12 Flash memory

1 Flash-based gadgets

Flash memory is used in many handheld devices. Match the descriptions (1–6) with the pictures (a–f).

1 This handheld console lets you play games stored on ROM game cards, which have a small amount of flash memory to save user data, for example high scores.

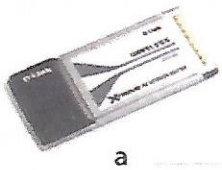
2 This flash memory card is used as 'digital film' to store images on a digital camera.

3 This wireless LAN card allows laptop and PDA users to access the Internet from any Wi-Fi access point.

4 This USB flash pen drive is the latest mobile drive for your computer.

5 It looks like an ordinary watch, but this USB drive from Edge Tech can store up to 1GB of flash memory. It will let you save and transfer your photos, songs and data files easily.

6 This flash-based player provides everything you need to play music and store data on the go. It also comes with a built-in FM radio and voice recorder.

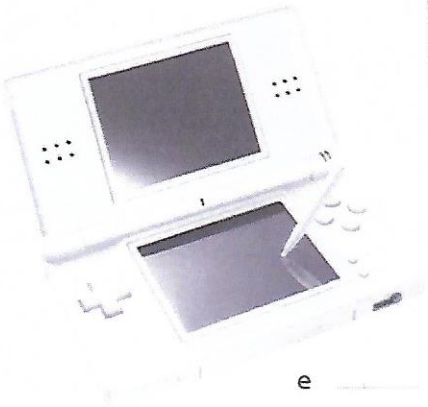


a

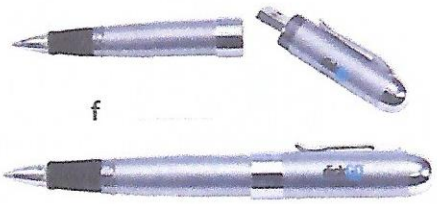
b

c

d



e



f

2 Memory in a flash!

A Look at the title of the text on page 58. Why is it a suitable title for an article about flash memory? Read the first paragraph of the text to find out.

B Read the whole text and answer these questions.

1 What is flash memory?

2 What are the differences between RAM memory and flash memory?

3 What can devices which use multi-level cell technology do?

4 What are the differences between flash drives and external hard drives?

5 What is the advantage of using U3 technology in flash drives?

6 How much data can a flash memory card hold?

7 What is the name of the flash card created by Sony for its digital cameras?

Memory in a flash!

Flash memory is a type of **non-volatile** memory that can be electronically erased and reprogrammed. Its name was invented by Toshiba to express how much faster it could be erased – 'in a flash', which means 'very quickly'.

Unlike RAM, which is **volatile**, flash memory retains the information stored in the chip when the power is turned off. This makes it ideal for use in digital cameras, laptops, network switches, video game cards, mobile phones and portable multimedia players. In addition, it offers fast read access times (although not as fast as RAM), with transfer rates of 12MB per second. Unlike ROM chips, flash memory chips are rewritable, so you can update programs via software.

Inside the chip, data is stored in several floating gate transistors, called **cells**. Each cell traditionally stores one bit of data (1 = erased and 0 = programmed). New devices have a multi-level cell structure so they can store more that one bit per cell. The chips are constructed with either **NOR** or **NAND** gates. NOR chips function like a computer's main memory, while NAND works like a hard drive. For example, in a camera, NOR flash contains the camera's internal software, while NAND flash is used to store the images.

Flash memory is used in several ways:

- Many PCs have their BIOS (basic input/output system) stored on a flash memory chip so it can be updated if necessary.
- Modems use flash memory because it allows the manufacturer to support new protocols.
- **USB flash drives** are used to save and move MP3s and other data files between computers. They are more easily transported than external hard drives because they use **solid-state** technology, meaning that they don't have fragile moving parts that can break if dropped. However, USB flash drives have less storage capacity than hard drives.
- New **U3 smart drives** allow users to store both applications and data. They have two drive partitions and can carry applications that run on the host computer without requiring installation.
- **Flash memory cards** are used to store images on cameras, to back up data on PDAs, to transfer games in video consoles, to record voice and music on MP3 players or to store movies on MP4 players. They are as small as a stamp, and capacity can range from 8MB to several gigabytes. The only limitation is that flash cards are often not interchangeable between devices. Some formats include: CompactFlash, Secure Digital, MultiMedia Card, miniSD card, and xD-Picture Card. Sony has its own product called the Memory Stick, used in its digital still cameras, video camcorders and the PlayStation Portable. The photos stored in a digital camera can be offloaded to a computer via cable or wirelessly. Another option is to have a **flash card reader** permanently connected to your PC; you simply eject the card from the camera and put it into the reader instead of having to plug the camera in.

The future of hard drives may be **hybrid** hard drives. Hybrid hard drives combine a magnetic hard disk *and* flash memory into one device. This allows computers to boot, or start, more quickly, and also reduces power consumption.

SanDisk's card readers read and write to just about every flash memory card

C Find words or phrases in the text with the following meanings.

1 permanent; able to hold data without power (lines 1–5) .....
2 able to be rewritten many times (lines 10–15) .....
3 different sections of a disk drive or storage area (lines 40–45) .....
4 to make a copy of a file so that the original is not lost (lines 45–50) .....
5 transferred to another device (lines 60–65) .....
6 a peripheral device that reads and writes flash memory cards (lines 60–65) .....
7 a product that integrates two different technologies (lines 65–70) .....

4 Describing flash drives

A **Listen to a salesperson at his stand at a consumer electronics show describing two flash products to a potential customer. Which product (a or b) is the visitor most interested in?**

a The Dragon flash drive

b The Dragon MP4 player

B **Listen again and tick (✓) which features the salesperson mentions for each device.**

Features	Dragon flash drive	Dragon MP4 player
Back up computer data	☑	☐
Transport files between PCs	☐	☐
Audio and video playback	☐	☐
FM radio tuner	☐	☐
Voice recorder	☐	☐
Games	☐	☐

C **Listen again and answer these questions.**

1 What is the storage capacity of the Dragon flash drive?

2 How do you connect it to the computer?

3 According to the salesperson, what are the advantages of a USB flash drive over a DVD or an external hard drive?

4 Some portable media players are also known as MP4 players. Why?

5 What is the screen size of the Dragon MP4 player?

6 How long does the battery last?

An MP4 player

USB drives are typically designed to attach to a key ring, such as the Cruzer Freedom USB flash drive