

South Bristol Amateur Radio Club Foundation Course

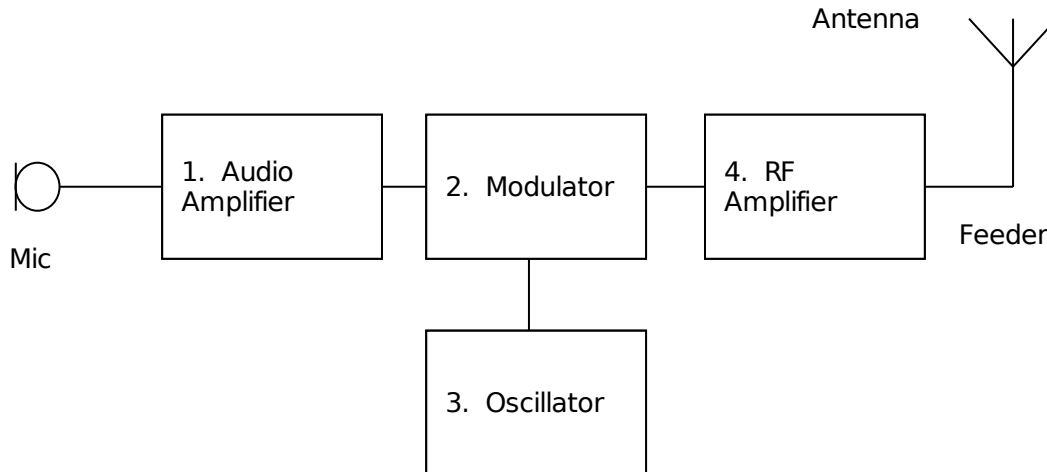
Lesson Three

6.0 Transmitters and Receivers

(Syllabus section 4a.1 to 4d.2)

(Manual pages 1011)

6.1 Transmitter Block Diagram



Sound waves enter the Audio Stage (1) from the microphone. The Modulator (2) picks up the audio and mixes it with the RF signal generated by the oscillator (3). The RF Power Amplifier (4) then amplifies the signal to be radiated by the Antenna.

6.2 Note that:

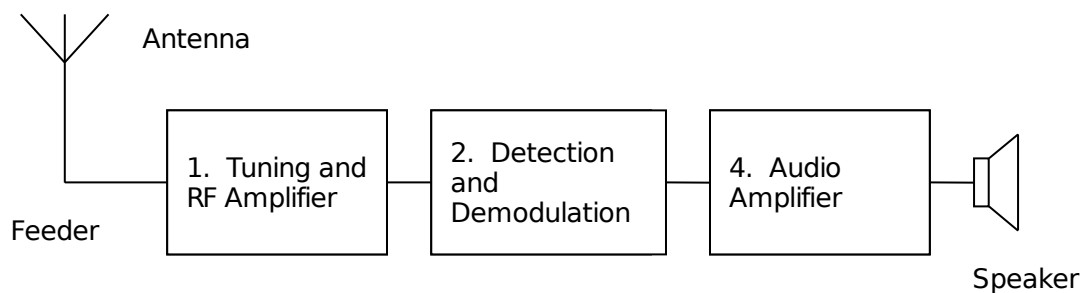
- The **Oscillator** (3) may also be referred to as a **Frequency Generator**. This determines the frequency on which the transmitter operates (carrier frequency).
- Incorrect setting of the oscillator / frequency generator can result in operation outside the amateur band and cause interference to other users.
- The audio (or data) signal is modulated onto the RF carrier in the modulation stage of the transmitter.
- The RF carrier is modulated by varying its amplitude or frequency resulting in amplitude modulation (AM) or frequency modulation (FM) modes. A variation of AM is a mode called single side band (SSB)
- Speech can be carried by AM, SSB, or FM and computer data may be transmitted by suitable audio tones generated in a modem or TNC (terminal node controller). This would use frequency shift keying (FSK)
- The mode used to send morse code is called CW (continuous wave) where the unmodulated carrier wave is switched (keyed) on and off.
- The drawings of the various modulated waveforms are in the manual (page 10).
- The transmitter must be connected (loaded) to a correctly matched antenna to ensure that the maximum amount of power is radiated. The wrong kind of antenna can damage the transmitter (more about this in lesson 5).

- Excessive amplitude modulation can cause distorted output and interference to adjacent channels.
- Excessive frequency deviation will cause interference to adjacent channels.
- Excessive modulation can be prevented by a correctly adjusted microphone gain control (if fitted). This will also apply if a TNC is used.
- The Foundation licensee can only use manufactured transmitting equipment. No home brew is allowed

6.3 Some terms you need to remember:

- **Carrier** - The RF signal frequency generated by the oscillator.
- **Audio Waveform** - The waveform containing the audio (or data) signal.
- **Modulation** - The process of applying the audio or data information to a carrier.
- **Modulated Waveform** - The modulated RF wave containing the audio or data signal.

6.4 Receiver Block diagram.



The tuning stage (1) tunes to the required frequency and amplifies the incoming signal. The audio signal detected by the Detection stage is passed on to the Audio Amplifier (4), which then sends the audio signal to the Loudspeaker.

6.5 Note that:

- The tuning stage selects one signal from many on different frequencies by a tuned circuit.
- A tuned circuit consists of a coil (inductor) and a capacitor.

7.0 Technical Basics #2

(Syllabus section 3a.1)

(Manual page 5)

7.1 There are several prefixes that you need to know:

- Milli (m) which is divide by 1,000 (one thousandth).
- Kilo (k) which is multiply by 1,000 (one thousand).
- Mega (M) which is multiply by 1,000,000 (one million).

E.g. Kilogramme (kg), kilometre (km), millimetre (mm), megahertz (MHz).