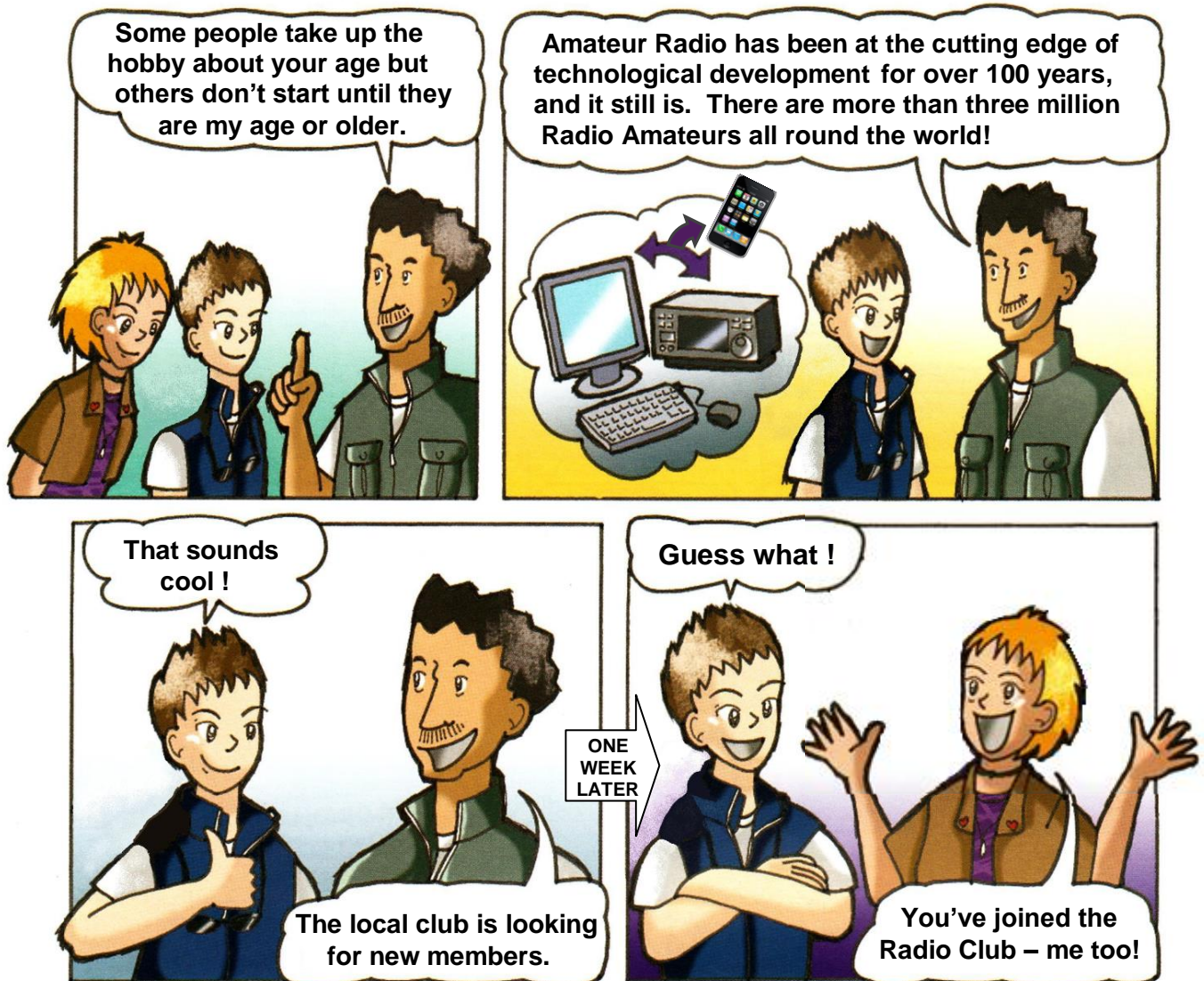


# Alex

## discovers Amateur Radio

ICOM®

LISTEN  
TO AMATEUR  
RADIO ON YOUR  
PC / TABLET / etc.  
FREE LINK  
PAGE 26



### An introduction to Amateur Radio

Whether you're Alex or their Dad (Mum, brother, or sister), then just like the hobby, this booklet has something for everyone school age to retired.



**FREE** Amateur Radio Smartphone Apps – see back cover

## Welcome to the World of Amateur Radio!

Thank you for your interest in Alex discovers Amateur Radio. This is your first step in discovering the excitement of Amateur Radio. No matter what your age this story is designed to provide you with basic information about Amateur Radio – its history, its applications, and its relevance in the world today.

We hope you have fun reading this booklet. We had fun creating it, and encourage you to get involved in this state of the art hobby. Amateur Radio is enjoyed by people from all walks of life, young and old alike. No matter what your age we feel this booklet has enough information for you to want to dip into it again and again. If you find it interesting and informative please pass it on to a friend when you have finished with it. For more information on how to become a Radio Amateur, and how to find a local club, see the final pages and the back cover. There are also details of internet links that you might enjoy. For a concise introduction to Amateur Radio scan the QR code on the left, or visit the Radio Society of Great Britain pages for newcomers to the hobby at:



<http://rsgb.org/main/get-started-in-amateur-radio/what-is-amateur-radio/>

First time through just reading the white speech bubbles gives the story a nice flow. You can then go back and read the information boxes and try the quizzes.



... but I hope they don't miss the QR code for the Space Station on page 9, or the one for the Rhythm of the Code on page 18.

This booklet is based on a modified version of an original publication "The Adventures of Zack and Max - The Odyssey Begins" illustrated by Kayoko Nakajima © 2002 ICOM America, Inc.

The artwork and text of this **GRAPHIC GUIDE** have been fully updated, and further re-written, for use in the UK by kind permission of the original artist Kayoko Nakajima and Icom America, Inc.

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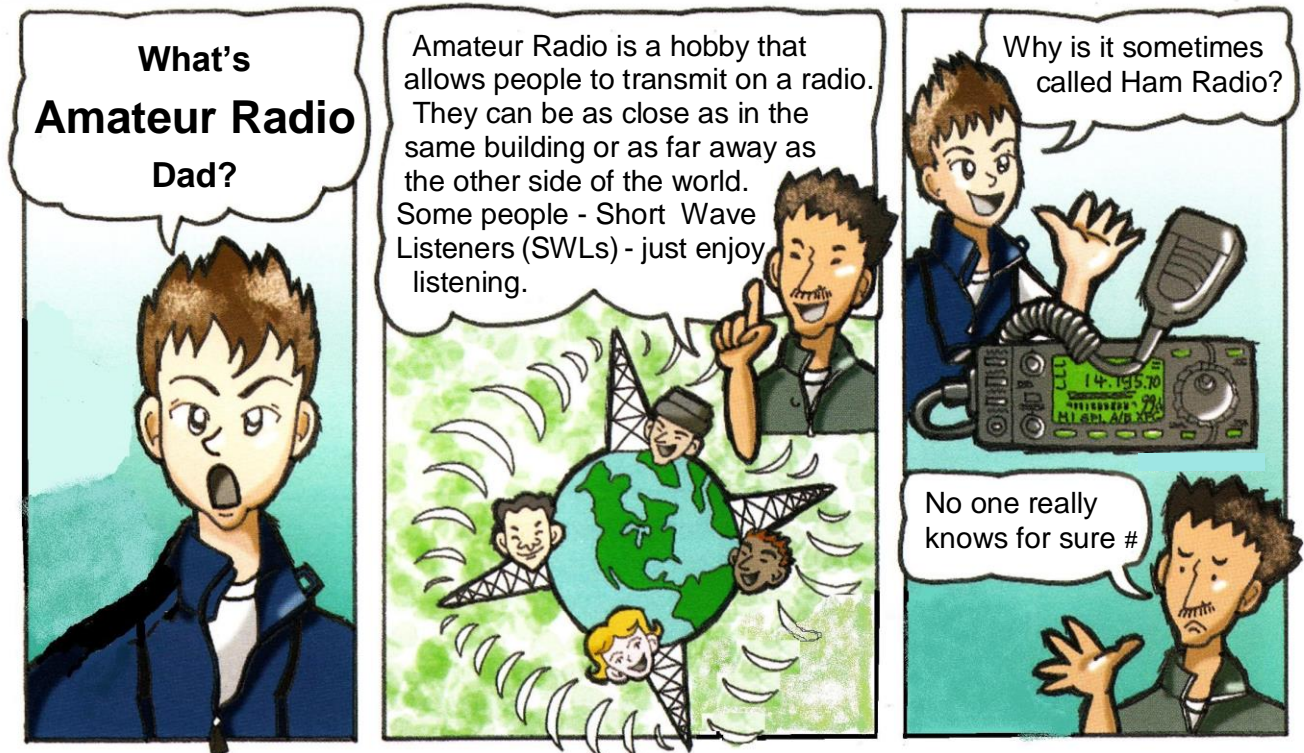
With the exception of Dave and Kath Wilson, Mathew M3UAY, and Amy M6SIP all characters are imaginary and any resemblance to any real person, living or dead, is entirely coincidental. All call signs used in this story are real and are used with permission.

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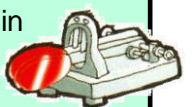
An outreach project supported by 'The learning lighthouse' CLC (City Learning Centre) Wirral.



## A few months earlier ...



# One possible explanation is that in the early days of radio, when Morse Code was in common use, the commercial radio operators looked down on Radio Amateurs and claimed their operation of the Morse key was ham fisted (meaning clumsy).







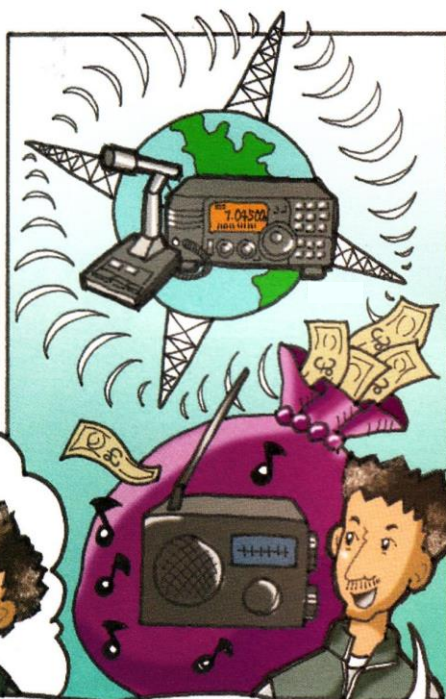
Amateur Radio is a fun and exciting hobby. It is regulated and licensed in the UK by **OFCOM**.

You can't *broadcast* or *play music* over Amateur Radio.

But why not? I hear music on my radio all the time.

That's not Amateur Radio.

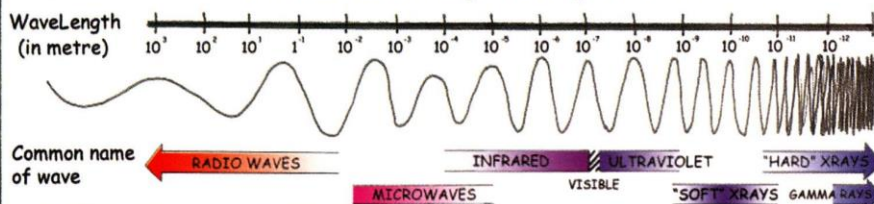
That's **Broadcast Radio**. It transmits programmes as a public service, or to make money through advertising. **Amateur Radio** is not for commercial use, and your radio doesn't pick up Amateur frequencies.



## Frequencies?



### The Electromagnetic Spectrum



Radio is part of the electromagnetic spectrum, just like x-rays and light. All electromagnetic energy travels in waves at the speed of light. The **longer** the wavelength, the **lower** the frequency and the shorter the wavelength the higher the frequency.

So are Amateur Radio waves longer or shorter than one's received by my radio?

Both. There are **BANDS** of frequencies set aside for Amateur use. Some bands use low frequencies – these are long waves, longer than a house – and some use high frequencies. Some Amateur waves are so small they are called '**microwaves**'.



### Amateur Radio Bands available to beginners include:

**Low Frequency LF:** 136KHz, **High Frequency HF:** 160m (1.8MHz), 80m (3.5MHz), 40m (7MHz), 30m (10MHz), 20m (14MHz), 17m (18MHz), 15m (21MHz), 12m (24MHz), 10m (28MHz), **Very High Frequency VHF:** 6m (50MHz), 4m (70MHz), 2m (144MHz), **Ultra High Frequency UHF:** 70cm (430MHz), **Microwaves:** 3cm (10GHz).

Hz stands for **Hertz** and is named after the German scientist Heinrich Hertz who discovered electromagnetic waves – at first called Hertzian Waves. A frequency of 1 Hz is one wave per second, 1 KHz is one thousand per second, 1 MHz is 1 million, and 1 GHz a thousand million.







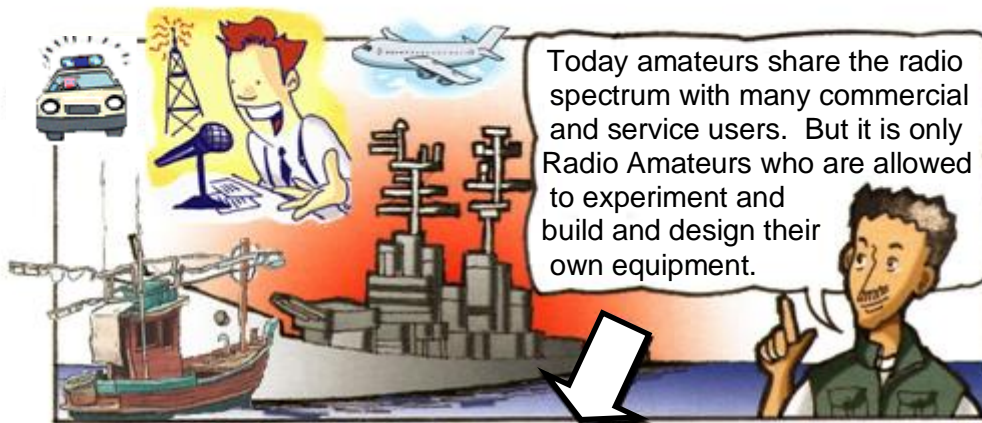
Today, within the frequencies allocated for legal amateur use, there are recommended **Band Plans**. These are agreed recommendations for the use of particular frequencies for different types of activity such as: long distance communications (DX), mobile use from a car or bicycle, satellite communications, making initial contact, etc. There are also suggested frequencies for different types of signals such as voice transmissions, Morse Code (CW), digital modes, slow scan television, images etc. Band Plans are not legally binding.

Two Meter Band  
144.0 MHz through 148.0 MHz

| Frequency (MHz)   | Mode |
|-------------------|------|
| 144.000 - 144.100 | SSB  |
| 144.100 - 144.200 | SSB  |
| 144.200 - 144.300 | SSB  |
| 144.300 - 144.400 | SSB  |
| 144.400 - 144.500 | SSB  |
| 144.500 - 144.600 | SSB  |
| 144.600 - 144.700 | SSB  |
| 144.700 - 144.800 | SSB  |
| 144.800 - 144.900 | SSB  |
| 144.900 - 145.000 | SSB  |
| 145.000 - 145.100 | SSB  |
| 145.100 - 145.200 | SSB  |
| 145.200 - 145.300 | SSB  |
| 145.300 - 145.400 | SSB  |
| 145.400 - 145.500 | SSB  |
| 145.500 - 145.600 | SSB  |
| 145.600 - 145.700 | SSB  |
| 145.700 - 145.800 | SSB  |
| 145.800 - 145.900 | SSB  |
| 145.900 - 146.000 | SSB  |
| 146.000 - 146.100 | SSB  |
| 146.100 - 146.200 | SSB  |
| 146.200 - 146.300 | SSB  |
| 146.300 - 146.400 | SSB  |
| 146.400 - 146.500 | SSB  |
| 146.500 - 146.600 | SSB  |
| 146.600 - 146.700 | SSB  |
| 146.700 - 146.800 | SSB  |
| 146.800 - 146.900 | SSB  |
| 146.900 - 147.000 | SSB  |
| 147.000 - 147.100 | SSB  |
| 147.100 - 147.200 | SSB  |
| 147.200 - 147.300 | SSB  |
| 147.300 - 147.400 | SSB  |
| 147.400 - 147.500 | SSB  |
| 147.500 - 147.600 | SSB  |
| 147.600 - 147.700 | SSB  |
| 147.700 - 147.800 | SSB  |
| 147.800 - 147.900 | SSB  |
| 147.900 - 148.000 | SSB  |

www.rsgb.org

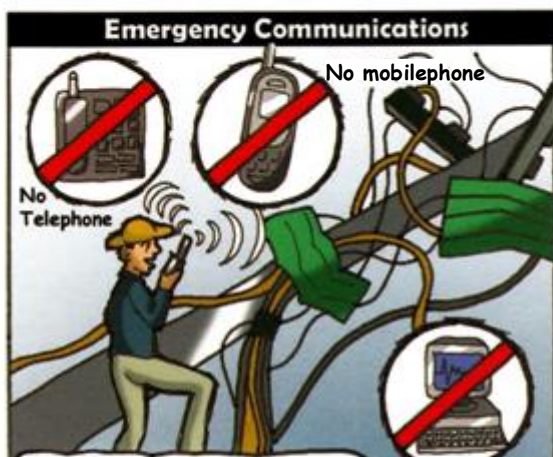




So the radio in my room would not be there if it weren't for Radio Hams?



Possibly.



Amateur Radio has other uses too, Alex ... a big use worldwide is for **emergency communications**.

In a major disaster it is sometimes the only way at first that people can communicate and organise help.

**RAYNET** is a UK Radio Amateur organisation that helps out in emergencies.

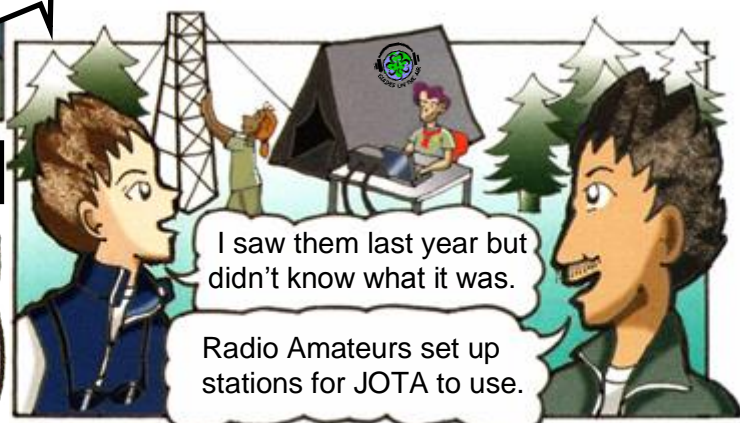


As well as providing emergency communications in areas where natural disasters such as hurricanes and earthquakes are common Radio Amateurs in the UK provide communications during times when the emergency services' communications fail, or are over stretched. Also as a public service, and to keep in practice, RAYNET Groups often provide mobile communications during sponsored walks, marathons, and other large events.



### Other activities

Each year about half-a-million Scouts and Guides all over the world "get together" over the airwaves in the third **full** weekend of October for the annual Jamboree-on-the-Air (JOTA).





## Knowledge Checklist

### Quiz 1

#### Multiple Choice Quiz (tick the best answer [✓] )

**1 Amateur Radio Licences are issued by**

- A [ ] The Radio Society of Great Britain
- B [ ] OFCOM
- C [ ] The local College of Further Education
- D [ ] The TV Licensing Authority

**2 Which of the following is NOT permitted on Amateur Radio?**

- A [ ] A reply to a station in another country
- B [ ] A message in Morse code
- C [ ] Transmitting music
- D [ ] Agreeing to meet at the radio club

**3 Radio waves ..**

- A [ ] can only be used by Radio Amateurs
- B [ ] are part of the waves known as sonar
- C [ ] travel at the speed of sound
- D [ ] are part of the electromagnetic spectrum

**4 If a radio wave has a long wavelength then**

- A [ ] Its frequency is low
- B [ ] Its frequency is high
- C [ ] Its frequency changes on sunny days
- D [ ] Its frequency changes at night

**5 A Radio Wave with a frequency of 144MHz is known as**

- A [ ] Low Frequency LF
- B [ ] High Frequency HF
- C [ ] Very High Frequency VHF
- D [ ] Microwave

**6 Band Plans are published because**

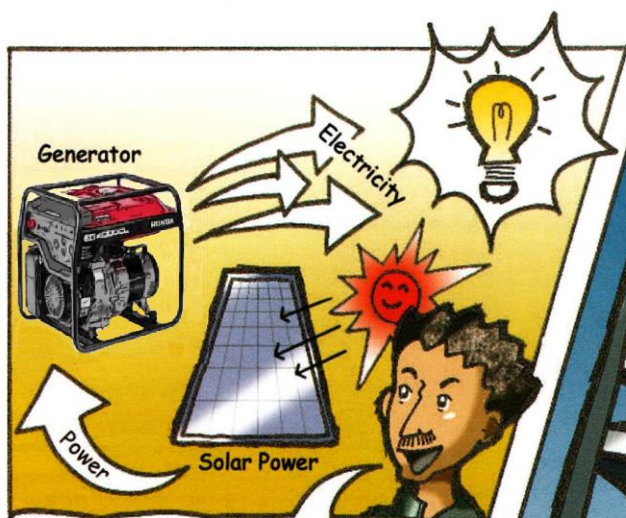
- A [ ] it is a convenient way of remembering the amateur licence conditions
- B [ ] it allows the different modes and types of transmission to best share the band without causing chaos
- C [ ] it allocates most of the band to the higher power stations
- D [ ] it is illegal to operate in contravention of the band plan.

**7 RAYNET is**

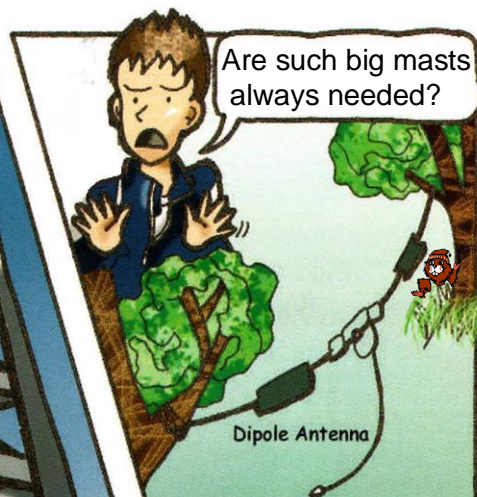
- A [ ] a type of radar
- B [ ] the latest type of commercial fishing sonar
- C [ ] a group of radio amateurs all called Ray
- D [ ] a group of Radio Amateurs providing emergency communications

Answers are on the bottom of page 10.





Operating in the countryside away from mains electricity is not just fun but good practice for operation during an emergency. They use portable generators, solar panels, wind power; and large batteries like car batteries to supply their own electricity.



No - not usually. Many aerials - antennas as Radio Amateurs often call them - are as easy to set up as running a long wire to a tree or pole.

It sounds like fun!

It is, but it's hard work too setting up a complete Radio Station and everything else that's needed.



Sometimes antennas are fastened high up on poles but for some purposes they are hand held on the ground.

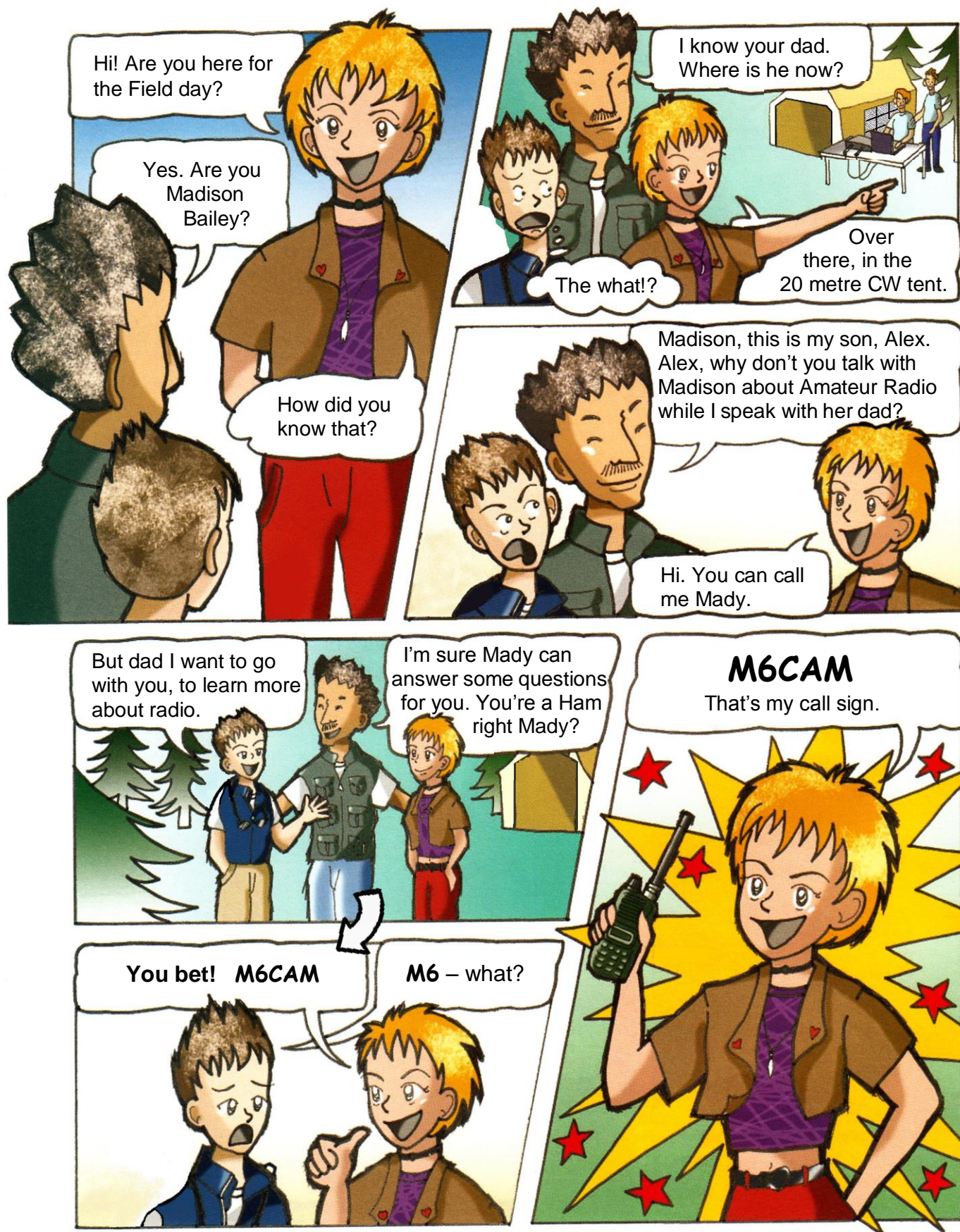


So can we go and see what's going on over there today? It looks different to the JOTA day.

That's because today is a **National Field Day**.# Radio Amateurs like it when people ask questions about their hobby. Let's wander over...

# **National Field Day** takes place over the first weekend in June and is a CW (Morse Code) event. A SSB (voice) Field Day is held during the first weekend in September and a VHF Field Day in July. These, and lots of other special events and contests throughout the year, help develop expertise such as: operator technique; antenna design, construction, and erection; generator maintenance; and, increasingly, computer expertise linked to radio communication.





There are three levels of Amateur Licence in the UK. **Foundation** like Mady has. **Intermediate** is the next stage up, and **Full** the final stage. All require the holder to pass an exam at the appropriate level before they are issued with a transmitting licence and their own call sign. The Foundation exam is the simplest and consists of 26 multiple choice questions, as well as a simple operating assessment.





**VHF** and **UHF** frequencies are used for communications with satellites overhead in space; and "**line of sight**" on earth for both **base station**<sup>#</sup> and **hand held** radios working direct to each other – or sometimes over longer distances through nearby repeater stations on hill tops or high buildings. Some repeaters also allow contacts to be made all round the world because they are connected through the internet to other repeater stations in other countries.

As well as "**line of sight**" (*ground wave*), **HF** allows direct communications all round the world (*sky wave*). With the right sort of antenna, and conditions, even back pack, and mobile HF rigs can make international contacts.

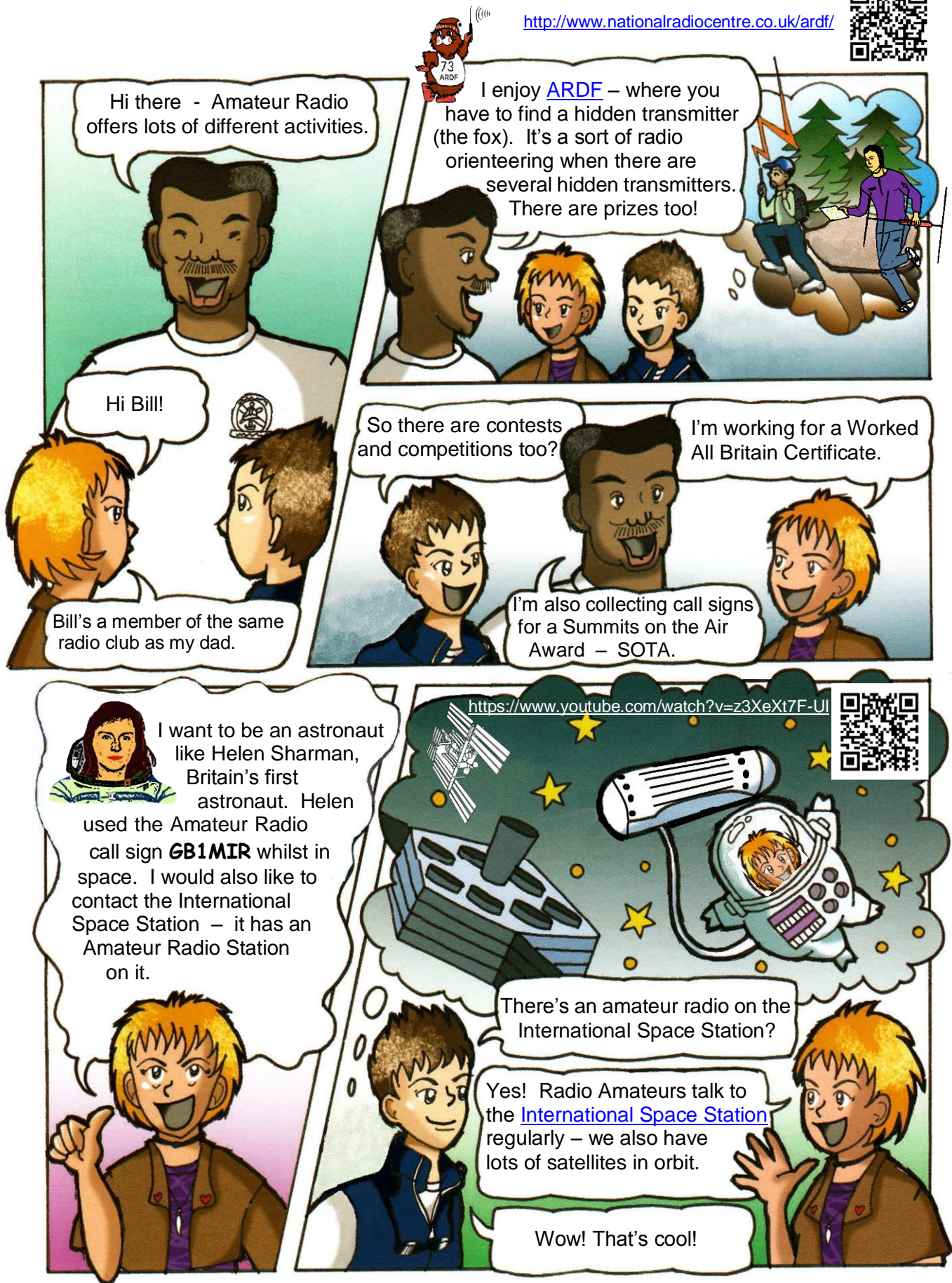
There is a conductive ring of gas 70 to 400 km above the earth called the **IONOSPHERE**. When the ionosphere is strongly ionised it bends some radio waves back to earth instead of allowing them to escape into space. Signals can therefore bounce repeatedly between ground and ionosphere and travel all round the world. Part of the fun is deciding which band will be open to the part of the world you want to contact.<sup>#2</sup>

The world is divided into different **time zones**. To avoid confusion during contacts Radio Amateurs all over the world use **UTC** (same as GMT) and the 24 hour clock.

<sup>#</sup>Base stations use separate external antennas.

<sup>#2</sup> The strength of ionisation in the ionosphere depends on the amount of radiation, mainly **UV**, received from the sun. It varies with the time of day, and with the season, i.e. summer to winter, and with other factors such as sun spots and electromagnetic storms. The stronger the level of ionisation the higher the frequency of signals that will be bent (refracted) back. VHF and UHF signals usually pass straight through into space. During the day signals as high as 30MHz can be bent back - at night this is lower, often 3MHz or less. The highest frequency refracted back at a particular time is called the **Maximum Usable Frequency** for long distance contacts - **MUF**.





There are always lots of other contests, competitions, and activities to take part in. Many amateurs collect contacts for Islands on the Air - **IOTA**. Every year radio stations are set up in Mills all over the country for **Mills on the Air** weekend. Many amateurs with similar interests meet up regularly on the same frequency - called **NETS**. One of the most regular and biggest UK nets is the Barometric Net on 80m. There are also geographic nets such as the *Euro Net*.



## Knowledge Checklist

### Quiz 2

#### Multiple Choice Quiz (tick the best answer [✓] )

**1 Jamboree on the Air is ...**

- A [ ] only for scouts and guides in the UK
- B [ ] only for guides not scouts
- C [ ] held in October every year
- D [ ] only held once every two years

**2 Which of the items listed below is NOT a type of Amateur licence?**

- A [ ] Intermediate
- B [ ] Beginner
- C [ ] Foundation
- D [ ] Full

**3 VHF stands for ...**

- A [ ] Vertical Horizontal Frontage
- B [ ] Very Happy Families
- C [ ] Very High Frequency
- D [ ] Ultra High Frequency

**4 The Ionosphere is ...**

- A [ ] A large iron ball near Swanage.
- B [ ] The latest type of ironing board
- C [ ] The name given to the bending of radio waves in the sky
- D [ ] A conductive ring of gas above the earth

**5 The highest frequency refracted back to earth at a particular time is known as ...**

- A [ ] MUF
- B [ ] MFU
- C [ ] FMU
- D [ ] UFM

**6 Receiver antennas are usually carried by hand when ...**

- A [ ] high power transmissions are required
- B [ ] they have blown down in a gale
- C [ ] they are being used in an orienteering event such as ARDF  
(Amateur Radio Direction Finding)
- D [ ] CW (Carrier Wave) - Morse Code is being used

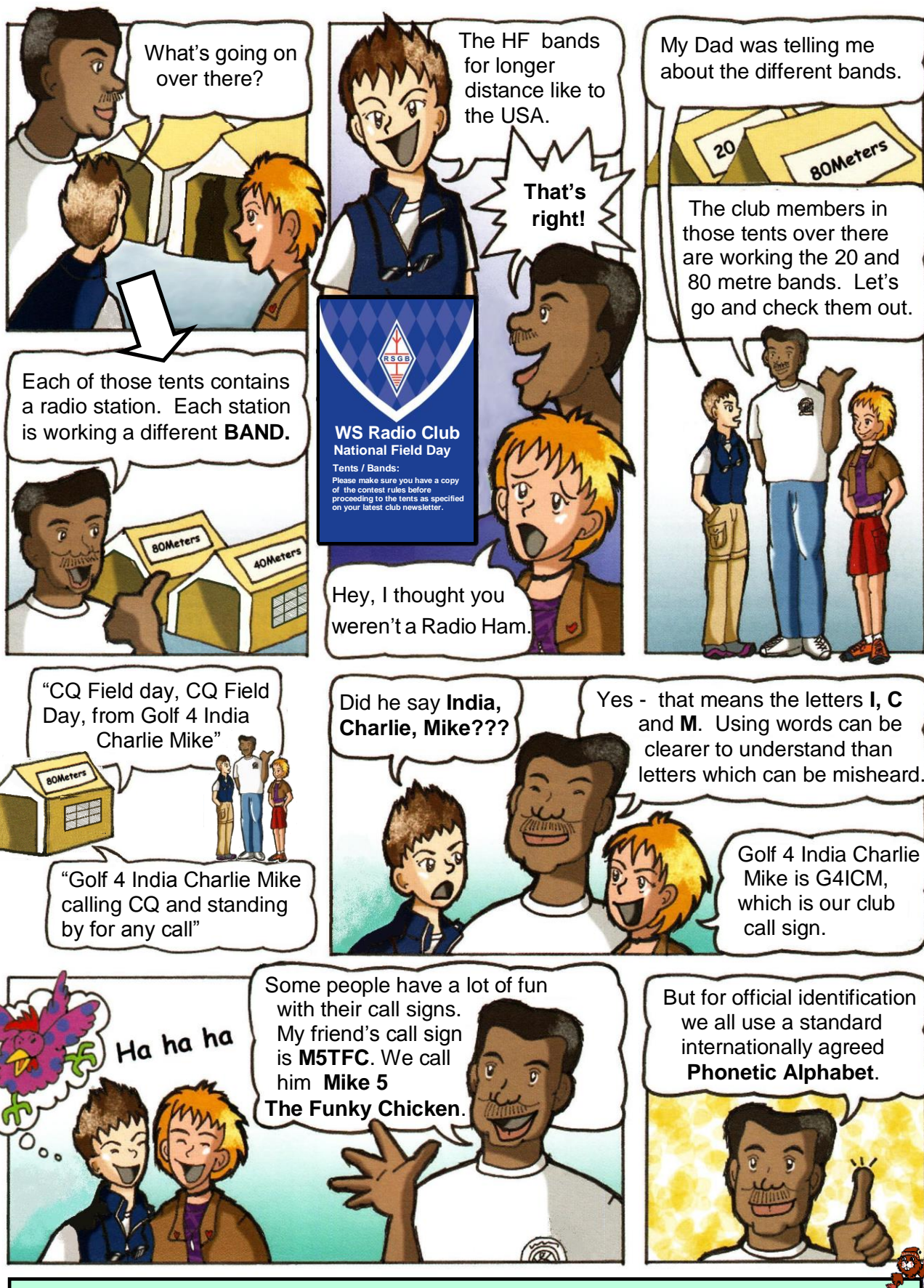
**7 Radio signals refracted back to earth are called ...**

- A [ ] Line of sight waves
- B [ ] Ground waves
- C [ ] Standing waves
- D [ ] Sky waves

Answers are on the bottom of page 15.

**QUIZ 1 ANSWERS: 1 B, 2 C, 3 D, 4 A, 5 C, 6 B, 7 D**

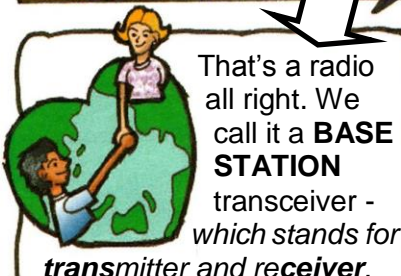
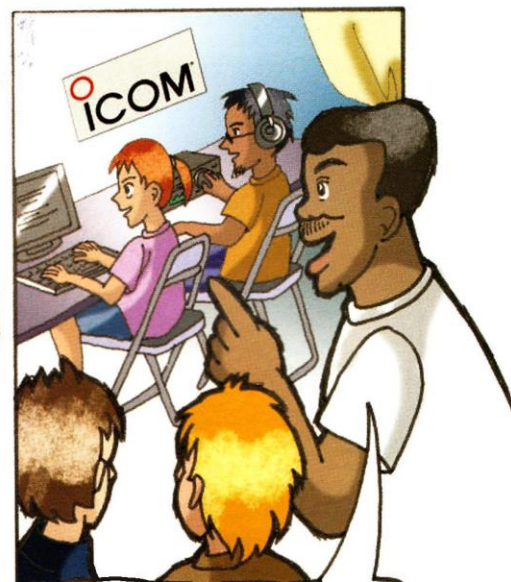




### The Official International Phonetic Alphabet

|           |           |            |          |           |        |
|-----------|-----------|------------|----------|-----------|--------|
| A Alpha   | F Foxtrot | K Kilo     | P Papa   | U Uniform | Z Zulu |
| B Bravo   | G Golf    | L Lima     | Q Québec | V Victor  |        |
| C Charlie | H Hotel   | M Mike     | R Romeo  | W Whiskey |        |
| D Delta   | I India   | N November | S Sierra | X X-Ray   |        |
| E Echo    | J Juliet  | O Oscar    | T Tango  | Y Yankee  |        |





That's a radio all right. We call it a **BASE STATION** transceiver - which stands for **transmitter and receiver**.

Amateur Radio is a fun hobby but you don't need to have an expensive rig with lots of features like that one to still have a great time talking to some other Radio Amateur in a country 6000 miles away with nothing but air between the two of you.

We hold **contests** to see **how far** and **how often** we can make a **QSO** - that's a two way contact. But mainly we just enjoy chatting and making new friends over the air.

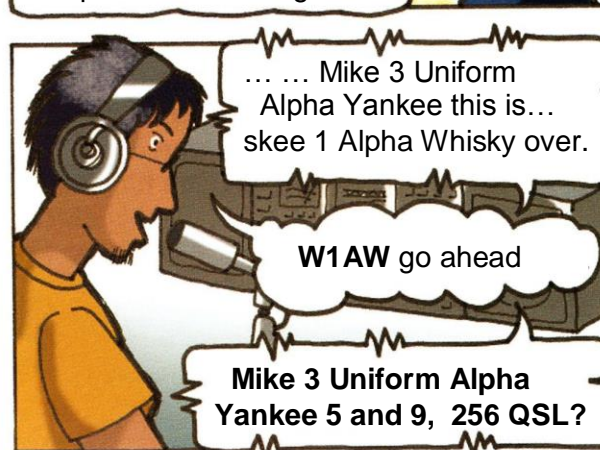
Often we exchange **QSL** cards by mail or by the Internet to acknowledge the contact.



Matty is working to get as many contacts as possible and Sharon is entering call signs into a computer for future verification. Contests can get very intense. Some people don't like the way they can take the whole band over for several hours.



Whisky 1 station go ahead please.



**Mike 3 Uniform Alpha Yankee 5 and 9, 256 QSL?**

Originally developed to speed up Morse Code contacts Radio Amateurs use Q codes to help, particularly when conditions are bad, or if they don't both speak the same language. QSO is a contact - QSL contact confirmed - QRM interference to signal - QRZ who is calling. CQ is sent when you want **anyone** to reply to you rather than a particular station - it means *seeking you*. Signal reports are given as 1 to 5 for readability (5 best) and 1 to 9 for signal strength. (9 best). The number 256 means M3UAY was W1AW's 256th contact during this contest.

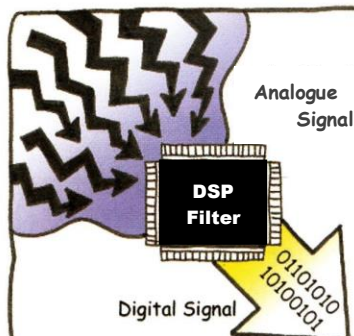


Roger Whisky 1 Alpha Whisky you are 5 and 9 - 1036 in Wallasey – good luck in the contest. **QRZ from, from Mike 3 Uniform Alpha Yankee.**



### DSP - DIGITAL SIGNAL PROCESSING

There are a number of reasons why the call could have suddenly come in so strong: the other station might have increased their power; a change in the atmosphere could have improved propagation; Matty could have adjusted the receiver controls – in particular the **DSP**...



... Simple **DSP** is like the sound card on a computer – it digitally processes an audio signal.

**IF-DSP** is before the **audio stage** so that makes it more effective.



Sounds complicated all this **audio stage** and **IF** !

Yes but you don't **have** to understand what's going on inside to use it.

Good, but I would like to learn more about how it works once I know how to use the controls.



Different radios have slightly different controls, some easier to use than others, but they all do much the same thing ...



... they shape the incoming radio signal to get rid of any interference and focus on the signal you want to listen to<sup>#</sup>.



<sup>#</sup>Today all this filtering and processing can be carried out by a home computer running the correct program. This is called **Software Defined Radio - SDR**. A radio receiver has several main stages. The Tuning and Radio Frequency (RF) stage which tunes in the wanted signal from the antenna and amplifies it. The Intermediate Frequency (IF) stage that provides more amplification and filtering out of unwanted signals. The detector which recovers (demodulates) the original audio signal. The Audio Amplifier which amplifies the audio signal.

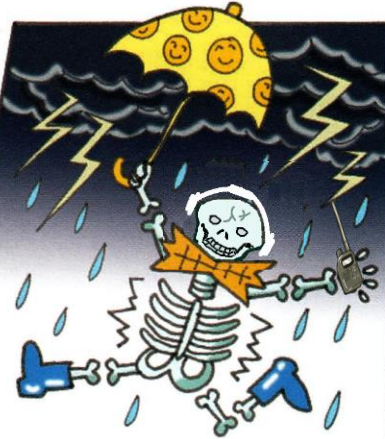




DSP has improved amateur radio performance in recent years. It makes it much easier to isolate the signal you want to listen to and eliminate QRM (interference).



Micro-chips are now so powerful they can replace many processing parts of a radio. Software upgrades can later be downloaded.

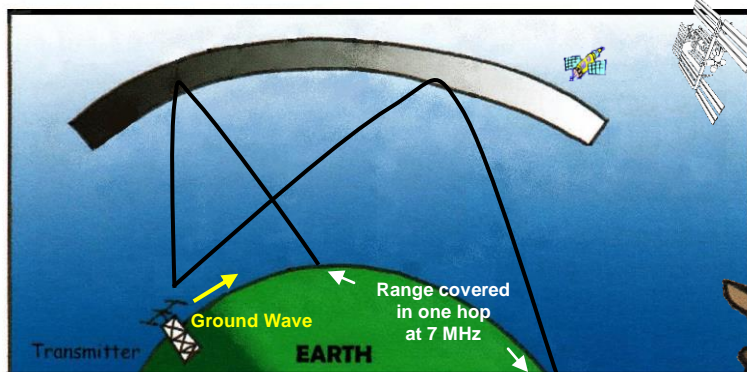


Bill, what was the other way you said could help us hear signals more clearly – changes in the atmosphere.

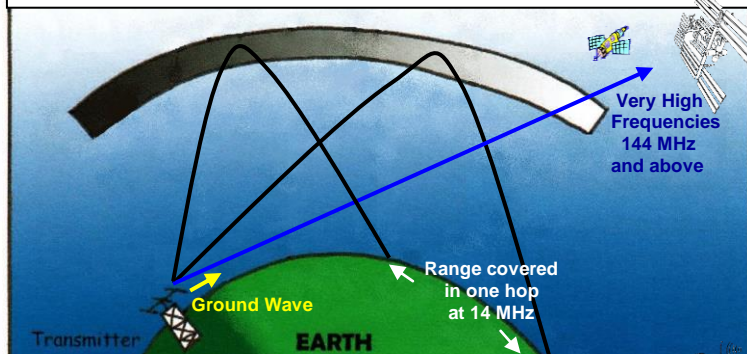
It could have been favourable atmospheric conditions.

More than you might think. A good hailstorm will bounce and scatter radio signals. Even rain clouds can affect signals.

What does the atmosphere have to do with radio signals?

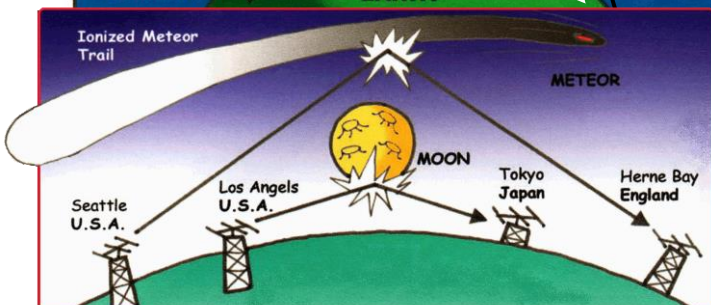


Higher frequencies “bend” differently to low frequencies



But the biggest way the atmosphere affects radio signals isn't by weather but by the different properties of the ionised layers in the sky.

There are several different layers in the ionosphere 70 to 400 km high. Radio signals usually travel in straight lines. Very High Frequency (VHF) signals usually travel directly into space but lower frequencies can be bent back to earth by the ionosphere. There is also a ground wave close to the earth's surface.



More unusual forms of propagation include scatter from meteor showers, and bouncing signals off the moon. Very high gain antennas are usually needed to reliably pick up the weak return signals.



## Knowledge Checklist

### Quiz 3

#### Multiple Choice Quiz (tick the best answer [✓] )

- 1 The correct phonetic spelling of the word Juliet is**  
A [ ] juliet uncle lama india echo tango  
B [ ] juliet uniform lima index echo tango  
C [ ] juliet uniform lima india echo tango  
D [ ] juno uniform lima india echo tango
- 2 The Q code indication you are suffering interference is**  
A [ ] QRM  
B [ ] QRL  
C [ ] QST  
D [ ] QSO
- 3 A CQ call means that you want**  
A [ ] only one particular station to reply to you  
B [ ] only want stations with C and Q in their call sign to reply  
C [ ] are seeking a reply from any station  
D [ ] only want a reply in Morse Code
- 4 The part of a radio that shapes the incoming signal to get rid of any interference is the**  
A [ ] Tuner  
B [ ] DSP  
C [ ] DIP switch  
D [ ] Loud Speaker
- 5 The process by which Radio Waves are bent in the ionosphere is called**  
A [ ] Bouncing  
B [ ] Reflection  
C [ ] Refraction  
D [ ] Skipping
- 6 Radio Waves usually travel**  
A [ ] in straight lines  
B [ ] only upwards  
C [ ] only sideways  
D [ ] at the speed of sound
- 7 VHF and UHF frequencies**  
A [ ] are best for direct communications with the other side of the world  
B [ ] are always bent back by the ionosphere  
C [ ] are the only frequencies that can be used by Foundation Licence holders  
D [ ] usually pass through the ionosphere into space

Answers are on the bottom of page 20.

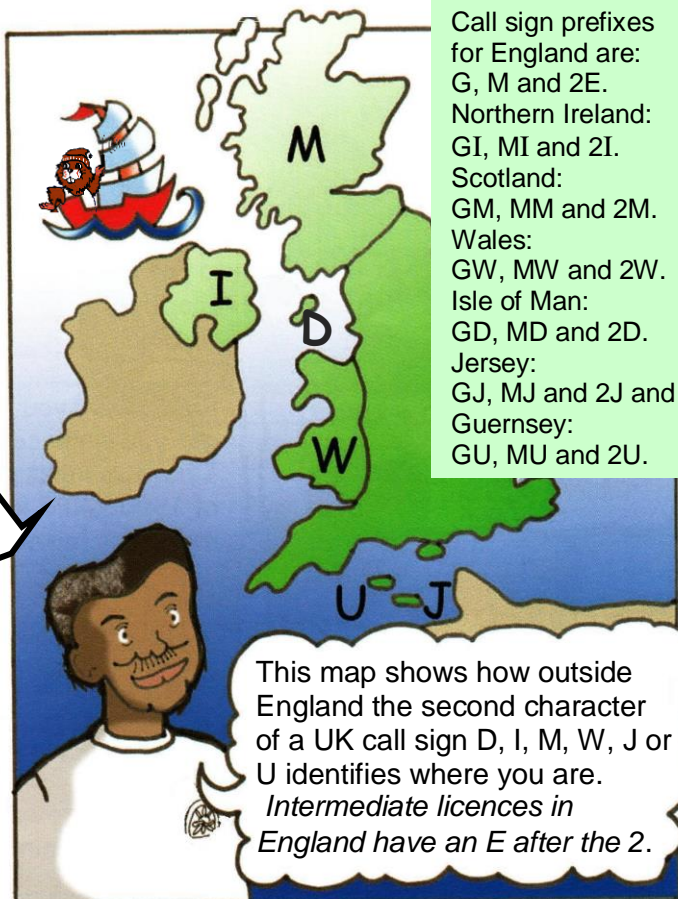
**QUIZ 2 ANSWERS: 1 C, 2 B, 3 C, 4 D, 5 A, 6 C, 7 D**



You can tell where a station is located from its call sign. Every country has its own call sign codes. All UK call signs begin with a **G**, an **M**, or a **2**.



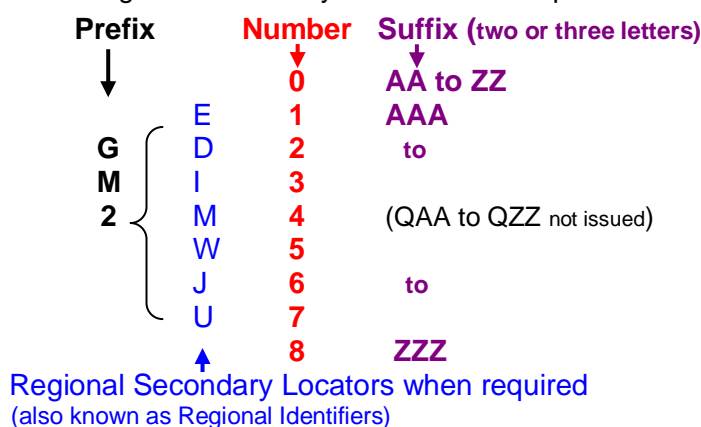
**D**- Isle of Man  
**I**- Northern Ireland  
**M**- Scotland  
**W**- Wales  
**E**- England but only used with Intermediate Licensed calls  
**J**- Jersey  
**U**- Guernsey



Call sign prefixes for England are: G, M and 2E.  
 Northern Ireland: GI, MI and 2I.  
 Scotland: GM, MM and 2M.  
 Wales: GW, MW and 2W.  
 Isle of Man: GD, MD and 2D.  
 Jersey: GJ, MJ and 2J and Guernsey: GU, MU and 2U.

This map shows how outside England the second character of a UK call sign D, I, M, W, J or U identifies where you are. *Intermediate licences in England have an E after the 2.*

Sounds complicated but you soon get used to it. Call signs starting with M3 or M6 are Foundation Level licences. Those starting with a 2 are Intermediate licences. All others are now Full licences. The format is Prefix – Regional Secondary Locator when required – Number – Suffix.



So **G3ABC** would be an English station Full licence. **M6ABC** an English Foundation licence. **2E0ABC** an English Intermediate licence. **MM0ABC** and **GM0ABC** would both be Scottish Full Licences.

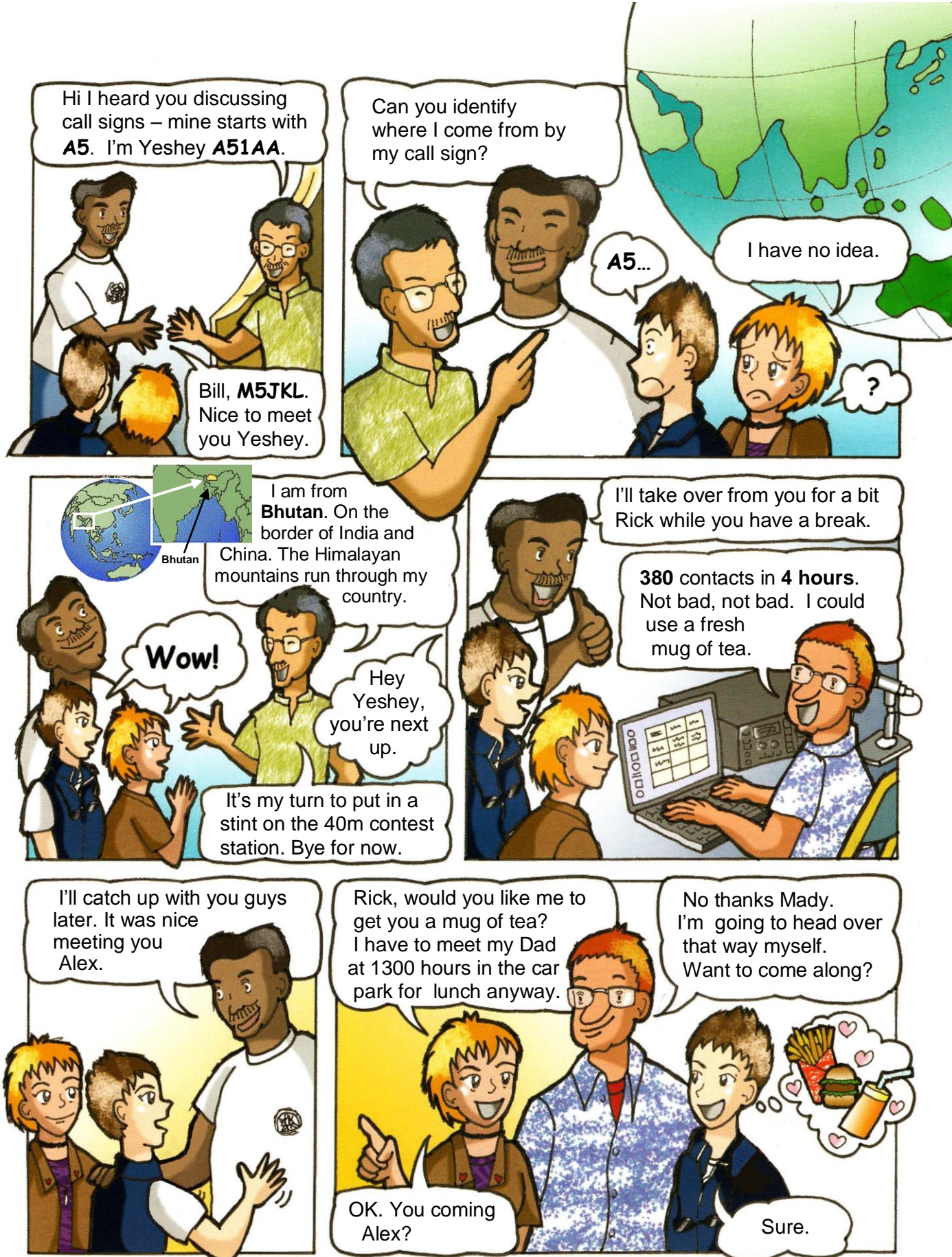
When operating: at an Alternative postal address **/A** can be added to the end of the call sign; at a temporary location **/P**; when mobile (foot, car or bike) **/M**; Full licensees are allowed Maritime Mobile **/MM**.

You will sometimes hear Club stations using special *Club Regional Secondary Locators*: X in England, P in Guernsey, T in the Isle of Man, H in Jersey, N in Northern Ireland, S in Scotland and C in Wales.

#### Just for interest - Historic Call Sign Series:

Between 1920 and 1939 licences were issued in the G2 to G6, and G8 two letter suffix, and the G2 three letter suffix, series. i.e. G2AA to G6ZZ, and G8AA to G8ZZ, and G2AAA to G2ZZZ. G3AAA to G3PZZ were issued between 1946 and 1962; G3RAA to G3ZZZ between 1962 and 1971; G4AAA to G4ZZZ between 1971 and 1985; the G0 series 1985 to 1996; and the M0 series from 1996 onwards; G8AAA to G8ZZZ between 1964 and 1981; G6AAA to G6ZZZ (former fast scan TV licences) were re-issued from 1981 to 1983 as normal licenses; G1AAA to G1ZZZ from 1982 to 1988; G7AAA to G7ZZZ 1988 to 1996. M1AAA to M1ZZZ from 1996 to 2003; M5AAA to M5ZZZ (5 wpm Morse pass) from 1999 to 2003. 2E0AAA to 2E0ZZZ from 1991 onwards. 2E1AAA to 2E1ZZZ from 1991 to 2003. M3AAA from 2002 onwards. M6AAA from 2008 onwards. Repeaters and Special Event Stations are licences with the prefix GB. Suffixes QAA to QZZ are not issued in any series.





**Some call sign prefixes you might hear:** CT Portugal, DA-DR Germany, EA-EH Spain, F France, HB Switzerland, I Italy, JA-JS Japan, K,W,N,AA-AK USA, LA-LN Norway, LO-LW Argentina, LX Luxembourg, ON-OT Belgium, OX Greenland, PA-PI Netherlands, PP-PY Brazil, SN-SR Poland, SU Egypt, UA-U11, RA-RZ European Russia, VE,VO,VY Canada, VK Australia, ZI-ZM New Zealand, ZR-ZU South Africa.

Look up who call signs belong to at <http://www.QRZ.com>



What a fantastic day!

Guess what it is I like the most about Amateur Radio?

Talking to astronauts?

Constructing electronics projects?

Yeshey from Bhutan

Hiroshi from Japan

Maria from Peru

No - What I like the most about being a Radio Amateur is making friends with people from all over the world!

You met Yeshey from Bhutan. He is a good friend of mine who I met through Amateur Radio. I also have a friend from Japan, his name is Hiroshi, and I have another friend from Peru. Her name is Maria.

That's neat! I always wanted to try Japanese food, and I want to find out about the latest Japanese apps and games!

What's that sound?

That's CW. Morse Code.

Morse code Keyer

Morse Code is a data language. Patterns of dots and dashes replace the letters of the alphabet.

Do I have to master Morse Code to get a licence?

Not any more – but you do get a chance to decode and send messages using a code sheet at your own speed as part of the practical assessment.

No prob.

|         |          |         |           |
|---------|----------|---------|-----------|
| A •—    | J •— — — | S •••   | 1 •— — —  |
| B —•••  | K —•—    | T —     | 2 •—•—    |
| C —•—•  | L •—••   | U ••—   | 3 ••—•    |
| D —••   | M — —    | V •••—  | 4 ••••    |
| E •     | N —•     | W •— —  | 5 ••••    |
| F ••—•  | O — — —  | X —••—  | 6 —•••    |
| G — — — | P •—••   | Y —•—•  | 7 —•••    |
| H —•••  | Q —•••—  | Z — —•— | 8 —•••    |
| I ••    | R •—•    |         | 9 —•••    |
|         |          |         | 0 — — — — |

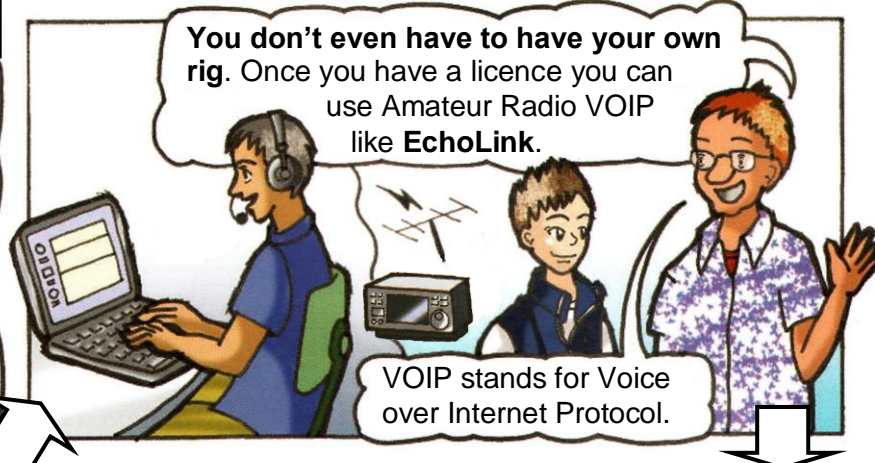
Get into the habit of reading the Morse dots as di (pronounced as in dip) and the dashes as dah, and keep a steady rhythm in your mind. A is di dah, K is dah di dah. If a dot is at the end of a letter read it as dit so R is di dah dit. Listen to the CW Tutor at: <http://www.alecwood.me.uk/MORSE.mp3>



## Using Computers



If you connect a computer to your rig there are programs like Fldigi that can generate and read Morse, as well as more recent data formats like PSK31 that will work even with very weak signals. Another data mode that has been around a very long time and is still heard on the bands is RTTY.



**EchoLink** is a well established system and is free to join. You email them a copy of your licence, download the free software and in no time at all you can be talking to Radio Amateurs all over the world. This is like Skype but there are transmitters connected to echolink so you can be sat at your computer talking through a transmitter to someone on their home radio, mobile, or portable, on the other side of the world.

More recent systems are available that combine Amateur Radio and the internet. **D-STAR** (Digital Smart Technology for Amateur Radio) is an exciting new form of Amateur Radio that compliments other parts of the hobby. It utilises digital communication and the Internet, with optional GPS. As well as direct radio to radio contacts, it allows communications worldwide through special D-STAR repeaters.

**Amateur Television** has been around for a long time and is easier than ever now using free computer programs to generate, decode, and display the signals. The simplest is **Slow Scan TV** which sends still TV pictures a bit like a fax machine.



**EchoLink** is also connected to some UK repeaters so you can use EchoLink through them.

So you can talk to other countries on your hand held!



### EXPERIMENTING

Designing a computer interface or complete radio, building from kits, experimenting with Raspberry Pi, are very satisfying and rewarding aspects of the hobby. You can also keep costs down.

Software Defined Radio allows cutting edge development and experimental work without all the problems of continually modifying and re-building hardware.

That's right ....there's even an echolink app to use smartphones like walkie-talkies to transmit worldwide via echolink. Another interesting system is APRS. It uses GPS technology to transmit your location, speed, and direction.



You can buy rigs with APRS built in or use a Terminal Node Controller (TNC) between your PC and an inexpensive transceiver. The TNC converts the output from your PC into small data "packets" and sends them as audio to your transceiver. On receive, the reverse happens. **APRS** stands for Automatic Packet Reporting System - it's not just automatic position reporting. (See [www.aprs.fi](http://www.aprs.fi))



## Knowledge Checklist

### Quiz 4

#### Multiple Choice Quiz (tick the best answer [✓])

**1 Which one of the call signs below indicates a Foundation licensee transmitting in Scotland?**

- A ☐ M6ABC/S
- B ☐ M6ABC
- C ☐ M6ABC/M
- D ☐ MM6ABC

**2 A Full licensee may have the call sign**

- A ☐ MW0XYZ
- B ☐ MD6XYZ
- C ☐ MU3XYZ
- D ☐ 2M1XYZ

**3 RTTY and PSK31 are both**

- A ☐ Brazilian call signs
- B ☐ types of data signals
- C ☐ types of transistor
- D ☐ secret codes

**4 A TNC converter (Terminal Node Controller) is connected**

- A ☐ between the antenna and the transceiver
- B ☐ between the mains and the transceiver
- C ☐ between a PC and the transceiver
- D ☐ between the earth connection and the transceiver

**5 Morse code consists of**

- A ☐ a pattern of dots and dashes
- B ☐ dots sent at different speeds
- C ☐ dashes sent at different speeds
- D ☐ a different voltage for every letter of the alphabet

**6 The regional identifier for Guernsey is**

- A ☐ G
- B ☐ U
- C ☐ D
- D ☐ I

**7 A significant feature of the amateur licence is that**

- A ☐ it is available from all post offices
- B ☐ it is non-commercial in nature
- C ☐ attendance at training classes is compulsory
- D ☐ the Foundation licence is recognised worldwide.

Answers are on the bottom of page 24.

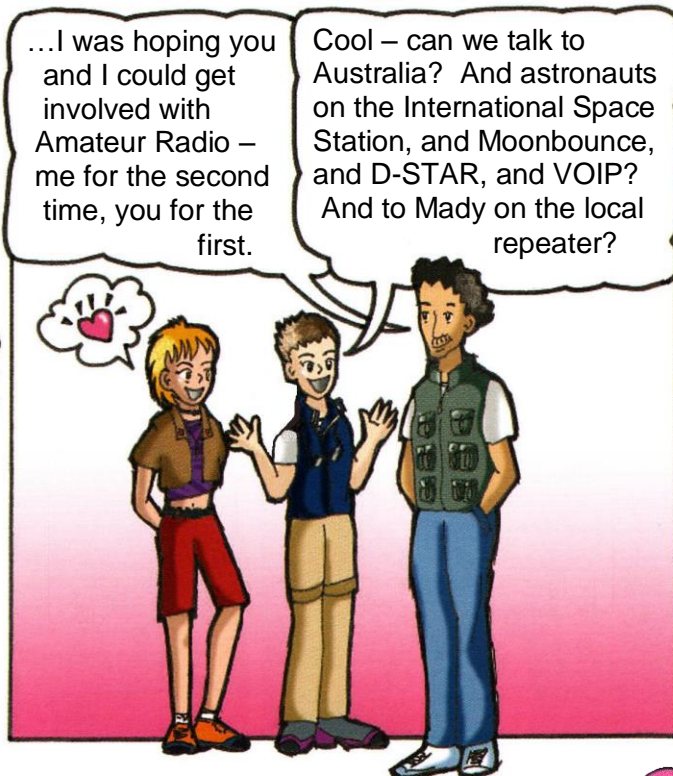
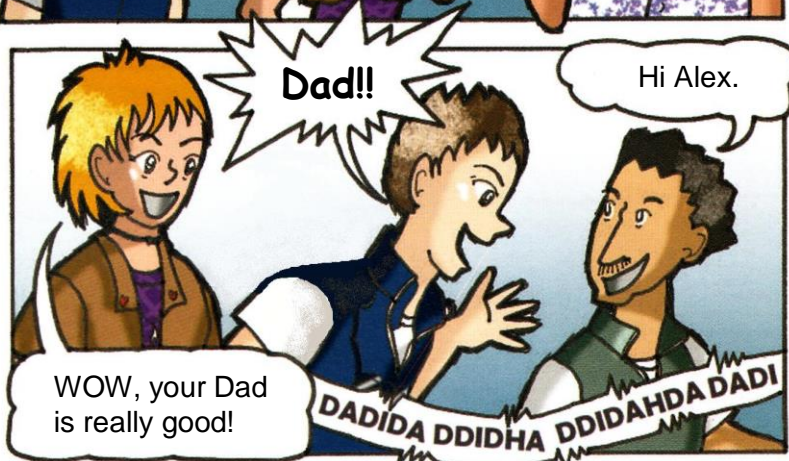
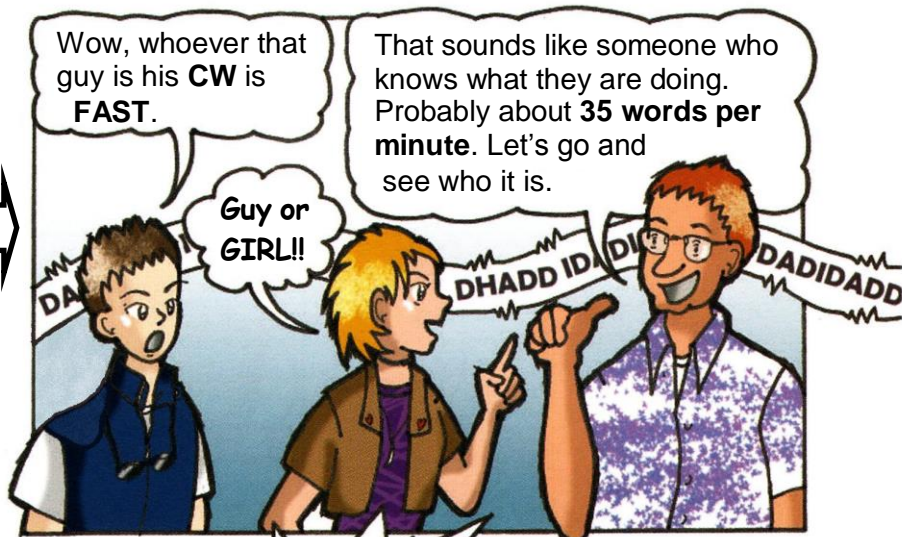
**QUIZ 3 ANSWERS: 1 C, 2 A, 3 C, 4 B, 5 C, 6 A, 7 D**



... Alex and Mady were chatting with Rick at his Amateur Radio Club's National Field Day weekend ... when they heard some fast Morse Code being sent...



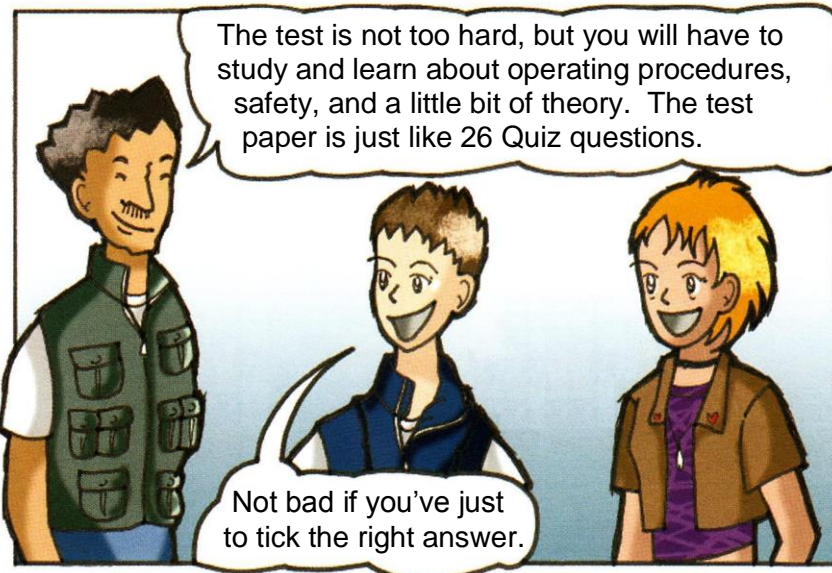
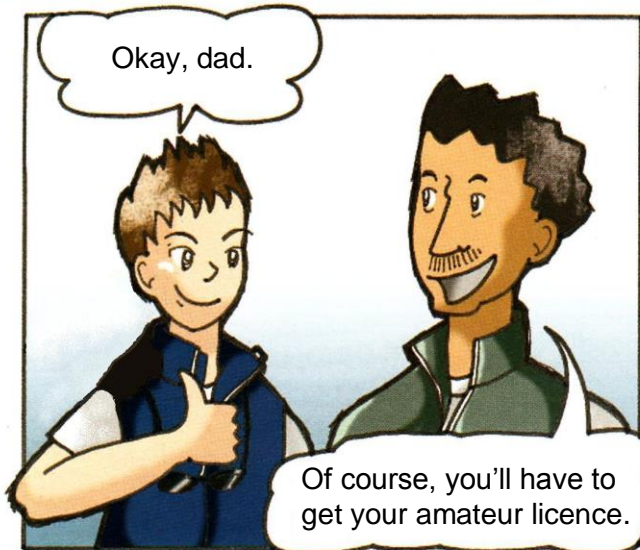
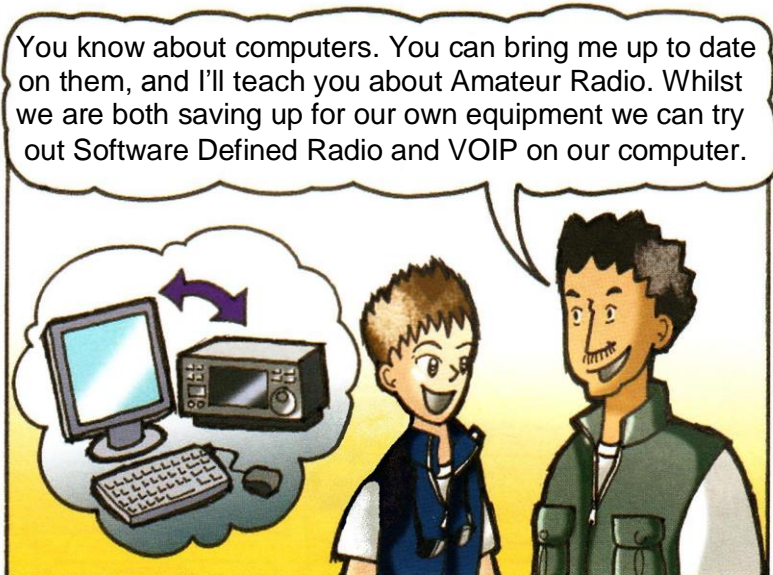
Barbara Dunne licenced as G6YL in 1927 was the first UK, and European, female Radio Amateur.



It has always been the custom to refer to female Radio Hams as **YLS** (Young Ladies). When she became the second female Radio Amateur Nell Corry took the call sign G2YL. **BYLARA** is the British Young Ladies Amateur Radio Association and has the Club call sign M0BYL. There is a quarterly Newsletter and the **BYLARA AWARD** is available for working BYLARA members and other YLS. Information can be found at <http://bylara.org.uk/>

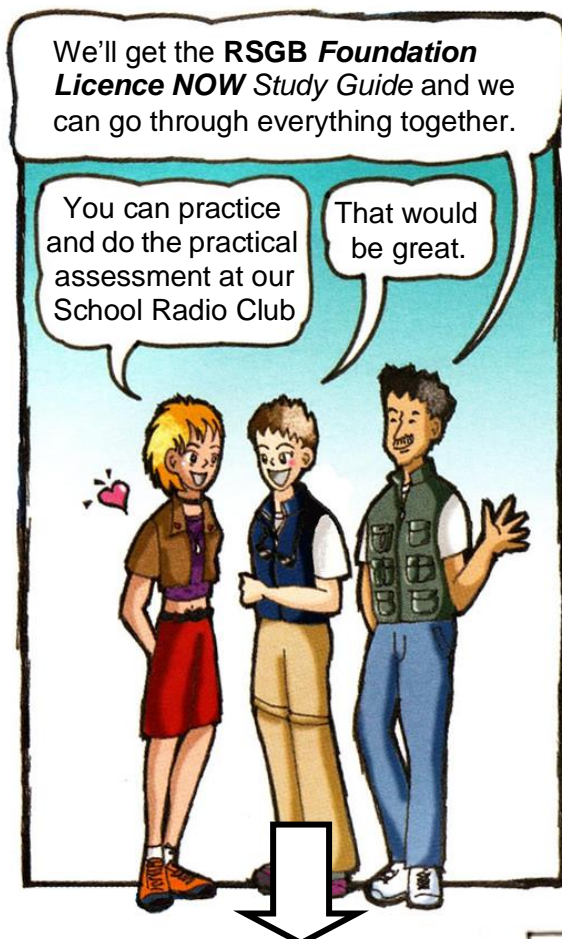




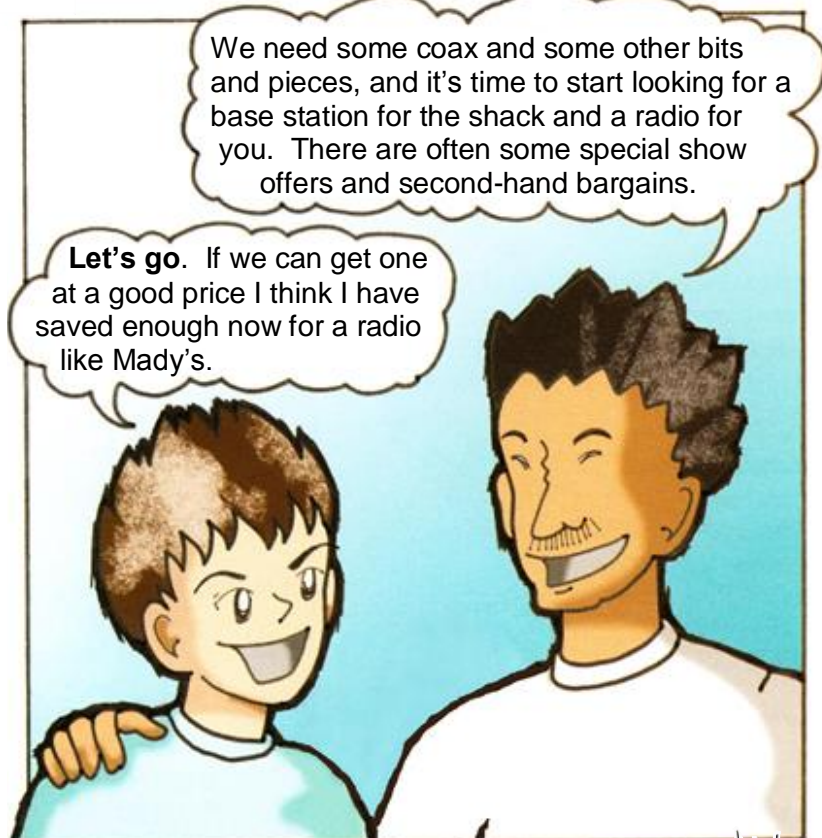


To begin transmitting on amateur radio you need to pass a simple multiple-choice test called the Foundation exam. The Foundation licence is your gateway to amateur radio. Studying for the exam that leads to the licence provides you with an exciting introduction to the hobby while requiring an acceptable minimum level of skill and experience. Your Foundation licence is recognized by the UK communications regulator Ofcom, and entitles you to take a unique identifier (call sign) which will be used to identify you when you are transmitting.





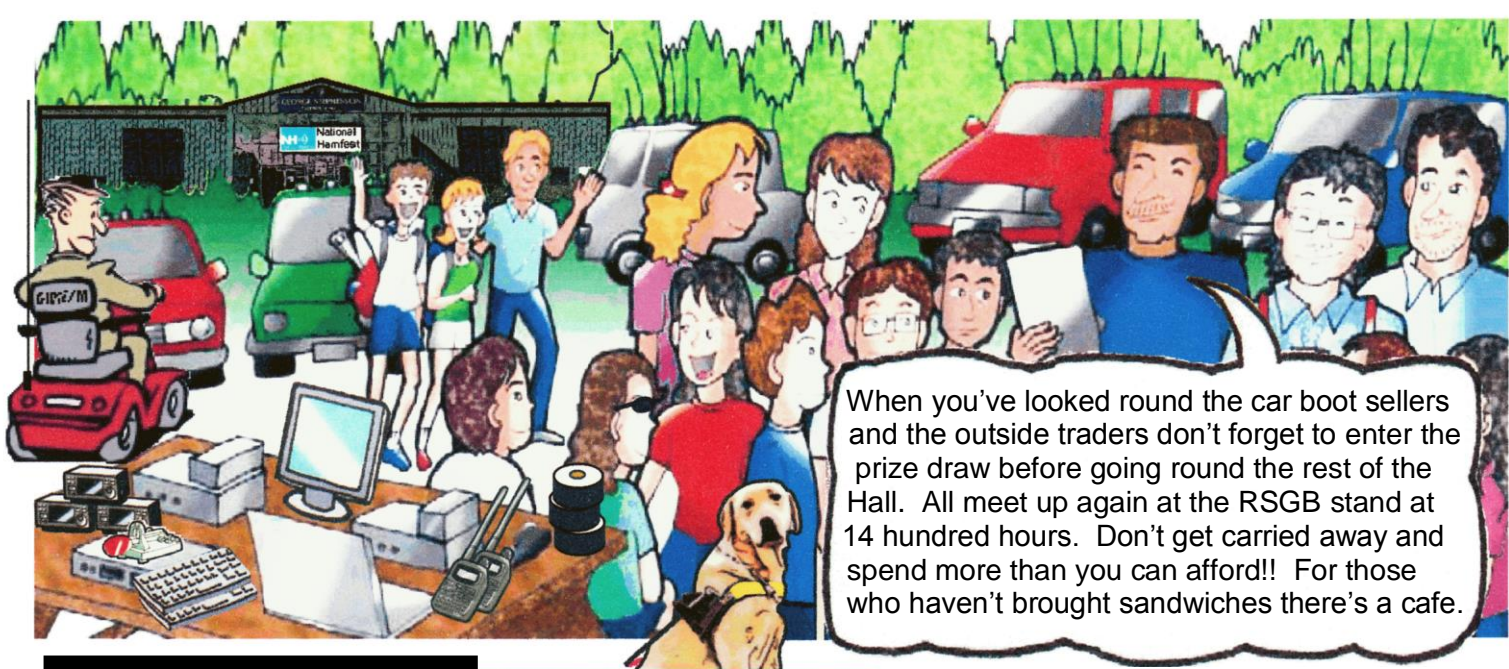
Alex read through the Study guide **Foundation Licence Now** with his dad explaining the bits that he didn't immediately understand. Along with this - and practical experience, and a bit more help, gained at the Radio Club he had recently joined - Alex quickly knew enough to demonstrate he was safe using Amateur Radio Equipment and that he understood the correct operating procedures. The Club Tutor awarded Alex his official RCF Practical Assessment **Record of Achievement**. This meant that Alex was legally able to operate the club's Full licence station under supervision. It also meant he could now take the examination for his own Foundation Licence. Alex took the test at the local Radio Club and like many people passed first time.



The **National Hamfest** is an annual event run by Lincoln Short Wave Club with the support and assistance of the **Radio Society of Great Britain (RSGB)**. It takes place over two days at the beginning of October / end of September each year and is held at Newark and Nottingham Showground, Newark, NG24 2NY. All the major retailers have stands as well as lots of smaller traders, clubs, and organizations. Admission tickets are cheaper if ordered in advance on the Internet. More details at [www.nationalhamfest.org.uk](http://www.nationalhamfest.org.uk)







## INSIDE THE EXHIBITION HALL



Look there's Kath and Dave.

Yes they help run our local Repeater Group. Dave was the President of the RSGB recently. Perhaps next time it will be Kath. Let's see if there are any books on the RSGB stand that we want. There are sometimes special offers and you save on the postage costs anyway.

Alex and his dad didn't find the base station they wanted but they did pick up lots of useful bits and pieces, including one of the latest dual band handhelds for Alex at under £40, and an SWR meter for checking and tuning antennas. They also met several people that they had talked to on the radio but never met in person before. Alex's dad visited the RAYNET stand to find out more about it, and he joined RAOTA. (The Radio Amateurs Old Timers Association) - you don't have to be old to join - just to have been involved in Amateur Radio in one form or another for at least 20 years!

How do you rate **National Hamfest** then?

**A Great Day.**

## THE END of the story so far.

Although they didn't find the base station they wanted at the National Hamfest there are plenty of other local Rallies held in different parts of the UK throughout the year. Bargains can also often be found on the Internet on sites such as ebay, JUNKSALE, Radioworld, Radioclassifieds, JBT, and many others.

Alex is still a student so he was able to get free membership of the RSGB once he had got his Licence. He found the society's monthly magazine very useful for finding out more about the hobby, what was on where and when, and reading reviews of equipment.

Impartial reviews of Amateur Radio equipment can also be found at <http://www.eham.net>

**QUIZ 4 ANSWERS: 1.D, 2.A, 3.B, 4.C, 5.A, 6.B, 7.B**





# FIND FREDDIE

Here are 23 facts. Some have already been mentioned. All are correct facts that you might like to know. To help you absorb them Freddie the ARDF fox is hidden 12 times in this booklet - each time close to one of the important facts listed below. Three times before Quiz 1, twice between Quiz 1 and 2, three times between Quiz 2 and 3, three times between Quiz 3 and 4, and once between Quiz 4 and this page. Can you find Freddie in each section and tick the 12 facts in the list below that Freddie is hiding close to in the pictures?

1. The transmission of music is unacceptable in amateur radio.
2. Electrical current is a measure of how much electricity is flowing. It is measured in Amps.
3. Potential Difference is measured in volts. An AA battery has a potential difference between its connectors of 1.5 volts and is safe to handle although its connectors must not be shorted out. The mains is 230 volts and can kill a person.
4. Band Plans are voluntary but the frequencies allocated to each amateur band are legally binding and you are only licensed to transmit on the frequencies which are shown in the Licence Schedule.
5. A simple transmitter consists of a microphone and Audio Stage (picks up and amplifies your voice), a Radio Frequency (RF) Generator (oscillator), a Modulator (the process of superimposing your voice signal on the oscillator signal is called modulation), an RF Power Amplifier, and an Antenna.
6. Amplitude Modulation AM, Frequency Modulation FM, and Single Sideband SSB are all types of modulation.
7. Foundation licence holders can construct equipment using commercially available kits. Intermediate and Full licence holders can design and build their own.
8. During transmissions the station must be clearly identifiable at all times. Unless specific requirements relating to band/mode apply then callsigns should be transmitted as frequently as is practicable.
9. A Dipole is a type of antenna. It consists of two elements, often lengths of wire at HF, with a connection in the middle to the radio.
10. VHF and UHF frequencies are used for line of sight communications.
11. Broadcasting, sending messages for general reception, is not permitted.
12. The Standard Phonetic Alphabet is not compulsory but it avoids confusion when talking to radio amateurs from other countries that do not speak the same language.
13. Transmitters can cause interference to your own, and neighbours, televisions and some other electrical/electronic appliances. EMC, Electromagnetic Compatibility, is the avoidance of such interference and has to be studied for the licence exam.
14. The Tuning and Radio Frequency stages of a receiver tune in (select) the wanted signal and amplify it.
15. The ionosphere has a greater bending effect on the lower radio frequencies than on the higher radio frequencies which are often not bent sufficiently to return to earth at all.
16. With VHF and UHF signals the best way to increase the range is to put the antenna as high as possible.
17. Where a UK call sign has a two character prefix the second character is a letter known as the Regional Secondary Locator.
18. The Morse character for the letter E is a single dot.
19. Software Defined Radio allows you to change the design and performance of different parts of the radio without changing the hardware (components).
20. Once you have been issued with an Official Record of Achievement you can legally operate an Amateur Transmitter under supervision.
21. The use of offensive or threatening language whilst on the air is unacceptable in amateur radio. If it is heard it is best ignored. Best practice is to let them be and tune to a different frequency. Responding can give the offender a feeling of power and can even encourage them to step up their efforts to annoy you and others!
22. OFCOM stands for Office of Communications - it is the regulator authority for the UK communications industries.
23. In the early days many Radio Amateurs set their station up in a shed or "shack" in the garden away from the house. We still refer to the room with our amateur radio station in it as our "shack" even if it is in the house.

**ANSWERS ARE ON THE BOTTOM OF PAGE 28**



## BECOME AN INSTANT SHORTWAVE LISTENER (SWL)

### FREE ACCESS TO RADIO RECEIVERS WORLDWIDE VIA YOUR COMPUTER

The link below is to state of the art software controlled receivers connected to the internet. You can use your home computer, laptop, or tablet to listen to and control these short-wave receivers and tune into the Amateur Radio Bands – many now also have mobile phone versions. Several users can listen to different frequencies at the same time – you choose the frequency and mode you want<sup>#See bottom of page27</sup>. You don't need a licence to use these receivers.

These receivers are experimental so may not be available every day 24/7. No changes are made to your computer settings and no software is downloaded or installed.

Firefox, Chrome, or other browsers that support HTML5, usually work first time without any problems. *Most Windows XP and above Computers work without any*

*problems. If you are using Windows Explorer then before listening to them you may need to add the Portals to Java's Exception Site List – follow the onscreen help. If you don't hear anything make sure you have selected HTML5 or Java as appropriate. If using Java make sure it is enabled in your browser's settings, and is an up to date version. Details are given later for doing this.*


An up to date list of Portals can always be found at <http://www.websdr.org/>

To try out these receivers copy one of the URLs from the list there and type or paste it in to your web browser ....

eg. <http://websdr.ewi.utwente.nl:8901/> .... and then press ENTER.

If using Java you might be asked "Do you want to run this application?" and you might have to click [RUN] two, or even three, times – it isn't obvious because the window doesn't change but this is once for each applet used. You should start to hear radio noise. (Make sure your volume is turned up).

Scroll down the screen, reading as you go, until you get to a box labelled "Your name or callsign:" Type a user name followed by SWL in this box (SWL stands for Short Wave Listener). e.g. "David SWL". Then keep scrolling down past the moving waterfall displays until you reach the Frequency, Bandwidth, Waterfall settings, and S Meter and MUTE button.

Click on a band you want to listen to. You can then either use the UP/DOWN buttons to change frequency, or type in a frequency, or scroll up to the Spectrum display for your chosen band and use the mouse to slide the yellow indicator  about in the band. Don't alter the width of the yellow indicator too much because this narrows the receiver bandwidth and you will then not hear wide SSB signals, only Morse and other data signals.

The receivers you are connected to only have a few electronic components and are very small. Look at the photograph of one above. Many amateurs have a lot of fun using these websites to hear their own signals and check on propagation conditions into different parts of the world. Sometimes when there is a lot of local electrical interference amateurs use them alongside their own local transceiver.

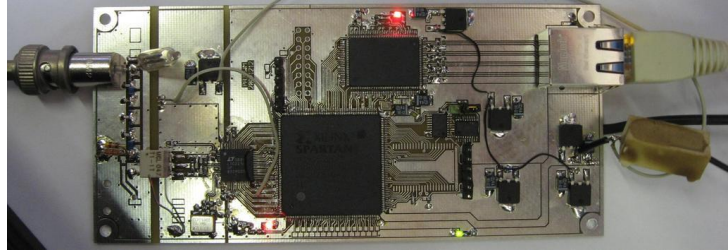
You might like to keep a log of the call signs that you hear and look up the prefix for the country they are from in the list on the next page, and see who they belong to at <http://www.QRZ.com>

**If you are using Java and having problems getting the receiver to work then try getting the latest Java Update online at:** <http://www.java.com/en/download/manual.jsp>

**To enable Java once updated/installed on Internet Explorer 4.x and Up then:-**

- Click "Tools" --> "Internet Options"
- Select the Advanced Tab, and scroll down to "Java (Sun)"
- Check the box next to the Java version
- Next, select the Security Tab, and select the "Custom Level" button
- Scroll down to "Scripting of Java applets"
- Make sure the "Enable" button is checked.
- Click OK to save your preference.
- 

You will find more help here: [http://www.java.com/en/download/help/enable\\_browser.xml](http://www.java.com/en/download/help/enable_browser.xml)





# International call sign prefixes

|                                      |   |   |  |
|--------------------------------------|---|---|--|
| AAA-ALZ United States of America     | HZA-HZZ Saudi Arabia                          | TYA-TYZ Benin                           | 3WA-3WZ Viet Nam                               |
| AMA-AOZ Spain                        | H2A-H2Z Cyprus                                | TZA-TZZ Mali                            | 3XA-3XZ Guinea                                 |
| APA-ASZ Pakistan                     | H3A-H3Z Panama                                | T2A-T2Z Tuvalu                          | 3YA-3YZ Norway                                 |
| ATA-AWZ India                        | H4A-H4Z Solomon Islands                       | T3A-T3Z Kiribati                        | 3ZA-3ZZ Poland                                 |
| AXA-AXZ Australia                    | H6A-H7Z Nicaragua                             | T4A-T4Z Cuba                            | 4AA-4CZ Mexico                                 |
| AYA-AZZ Argentina                    | H8A-H9Z Panama                                | T5A-T5Z Somalia                         | 4DA-4IZ Philippines                            |
| A2A-A2Z Botswana                     | IAA-IZZ Italy                                 | T6A-T6Z Afghanistan                     | 4JA-4KZ Azerbaijani Republic                   |
| A3A-A3Z Tonga                        | JAA-JSZ Japan                                 | T7A-T7Z San Marino                      | 4LA-4LZ Georgia                                |
| A4A-A4Z Oman                         | JTA-JVZ Mongolia                              | T8A-T8Z Palau                           | 4MA-4MZ Venezuela                              |
| A5A-A5Z Bhutan                       | JWA-JXZ Norway                                | T9A-T9Z Bosnia and Herzegovina          | 4NA-4OZ Yugoslavia                             |
| A6A-A6Z United Arab Emirates         | JYA-JYZ Jordan                                | UAA-UIZ Russian Federation              | 4PA-4SZ Sri Lanka                              |
| A7A-A7Z Qatar                        | JZA-JZZ Indonesia                             | UJA-UMZ Uzbekistan                      | 4TA-4TZ Peru                                   |
| A8A-A8Z Liberia                      | J2A-J2Z Djibouti                              | UNA-UQZ Kazakhstan                      | 4UA-4UZ United Nations                         |
| A9A-A9Z Bahrain                      | J3A-J3Z Grenada                               | URA-UZZ Ukraine                         | 4VA-4VZ Haiti                                  |
| BAA-BZZ China (People's Republic of) | J4A-J4Z Greece                                | VAA-VGZ Canada                          | 4WA-4WZ United Nations                         |
| CAA-CEZ Chile                        | J5A-J5Z Guinea-Bissau                         | VHA-VNZ Australia                       | 4XA-4XZ Israel                                 |
| CFA-CKZ Canada                       | J6A-J6Z Saint Lucia                           | VOA-VOZ Canada                          | 4YA-4YZ International Civil Aviation Authority |
| CLA-CMZ Cuba                         | J7A-J7Z Dominica                              | VPA-VQZ United Kingdom                  | 4ZA-4ZZ Israel                                 |
| CNA-CNZ Morocco                      | J8A-J8Z St. Vincent and the Grenadines        | VRA-VRZ Hong Kong                       | 5AA-5AZ Libya                                  |
| COA-COZ Cuba                         | KAA-KZZ United States of America              | VSA-VSZ United Kingdom                  | 5BA-5BZ Cyprus                                 |
| CPA-CPZ Bolivia                      | LAA-LNZ Norway                                | VTa-VWZ India                           | 5CA-5GZ Morocco                                |
| CQA-CUZ Portugal                     | LOA-LWZ Argentina                             | VXA-VYZ Canada                          | 5HA-5IZ Tanzania                               |
| CVA-CXZ Uruguay                      | LXA-LXZ Luxembourg                            | VZA-VZZ Australia                       | 5JA-5KZ Colombia                               |
| CYA-CZZ Canada                       | LYA-LYZ Lithuania                             | V2A-V2Z Antigua and Barbuda             | 5LA-5MZ Liberia                                |
| C2A-C2Z Nauru                        | LZA-LZZ Bulgaria                              | V3A-V3Z Belize                          | 5NA-5OZ Nigeria                                |
| C3A-C3Z Andorra                      | L2A-L9Z Argentina                             | V4A-V4Z Saint Kitts and Nevis           | 5PA-5QZ Denmark                                |
| C4A-C4Z Cyprus                       | MAA-MZZ United Kingdom                        | V5A-V5Z Namibia                         | 5RA-5SZ Madagascar                             |
| C5A-C5Z Gambia                       | NAA-NZZ United States of America              | V6A-V6Z Micronesia                      | 5TA-5TZ Mauritania                             |
| C6A-C6Z Bahamas                      | OAA-OCZ Peru                                  | V7A-V7Z Marshall Islands                | 5UA-5UZ Niger                                  |
| C7A-C7Z World Meteorological Org.    | ODA-ODZ Lebanon                               | V8A-V8Z Brunei                          | 5VA-5VZ Togo                                   |
| C8A-C9Z Mozambique                   | OEA-OEZ Austria                               | WAA-WZZ United States of America        | 5WA-5WZ Western Samoa                          |
| DAA-DRZ Germany                      | OFA-OJZ Finland                               | XAA-XIZ Mexico                          | 5XA-5XZ Uganda                                 |
| DSA-DTZ Republic of Korea            | OKA-OLZ Czech Republic                        | XJA-XOZ Canada                          | 5YA-5ZZ Kenya                                  |
| DUA-DZZ Philippines                  | OMA-OMZ Slovak Republic                       | XPA-XPZ Denmark                         | 6AA-6BZ Egypt                                  |
| D2A-D3Z Angola                       | ONA-OTZ Belgium                               | XQA-XRZ Chile                           | 6CA-6CZ Syria                                  |
| D4A-D4Z Cape Verde                   | OUA-OZZ Denmark                               | XSA-XSZ China                           | 6DA-6JZ Mexico                                 |
| D5A-D5Z Liberia                      | PAA-PIZ Netherlands                           | XTA-XTZ Burkina Faso                    | 6KA-6KZ Republic of Korea                      |
| D6A-D6Z Comoros                      | PJA-PJZ Netherlands Antilles                  | XUA-XUZ Cambodia                        | 6OA-6OZ Somalia                                |
| D7A-D9Z Republic of Korea            | PKA-POZ Indonesia                             | XVA-XVZ Viet Nam                        | 6PA-6SZ Pakistan                               |
| EAA-EHZ Spain                        | PPA-PYZ Brazil                                | XWA-XWZ Laos                            | 6TA-6UZ Sudan                                  |
| EIA-EJZ Ireland                      | PZA-PZZ Suriname                              | XXA-XXZ Portugal                        | 6VA-6WZ Senegal                                |
| EKA-EKZ Armenia                      | P2A-P2Z Papua New Guinea                      | XYA-XZZ Myanmar                         | 6XA-6XZ Madagascar                             |
| ELA-ELZ Liberia                      | P3A-P3Z Cyprus                                | YAA-YAZ Afghanistan                     | 6YA-6YZ Jamaica                                |
| EMA-EOZ Ukraine                      | P4A-P4Z Aruba                                 | YBA-YHZ Indonesia                       | 6ZA-6ZZ Liberia                                |
| EPA-EQZ Iran                         | P5A-P9Z Democratic People's Republic of Korea | YIA-YIZ Iraq                            | 7AA-7IZ Indonesia                              |
| ERA-ERZ Moldova                      | RAA-RZZ Russian Federation                    | YJA-YJZ Vanuatu                         | 7JA-7NZ Japan                                  |
| ESA-ESZ Estonia                      | SAA-SMZ Sweden                                | YKA-YKZ Syria                           | 7OA-7OZ Yemen                                  |
| ETA-ETZ Ethiopia                     | SNA-SRZ Poland                                | YLA-YLZ Latvia                          | 7PA-7PZ Lesotho                                |
| EUA-EWZ Belarus                      | SSA-SSM Egypt                                 | YMA-YMZ Turkey                          | 7QA-7QZ Malawi                                 |
| EXA-EXZ Kyrgyzstan                   | SSN-STZ Sudan                                 | YNA-YNZ Nicaragua                       | 7RA-7RZ Algeria                                |
| EYA-EYZ Tajikistan                   | SUA-SUZ Egypt                                 | YOA-YRZ Romania                         | 7SA-7SZ Sweden                                 |
| EZA-EZZ Turkmenistan                 | SVA-SZZ Greece                                | YSA-YSZ El Salvador                     | 7TA-7YZ Algeria                                |
| E2A-E2Z Thailand                     | S2A-S3Z Bangladesh                            | YTA-YUZ Yugoslavia                      | 7ZA-7ZZ Saudi Arabia                           |
| E3A-E3Z Eritrea                      | S5A-S5Z Slovenia                              | YVA-YYZ Venezuela                       | 8AA-8IZ Indonesia                              |
| E4A-E4Z Palestinian Authority        | S6A-S6Z Singapore                             | YZA-YZZ Yugoslavia                      | 8JA-8NZ Japan                                  |
| FAA-FZZ France                       | S7A-S7Z Seychelles                            | Y2A-Y2Z Germany                         | 8OA-8OZ Botswana                               |
| GAA-GZZ United Kingdom               | S8A-S8Z South Africa                          | ZAA-ZAZ Albania                         | 8PA-8PZ Barbados                               |
| HAA-HAZ Hungary                      | S9A-S9Z Sao Tome and Principe                 | ZBA-ZJZ United Kingdom                  | 8QA-8QZ Maldives                               |
| HBA-HBZ Switzerland                  | TAA-TCZ Turkey                                | ZKA-ZMZ New Zealand                     | 8RA-8RZ Guyana                                 |
| HCA-HDZ Ecuador                      | TDA-TDZ Guatemala                             | ZNA-ZOZ United Kingdom                  | 8SA-8SZ Sweden                                 |
| HEA-HEZ Switzerland                  | TEA-TEZ Costa Rica                            | ZPA-ZPZ Paraguay                        | 8TA-8YZ India                                  |
| HFA-HFZ Poland                       | TFA-TFZ Iceland                               | ZQA-ZQZ United Kingdom                  | 8ZA-8ZZ Saudi Arabia                           |
| HGA-HGZ Hungary                      | TGA-TGZ Guatemala                             | ZRA-ZUZ South Africa                    | 9AA-9AZ Croatia                                |
| HHA-HHZ Haiti                        | THA-THZ France                                | ZVA-ZZZ Brazil                          | 9BA-9DZ Iran                                   |
| HIA-HIZ Dominican Republic           | TIA-TIZ Costa Rica                            | Z2A-Z2Z Zimbabwe                        | 9EA-9FZ Ethiopia                               |
| HJA-HKZ Colombia                     | TJA-TJZ Cameroon                              | Z3A-Z3Z Macedonia (Former Yugoslav Rep) | 9GA-9GZ Ghana                                  |
| HLA-HLZ Republic of Korea            | TKA-TKZ France                                | 2AA-2ZZ United Kingdom                  | 9HA-9HZ Malta                                  |
| HMA-HMZ Korea                        | TLA-TLZ Central Africa                        | 3AA-3AZ Monaco                          | 9IA-9JZ Zambia                                 |
| HNA-HNZ Iraq                         | TMA-TMZ France                                | 3BA-3BZ Mauritius                       | 9KA-9KZ Kuwait                                 |
| HOA-HPZ Panama                       | TNA-TNZ Congo (Republic of the)               | 3CA-3CZ Equatorial Guinea               | 9LA-9LZ Sierra Leone                           |
| HQA-HRZ Honduras                     | TOA-TQZ France                                | 3DA-3DM Swaziland                       | 9MA-9MZ Malaysia                               |
| HSA-HSZ Thailand                     | TRA-TRZ Gabon                                 | 3DN-3DZ Fiji                            |  |
| HTA-HTZ Nicaragua                    | TSA-TSZ Tunisia                               | 3EA-3FZ Panama                          |  |
| HUA-HUZ El Salvador                  | TTA-TTZ Chad                                  | 3GA-3GZ Chile                           |  |
| HVA-HVZ Vatican City State           | TUA-TUZ Ivory Coast                           | 3HA-3UZ China                           |  |
| HWA-HYZ France                       | TVA-TXZ France                                | 3VA-3VZ Tunisia                         |  |

**Example:** M6ABC prefix is **M** and MAA to MZZ is United Kingdom  
DJ2RD prefix is **DJ** and DAA to DRZ is Germany

# To know what frequencies to listen on visit the page address below. When using Single Sideband - USB is usually used on 60m, and on 20m and above. LSB is usually used on the other bands. <http://rsgb.org/main/operating/band-plans/>





## Further Reading



### Internet

If you are interested in taking up this fascinating hobby you can find lots of information on the RSGB pages “**What is Amateur Radio?**” at <http://rsgb.org/main/get-started-in-amateur-radio/what-is-amateur-radio/>

### Books

**If you are thinking of studying for a transmitting licence then you might like the study guide:**

#### **Foundation Licence - Now !**

By Alan Betts, G0HIQ

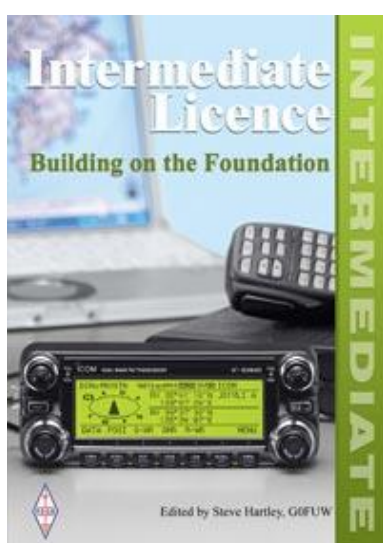
If you want to obtain an Amateur Radio Foundation Licence this book is for you. This is the latest edition of the Radio Society of Great Britain (RSGB) book that contains all that is required to obtain a Foundation licence. Even if you just want to know about Amateur Radio this book provides insight into the technical basics, receivers, transmitters and antennas. How and where to operate with your new licence are covered along with safety considerations and electromagnetic compatibility. Written in an easy to use and understand style this is the ideal book for young and old alike.

RSGB, paperback, 297 by 210mm, 36 pages, ISBN: 9781-8723-0980-4



Non Member's Price £4.99  
Reductions for RSGB Member's

Study Guides are also available for the Intermediate and Full licences.



All available direct from the RSGB or good bookshops.

**FREDDIE THE FOX ANSWERS: FACT NUMBER: PAGE,**

**1:2, 4:3, 6:4, 9: 6, 10:8, 12:11, 14:13, 15:14, 17:16, 18:18, 19:19, 20:23**



# Getting started in Amateur Radio



## The Foundation Licence

The Foundation licence is your gateway to amateur radio. The course and exam that leads to the licence provides you with an exciting introduction to the hobby while requiring an acceptable minimum level of skill and experience. Your Foundation licence is recognised by the UK communications regulator Ofcom, and entitles you to take a unique identifier called a callsign which will be used to identify you when you are transmitting.



## The Foundation Course

The Foundation courses take place locally in a friendly and informal environment and are conducted by experienced radio amateurs, usually at a local radio club. Most of the training is practical, there is a small amount of radio and electronics theory but only enough for you to appreciate things like using the correct fuses in your equipment and how to build an antenna to get the most out of your radio station. Your course will take 10 to 12 hours to complete, and can be spread out over a few weeks or weekends. You can find more details of the Foundation Level Course at:

<http://rsgb.org/main/clubs-training/for-students/foundation/> and of local clubs via the link on the back cover of this booklet.



## The Foundation Exam

Don't be put off by the thought of having to do an exam. The Foundation exam is very straightforward and consists of 26 multiple choice questions which you have 55 minutes to answer. Some of the Quiz questions in this book are taken from actual exams. Your exam paper is checked by the invigilator straight after the exam so there is no long wait to know whether you have passed or not. For the Foundation licence course exam there is a fee of £27.50.



## What happens after the Foundation Exam?

If you have passed the Foundation exam you will receive a certificate and your candidate number in the post from the RSGB Examinations Department. The next step is to log on to the Ofcom licensing system to apply for your licence. If you apply for your Foundation licence on the Ofcom website, your licence is free of charge. Details at: <http://licensing.ofcom.org.uk/radiocommunication-licences/amateur-radio/>



Once you have your Foundation licence and have chosen a callsign, you are ready to make your first transmission on the amateur radio bands; an exciting moment. You are now free to operate on the amateur bands, without supervision, up to a power of 10 watts. This does not sound like very much power, but once you have acquired experience operating your radio you will find it is enough to communicate anywhere in the world.

To find out more call the RSGB on 01234 832 700 and choose option 5 for Amateur Radio Enquiries. Our advisors will be pleased to answer *any* question you may have about obtaining a Foundation licence.

The **RSGB** wishes you the best of luck on your journey to becoming a licensed radio amateur.



## **The Radio Amateurs' Emergency Network**

RAYNET, The Radio Amateurs' Emergency Network is the UK's national voluntary communications service provided for the community by licensed radio amateurs.



RAYNET was formed in 1953 following the severe East coast flooding, to provide a way of organising the valuable resource that Amateur Radio is able to provide to the community.

Since then, it has grown into a very active organisation with around 2000 members, providing communication assistance on many hundreds of events each year.

The primary aim of the organisation is to provide communications in times of emergency and disaster. The list of 'User Services' (i.e. people who we are allowed under the terms of the Amateur transmitting licence to pass messages on behalf of) who may call on our help include:

- Any UK Police force, Fire & Rescue service or Ambulance trust.
- HM Coastguard
- Local Authority Emergency Planning Officers
- Any health authority
- Any government department
- British Red Cross
- St John Ambulance
- St Andrew's Ambulance Association
- WRVS
- Salvation Army
- Any 'Public Utility'. This can include BT, Gas and Water suppliers etc.

As well as planned events, RAYNET is available to the user services on short notice callout, with teams mobilised typically within one hour. In many cases the use of RAYNET is written into the user services' major incident plans, so that they may alert the organisation at an early stage.

To ensure that our approach to an incident is professional and that the members have a good idea what is expected of them, the organisation is involved with many hundreds of community events such as sponsored walks, marathons etc. which, as well as providing help for the User Services (most often St. John Ambulance and Red Cross), provide a valuable training ground for our members.

During the summer months, many groups are out on events nearly every weekend. During the winter, there are regular training evenings to introduce, discuss and learn new skills.

One of the rewards members of the organisation get is a strong sense of providing worthwhile service to the community in return for the privilege of the transmitting licence, as RAYNET is the only really public face of Amateur radio.

If you would like to find out more about RAYNET, including how to find and join a group near you please visit the RAYNET website at: <http://www.raynet-uk.net/main/>



or, if you have a smartphone scan the QR code on the left.



## Activities to watch out for

If you are out and about in June, July, and September you might come across National Field Day activities. The first weekend in June is a CW (Morse Code) event. A SSB (voice) Field Day is held during the first weekend in September, and a VHF Field Day in July. On the third full weekend of October you might come across scouts and guides taking part in the annual Jamboree-on-the-Air.



Around the second week in May every year you will find Amateur Radio stations set up in wind and water mills around the country for National Mills Weekend. Every August Amateur Radio Stations are set up in lighthouses around the world for International Lighthouse/Lightship Weekend.

There are also special event stations set up at lots of other venues throughout the year and at the National Radio Centre, Bletchley Park (check NRC opening days and times as these are not the same as Bletchley Park itself). If you come across any of these be sure to take a look and ask about the hobby. You need to have a licence to operate the equipment but at some special event stations it is possible for visitors to get on the mic and talk to amateurs around the world.



[Jamboree-on-the-Air](#)



[Mills on the Air](#)



[Lighthouses on the Air](#)



[National Radio Centre](#)

or to find your local club go to: <http://rsgb.org/main/clubs-training/find-a-club/> and enter your postcode.



## Notes:



I just googled YOTA UK and found out about "Youngsters on the Air".  
[https://twitter.com/YOTA\\_UK](https://twitter.com/YOTA_UK)

Also found the International website at <http://www.ham-yota.eu/>



*A British astronaut Tim Peake was on the International Space Station during the first half of 2016. Tim used the special call sign GB1SS to contact Radio Amateurs all round the world as well as undertaking a special programme of amateur radio contacts with a number of schools across the UK.*



<http://rsgb.org/main/blog/front-page-news/2014/10/24/gb1ss-uk-astronauts/>



I nearly forgot - there's a really cool couple of short videos introducing Amateur Radio at: [https://youtu.be/8x6x\\_6mDVIQ](https://youtu.be/8x6x_6mDVIQ) and <http://youtu.be/ieM0nY1moke> I think you will like them.



### **ICOM have supported the production of this booklet**

ICOM, Inc., founded by Tokuzo Inoue, JA3FA, is a worldwide leading manufacturer of Amateur and other radio equipment. Headquartered in Osaka, Japan, ICOM entered the radio business 50 years ago, creating some of the first transistorised amateur radio transceivers. Today, ICOM is proud to continue its advancement of the hobby by offering a wide range of amateur radios – from cutting-edge, digital technology base transceivers, to innovative handheld radios. ICOM is always working to improve its products by employing the latest technology, listening to customer suggestions, and drawing from experience in the radio industry.

#### **ICOM, Inc.**

1-1-32, Kamiminami, Hirano-ku,  
Osaka, 547-0003, Japan  
06-6793-5302  
06-6793-0013 (fax)  
[www.icom.co.jp](http://www.icom.co.jp)

#### **Icom (UK) Ltd,**

Blacksole House  
The Boulevard, Altira Park,  
Herne Bay, Kent CT6 6GZ  
Tel: +44 (0) 1227 741741  
Fax: +44 (0) 1227 741742  
[www.icomuk.co.uk](http://www.icomuk.co.uk)

## What is amateur radio?

Amateur Radio interests people of all ages, particularly those who are curious about “how things work”. This exciting hobby provides a unique opportunity to use our own designated radio frequencies for non-commercial transmission of messages, experimentation, self-training, and emergency communications – as well as just for fun.

Activities like Radio Direction Finding (similar to orienteering but with a high-tech “spin”), Field Days, Summits on the Air, and IOTA (Islands On The Air), allow the rest of our family and friends to enjoy our amateur radio activities as well!

Amateur Radio is the original high technology “social network”. On air you will meet royalty, celebrities, public figures, those at work or unemployed; and all ages from youngsters to old timers. Using call signs as identifiers, there is no status on the air, and you talk, equal to equal, to everyone you contact.

### Radio amateurs enjoy their hobby in a number of ways:

- Simply having fun contacting people by radio all over the world, as well as just round the corner - which often leads to developing lasting local and international friendships.
- Taking part in local, national, and international competitions to test how effective their equipment is, and how good they are as an operator.
- Technical experimentation including building their own equipment from kits or from their own designs - many of the advances in radio technology have been developed, and used first, by radio amateurs.
- Communicating through amateur space satellites, with the International Space Station, by moonbounce, and the latest integrated internet, digital, and GPS technologies.
- Providing communications at times of emergencies, and keeping in practice by undertaking exercises and providing communications at local and national community events such as marathons and sponsored walks and bike rides.

There is no better way to explore the fascinating “*state of the art*” world of voice, television, and data communications involving: radio, computers, GPS, internet and satellites, than by becoming a radio amateur. Getting started need not cost the earth there is plenty of inexpensive and second hand equipment available on the internet and at local Rallies.

Whatever your interest in radio communications, you will find others sharing that interest - from “geeky” experimenters to those just interested in chatting on the airwaves.



**LATEST AMATEUR RADIO RIGS FROM ICOM**  
For details of all the latest Rigs from ICOM go to:  
[http://www.icomuk.co.uk/Amateur\\_Radio\\_Ham](http://www.icomuk.co.uk/Amateur_Radio_Ham)



### **AMATEUR RADIO SMARTPHONE APPS:** (*search for them on Play Store etc.*)

QrzDROID – look up callsigns to see who people are and where their QTH is.

Repeater UK – find the nearest repeater to listen through / transmit through.

APRSdroid – plot your location and see other Amateurs on APRS.fi map.

EchoLink – talk to amateurs worldwide relayed through repeaters or direct.

Morse Decoder – auto-read Morse Code – some free apps and some at low cost.



**This booklet presented by:**

To find out more about local clubs go to: <http://rsgb.org/main/clubs-training/find-a-club/>

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free Adobe Reader  
<http://arbooklet.wordpress.com>





**Please feel free to print a copy of this booklet for your own personal use if you so wish**

**INSTRUCTIONS ON HOW TO PRINT AN A5 SIZE BOOKLET USING ONLY 10 SHEETS OF A4 PAPER ARE ON THE LAST PAGE**

**REMOVE THIS UNWANTED BACK SHEET**





## INSTRUCTIONS FOR PRINTING AN A5 SIZE BOOKLET

From within Adobe Reader select PRINT – Booklet - Both sides – Sheets 1 to 10 – Binding Left – Portrait and then Print this booklet on to A4 paper.

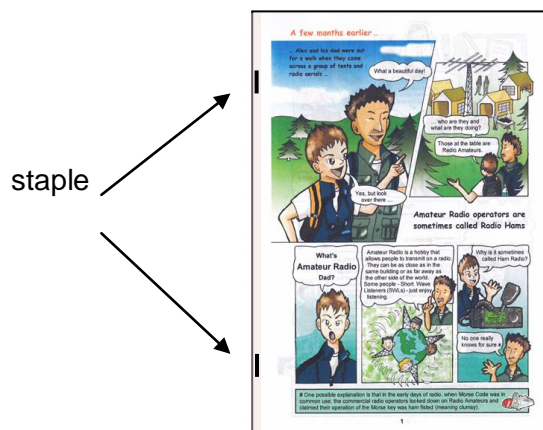
Remove this sheet of paper (with the front cover and these instructions on it) from the rest of the 9 sheets.

Trim this part off the sheet with a sharp knife or scissors along the dotted line leaving a strip to wrap around the booklet when the front cover is later glued in place (see the bottom of this page).

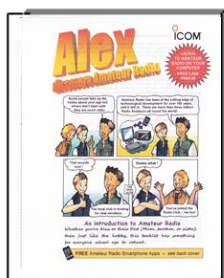
Carefully mark the centre of the top sheet of the remaining sheets and cut them in half using a sharp knife and a ruler.



Place the pile containing pages 1 to 18 on top of the pile containing pages 19 to back cover (with pages 18 and 19 facing each other). Remove the unwanted back sheet. Square the pages up and staple them close to the centre edge with two staples as below.



Run a glue stick along the front stapled edge (shaded in pink above) and place the front cover carefully in place. Turn the booklet over and paste along the inside of the front cover flap before folding it carefully over and sticking it to the back cover concealing the staples.



Glue flap and fold over

If you don't have a glue stick then trim the front cover and include in pile before stapling.