Feeders &Antennas

Feeders

THE WIRE connecting a transmitter to an antenna or aerial is called the feeder.

The feeder is carrying powerful radio frequency signals which will radiate from any piece of wire. To prevent radiation from the feeder, it is usually made as coaxial cable (**Fig 13**). A coaxial cable contains a centre conductor, which carries the signal, and an outer screen. The primary purpose of the screen is to confine the signal within the cable.

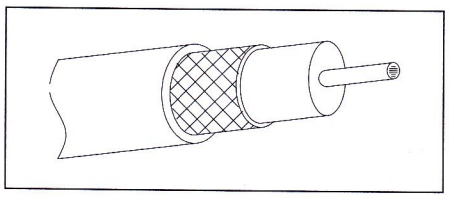

Fig 13: Coaxial cable is the type of cable used on a TV antenna.

The outer screen is usually braided to provide a good, continuous covering. The inner conductor may be a single, thick piece of wire, or a few twisted strands.

The correct type of plug must be used, either a 'BNC' or a 'PL259'. These are illustrated in **Fig 14**. The screen of the coaxial cable must be properly connected to the body of the plug to ensure the screen and plug form a continuous shield for the inner conductor, which is soldered to the centre pin in the plug.

Antennas

THE ANTENNA (sometimes called an aerial) actually radiates the signal. It converts the electrical signals on the feeder into radio waves.

It needs to be designed for the frequency or wavelength in use. There are five antennas that we need to consider for the Foundation exam. Once you are licensed the choice of antenna is entirely up to you.

The dipole

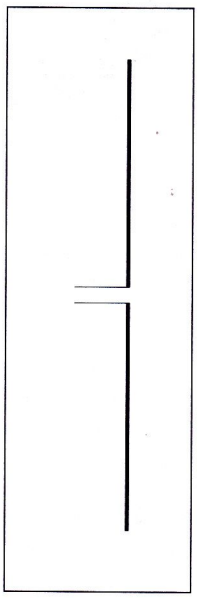

Fig 15: The half-wave dipole antenna.

The dipole is the basic antenna and is half a wavelength long. This means the size of the dipole (and all other antennas) must be suitable for the intended frequency of use.

If it is mounted vertically, as shown in **Fig 15**, it radiates equally in all horizontal directions. If it is mounted horizontally, which is more common at HF, it radiates well from the sides but not off the ends. Given the choice, it should be side-on to the desired direction of maximum signal, but this is not always possible in a small garden.

The ¼ wave ground plane

This antenna gets its name from the fact that the radiating element is ¼ wavelength long, often written as $\lambda/4$ since the symbol for wavelength is the Greek letter λ, lambda.

The radiating or active element is always vertical (see **Fig 16**). The 4 horizontal wires, called 'radials', form a 'ground plane' - an earthed surface which acts like a mirror to radio waves.

The transmitted signal is 'omni-directional', that is it radiates equally in all horizontal directions. It does not radiate vertically.

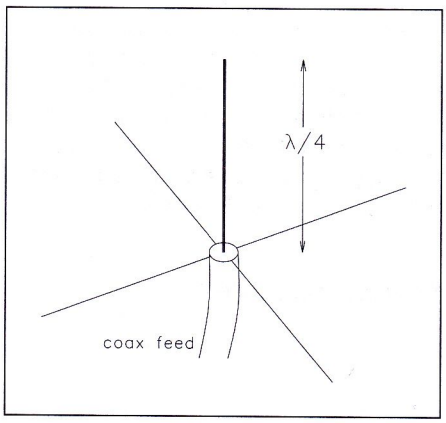

Fig 16: The λ/4 ground plane antenna.

The Yagi

The Yagi antenna is directional. Most TV antennas are Yagis, mounted to point at the TV transmitter. The antenna is able to focus the radio signal in a particular direction, in much the same way as a searchlight or car headlight beams the light in one direction.

Maximum signal is towards the tapering end. In **Fig 17** this is to the right. The Yagi can be mounted with the elements vertical (as shown), or horizontally. For good communication the transmit and receive Yagis must point towards each other and be either both horizontal or both vertical. It is worth noting that the thicker vertical line is actually a dipole, which must be half a wavelength long.

The Yagi is a useful antenna because of its focussing ability. The signal transmitted in the wanted direction is increased, whilst that in other directions is reduced. Greater range can be achieved or a lower transmit power could be used. The effective power in the wanted direction has increased by the focussing 'gain' of the antenna. This gain is usually quoted by the manufacturer.

The 'effective radiated power' or 'erp' is

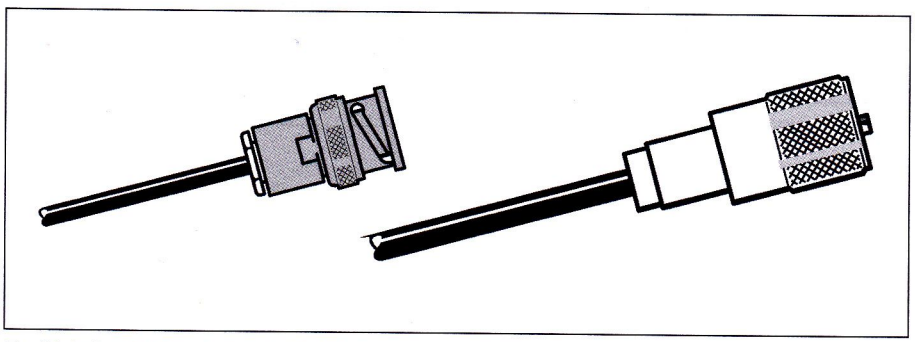

Fig 14: Left, a BNC plug. Right, a PL259. Note that the PL259 is somewhat larger.

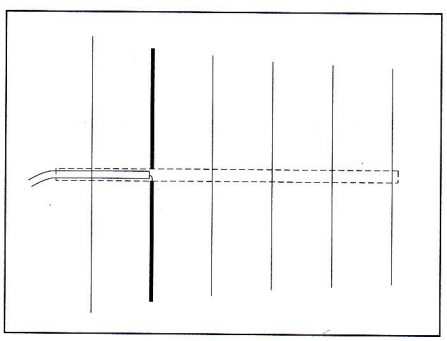

Fig 17: The Yagi antenna.