2 Input devices

By the end of this unit you should be able to:
- Explain the use of the various input devices

Unit at a glance

- Input devices are used to enter information such as letters, numbers, sounds or pictures into a computer. There are many input devices, including:
  - Keyboard.
  - Mouse.
  - Light pen.
  - Microphone.
  - Document scanner.
  - Character reader.
  - Bar-code reader.

In Unit 1 you were introduced to some input devices, including the keyboard and the mouse. Do you remember the definition of an input device? What are some of the input devices about which you have learned? In addition to the input devices we have already discussed, several devices have been developed to make input easier, faster and more accurate, particularly in the business environment. We will now examine a few of these.

Pointing devices

As you learned in Unit 1, the mouse is a handheld device that is used to select items on the computer screen. There are several variations to the mouse, including the trackpoint, touchpad, trackerball and joystick. These are collectively referred to as *pointing devices* (Figure 2.1).

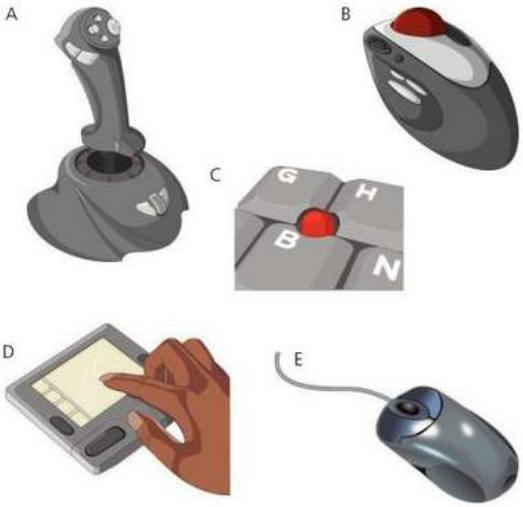

Figure 2.1 *Pointing devices: A joystick; B trackerball; C trackpoint; D touchpad; E mouse*

A **trackpoint** is more commonly found on a portable computer. It is a device about the size of a pencil eraser that is fixed between the keys on the keyboard. The cursor is controlled by moving the trackpoint with a fingertip. The buttons are found adjacent to the keyboard, close to the trackpoint.

The **touchpad** is a flat device that can sense where on its surface it is touched. You control the screen pointer by gliding your fingers along the surface of the touchpad.

The **trackerball** or **trackball** is an inverted mouse, with the ball facing upwards. The ball is rotated by the fingers or palm of the hand to control the movement of the screen pointer.

The **joystick** is a device that allows the user to control the screen pointer by manipulating an upright rod. The joystick is used to control video games. It is also used in simulation systems, such as flight training programs that create a virtual aircraft on the computer.

Keyboards

You read about the keyboard in Unit 1. There are many different variations of the keyboard. **Multimedia** keyboards have additional keys that control sound, visual display, Internet connections, and so on. **Internet** keyboards have special keys that open and use features of the browser program used to access the Internet.

You may have noticed a flat screen on the cash register in fast-food outlets. This is a **Concept keyboard** (Figure 2.2). It consists of a grid of buttons that have been programmed with a set of instructions and is then covered with an overlay sheet. The concept overlays in fast-food outlets carry a picture or description of the available meals and make ordering easier and quicker. This sort of keyboard is also used for small children, or for persons who may have physical difficulty using a conventional keyboard.

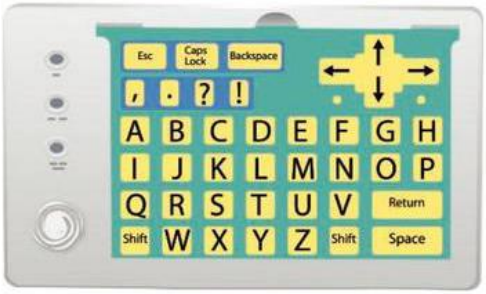

Figure 2.2 *A concept keyboard*

Light pen

A **light pen** is an input device that is used to select objects on a display screen (Figure 2.3). The user points it at the screen to move the pointer and choose objects. A light-sensitive device detects the pixel or picture element on the screen at which the pen is pointing. The user is then able to select the object in a similar way to using a mouse. Some video games use a 'gun' that is really a simple light pen that is capable of operating from a greater distance.

Figure 2.3 *Light pen*

The light pen is very useful for designers and artists because they can create freehand drawings directly on the monitor screen.

Digital cameras

Figure 2.4 *Digital camera*

Digital cameras have mostly replaced cameras that use film (Figure 2.4). A **digital camera** operates independently of the computer. It allows you to take pictures and to store digital photographic images. Some digital cameras can also capture

sound and video. The images and sounds are stored on a memory chip or disk that can be transferred to your computer. Digital cameras are often used when producing advertising and sales material. Digital cameras are used extensively in the production of websites for e-commerce (the use of the Internet to conduct business).

Figure 2.5 *PC camera, or webcam*

A PC camera or webcam is a digital camera connected to the computer (Figure 2.5). The computer is its power source. Video, with sounds and still images captured by a PC camera, are sent directly to the computer where they can be edited and stored. Webcams are used to see and speak with persons via the Internet. Some business people use PC cameras for videoconferencing, conducting meetings with persons who are a long way away.

Graphics tablet

A **graphics tablet** or **digitising pad** allows the user to draw on a flat pad (also called the tablet) using a **stylus** or special pen (Figure 2.6). Some models display the drawings on the tablet itself while others send the drawings to the computer screen. This device is popular with artists, architects and designers.

Figure 2.6 *Graphics tablet*

Scanner

A **scanner** is a device that converts existing images or documents to a digital image on the computer. A scanner bounces a beam of light off the document and records the reflected light as a series of binary digits or a bitmap. You can then take that image and use it in a paint program, send it out as a fax or print it. With optical character

DID YOU KNOW?

How a digital camera works

A digital camera uses no film. Instead it uses a sensor that converts light into electrical charges. The image sensor is a silicon chip with a grid containing hundreds of thousands or millions of photosensitive diodes called photosites. Each photosite captures a single picture element or pixel of the image.

When you press the shutter release button of a digital camera, the shutter opens briefly. Each pixel on the image sensor records the brightness of the light that falls on it by accumulating an electrical charge. The more light that hits a pixel, the higher the charge it records. When the shutter closes to end the exposure, the charge from each pixel is measured and converted into a digital number that is stored on a memory card or a disk. The series of numbers can then be used to reconstruct the image by setting the colour and brightness of matching pixels on the screen or printed page.

recognition (OCR) software you can convert printed documents such as letters or newspaper articles to text that can be used in your word processor.

Figure 2.7 *Scanner*

Optical mark reader

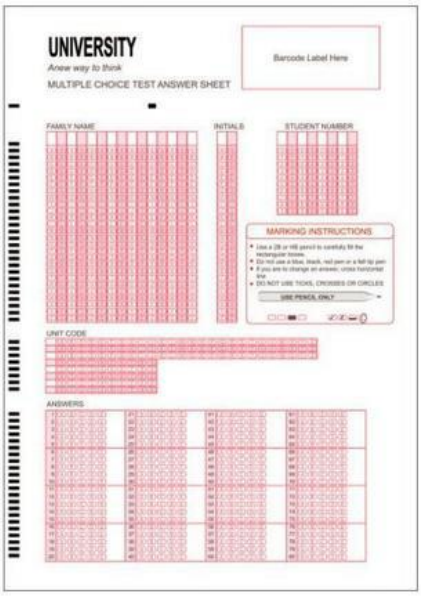

Figure 2.8 *An OMR form*

An **optical mark reader (OMR)** reads into the computer marks made by pencil on a printed form. OMR systems read pre-printed forms such as applications, questionnaires and multiple-choice examination papers (Figure 2.8). Data can be input quickly and easily without the need for manual typing, but marks must be placed precisely where indicated and must be dark enough to be read by the scanner.

Bar-code reader

A **bar-code** is a series of printed vertical lines of differing widths that represent numbers. The bars are read by an optical scanner and software is used to identify the product for sales pricing and controlling stock (Figure 2.9). These codes are printed on nearly every package that is sold. Shops use bar-codes because they are cheap to produce, very durable and make it easier to know when to order stock. They make the payment process faster and reduce the risk of errors, so customer satisfaction is increased. Bar-codes are used to identify books in some libraries that have an electronic lending system.

First the bars must be linked to the data you want to capture

The bar-code can then be printed out, using either an inkjet printer (as here) or using a laser printer

The bar-code may then be read with a scanner

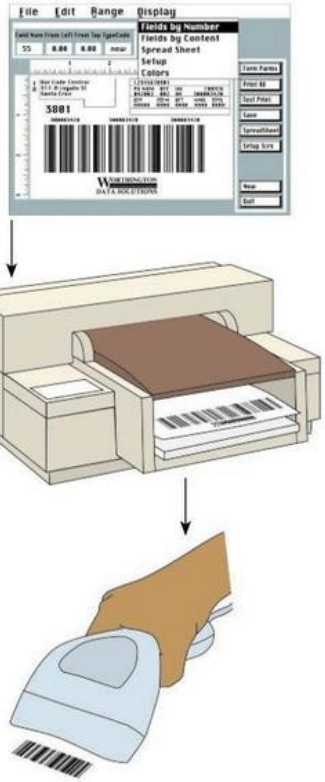

Figure 2.9 *How bar-codes work*

Magnetic ink character reader

Magnetic ink character recognition (MICR) is the reading of characters that are printed with magnetic ink (Figure 2.10). The device for recognising the characters is called a magnetic ink reader. This system is used for numbering cheques and identifying the account on which the cheque will be drawn. MICR is used because the characters are very difficult to forge or damage. Also, the data can be read electronically, making input faster and more accurate.

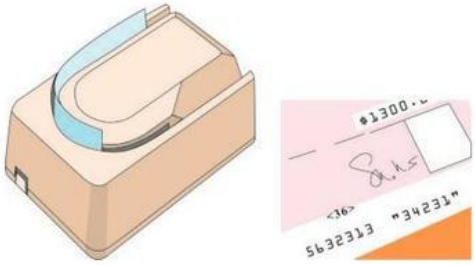

Figure 2.10 *Magnetic ink character reader and cheque*

Magnetic strip

A **magnetic strip** is a short piece of magnetic tape that is attached to a plastic card, such as a credit card (Figure 2.11). Other cards that use this technology are debit or cash-point cards, telephone calling cards, club membership cards and personal identity cards. The strip contains the personal details of the card owner as well as account information. The card is read when it is inserted or swiped in a special reader. Magnetic strips are convenient and easy to use. However, the data can be lost or corrupted if the cards are bent or exposed to magnetic fields.

Figure 2.11 *Magnetic strip*

Touch screen

A **touch screen** or **active picture technology** uses a special type of visual display unit that has a grid of light beams or fine wires across the screen on which options are displayed. The computer senses where the screen is touched, recognising which words or icons have been selected. Touch-screen displays are generally utilised on computers that the public use, e.g. on automated banking machines and check-in machines in airports (Figure 2.12).

Figure 2.12 *Touch-screen check in*

Direct voice input

Direct voice input or **voice recognition** is the control of a computer by voice. The speaker uses a microphone and related software that converts sound waves to a digital code. There

is a wide variation in human speech patterns so direct voice input is usually confined to a limited number of commands. However, the technology is constantly being improved, so that newer systems are more versatile. Uses include security systems, for example to control entry to a building, and in mobile phones. Voice recognition means that the user can make calls while driving (although safety organisations still advise against this). Voice recognition can also be used with a word-processing program to enter text.

Figure 2.13 *Voice recognition*

To do

Identify the use and benefits of each input device.

My glossary

Write definitions of the following terms.

Active picture technology
Bar-code
Concept keyboard
Digital camera
Digitising pad
Direct voice input
E-commerce
Graphics tablet
Joystick
Keyboard
Magnetic ink character recognition
Magnetic strip
Multimedia keyboard
Optical character recognition
Optical mark reader
PC camera
Scanner
Stylus
Touch screen
Touchpad
Trackball
Trackpoint
Voice recognition

Examination-type questions

1 a Define the term 'input'. *(1 mark)*

b Name the most suitable input device to be used in each of the following situations:

(i) For sending a copy of an existing photograph via the Internet to a friend living abroad.

(ii) When correcting a multiple-choice examination answer sheet.

(iii) When conducting a meeting via the Internet.

(iv) To speed up the bill preparation process at a grocery store. *(8 marks)*

c Explain the difference between optical character recognition and magnetic ink character recognition. *(2 marks)*

d Describe three pointing devices other than the mouse. *(3 marks)*

e (i) What is active picture technology? *(2 marks)*

(ii) Describe two situations in which this technology is used. *(4 marks)*