDE	VOB Instant CD/DVD	Sonic MyDVD
Philips DVD-RW 208	01756 702 892	www.pcstuff.philips.com	£499	Internal	DVD+RW	2.4x	N/A	8x	10x	12x	32x	IDE	Nero Burning ROM	Sonic MyDVD
Sony DRU110A	00 800 2623 7669	www.sony-cp.com	£389	Internal	DVD+RW	2.4x	N/A	8x	10x	12x	32x	IDE	B's Gold	Sonic MyDVD

DVD software

DVD may be enjoying success in the home movie market, but CD-ROM remains the standard for PC software. Amazing as it sounds, today's operating systems and applications have grown little over the years and can still normally be stored on a single CD. DVD's capacity of up to 25 times more than a CD is simply not required. The situation is unlikely to change either, as operating systems and application updates will increasingly be delivered via the web.



→ One the few packages that need DVD's huge capacity is the Encarta Encyclopedia

There are, however, a handful of PC titles that take advantage of DVD. Microsoft's Encarta (www.microsoft.com/encarta) or Acclaim's Encyclopaedia Britannica (www.britannica.co.uk) are sold on a single DVD. If you're into directories, the UK Info Decade (www.192.com) offers over 200 million Electoral Roll records, covering the last 10 years on a single DVD. Despite a lack of compelling DVD-ROM titles, we'd recommend that every new PC is fitted with a DVD-ROM drive. These devices are only slightly more expensive than CD-ROM drives, and you'll be covered for the future. There's also the small matter of being able to play thousands of high-quality movies.

→ DVD's large capacity makes it perfect for anyone who frequently backs up large amounts of data

Uses of DVD drives

• **Capture and edit digital video** Beyond enormous storage capabilities, the killer application for DVD writers is making your own video discs. You can digitally capture and edit DV (digital video) camcorder footage before transferring it on to a DVD, formatted complete with interactive menus. This is surely the ultimate way of showing everything from holiday movies and wedding videos to promotional footage.

Sonic's MyDVD package costs about £70 and makes decent DVD videos. You can buy and download this application from www.sonic.com, although it was also supplied as standard with four of the internal drives we tested. Note that converting video into DVD's native Mpeg-2 format can take some time – 12 minutes of DV footage took 38 minutes to convert using a dual 933MHz Pentium III-based PC.

If you're after a budget option, Pinnacle System's Express offers similar capabilities for £37. For an extra £18, though, you get an additional FireWire card, which is handy, since you'll need FireWire to digitally capture video from a DV or digital-8 camcorder. Whatever software you use, though, remember to check whether your DVD player and DVD-ROM drive will play back the blank DVD discs. One of our oldest players refused to accept any of the rewritable formats, although it was fine with write-once DVD-R discs.

In terms of writing and copying DVDs, the most capable application around today is Ahead Software's Nero 5.5, which costs just £35. For full support of all the latest drives and formats, you should download the latest update from www.nero.com.

• **Back up big time** The major selling point for rewritable DVD drives in the business environment is the medium's huge capacity. It may not be able to back up an entire hard disk, but it's far more useful than paltry CDs. Storing seven times more data than a CD means you need seven times less shelf space, or 14 times less if using double-sided DVD-RAM media, which is great news for those who archive or back up a lot of data.

• **Don't split us up** More important is a DVD drive's ability to handle and copy single large files, which previously had to either be split between several CDs or stored on an expensive alternative medium. Such files could include databases, email inboxes or multimedia collections.

• **Magnificient multimedia** DVD drives also let you store longer and higher-quality video clips, while corporate videos can be authored and distributed using DVD cheaply and easily, rather than employing the services of expensive bureaux.

Before switching your business to DVD, though, remember that not everyone has DVD capabilities and, even if they do, you still have to ensure your chosen format is compatible with the required drives. Conventional CD-R and CD-RW media is also currently cheaper per megabyte and, of course, more widespread, so more people will be able to play them.

Deciding factors

If we take a look at the different types of DVD writers available at the moment and assess their uses, it is easier to note the pros and cons of each option (see table on previous page).

If speed is your main concern then DVD+RW has to be your number one choice, as our tests show that this format offers the fastest rewriting times by a wide margin (see *Driving force,* right). However, don't dismiss its rival format DVD-RW as this is almost as quick to write to DVD-R discs, and faster drives are sure to be around the corner.

DVD+RW and DVD-RW can also boast the broadest compatibility with drives and players, and most that can read one type can read the other. But that's not to say that you can read this media in any drive as many models, even recent launches, failed to recognise either. To ensure the best level of compatibility you have to switch to DVD-R disks, which is a bit of a blow for DVD+RW as these drives cannot write on them.

As far as cost is concerned both DVD+RW and DVD-RW drives are much of a muchness, and media prices should soon even out to around £10 a disc for both formats. Another advantage these two types of media share along with DVD-R is that they are made on the same production lines as CD-R and CD-RW disks, so prices should fall even further as DVD writing gains in popularity. DVD-RAM media, on the other hand, has to be made on a specialist line so you're unlikely to see costs fall dramatically.

But the price of media's not the only thing holding DVD-RAM back; it's also dogged by compatibility issues, as it won't play in most DVD drives. Having said that, though, Hitachi and Panasonic plan to soon bring out drives that will read DVD-RAM media, and Panasonic's LF-D311 DVD-RAM drive can write – slowly – to DVD-R discs. On the plus side for DVD-RAM is ease of use, as copying files requires no extra software.

If we had to choose a drive to recommend in terms of overall performance, compatibility and price then it's a tough call between Panasonic's LF-D311 and Pioneer's DVR-A03. Panasonic's DVD-RAM drive is simple to use, but you can read media from Pioneer's DVD-RW unit in more drives. Both can write to DVD-R discs, which helps to solve the compatibility issue, but Pioneer's drive is much faster for this, which we feel gives it the edge.

Patience is a virtue

However, before making your choice it might be worth holding on to see what becomes of the DVD Forum's DVD-Multi platform, which will support DVD-RAM, DVD-R and DVD-RW. The versatility of these multidrives could mean they turn out to be the best of all worlds, and they should be on sale later this year – a time when media prices will also be much cheaper. If you can wait, hang on to see how the market develops. ■

For a hands-on guide to installing a DVD drive get article 2518 from Faxback on page 145,

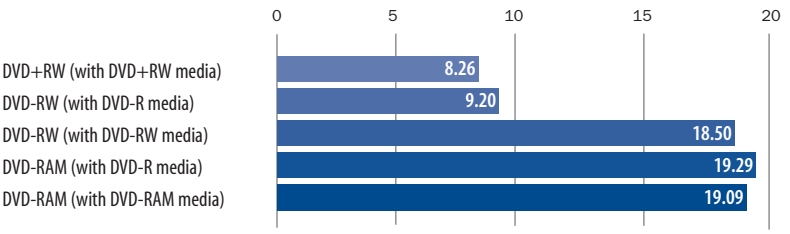
Driving force

We tested four internal DVD-writers: Pioneer DVR-A03 (DVD-RW drive), Sony DRU110A (DVD+RW model), HP DVD100i (DVD+RW drive) and Panasonic LF-D311 (DVD-RAM device). We also tested a pair of external La Cie FireWire models, one featuring the Pioneer DVR-A03 and the other employing Panasonic's LF-D311. While all drives will rewrite their own DVD media, they offer varying degrees of support for writing on other formats. The Pioneer DVD-RW and Panasonic DVD-RAM drives will both write to DVD-R blanks at dual-speed and single-speed respectively. Disappointingly, neither HP's nor Sony's DVD+RW drives could write to DVD-R. Our DVD-RW and DVD+RW drives would, however, write CD-R and CD-RW media at speeds quoted in our table. Note that the DVD-RAM drive could read, but not write, CD-R or CD-RWs.

We tested how long it would take to copy 1.27GB of data stored in multiple folders from a hard disk, and then timed an on-the-fly direct copy of a single-layer DVD video disc, measuring 3.41GB. Each drive comes with its own writing software, but for consistency, we used Nero 5.5; the results are shown in the graphs below. Putting an internal drive into an external FireWire box did not affect its performance in our tests.

In terms of compatibility, the DVD-RW and DVD+RW discs could be read in most of the DVD-ROM drives and domestic players that we tried – our oldest ROM drives and players didn't want to know, though. Interestingly, our DVD-RW and DVD-RAM drives could not read DVD+RW discs. Once removed from their caddies, the DVD-RAM discs weren't readable in any of our other DVD drives, although DVD-RAM's supporters claim compatibility with their latest models. The DVD-R format, however, was readable in every ROM drive and domestic video player at our disposal.

Time to copy 1.27GB folder (in minutes and seconds – shorter bars are better)



Time to copy 3.41GB DVD video (in minutes and seconds – shorter bars are better)