
Illustration by Kevin O'Keefe

# Storage depot

## Contents



*Reviewed by Dave Mitchell and Ajith Ram*

**Floppies all full up? Hard disk had enough? Here's where we look at what's hot in storage and backup.**

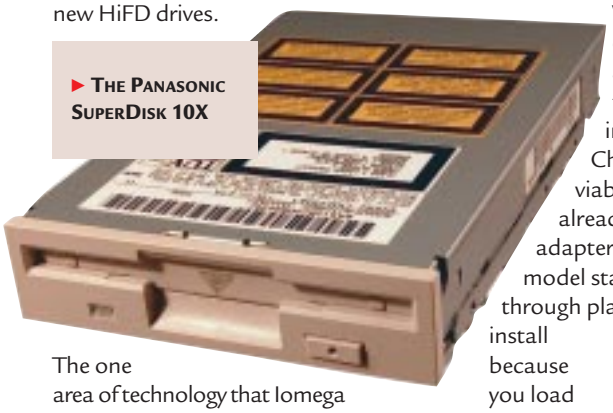
Some things in life seem to stay the same while all around them changes. And so it is with PC storage. Since their introduction, floppy disks have been a standard feature in our PCs, providing an easy way of storing and backing-up data. But times change and the floppy's 1.44Mb capacity is now woefully inadequate, leaving users needing a faster and larger-capacity means of backing up their ever-growing data files. In this group test, we have benchmarked eight of the most likely candidates for backing up your data.

Similarly, hard disks have relied on the same basic technology for many years although improved interfaces, speeds and capacities have meant that they have kept pace with current needs. With cost per megabyte being at an all-time low, we look at eight hard drives with various capacities and interfaces to find the best and fastest choice of permanent storage.

# Removable **storage**

The floppy disk drive should have become extinct years ago and yet it is still an essential part of your PC. Data files and applications are growing at an alarming rate and if you want to liberate hard disk space or transfer files across PCs you need something with far more capacity and speed. Here, we look at some removable storage alternatives.

Less than a year ago you would have been spoilt for choice both in storage capacities and technologies. Since then, Iomega has bought up French company Nomai and stopped production of its hard disk-based products. Even more significant is Iomega's recent buy-out of troubled SyQuest, halting development of the highly respected SparQ, SyJet and Ezflyer drives, leaving Iomega's own JAZ hard disk-based products with literally no competition. In an interesting move, Sony has also put a hold on releasing its new HiFD drives.



▶ THE PANASONIC SUPERDISK 10X

The one area of technology that Iomega has left well alone is magneto-optical drives — and quite rightly as it would be going up against some big names.

## Zip 100 & SuperDisk 120

Your choice of removable storage device will be driven by four main factors: capacity, speed, interface and price. If you need around 100Mb on a single disk then you really have only two choices — Iomega's ZIP 100 and the SuperDisk 120, available from a number of manufacturers.

**The SuperDisk 120** offers up to 120Mb on a single disk the same size as a floppy and is fully backward compatible with 1.44Mb disks. With BIOS and operating system support it can also be used as a bootable drive. Windows 95 OSR2 and Windows 98 fully support the SuperDisk and it will automatically assign it with the next available drive letter.


▲ IOMEGA'S USB VERSION ZIP 100

**Iomega's ZIP 100** has the widest range of interface options. We looked at the external parallel port and USB versions but there's also SCSI and internal IDE models. Choosing SCSI will only be viable price-wise if your system already has a suitable host adapter card installed. The USB model stands out thanks to its see-through plastic shell and it's easier to install because you load the software and drivers first and then connect it to a USB port with the supplied cable.

▶ IOMEGA'S NEW ZIP 250

However, if you're still using Windows 95 you must be running OSR2.1 and also have the USB supplement installed.

The USB ZIP 100 out-distances the opposition at this level and delivers good backup and restore speeds across the board. If you're storing clipart or photographs, the USB drive will also be a better bet as it completed the thumbnail browsing and slideshow tests substantially faster.

Clearly, the SuperDisk is no speed merchant but it's the cheapest drive on test. Media costs are lower and it can completely replace the floppy disk drive. In pence per megabyte, the ZIP 100 disks are one of the most expensive on the market.

## Zip 250 & PowerMO

Moving up in capacity brings us to Iomega's new **ZIP 250** which uses the same recording technology as the ZIP 100 and the same sized disks but with increased capacity. SCSI and parallel interfaces are on offer and the drive accepts 100Mb ZIP disks. The SCSI drive has a 25-pin D-Sub connector although it offers optional cable converters.

◀ IOMEGA'S ZIP 100 PARALLEL PORT VERSION

We tested both drives and found the SCSI interface to be substantially faster. Media costs are noticeably lower than the 100Mb disks. We were not overly impressed with build quality though, as the internal mechanisms are not held securely inside the chassis.


▶ THE OLYMPUS POWERMO

At this storage level, there is competition from magneto-optical (MO) drives. Olympus' **PowerMO** uses 230Mb MO disks with SCSI and parallel interfaces. The drive is small but feels more solid than the ZIP 250. If you have a SCSI adapter card, installation is simple although it uses Mac-style 25-pin D-Sub connectors so you will probably need a converter cable. Olympus includes a parallel port cable that has a pass-through socket allowing a printer to be attached.

Overall performance for the PowerMO is uninspiring and will get even worse if you use the parallel port. Backup times are lengthy as the drive performs verification when writing data to the disk. Read operations are more impressive and the drive performed particularly well in the slideshow and browser tests showing Olympus' target market of users, who wish to store and view photo images, to be spot on.

The initial outlay for the PowerMO is comparatively high although overall storage costs are around half that of the ZIP 250. The media is more robust as a laser is used to write data so nothing comes even close to contacting the disk's surface. MO is an ideal medium for archiving data and storing it over long periods because the disks have a guaranteed life of 30 years.

## MO640 & LF-1500

If you need more storage and some radical drive design then the **LaCie MO640** should fit the bill. It comes with Centronics and 25-pin D-Sub SCSI connectors so it will work with either a PC or a Mac. The MO640 performs better when reading data as it also carries out write verification. Overall though, it turned in some good times, particularly in the image-based tests.

**Panasonic's LF-1500** stands out from the crowd as a combined PD and eight-speed CD-ROM drive. The large cartridges offer 650Mb of storage and recording is carried out using a unique phase change method where a laser is used to modify the structure of the recording surface. When the LF-1500 is installed, it is assigned separate drive letters for the PD and CD-ROM functions. The drive is solidly built with a small LCD display panel on the front showing the type of media loaded, or track details if a music CD is being played. It uses a parallel port connection only and this resulted in a lacklustre performance. The bundled parallel cable has a pass-through port. But do bear in mind that you cannot use both drive and printer simultaneously and will have to swap between the two using the supplied PD-Printer Switch software utility.


◀ THE PANASONIC LF-1500 PD CD

## JAZ 2Gb drive

If you need a removable drive that offers performance close to hard disk speed then the only options are the 1Gb or 2Gb versions of the **Iomega** JAZ drive. Both are available as internal and external drives but only with a SCSI interface.


◀ THE IOMEGA JAZ 2GB DRIVE

Performance is excellent with the JAZ 2Gb drive taking podium position in every test and by a huge margin. This makes it ideal for a wide range of applications such as audio and video presentations that can be easily transported across different PCs. The JAZ media feels more solid than most and uses a dust-flap to protect its innards when not in use. The JAZ 2Gb is fully compatible with 1Gb cartridges. At £254, the JAZ 2Gb represents good value for the large storage capacity.

## Bundled software

That's the hardware side, so what about the bundled software?

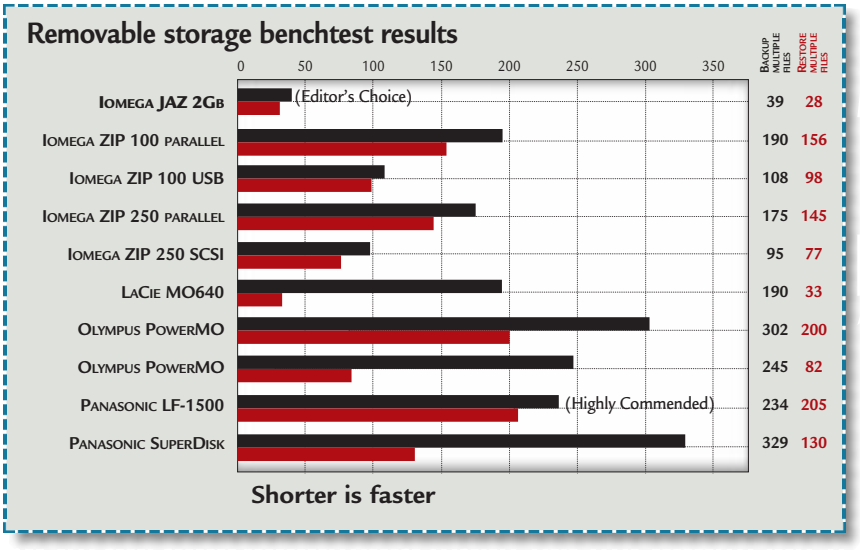
- **Iomega** offers the best package with IomegaWare, an updated version of Iomega Tools. A backup utility is standard while Symantec's Norton Zip Rescue creates a boot disk combination of floppy and ZIP disk to get your system running in the event of hard disk problems.
- **Panasonic** doesn't provide anything with its SuperDisk 10X but includes a single-user copy of Seagate's Backup Exec backup software with the LF-1500.
- **LaCie** provides 'Here and Now' which allows MO disks to be transferred between Mac and PC systems. You also get Formatter One Pro for partitioning and testing MO disks.
- **Olympus** includes basic backup with NovaDisk SE while PhotoAlbum provides picture archiving and viewing facilities.

DAVE MITCHELL

# Editor's **Choice**

Although Iomega seems to be tying up the loose ends in the removable storage market it's good to see that there are other options available. MO drives represent a viable and ultimately more reliable means of removable data storage while the SuperDisk 10X is the only true floppy disk replacement. **Panasonic's LF-1500** may not be fast but could prove to be useful as it adds CD-ROM capabilities that may appeal particularly to laptop users who want both features while on the move, so this is **Highly Commended.** However, if you need top performance and storage capacity then **Iomega's 2Gb JAZ** drive is the only one to go for and so this is our **Editor's Choice.**

# PCW Labs Report




**We have shown the scores, in seconds, for multiple file backup and restore as this is how most people will be using the drives. These results show the strength of the Iomega drives in terms of speed. Interface makes a great difference to the speed, with both SCSI and USB showing marked improvements over parallel drives. The single file backup and restore tests ranked the drives in the same order as shown here. The ACDSee32 tests showed the LaCie drive to be the second fastest, after the JAZ, with the two Panasonic drives again being very slow. More than anything else, these tests showed the need for a fast interface. The four fastest drives all had SCSI interfaces, with the USB ZIP as the next fastest contender.**

## How we did the tests

**We used a PII 266MHz PC** with 64Mb of memory, running Windows 98. We used 83.6Mb of Word documents, PowerPoint presentations and Excel spreadsheets. To test sustained transfer rates we also used a 73Mb video clip. First the data was copied to the test drive and then restored back to the hard disk.

**Removable storage** is increasingly being used to store large photo images so we devised two tests to see how well each handled these types of files. We used ACD Systems' ACDSee32, designed to view images by creating a display of small thumbnail pictures. A directory containing 35 2.6Mb bitmaps was copied to the test drive and ACDSee32 was asked to automatically display thumbnails. You may also wish to store multimedia presentations for display so we tested this using its SlideShow feature. Using the same bitmaps, it was configured to display each picture sequentially at full screen size with no delay between loading each one.

Table of features

| Product | Iomega JAZ | Iomega ZIP 100 | Iomega ZIP 100 | Iomega ZIP 250 |
|---|---|---|---|---|
| Phone | 0800 973194 | 0800 973194 | 0800 973194 | 0800 973194 |
| URL | www.iomega.com | www.iomega.com | www.iomega.com | www.iomega.com |
| Price ex VAT / inc VAT | £254 / £299 | £75 / £89 | £84 / £99 | £144 / £169 |
| Interface | SCSI | Parallel | USB | Parallel |
| Other interfaces? | No | SCSI, IDE/ATAPI | See parallel version | SCSI |
| Storage technology | Hard disk | Floppy disk | Floppy disk | Floppy disk |
| Unformatted media size | 2Gb | 100Mb | 100Mb | 250Mb |
| Media price (ex. VAT) | £67.23 | £7.66 | £7.66 | £12.77 |
| Cost per Mb | 3.28p | 7.66p | 7.66p | 5.11p |
| Compatible media | 1Gb JAZ | None | None | ZIP 100 |
| **Product** | **LaCie MO640** | **Olympus PowerMO** | **Panasonic LF-1500** | **Panasonic SuperDisk 10X** |
| Phone | 0171 872 8000 | 0800 0720070 | 0800 444220 | 0800 444220 |
| URL | www.lacie.com | www.olympus.com | www.panasonic.co.uk | www.panasonic.co.uk |
| Price ex VAT / inc VAT | £279 / £328 | £178 / £209 | £299 / £351 | £59 / £69 |
| Interface | SCSI | SCSI/Parallel | Parallel | IDE/ATAPI |
| Other interfaces? | No | No | No | No |
| Storage technology | Magneto optical | Magneto optical | Phase change | Floppy disk |
| Unformatted media size | 640Mb | 230Mb | 650Mb | 120Mb |
| Media price (ex VAT) | £7.99 | £5.95 | £19.95 | £7.50 |
| Cost per Mb | 1.24p | 2.58p | 3.07p | 6.25p |
| Compatible media | 540Mb MO | 128Mb MO | CD-ROM | 1.44Mb/720Kb |

# Hard **drives**

While CPU and graphics technologies are most commonly credited with deciding the speed of your PC, there is another component that deserves just as much credit. Without the spectacular advances in hard drive technologies, affordable modern computing would have been impossible. With the impending introduction of new technologies, hard drives are poised to become faster and more reliable. The most significant of these technologies is Ultra DMA66, otherwise called Ultra ATA66.

When Intel introduced the TX chipset in early 1997, one of its new features was support for Ultra DMA33. Theoretically at least, this protocol promised twice the performance of its predecessor. The story is the same this time around.

Ultra DMA66 promises a maximum burst throughput of 66.6Mb/sec; twice that of Ultra DMA33. The new protocol also implements enhanced CRC (Cyclical Redundancy Check) for ensuring better data integrity. Despite its promise, though, Ultra DMA66 suffers from many of the handicaps of its predecessor. The 66.6Mb throughput is the absolute theoretical maximum which can be achieved, so this is the maximum burst throughput. In other words, it is the maximum throughput from the data buffer on the hard drive. Sustained throughput between the hard drive and memory will be much less.

To get the full benefit of Ultra DMA66, the motherboard chipset as well as the hard drive must support it. At present there are no motherboards which support the new protocol. However, upcoming chipsets such as Intel's Camino will support it. People using older motherboards will see little or no benefit.

Ultra DMA66 also requires a new type of cable. This cable uses 80 conductors; twice as many as those used by Ultra DMA33 devices. However, despite the increase in conductors, there are only 40 connecting pins. This makes the new protocol backward compatible with its predecessor.

Also coming up soon are much larger hard drives. Maxtor has a 50Gb UltraDMA66 hard drive, while Seagate has a 50.1Gb version, with either an Ultra2 SCSI or fibrechannel interface.

**There are two main ways** to format your hard drive. Low-level formatting is performed by the BIOS. As this is a procedure which can damage the drive, it is usually performed only by the manufacturer.

High-level formatting is required for installing an operating system such as Windows 98. Before formatting, you have to decide how many partitions the drive should have.

Early versions of Windows 95 use the FAT16 file system. FAT16 limits hard disk sizes to 2.1Gb so any larger drives will have to be partitioned and addressed as separate logical drives. FAT32, however, works more efficiently on larger drives and there is no need to partition any of the drives currently available using this file allocation system.

If you intend to use multiple OSes from the same hard drive, a dedicated partition has to be made available for each. As not all OSes use the same file system, separate partitions will need to be formatted in different ways. There are several utilities available to help you do this, such as Partition Magic from Powerquest (contact Pow 01202 716726, www.powerquest.com) and System Commander Deluxe from V-com (contact MediaGold 0171 419 9861, www.v-com.com).

AJITH RAM

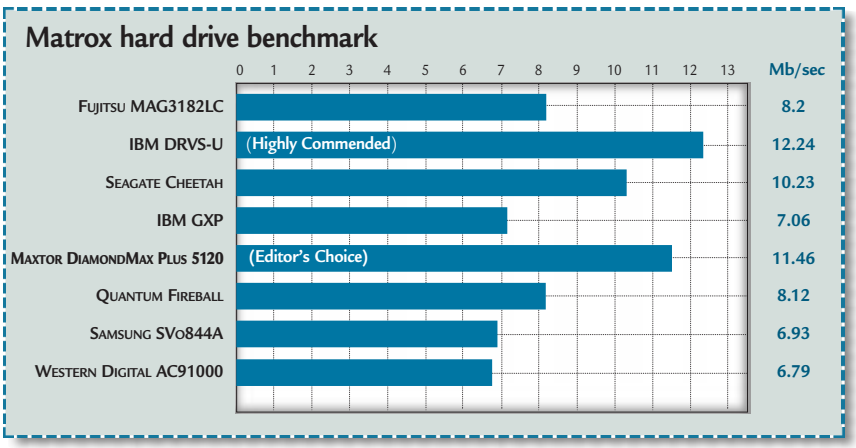
## Editor's **Choice**

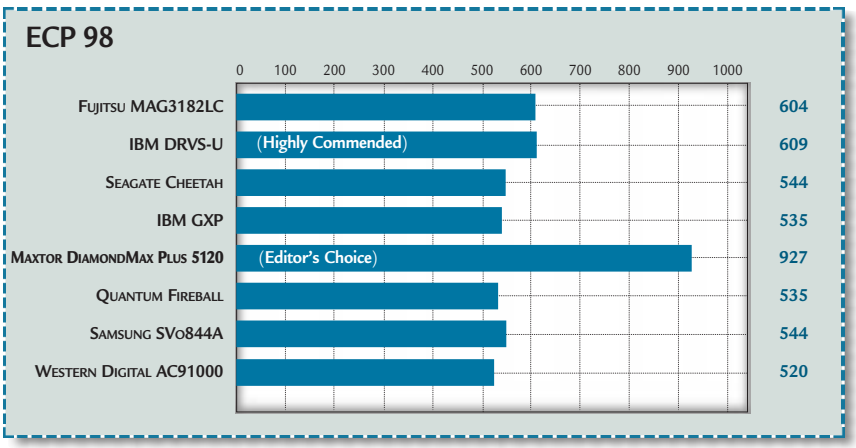
The proponents of Ultra DMA have long claimed that the standard offers almost the same speed as SCSI. On the other hand, supporters of SCSI pointed out the interface's better overall throughput, low CPU usage and ability to handle multiple devices.

Maximum throughput of Ultra DMA66 is almost on par with SCSI2. This is quite evident from our test results. The 7,200rpm Maxtor DiamondMax Plus 5120, is almost as fast as the 10,000rpm IBM DRVS-U SCSI drive. Moreover, it is cheaper than SCSI drives of the same size.

Our **Editor's Choice** is the **Maxtor** drive for its good performance at an affordable price per megabyte. And, the fastest drive in the test, **IBM's DRVS-U,** deserves our **Highly Commended** award for its outstanding performance results.

# PCW Labs Report




## How we did the tests

**At present,** there are no motherboards available with chipset-level support for Ultra DMA66. Therefore, tests of all IDE drives were conducted on a PC with an Abit BX6 motherboard, Pentium III 500 and 128Mb of RAM.

**We tested the hard drives** using two benchmark suites. The Matrox Hard Drive Benchmark is used by Matrox Corporation to test the capabilities of the drives in their high-end video editing suites. The final result is the average of the hard drive's read/write speeds. Our labs test, ECP 98, reads and writes file sizes varying from 4Kb to 16Mb. It also measures data throughput to and from the hard drive buffer.

## Table of features

| Manufacturer | Fujitsu | IBM | Seagate | IBM |
|---|---|---|---|---|
| Model | MAG3182LC | DRVS-U 9LZX | ST318203LW | GXP DJNA-372200 |
| Interface | SCSI2 LVD | SCSI2 LVD | SCSI2 LVD | Ultra DMA66 |
| Capacity | 18.2Gb | 9.1Gb | 18.2Gb | 22.0Gb |
| Nominal speed | 10,000rpm | 10,000rpm | 10,000rpm | 7,200rpm |
| Size of data buffer | 2Mb | 2Mb | 2Mb | 1Mb |
| Tel no | 01264 336991 | 01705 568525 | 01628 890366 | 01705 568525 |
| URL | www.fujitsu.com | www.ibm.com | www.seagate.com | www.ibm.com |
| Price ex VAT | £620 | £395 | £630 | £395 |
| Price inc VAT | £728.50 | £464.13 | £740.25 | £464.13 |
| **Manufacturer** | **Maxtor** | **Quantum** | **Samsung** | **Western Digital** |
| Model | DiamondMax Plus 5120 | QM313000CR-A | SV0844A | AC29100 |
| Interface | Ultra DMA66 | Ultra DMA66 | Ultra DMA66 | Ultra DMA66 |
| Capacity | 20Gb | 13Gb | 8.4Gb | 9.1Gb |
| Nominal speed | 7,200rpm | 7,200rpm | 7,200rpm | 7,200rpm |
| Size of data buffer | 1Mb | 1Mb | 1Mb | 1Mb |
| Tel no | 01923 712448 | 00 353 42 93 55 100 | 0181 391 8299 | 0113 2444958 |
| URL | www.maxtor.com | www.quantum.com | www.samsung.com | www.westerndigital.com |
| Price ex VAT | £315 | £190 | £135 | £155 |
| Price inc VAT | £369 | £223.25 | £158.75 | £182.13 |