

Thank you for your answers to my Lesson 13A.

I have been through your papers and have decided to send everyone the complete set of answers even if they got all the answers correct or nearly all correct. This has enabled me to enlarge on some of the points and give you all some further information. Some of this information is beyond what is necessary for the RAE itself. For example, you do not need to know the details given as an expansion of the beacon answer, but I think it is of interest.

1. Is it compulsory to comply with band-plans while operating amateur radio equipment in the United Kingdom?

No. It is not compulsory for UK Amateurs to comply with Band Plans as they do not form part of the Amateur Licence itself.

2. Give three advantages of band-plans.

Different modes of transmission are given separate portions of the bands resulting in less mutual interference. It is easier to find the mode that interests you.

Local and long distance (DX) contacts are kept apart.

High and low power stations use different parts of the band.

3. Who plans the band-plans?

Amateurs themselves devise the band plans.

They are planned by the International Amateur Radio Union (IARU).

This comprises national amateur societies such as the RSGB.

4. Are there any disadvantages of the band-plan system?

Not all countries, unfortunately, have the same band plans. Under certain conditions it can result in one section of a band being overcrowded whilst other sections are almost empty. Being voluntary there will always be those who will not abide by the plans. They point out that their licence does not restrict the permitted modes to any particular part of the bands. They therefore continue to operate against the band plan recommendations.

5. What is the purpose of a “calling frequency”?

Certain frequencies are designated as calling frequencies.

Often there is one for each of the usual modes of transmission.

These are used to make the initial contact with another station. The conversation is then continued on another, mutually agreed, frequency that has been found to be unoccupied.

Calling frequencies are most useful when bands are lightly used or for modes of a minority interest.

6. If your radio equipment draws 4 Amps (at 240 Volts), what value fuse would you fit in the 13 Amp plug?

A fuse is put into a circuit to be the intentional weak link. If, due to a fault, the current rises above its normal value there is a risk that the wiring would overheat. To avoid this danger a fuse rated at or just above the normal current should be fitted.

A piece of equipment drawing 4 Amps should, ideally, be fitted with a 4 Amp fuse. However, there are only a few values available in the $\frac{3}{4}$ inch size designed for the square pin plugs. At best you will only be able to get such fuses rated at 2, 3, 5, 10 and 13 Amps.

In our example a 5 Amp fuse should be used. The current marked on a fuse is the current that it will carry indefinitely without blowing. The fusing current (the value at which it will blow immediately) is approximately twice this value. If a 3 Amp fuse had been used it would have been OK for short periods. The longer that 4 Amps flows through a 3 Amp fuse the warmer the fuse wire will get. Given sufficient time it will melt.

7. Should aerials be disconnected from the radio during an electrical storm?

It is not wise to have an aerial connected to your radio equipment during an electrical storm.

The high voltage that builds up could easily damage sensitive high Impedance circuits.

However, once an electrical storm has actually started, it would be very unwise to touch the aerial or feeder cables. For your own safety it should be done before the storm starts or not at all!

8. Why do amateur repeaters transmit and receive on different frequencies?

Normally when two Radio Amateurs are in communication with each other they use the same frequency.

Hopefully they do not both talk (transmit) at the same time. One transmits while the other is receiving and then they swap round.

When Amateurs use a repeater they still only talk one at a time but they have to transmit on one frequency and listen on another - why? Although there is only one person transmitting at a time the repeater has to both transmit and receive at the same time. It has to receive the signal from the transmitting Amateur and transmit it to the receiving Amateur.

If the repeater were to transmit and receive on the same frequency it would always hear only its own transmission and would probably go round in ever decreasing circles and disappear up its own coaxial cable!

9. What is the purpose of an amateur radio beacon?

The propagation of radio waves are affected by many factors such as weather, time of day, season and point in the sunspot cycle. Their effect is also dependant on the frequency in question.

It is very useful to know the true condition of what may appear to be a quiet band. Quite often it is difficult to know if this silence is due to propagation conditions or just the fact that there is no-one talking. If everybody listens nothing is heard....

Beacons can overcome this problem. Beacons are transmitters, built by Amateurs, and specially licenced to transmit 24 hours a day - unattended. They always give their callsign (in morse) and often give their location and other details. It is not useful or necessary to have beacons on all Amateur bands. The most common ones are on the 144, 432 and 28 MHz bands. The geographical distance between beacons depends on their band of operation. The VHF and UHF bands have many beacons spread around the country whereas on 28 MHz there are only about 28 beacons throughout the world. All the beacons on these bands transmit on different frequencies and identify themselves in CW. If you are not yet able to read CW it is possible to obtain a list from the RSGB.

Until recently there have not been any beacons on the 14 MHz band. This is a very busy band and no doubt to have a portion set aside for beacons would be resented. However it is very useful to know which parts of the world are 'open' on this band any any particular time. A very good compromise has been devised. Ten beacons scattered throughout the world all operate on 14.100 MHz. At first sight this looks like a recipe for total confusion. This would certainly be the case if they all transmitted at the same time. The clever answer is that they transmit in sequence. During the first minute the New York beacon transmits. During the next minute it is replaced by a beacon in California. These are followed in turn by Honolulu, Tokyo, Telaviv, Espo, Maderia and Transvaal. At the moment there two vacancies in the ten minute sequence. This pattern is repeated 24 hours a day every ten minutes. There is another clever bit - each transmission minute is divided up as follows:

0- 12 seconds period the beacon gives its callsign in CW
at 100 Watts

13- 22	second period is a carrier at 100 watts
22- 32	second period the carrier is reduced to 10 Watts
33- 42	second period carrier at 1 Watt
43- 52	second period the carrier is only 100 milliwatts
53- 57	second period the CW identification once again at full power (100 W)

10. What precautions should be taken when erecting aerials?

Some precautions are mentioned in the Amateur Licence Conditions.

I quote:

“Clause 4(1) of the licence requires that the apparatus in the Station shall be so designed, constructed, maintained and used that the use of the station does not cause any undue interference with any wireless telegraphy.

In order to prevent interference due to close coupling of antennas, the antenna to be used for the Station should be sited as far as possible from any existing television or other receiving antennas in the vicinity. This is particularly important if it is proposed to install an indoor transmitting antenna, eg in a loft, where interference may be conducted through the electricity supply wiring. In some circumstances it might not be possible to use an indoor antenna. “If the Station is situated within 0.80 km of the boundary of any aerodrome, the height of the antenna or any mast supporting it must not exceed 15 metres above the ground.” “An antenna which crosses above or is liable to fall or to be blown on to any overhead power wire (including electric lighting) or power apparatus must be guarded to the reasonable satisfaction of the power wire or power apparatus concerned.

11. Which lesson are you up to in the correspondence aid?

(This question is only useful when I have not been your tutor)

12. When discharging a capacitor a series resistor is used. Why the resistor?

If the capacitor were discharged with just a piece of wire the initial current would be enormous. Such a heavy current is very likely to damage the capacitor permanently. The resistor should not be too high else it will take too long for the capacitor to be safely discharged. The actual value chosen will depend on both the operating voltage and capacitance of the capacitor.

13. Why should you work with one hand in your pocket when faulting live equipment?

When working on live equipment you should stand on an insulating rubber mat and use only one hand. To avoid electrocution it is important to ensure that an electric current is not allowed to pass through your body. As you know two connections are required for a complete circuit so if you make sure there is only one you will be much safer. The worse thing that can do is to use both hands as this means that the electric shock current will pass through your heart. This is likely to be very unhealthy for you and a shock to everyone else.

14. Why should cold water pipes not be relied on as good earths?

There are two reasons that a 'good earth' is necessary. Firstly, most equipment requires an earth for safety reasons. A water pipe should not be trusted for this purpose nowadays as it is very likely to have plastic sections of pipe. Whereas plastic is fine for conducting water it is no good at for conducting electricity! Secondly an earth is used as part of the aerial system. Once again there is the problem of plastic pipes but pipes that wander round the house and visit most rooms are a means of introducing your transmitted signal where you don't want it - IE In your TV and HI-FI equipment.

15. A mains "master switch" is recommended in the radio shack.

Why?

The power to all equipment in the Amateur Radio Station should be controlled by one master switch. This enables everything to be turned off quickly if there is a problem. You should make the switch obvious so that everything can be turned off by some-one else if it is you that have the problem. It is also very useful to have a 'mains on' indicator connected to this switch and positioned so that it cannot be missed as you leave or enter the 'shack.'

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