South Bristol Amateur Radio Club
Foundation Course

Lesson Four

8.0 Technical Basics #3.

(Syllabus section 3b.1 to 3b.3)
(Manual pages 6, 7)

8.1 Current, Voltage, Resistance and Power

8.1.1 The Foundation licence requires a very basic understanding of electricity and simple calculations using Ohm s law.

8.1.2 Electricity travels through wires and circuits, a bit like water travelling through a central heating system.

8.1.3 The current is the amount of electricity flowing through a circuit and is measured in Amps (A). A higher current will require thicker wires to flow than a lower current, like thicker pipes to carry more water.

8.1.4 The pressure of the electricity flowing (also called potential difference) is measured in volts (V). This is like the difference in level between a water header tank and a tap. The larger the difference in height, the higher the pressure at the tap.

8.1.5 To control the flow of water in a system, pressure-regulating valves may be used. This can be likened to using resistors in an electrical circuit. Resistors make it harder for electricity to flow through the circuit. This is called resistance and is measured in Ohms.The Greek symbol Ω (omega) is used to represent Ohms.

8.1.6 Power is the amount of electricity an appliance consumes when running. Power is measured in Watts (W).

8.1.7 There is a direct relationship between current, voltage, resistance and power. This is called Ohm s law.

8.2 Use of prefixes

8.2.1 Remembering the prefixes from lesson #3 we can see that, for example:

- 1mA (milliamp) is one thousandths of an amp (0.001A)
- 500mA is five hundred thousandths of an amp, or half an amp (0.5A)
- 1000mA is one amp (1A)
- 1500mA is 1.5A
- 1kW (kilowatt) is one thousand watts
- 11.5kV is eleven thousand five hundred volts

8.3 Calculations using Ohm's law.

8.3.1 We use the following letters in maths when performing calculations with Ohm s law:

- Voltage = V, units are Volts,
- Current = I, units are Amps,
- Resistance = R, units are ohms,
- Power = P units are Watts.

8.3.2 Below you will find two triangles that we use to understand and remember how to use Ohms law.

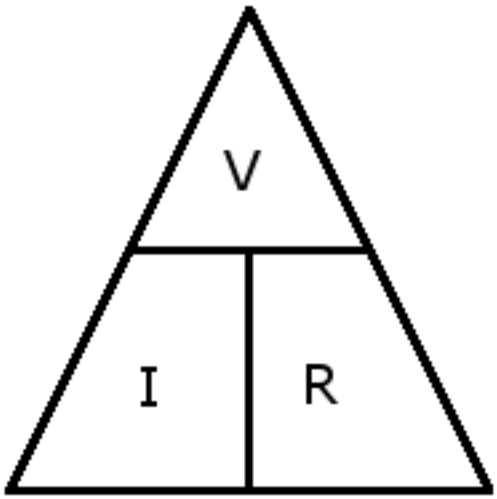


Fig 1

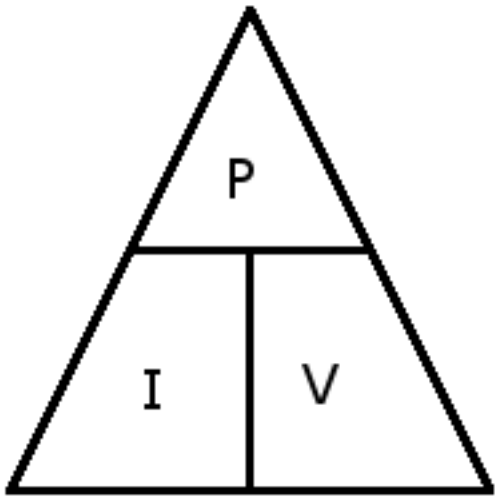


Fig 2

8.3.3 Using the triangle in fig.1, it is easy to calculate one the three values in an electrical circuit if you know the other two. Cover up the value you want to find to determine the correct formula. The horizontal line is the divide line and the vertical line is the multiply line.

8.3.4 From this triangle we can create three formulae.

- V = I x R or V=IR (Voltage = Current x Resistance)
- I = V / R (Current = Voltage divided by Resistance)
- R = V / I (Resistance = Voltage divided by Current)

8.3.5 We can apply the same rules to the triangle in fig.2 and create three more formulae.

- P = I x V or P=IV (Power = Current x Voltage)
- I = P / V (Current = Power divided by Voltage)
- V = P / I (Voltage = Power divided by Current)

Some example questions are on the Ohms Law worksheet (attached).

9.0 Logging
(Manual page 20)

9.1 It is no longer a requirement to maintain a permanent log of all calls and contacts.

9.2 You may be asked by an officer of Ofcom investigating a log of interference to keep a log for a duration and the officer will specify the details to be recorded.

9.3 However a log remains a valuable reference and is essential if you want to exchange QSL cards or submit entries for awards or in competition.

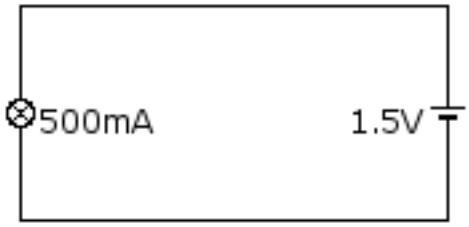
9.4 The log, provided it is maintained up to date, is also useful to show when you were operating and will often be accepted as showing you were not the cause of interference.

10.0 Licence Schedule

(Syllabus section 2c.8, 2c.9)
(Manual page 30)

10.1 You need to understand the licence schedule in the 'Terms, Conditions and Limitations' document. As a Foundation licencee you should refer to Table A. It is not necessary to memorize it. A copy will be provided for the exam.

Ohms Law Worksheet



1) In the above circuit, how much power would the lamp use?
   a) 750 watts
   b) 0.75 watts
   c) 7,500 watts
   d) 7.5 watts

2) What resistance does the lamp in question 1 have?
   a) 3 Ohms
   b) 0.003 Ohms
   c) 750 Ohms
   d) 300 Ohms

3) A typical amateur station will require a 13.8 V DC power supply. It is important that your supply is able to provide enough current at the required voltage. You have a radio that consumes 69 watts on high power (in transmit mode). You will need a power supply that will provide a minimum current of?
   a) 500mA
   b) 5mA
   c) 5A
   d) 50A

4) If I know the voltage and current consumed by a device, what formula do I need to use to calculate the resistance?
   a) P = IV
   b) R = V/I
   c) I = V/R
   d) V = IR

5) I=8, V=10, R=?
   a) 1.25
   b) 12.5
   c) 125
   d) 1250