

CHAPTER 1

INFocus

DIGITAL DEVICES

The whole world is going digital. But what exactly does digital mean, and what is a digital device?

In this session you will:

- ✓ gain an understanding of the types of digital devices
- ✓ gain an understanding of how digital devices are used at work
- ✓ gain an understanding of how digital devices work
- ✓ gain an understanding of the benefits of digital technology.

TYPES OF DIGITAL DEVICES

Everyday you'll come into contact with **digital devices** of some sort or another. It doesn't matter whether you are doing some shopping, playing sport, or just staying at home and

relaxing, digital devices exist everywhere. Some allow you to communicate, some entertain you, and some make you more productive. A handful of these digital devices is listed below.

Digital Devices That Help You Communicate

Digital Phones



Most phones in use today are digital. The most obvious are **mobile phones** which you can carry around with you and make phone calls wherever you can obtain a signal. The more sophisticated mobile phones can do more than just let you talk to someone – they take pictures and videos, store information, play music, access the internet, and more. These are known as **smartphones**. However, most home phones that are cordless and sit in cradles are also digital phones, and are sometimes referred to as **digital handsets**.

Digital Cameras



Almost every camera sold today is a **digital camera**. You can buy digital still cameras which allow you to take static pictures, digital movie cameras which allow you to take movies, or cameras that do both. These digital cameras are a far cry from their film-based predecessors.

Digital Devices That Help Entertain and Inform You

Digital Televisions



Television has been around now for many years but has only recently gone through a digital revolution. Most digital televisions today are flat (or curved), have a wide screen, and are based on either LCD or LED technology. Previously television sets were shaped more like a box, and were based on a cathode tube built inside. But it is the television signal, rather than the actual television set, that determines whether you are watching digital television or not.

Digital Radios



Digital radios are sometimes referred to as **DAB** (from **Digital Audio Broadcasting**). Most popular radio stations are now broadcasting in both analogue and digital. Older style analogue radio sets can only pick up analogue signals. Most of the newer digital radios can receive in both analogue and digital broadcast formats.

Digital Tablets



Digital tablets, such as the popular **iPad**, are like a cross between a phone, computer and a television. They are used to watch videos, send electronic messages, access the internet, listen to music, read digital books, and more.

Portable Music Devices



While you may not have one already, you most certainly would have noticed people walking around with earphones in their ears or on their heads. These people are probably listening to their favourite music on their portable music device (or smart phone). The most well-known of these devices is the **iPod**. This device allows you to have hours, if not days, worth of music stored on one small, digital device which you can listen to anywhere.

Smartwatches



Not only do these digital watches tell you the time, but once a smartwatch is connected to a smartphone via Bluetooth pairing to allow internet connectivity, they allow capabilities such as message notifications, GPS navigation and calendar synchronisation. And of course, a Bluetooth connection to your phone means the watch can help you place and take calls, and send and receive messages. Smart watches can also run apps and play back all sorts of digital media, like audio tracks or radio streamed to Bluetooth headphones. Many of these watches have touchscreens, which allow you to access functions like a calculator, and more.

DIGITAL DEVICES AT WORK

The workplace has seen a significant change over recent years and there are now many digital devices in operation there. Whether it be for communication, production, monitoring, research,

or virtually any other activity you could imagine in the workplace, there are now digital devices to assist.

Computers In The Workplace

The most common **digital device** you are likely to find in any workplace is the **computer**. Computers are not new to the workplace, but they do regularly change in many ways including their size and the uses they are applied to. Computers are usually either portable (such as laptops) or desk-bound.



A desk-bound computer, commonly referred to as a desktop computer, usually remains in the same place. It can be moved, but this takes time. Desktop computers are usually found in offices and are used for finance, general administration, marketing, sales, and the like.



A laptop computer is a portable computer that can be taken almost anywhere. It can be operated using its own battery or it can be connected to a normal power supply. This means that it can be used in a variety of locations either at a desk or in transit such as on a train or aeroplane.

You'd expect to find computers in offices. But they are now quite common on the factory floor and in industrial and scientific locations. Laptops make it possible to take work computers out on field trips.

Robotics In Production



Many factories and production centres that have become automated used digital devices such as robots. Robots are used for many factory operations such as machine loading, parts transfer, welding, spray painting, order picking, assembly, and much more.

These robots are controlled by computers with special programs that transmit instructions in a digital format. Robots are commonly used in very repetitive operations in production processes where quality is essential, and include building cars and electronics.

Other Workplace Digital Devices

Of course, most of the digital devices you'd use personally are also used in the workplace. For example, digital phones, digital cameras, and digital television can be found in almost every workplace.

How Digital Devices Work

Most people have heard of the term **digital** – you probably own a digital clock, digital camera and digital television. Few people, however, actually know what **digital** means and how **digital**

devices work. Today most electronic devices that you use are digital simply because of the great advantages that digital technology has over its **analogue** predecessor.

Digital Versus Analogue

Digital best describes systems or devices that are based on *discontinuous* data or events. The opposite of digital is **analogue** where data or events appear *continuous* and unbroken.

The simplest example here is the clock. Analogue clocks are those where the second hand travels smoothly (or continuously) around the face, as shown below left. Clocks that have numbers presented across the face and where the numbers change to reflect the time are digital clocks, as shown below to the right.



The hands on this analogue clock travel continuously around the face of the clock so an **infinite** number of times can be shown e.g. with sharp eyes you may see the time 10:10:25.5.

The numbers on this digital clock change every second. Therefore, only a **limited** number of times can be shown. E.g. times of less than a second are not shown on this digital clock.



Digital signals have several advantages over analogue signals. Some of these include being more secure, enable simultaneous multi-directional transmission, enable transmission of signals over a long distance and at a higher rate, are not corrupted by noise, and they can be processed by digital circuit components which are cheap and easily produced in many components on a single chip.

Digital Actually Means Numbers

In the digital world data and events are converted into **binary values**. Binary values have only an **on state** (represented by the number **1**) and an **off state** (represented by the number **0**). These very simple values can be joined together into complex combinations to create numbers which in turn can represent data or an event.

A typical example is television. All television programs are received as a **signal**.

With analogue the television signal is sent as one continuous wave from a television studio to your television set, either using broadcast towers, or cables.

Digital television is a more complex process. With digital television the signal is first converted to numbers – this step is sometimes referred to as **sampling**. It is then **quantized** (made smaller) and **encoded**. The signal is then transmitted to your television as a series of numbers. Your digital television then **reconstructs** the original signal using the sampled numbers and the encoding information.

Even if your location only receives digital television signals, you can continue to use your old analogue television, providing you have a special **set-top box** which receives the digital signals and reconstructs them back to an analogue signal for your television.

Digital Music

All music that is recorded through a microphone is analogue. However, today that music is then converted into numbers (**sampled** and **encoded**). The music can then be stored on CDs, on computer hard disks, portable players, USB sticks and cards, and more.

Your music player (it can be a portable device such as an **iPod**, your car sound system, your home theatre, or even your phone) then reconstructs those numbers using the instructions found in the encoding. Once the reconstruction has occurred you'll hear your music through your ear-phones or speakers in an analogue form.

Digital Cameras

In a digital camera an image is captured on a light-sensitive sensor. The camera then converts that image into numbers and stores those numbers in a file. The file is usually stored on a special storage card that can be inserted into the camera.

When you take the card to a camera store the store's equipment has special software that reconstructs those numbers in the file to produce a printed photograph.

THE BENEFITS OF DIGITAL DEVICES

Analogue devices work with data and events in one continuous stream, while digital devices work with a broken and discontinuous stream of data and events. Since digital devices first convert

data to numbers, then reconstruct the data again later, it would be easy to assume that analogue would be more efficient. The opposite is in fact the case with digital offering many benefits.

Transmitted Data

Transmitted data, such as television or radio signals and mobile phone calls, are best as digital signals because:

- Analogue signals which travel as wave forms are constantly subjected to interference (known as noise) from devices such as motor vehicles, electric motors, fluorescent lights, and the like and will therefore suffer in quality. Digital signals remain comparatively uniform and are not as easily distorted by noise. If they are, it is possible for the software that handles the reconstruction to rebuild the original signal without the noise – this is done using special programs known as *checksums*.
- Digital signals can sometimes be *compressed* (made smaller) which means they are easier and cheaper to transmit.
- Since digital signals consist of numbers it is possible to add more data to the signal that will benefit the recipient. With digital television, for example, it is possible to transmit information about the program such as promo literature and the like. With mobile phones it is possible to transmit caller details so that you know who is calling you when the phone rings.

Stored Data – Photography

Before looking at the benefits of digital technology for stored data, it is important to know how data was managed and stored in earlier times.

With cameras and photography, for example, images were captured on photo-sensitive film. A roll of film would be placed in the camera and once the available number of pictures had been taken (24, 36 etc), the film would have to be removed and chemically processed in a darkroom to prevent accidentally spoiling the film through too much light.

With digital technology, there are a range of benefits for photography:

- Images are now stored on a disk in the camera – the number of images that can be stored varies depending upon the size of the disk, but usually range into the hundreds.
- Since there is no film processing, images can be immediately previewed on the camera and unwanted images can be deleted freeing up space on the storage card.
- There is no longer a requirement for chemical processing of the film – and the chemicals used were often harmful to the environment.
- Film, once processed, was subject to deterioration over time. Images captured on a digital camera can easily be reproduced and stored on multiple storage devices which have an indefinite shelf-life.

Stored Data – Music

With music, albums were first recorded onto magnetic tape to create a master tape. This master tape was then used to produce plastic disks, known as *records* and sometimes referred to as *vinyl*. These vinyl disks could then be played on record players. A record player had a swing out arm with a very fine needle that would run through the grooves on the vinyl disk. The sound from this would be amplified to reproduce the music. Digital technology, again, provides many benefits:

- Music is either recorded direct to a digital storage device, or is recorded to a master tape which is then converted to digital storage. Shelf-life of digital storage media is far superior to tape.
- An infinite number of copies can be made of digital music without any loss or degradation to the quality of the sound.
- Music stored digitally can usually be played on a number of different devices (as opposed to vinyl records and cassette tapes which required specific players).
- Additional information such as album, artist, name of track, etc, is displayed on digital players.

ACTIVITY – DIGITAL DEVICES



Individual
Activity



Group
Activity

How Many Digital Devices Do You Use?

Digital devices are everywhere – there is no doubt about that. In this activity put on your thinking cap and work out how many of the devices listed below you use either daily or occasionally. These devices may be at home, at school, or in the workplace. Tick the ones that you use. The last rows are left blank in case you use other digital devices that are not listed here.

Tick if used	Device	Is it Digital? Yes/No	How Do You Know It Is Digital?
	Camera		e.g. Because it doesn't have film
	Television		
	iPod		
	MP3 Player		
	Car Sound System		
	Mobile Phone		
	Radio		
	Computer		
	Home Theatre System		
	Clock		
	Watch		

CHAPTER 2

InFocus

PREPARING A DIGITAL DEVICE

Most digital devices, especially those required for personal use such as cameras, phones, music players, and the like, need some sort of initial preparation when you first take them out of the box and begin to use them.

In this session you will:

- ✓ gain an understanding of how to use the operating manual
- ✓ learn how to obtain replacement instruction manuals
- ✓ gain an understanding of the download process
- ✓ learn how to download an instruction manual
- ✓ gain an understanding of identifying the important items packaged with a digital device
- ✓ gain an understanding of the various components of a digital device
- ✓ learn how to turn on digital devices
- ✓ gain an understanding of how settings are changed on digital devices
- ✓ learn how to save power when using a digital device.

THE OPERATING MANUAL

Most new digital devices that you purchase will be supplied with a printed operating manual. This manual goes under various names: operating guide, instruction manual, operations guide, and

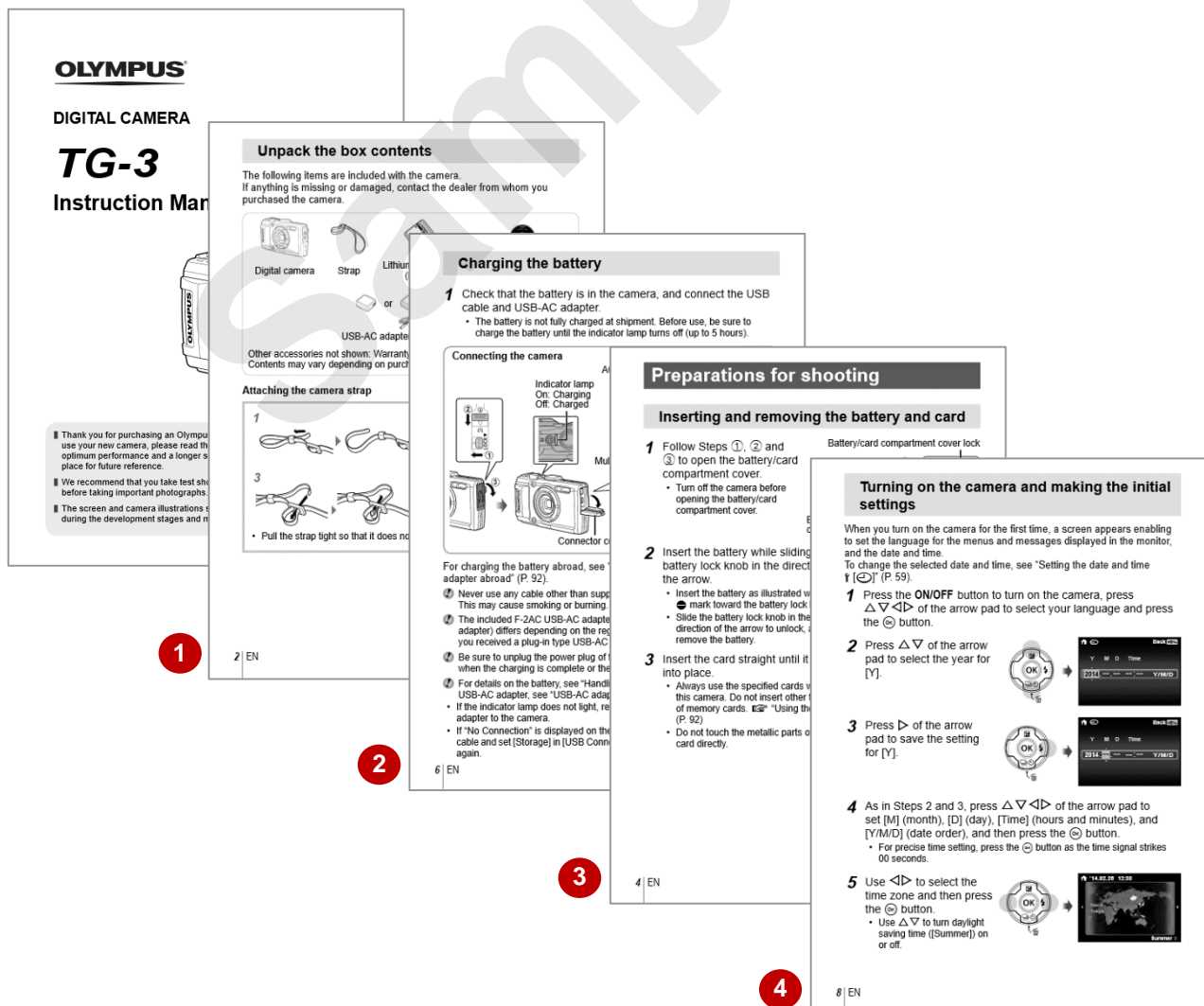
the like. These manuals come in various sizes depending upon the product and the manufacturer. As soon as you get your new device you should immediately look for this manual.

What To Do First

When you first purchase a new digital device and locate the manual you'll probably notice that it tells you to read the manual before using your new product. If the manual is only small then this is a good idea. If the manual is very large you'll spend hours reading about things that will most likely just confuse you even more.

However, this said, there are things you should do using information supplied in the manual:

1. Locate the section in the manual that tells you what you should have received in the box and check to make sure all of the those items are there – if items are missing and you have purchased a new device you should contact the retailer immediately to arrange an exchange.
2. Most digital devices use a battery. If this is the case locate the section in the manual that tells you how to charge the battery.
3. If your device has a battery, once you have charged it locate the section in the manual that shows you how to properly insert the battery. Follow these steps to insert the battery and any other operational items, such as storage cards, into the device.
4. Locate that part of the manual that tells you how to switch on the device (sometimes this can be a bit obscure) then follow the steps to switch the device on to ensure that it works.



GETTING A REPLACEMENT MANUAL

Unfortunately one of the first things that usually goes missing with a new device is the operating manual. Whether you've lost your manual or it didn't come with a manual, or perhaps you have

bought a second-hand item that didn't come with a manual. In most cases, you can obtain a copy of the manual directly from the manufacturer's website.

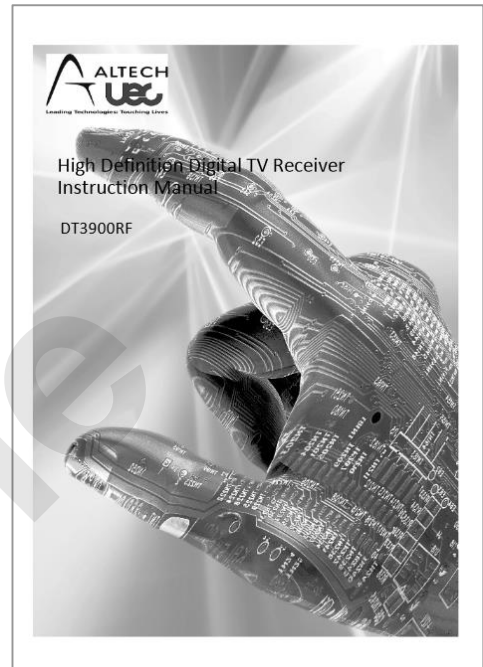
Digital Devices Have Digital Manuals!

The printing industry is one that has undergone huge change in technology over recent years. Virtually all instruction and operating manuals are now produced on a computer and saved to a digital file to send to the printer.

To make things easier for their spare parts and technical support departments, most manufacturers actually put a copy of the operating manual file on their website so that people can easily **download** them. Downloading is the process of creating a copy of the file on your computer from the manufacturer's website.

Most manufacturers will provide this copy for free, while some may require that you register the product that you purchased with them first. Some manufacturers make manuals available for free but restrict what can be done with the manual – for example, some can't be printed or copied to another computer once downloaded.

The really good thing here is that many manufacturers will keep online manuals available even long after the actual device may have been superseded and finished in production.



Understanding Downloaded Files

The instruction manuals created by manufacturers can be originally created using a number of different software packages. Some of these might include word processing applications such as *Microsoft Word* or very high-end desktop publishing applications such as *Adobe InDesign*. So that you don't have to have these expensive software packages on your computer, the manufacturers usually convert their instruction manual files to a more common type of file known as a **portable document file** (or **PDF** for short).

Your computer will still need special software, usually *Adobe Reader* or the *Windows Reader* app, to allow you to open the file and work with it, but since this software is very common and free, there is a good chance that the computer you are using already has it installed.

Obtaining a Printed Copy of the Manual

Another option for you would be to approach the manufacturer directly to obtain a new printed copy of the manual. This can be difficult as you need to make contact with the manufacturer, usually through a retail outlet where the device is sold. You will almost certainly have to purchase the manual and this could be expensive. Finally, you'll also have to wait for the manual to be shipped from the manufacturer.

Third Party Manuals And Books

Some digital devices are so popular that technology publishers have published their own user guides for these devices. The *Apple* products, such as the *iPhone* and the *iPad*, come to mind here. A browse through any bookstore with technology books will reveal multiple books detailing the operation and care of these devices.

THE DOWNLOAD PROCESS

Downloading a copy of an instruction manual from the manufacturer's website on the internet is a great way of quickly getting hold of a replacement manual. While the download

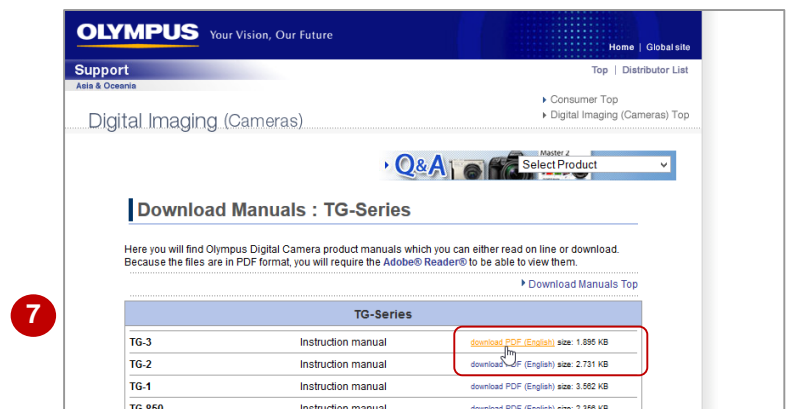
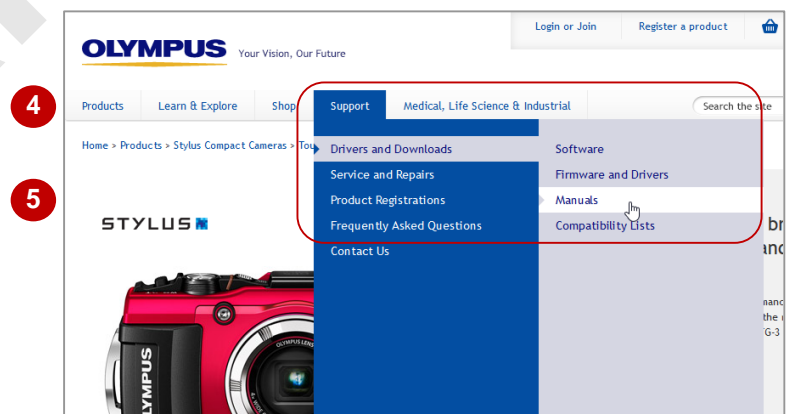
process itself is relatively straightforward, you sometimes need to do a bit of detective work to find out where to download the manual as each manufacturer's website is different.

You'll need at least two pieces of key information before looking online (on the web) for a manual:

- The name of the manufacturer
- The model number of the device you need the manual for.

Obviously, you'll also need to work on a computer that has access to the internet. Once all of this has been organised you can download an instruction manual using the following general steps:

1. Start the computer and access the internet using a web browser on the computer such as *Chrome*, *Firefox* or *Safari* – you can often find buttons for these at the bottom of the screen
2. In the search box type the name of the manufacturer and the model number, then press **Enter** to display matches for the name
3. Now you'll need to do some detective work. Firstly, ignore any advertisements that appear at the top of the search results page. Secondly, find an item where the website would seem to belong to the manufacturer (e.g. for *Olympus*, you may receive www.olympus.com possibly followed by the name of your country). Click on the item that you think will take you to the manufacturer's website
4. On the manufacturer's website look for a link that would take you to **Support** or **Product Help**, then click on this link
5. If the manufacturer provides access to online manuals, a link should appear somewhere on the support page. Click on this link
6. To proceed further you will now probably have to look for the model number details of the product. If the manufacturer produces several different types of devices (e.g. television sets, cameras, phones, etc.) you may first need to select the type of device you have. Click through the relevant links
7. When the name of the instruction manual appears, click on it and follow the steps to download it.



DOWNLOADING AN INSTRUCTION MANUAL

There's nothing like having a practice run to see how things are done. You'll now actually download an instruction manual for a Sony Cyber-shot DSC-W810 digital camera. You'll

need access to a computer that is connected to the internet. If you are not familiar with computers, get a friend or relative who is able to assist you with these steps.

Try This Yourself:

Ensure that the computer is switched on...

- 1 Click on the browser icon at the bottom of the screen to display your **web** browser, click in the search box, type **Sony**, then press **Enter**
- 2 Click on a link to **sony.com.au** to display the **Sony Australia** home page
- 3 Point to the **Support** tab near the top of the page to display available options
- 4 Click on **Find Drivers, Software, FAQs, Manuals and Compatibility**, then click on **I'm looking for manuals** under **How can we help you?**
- 5 Type **DSC-W810** in **Type in your model number**, then click on **[Go]** to display the support page for this camera
- 6 Click on **Instruction Manual** to display the pdf file
- 7 Click on the **Download** icon, then save the file to the **Downloads** folder

The screenshot shows the Sony Australia website with the following steps highlighted:

3. The **Support** tab is selected in the top navigation bar.
4. The **Manuals** section is displayed, showing a list of product categories. The **Find Drivers, Software, FAQs, Manuals and Compatibility** link is highlighted.
5. The **Support for Cyber-shot™ Digital Cameras** page is shown, with the **DSC-W810** model selected. The **Instruction Manual** link is highlighted.

For Your Reference...

To **download** an **instruction manual**:

1. Click on the **Browser** icon at the bottom of the screen
2. Type the manufacturer's name in the search box, then click on the appropriate website and follow the links to the manual

Handy to Know...

- Once the file has been saved on the computer, you can double-click on it to open it up. Again, you may need some assistance from a friend the first time you need to do this.

ACTIVITY – OPERATING MANUAL



Individual
Activity



Group
Activity

Download An Instruction Manual

Obtain access to a computer that is connected to the internet and use it to download an instruction manual for a digital device that you have. The digital device may be a digital camera, mobile phone or even a television set.

As you work through this activity write down the following details:

Details	
Type of digital device (e.g. camera, phone, etc)	
Name of the manufacturer	
Model number of the digital device (it should be shown somewhere on the device)	
Website address of the manufacturer	www.
Name of the downloaded file	
Location of the downloaded file (folder location that it was saved to)	