UK Foundation Amateur Radio License

Safety

Safety Considerations

Most of the syllabus is common sense but there are some important concepts too!

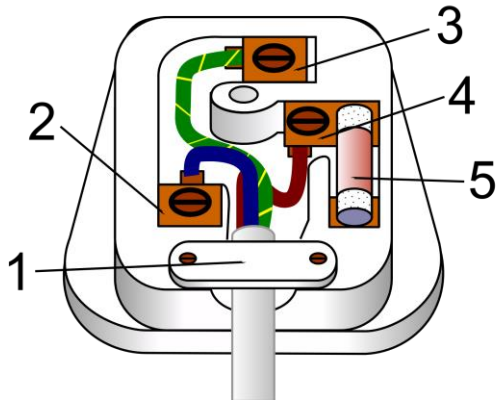
General Electrical Safety

- Mains voltages can be lethal, with higher-powered RF transmitters (and their power supplies) also potentially containing lethal voltages
- High currents (such as from some batteries) carry a risk of overheating and fire, even at low voltages, particularly if they are short-circuited.
- Common sense at foundation level:
  - Only work inside equipment that is disconnected from the power source.
  - Remove rings/wrist watches ect. when dealing with sources of high current.
  - Only use equipment according to manufacturer instructions, especially charging batteries using the correct charger (particularly lithium batteries as they can explode if not used correctly).

Mains Plugs

Image Source: https://commons.wikimedia.org/wiki/File:Three_pin_mains_plug_(UK).svg

- It is good general knowledge to know how to wire a 3-pin mains plug correctly (particularly an electronics engineer…):



1 – Cable (chord) grip
2 – Blue: Neutral terminal
3 – Yellow/Green: Earth terminal
4 – Brown: Live terminal
5 – Fuse

- The correct fuse must be fitted so that it will ‘blow’ before anything else overheats. For example, a mains flex will overheat well below 13A, so *a higher rating is not always appropriate*.
- Not all faults are a short circuit. If your fuse is blowing, this needs to be investigated.

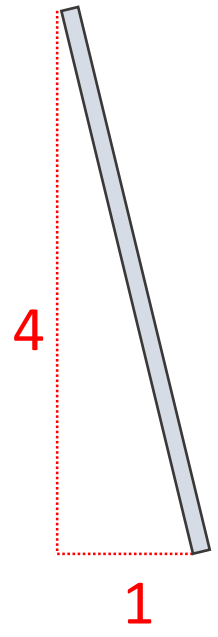
General Tool Safety

Common sense applies (again):

- Wear eye protection when working with tools.
- When soldering:
  - Use a soldering-iron stand.
  - Ventilate the solder fumes.
  - Wear eye protection to prevent solder or flux splashing into the eyes.
- When working at height, wear a tool belt and hard hats.
- Keep your station tidy – No wires trailing, avoid trip hazards, clean up after yourself (***THIS APPLIES TO THE UNDERGRADUATE LAB TOO***).
- Don’t turn your headphones too loud…

Easy Exam Mark

- ***The ladder should be at a 4:1 angle*** (4 units of height for every 1 unit of length out from the wall).



Master OFF Switch

- All stations is likely to have several devices, potentially high power, plugged into the mains supply – A master switch controlling the radio(s), accessories and workbench should be clearly marked ‘OFF’.
- If there is a serious accident, the casualty may still be in contact with the live mains – If another person then touches them, they could also be electrocuted.
- Therefore, the first action must always be to ***cut the power using the master switch.***

RCBO

- A Residual Current Circuit Breaker with Overcurrent protection (RCBO) contains an electromechanical fuse, cutting the circuit if the set current limit is exceeded. *Its workings are not examinable but its use is.*
- It has advantages over a wire fuse:
  - It is resettable.
  - The residual current section detects if live/neutral are not identical (normally about a 30 mA difference which is far smaller than a wire fuse can detect). This means if somebody touched the live wire, some current would pass to earth via them, not through the neutral : A RCBO can prevent this.
- NOTE: Contact with both live and neutral at the same time will still cause an electric shock (a RCBO or fuse cannot prevent this).

PME

- Do not mix RF and mains earths.
- If you fit an RF Earth (which you should), you must inform your District Network Operator (DNO) – Your electricity provider will provide you with your local DNO details.
- This is particularly important if your electricity supply is of a type known as ***Protective Multiple Earth (PME)***.
- PME is a particular method of earthing devices via the mains supply (its workings are not covered in the Foundation course).

RF Burns/Dangers

- RF burns are electric shocks from elements containing RF power (antennas, feeders ect.).
- General guidelines to follow:
  - **Do not touch antennas during transmission**, insulated but unscreened antennas/wires can cause almost as much damage as a bare wire.
  - Field strengths close to an antenna (particularly in the beam of a Yagi) can be high enough to **heat body tissue** when working at high powers. The eyes are particularly susceptible (as there is no blood flow to disperse the heat).
  - **Do not look down waveguides if they are in use** – The RF energy is concentrated in the guide.

Antennas and Lightning

- ***High antennas may need protection against lightning.*** Contact your building planning department (or local authority) before putting one up.
- Common sense advice:
  - Mount antennas securely against the elements (you don't want the wind blowing it into your neighbour's property…).
  - Keep antennas away from overhead power cables.
  - Keep antennas clear from conducting objects and out of reach (of being accidentally touched, walked into ect.).

Outdoors

- Damp ground will increase the effects of electric shock.
- Use of RCBO's is essential.
- A risk assessment is probably a condition of insurance cover – Do one.
- ***An accident at a public event is not good advertising…***