Mega storage to go

There's a new removable storage option for every job, from keychain-sized USB drives to mammoth external hard disks. Rosemary Haworth and Christopher Nulls examine 15 affordable, portable contenders

Storage is like money: you can never have too much of it. And you need different denominations for every situation. When choosing a storage device you'll want to balance several factors including capacity, portability and cost. Which one you opt for will depend on how you intend to use your storage. For example, you may want to transport files on a flash memory drive that you can put in your pocket and attach to any computer that has a USB port. Perhaps you want to burn data to cheap discs that most CD or DVD drives can read. Or maybe you want to transfer gigabytes of files to a hard drive.

To address these different storage situations we have separated the products in this review into three categories: *Put it in your*

pocket, Make multiple copies and *Really pack it away*. After all, you wouldn't rely on a comparatively slow optical or cartridge drive with removable media to back up your entire hard disk, particularly as external hard drives are far faster and can complete the task in one step. And you wouldn't reach for a hard drive if you had a pocket-sized flash memory drive to tote your presentation from desktop to laptop.

Having sized up the market for these three categories, we selected five devices of each type and compared their storage capacities, the media they handle and the data transfer rates they offer. Based on these criteria, plus their portability and price, we chose our pick of the crop.

Interfaces explained

One factor behind the recent expansion in storage options is widespread support for USB 2.0 on new desktop and notebook PCs. At 480 megabits (60 megabytes) per second, USB 2.0 is fast enough that it doesn't slow down external drive performance as USB 1.1 does. Neither USB 2.0 nor the less common FireWire 400 require you to install drivers or special software, so connecting drives using these interfaces is easy.

The drives will work almost instantly under Windows Me, 2000 or XP. The same is true of the new FireWire 800 interface, also known as IEEE 1394b, which doubles the maximum speed to 800Mbps (megabits per second). In light of the convenience of these fast interfaces, it's no wonder that external drives are becoming so popular.

Put it in your pocket

Easily the most convenient way to transport files from place to place, keychain-sized devices come in capacities as large as 2GB in solid state (no moving parts) memory systems that are not much bigger than a cigarette lighter. Most are reasonably sturdy and effortless to use – just plug them in, wait a few seconds for a driver to load and they're ready to take your files.

These pocketable drives are most appropriate if your capacity requirements are no more than 512MB. They can hold important documents, hundreds of digital photos and hours of MP3s. If you need more space, though, these devices get prohibitively expensive. We looked at models starting from a modest £30 or so for a 128MB drive, but a keychain-sized 2GB flash memory drive costs many hundreds of pounds. And considering you could lose it as easily as your keys, this is not our idea of a secure investment.

Most of these dinky devices come preloaded with solid state flash memory. Others, such as the Vtec XS-Drive, are able to read a range of miniature memory types such as SmartMedia and SD (Secure Digital) as well as having a modicum of onboard storage to boot.

For digital camera and camcorder owners a multiformat card device may be the best bet. Several companies now produce units capable of handling every type of removable flash memory from CompactFlash and MMC to the Microdrive cards used in IBM's eponymous device.

Removable flash media has several advantages. You can share the cards with a compatible digital camera or PDA and easily supplement your capacity with new cards as needed, at about half what you'd pay for an additional solid state memory drive
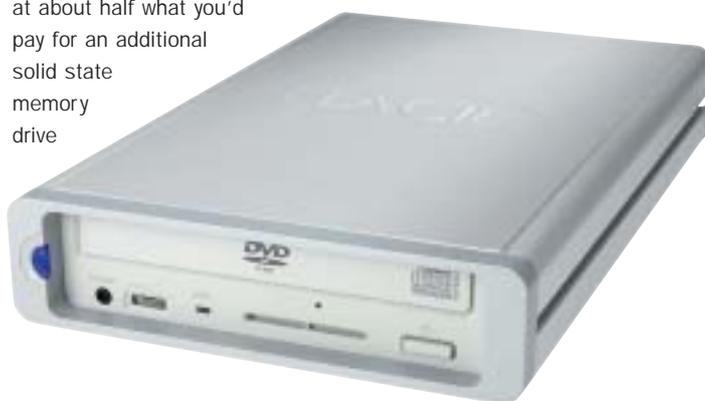
y **La Cie Dual DVD Recorder Drive**

Storage tools to keep your data organised

Duplicate files, mounds of unlabelled media and the pressing question of what's archived on which disc can easily become a recurring nightmare if you let your data get the upper hand. The following tips should help you impose some sort of order.

• Label it **Never mind using a permanent marker, the likes of Fellowes, Imation and Maxell all produce inexpensive kits that let you design custom labels and printable disc-sized templates. They also include an optical disc label applicator.**

   Avery makes tiny labels for flash media and various media types and offers free downloadable Word templates that work with them. You can even print your label directly on certain CDs or DVDs with Epson's Stylus Photo 900 inkjet printer or TDK's dedicated Label Printer.
• Open the Briefcase **Microsoft's Briefcase (built into Windows) can be useful for keeping duplicate data on your primary PC and on a device such as a laptop or an external hard drive. Files updated at either location are replicated to** the other device whenever you choose to synchronise files by clicking the Update All button. To give it a try, open the storage device in Windows XP's Explorer and select New, Briefcase and then follow the wizard's prompts.
• Organise it all **Windows' Indexing may facilitate searching your hard disk but low-cost utilities such as Argentum's MyFiles, Elcomsoft's Advanced Disk Catalog and 1Vision Software's 1Disk can index and organise your files across removable media as well. These apps can tell you on which disc you'll find a long-lost MP3, but it's still up to you to clean out the garage.**
• Get a device that does more **Do you really need to cart 30GB of music around on your Apple iPod? There's no reason your ears can't spare a little space for your brain. Have your music player cede a few gigabytes of storage space to share with your PC. Some hard drive audio players, such as the iPod and Creative's Nomad Jukebox Zen, can store data. Likewise, some USB flash memory drives, such as the CenDyne Gruvstick, can play MP3 files.**

Comparison table: pocket-sized drives

	Product	Price	Website	Capacity	Interface	Removable media	Comments
Drives with built-in storage	SanDisk Cruzer	£99	www.beststuff.co.uk	256MB	USB 1.1	MMC, Secure Digital	fast but larger than other drives
	Vtec XS-Drive	£138; £163	www.vtec.co.uk	20GB; 30GB	USB 1.1	CompactFlash Type I, SmartMedia, Memory Stick, Secure Digital, MMC, Microdrive	great compatibility; good price
	Lexar Media JumpDrive	£37	www.amazon.co.uk	128MB	USB 2.0	n/a	fast USB 2.0 interface
	Mini USB Flash Disk	£32.50	www.directusbstore.co.uk	128MB	USB 1.1	n/a	bootable; password-protection
	MobileDrive 3 in 1	£39.99	www.maplin.co.uk	32MB	USB 1.1	MMC, Secure Digital	built-in flash memory; displays two logical drives
Drives with removable media only	Belkin USB Media Reader/ Writer for Memory Stick	£29.37	www.dabs.com	n/a	USB 1.1	Memory Stick	handy for Sony fans, maker of the proprietary Memory Stick format
	PNY 6-in-1 Flash Reader	£39.95	www.pny-europe.com	n/a	USB 1.1	CompactFlash, SmartMedia, Memory Stick, Secure Digital, MMC, Microdrive	no built-in memory but great smart card support
	La Cie Universal Media Drive	£22.33	www.lacie.co.uk	n/a	USB 1.1	CompactFlash, SmartMedia, Memory Stick, Secure Digital, MMC, Microdrive	adds 4 drive letters to your hard drive so can use several memory cards at once; USB 1.1 interface
	Asus USB 6-in-1 Reader	£28.20	www.asus.com	n/a	USB 1.1	CompactFlash, SmartMedia, Memory Stick, Secure Digital, MMC, Microdrive	no built-in memory but great smart card support
	Crucial USB 6-in-1 Card Reader	£22.31	www.crucial.com/uk	n/a	USB 1.1	CompactFlash, SmartMedia, Memory Stick, Secure Digital, MMC, Microdrive	low-cost multi-card reader

of comparable capacity. On the other hand, you have to take care not to misplace the tiny media cards.

SanDisk's Cruzer, priced at £99 and equipped with a 256MB SD card, is really good value but it's slightly larger than the other pocket-sized flash memory devices featured here. This means it may not fit in the space allotted for USB ports on some desktop systems. In this case you'll have to use the included USB 1.1 extension cable to connect the drive to your PC. Unlike other devices, which cover their USB connectors with

an easy-to-misplace cap, the Cruzer has a nifty retractable connector.

Like SanDisk, several companies now produce USB keychain drives that also sport an extra slot for various flavours of smart memory cards as well as having an integrated memory. Once installed, these drives display two logical drives within Windows (one for the USB memory allocation; the other for the additional memory type). Search on sites such as Amazon.co.uk or Dabs.com for the memory card type you're after.

Many dedicated flash memory drives are bootable (if your Bios supports booting from a USB device), presenting a modern alternative to the floppy emergency boot disk and let you encrypt or password-protect your device and even resize drive partitions.

Products such as M-Systems' Disgo and DiskOnKey flash drives offer speedy file transfers thanks

λ **Maxtor Personal Storage 5000XT**

to the provision of an onboard ARM7 processor. When we tested the latter, it proved more than four times faster than the relatively speedy Cruzer whipping through our data writing tests.

Get the connection

USB 2.0 devices aren't yet that common in the pocket-sized storage area and you'll need a PC that supports this enhanced data transfer standard to reap its benefits. But products such as Lexar's JumpDrive are ahead of the game and are already available at only a small price premium over the slower USB 1.1.

There's a huge number of competing miniature flash drives on the market and it would be impractical for us to test and compare them all. The *Comparison table: pocket-sized drives* (above) simply lists prices, capacities and compatibility info together with some sites that specialise in selling such kit. Since they first made an appearance less than a year ago, they've really taken off. Shop around and you'll find some great deals.

Make multiple copies

The next type of portable storage device we looked at was optical drives. Since our focus here is on portability and practicality, we've concentrated on drives that you can easily transport and have ignored internal CD and DVD rewriters.

If you're happy installing an internal drive and pocketing the not inconsiderable difference between these and a plug-and-play external equivalent, turn to our Top 10 chart on page 222 where you'll find an at-a-glance summary of the current best buys.

Storing your files on CD or DVD is perhaps the most obvious way of transporting large files such as movie clips and lengthy presentations. There's also the advantage that the drives can be used to make copies of your data to share or archive as needed. Unlike smart memory cards the media for CD-RW and DVD-RW drives is relatively inexpensive.

When choosing an optical drive it pays to plump for USB 2.0 rather than being hobbled by USB 1.1. You might also consider FireWire, particularly if moviemaking is your thing or you're likely to progress to home video creation.

Look who's talking

Compatibility is another major issue. After a couple of years of toing and froing in the battle for format supremacy, several manufacturers have dispensed with throwing in their lot with either the DVD-R or DVD+R proponents and have instead produced dual- (or even multi-) format drives that can read and write both. We've even seen a drive from LG (the somewhat breathlessly named Super Multi DVD Writer Plus) that supports DVD-RAM – the Betamax of the DVD world – as well as the more mainstream DVD writing formats.

Look for models that can write data at up to 12-speed. Be aware that some higher speed drives require faster blank media. Sony's top-of-the-range DVD writers specify quad-speed DVD-RW discs. Don't forget you'll also need hardware capable of matching its demands.

If you like the idea of plenty of storage space but have no intention of splashing out £200 or so for the convenience of an external DVD drive, the next best thing is a CD-RW drive.

You may already have one of these, but upgrading to a faster device needn't cost much and will mean you can burn off a 650MB CD in a trice. If you're currently stuck with a 16-speed writer you'll find one of today's 52-speed versions far more practical for making multiple copies for backup or distribution. Another plus is that CD media is the most widely

y **Crucial USB 6-in-1 Card Reader**

Comparison table: portable optical drives

Product	Price	Website	Removable media	Interface	Comments
HP dvd300e	£293.75	www.hp.com/uk	4.7GB DVD+R/RWs; 650MB CD-R/RWs	USB 2.0 or FireWire	very fast; easy to use
Iomega Zip 750	€169 ex VAT	www.iomega-europe.com	750MB disks	USB 2.0 or FireWire	fast; rewritable but not most compatible format
Asus CRW-5224A-U	£70.50	www.scan.co.uk	650MB CD-R/RWs	USB 2.0; FireWire	fast; cheaper than going the DVD route
Philips Jack Rabbit JR32RWDV	£199.57	www.philips.co.uk	650MB CD-R/RW discs	USB 2.0; S-Video	reads DVDs; writes great CDs quickly; looks great
La Cie Dual DVD Recorder Drive	£263.20	www.lacie.co.uk	4.7GB DVD-ROMs; 650MB CD-R/RWs	USB 2.0; FireWire	looks great; supports latest transfer standards

note: we've listed only external devices here. See our Top 10 CD drives and DVD writers chart for details of internal options

Comparison table: portable hard drives

Product	Price	Website	Capacity	Interface	Comments
Iomega HDD 120GB FireWire	£244.40	www.iomega-europe.com	120GB	FireWire	fast
Western Digital 120GB External Drive	£278.48	www.wdc.com	120GB	FireWire	fast; easy to set up
Vtec VT-VDisk2/20	£135.13	www.vtec.co.uk	20GB	USB 2.0	lightweight; ideal for laptop use
La Cie Data Bank	£269	www.lacie.co.uk		USB 2.0; FireWire	lightweight; looks good; not as fast as Iomega HDD drive
Maxtor Personal Storage 5000XT	£298.45	www.maxtoronetouch.com	250GB	USB 2.0; FireWire	lengthy installation process; good value

Tomorrow's storage

If you feel undersupplied with storage capacity, don't fret. Greater capacities in various sizes are on the horizon.

• Blue-laser DVD In the next year, blue-laser DVD technology will boost the capacity of a single-sided DVD from 4.7GB (using a red laser) to double-digit gigabytes. But brace yourself for another format war as two competing consortia are working on incompatible blue-laser standards.

Pioneer, Samsung, Sharp, Sony and other parties are promoting Blu-ray technology, which will write up to 27GB per disc and will target high-end video applications for recording two hours of high-definition television on a disc. NEC and Toshiba, which jointly announced a blue laser technology known as Advanced Optical Disc, lead the other consortium. This group claims that AOD media will hold up to 36GB of data and will be able to read and write existing red laser DVDs.

If you want blue laser DVD you may have to wait a while. Sony's first standalone Blu-ray DVD recorder is available only in Japan and costs about $4,000. Other brands of blue laser DVD drives are likely to reach US shores early next year and, presumably, Europe not long afterwards.

• Hard drives One anticipated application of Serial ATA is in the pending IVDR standard. This spec defines a removable-cartridge format for hard drives, so we'll be able to tote removable cartridges from our PCs to our living rooms to our car audio systems as we would a DVD or CD. The first products aren't expected until 2004.

Meanwhile, Ximeta has come up with NetDisk, a portable hard drive that can be shared via 10/100 Base-T ethernet. It appears as a local drive to all the PCs on the network but doesn't need to be configured on a server.

• Miniature media Hitachi plans to upgrade the capacity of the Microdrive (originally developed by IBM and almost as small as a CompactFlash card) from 1GB to 4GB. Hitachi says the new Microdrives should be priced lower than a comparably sized CompactFlash card and will find a home in high-end digital photography and digital video recording. However, CompactFlash cards will continue to drop in price and gain capacity.

Flash media vendors expect CompactFlash to hit 8GB by the end of 2004. Secure Digital cards will reach 1GB by the end of 2003.

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compatible and blank discs cost just a few pence when bought in bulk.

We've only listed external versions here as they're ultra-convenient – just plug them in and install the driver software. The ubiquity of the CD format means that a trawl of online stores will reveal plenty of bargains in both the internal and external writers categories or, again, head to our Top 10 chart on page 222 for inspiration.

A non-optical drive such as Iomega's Zip 750 offers a durable, cartridge-based alternative to the easily scratched CD. This USB 2.0 drive has a slick-looking design, includes useful Iomega backup utilities and performs its tasks almost as quickly as a high-speed CD-RW.

Before CD-RWs became commonplace many PCs came equipped with 100MB Zip drives, so it's handy that the Zip 750 can also read from 100MB cartridges and read from and write to (rather slowly) 250MB cartridges. Unlike CDs, though, you can only share Zip 750 disks with other Zip 750 drive users, since the media is not backward-compatible with older Zip drives.

Really pack it away

Flash memory is optimal for quick, small file transfers, while optical storage is ideal for medium-sized tasks. But if you need to back up a hard drive or transport really large files, an external hard drive is the best choice for the job.

Portable versions cost around £250 for a 120GB model and, as with DVD writers, USB 2.0 and FireWire connections are becoming the norm. Most external drives have roughly the same dimensions as a DVD writer, too, but slimline

versions that are more like the size of a 200-page paperback can also be found.

Don't be fooled by their casing, though, as it affords little protection and an external hard drive can prove equally vulnerable to data loss or malfunctions as their internal equivalents if dropped or jarred. Handled with proper care, these drives are great for backing up gigabytes of files and often come with useful software to facilitate the process.

Size does matter

You'll get the best value and performance from a model that contains a faster, higher-capacity 3.5in desktop drive, such as the Western Digital offering we've listed. Units such as the Vtec VT-Disk typically feature 2.5in notebook hard drives and, since making technology smaller still costs more, you'll get fewer gigabytes of storage space for your money and backups will be slightly slower. When we put 3.5in models up against 2.5in versions, the difference in performance was considerable – in some cases as much as 40 percent between reading rates and even more when writing data. ∎

⊼ **PNY 6-in-1 Flash Reader**