

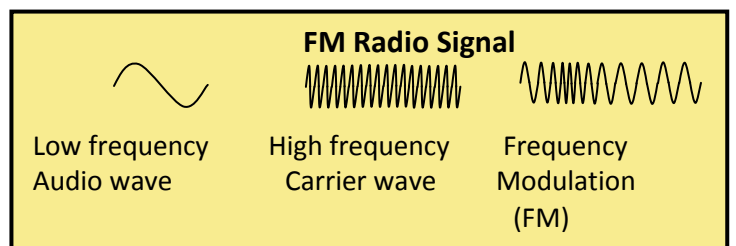
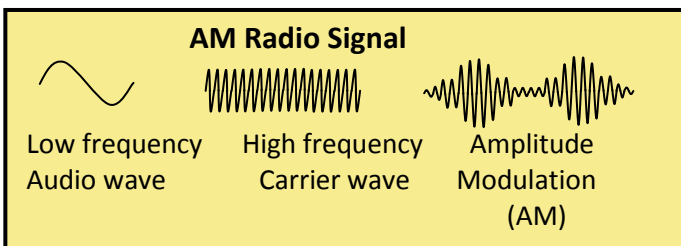
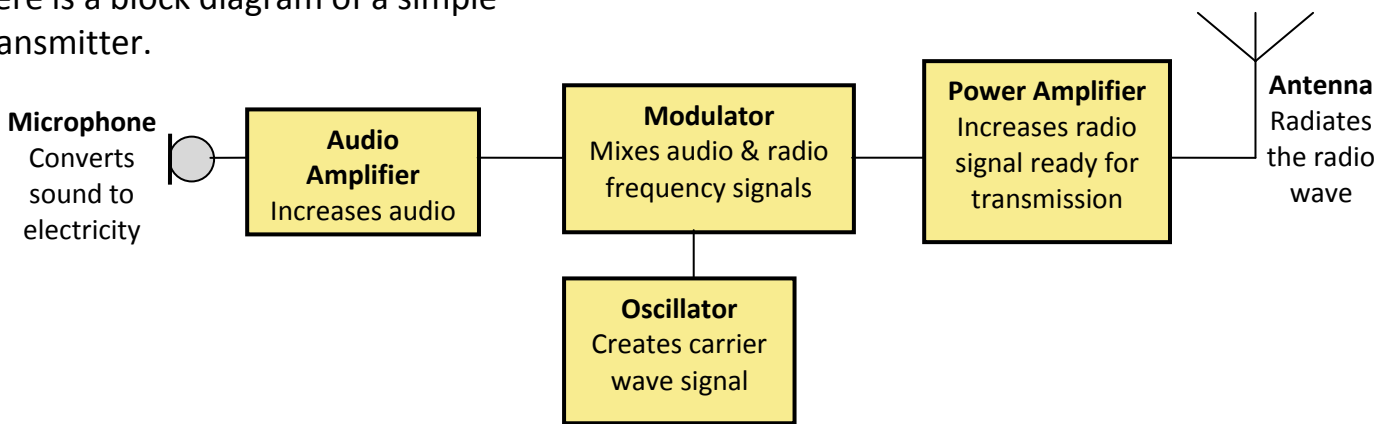
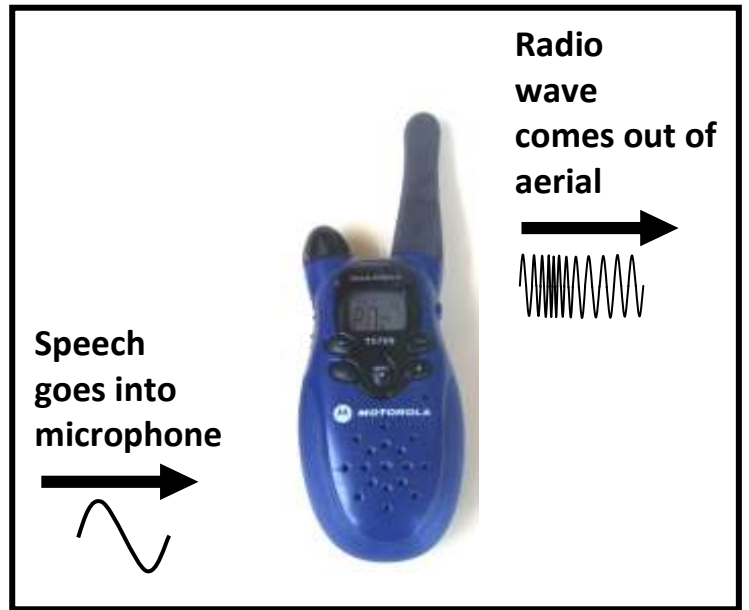
Radio Transmitters

A microphone changes sound waves into varying electricity. This is mixed with a high frequency carrier wave in the transmitter which is radiated out from the antenna.

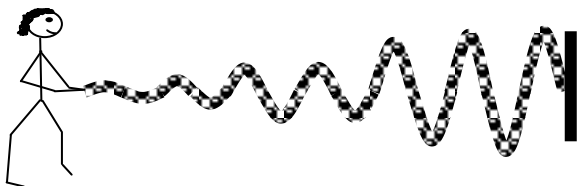
The mixing of the speech signal and the carrier wave is modulation. The type of modulation is called the "**mode**".

The most common methods of modulation are Amplitude Modulation (AM) and Frequency Modulation (FM).

Here is a block diagram of a simple transmitter.



1. Send some waves along a rope tied at one end. Now try to send waves at the same rate but making them bigger and smaller. **This is like AM.**



2. Try to send the waves at a faster and slower rate.



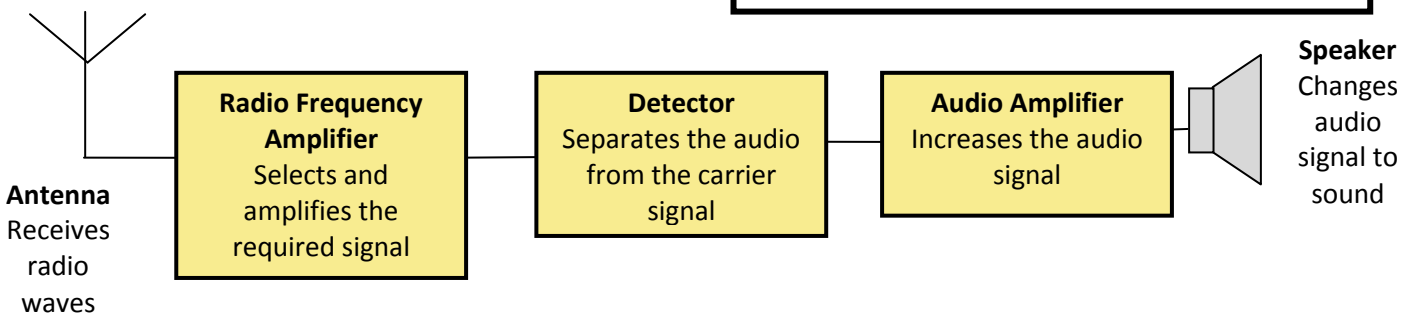
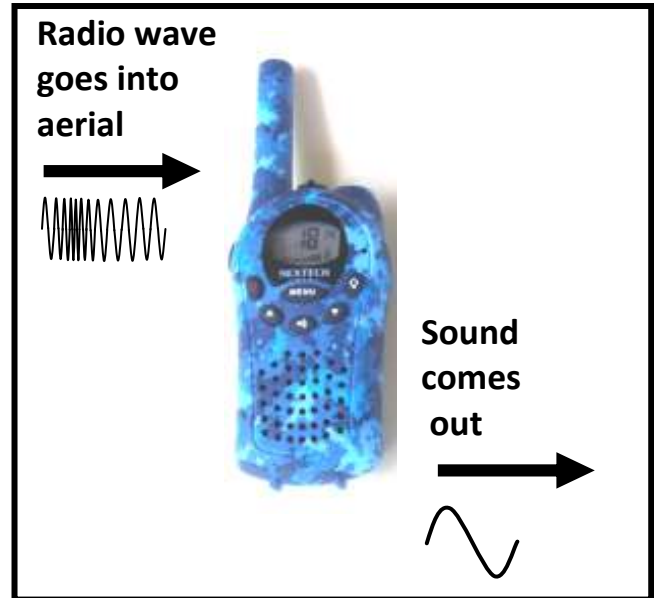
DTMF tones
(Dual-tone multi-frequency)
 DTMF tones are audible tones utilised to control remote equipment. They can be transmitted to connect to radio repeaters which are linked via the internet (IRLP) or Echolink stations.



Radio Receivers

A radio receiver works in reverse to a radio transmitter. There are millions of radio signals out there but by tuning your radio to a particular radio station you can choose the one that you want to listen to.

The radio signal creates electrical currents in the aerial of your radio. The detector stage removes the carrier wave and sends the audio signal to the speaker. Here it is converted back to sound waves.



Radio Terms

A good radio receiver needs to have good:

Sensitivity: - the ability to receive weak signals

Selectivity: - the ability to separate radio signals on nearby frequencies

Stability: - the ability to remain on the chosen frequency for a long period of time

1. Use a CB handheld radio to talk to a friend.
What are the controls on a CB radio and what do they do?
2. What other devices or services use radio signals around your home or outdoors?
3. If you have a radio tune across the AM and FM sections. What stations can you hear?

AM	54	60	70	80	100	120	140	160 x 10 kHz
FM	88	92	96	100	103	106	108	MHz

AM stations range from 540 kHz to 1600 kHz and are called Medium Wave stations
FM stations range from 88 MHz to 108 MHz and are Very High Frequencies (VHF).

4. Find out the frequencies of some radio stations. Are they AM or FM stations?



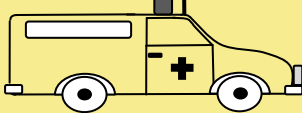


Radio Interference

There are 2 types of radio interference that need to be considered.

A. Interference causing difficulty in hearing the required radio station

INTERFERENCE TYPE	SOLUTION
Static (QRN) from storms or electrical equipment.	Reduce the "RF Gain" or turn on the "Noise Blanker".
Interfering signals (QRM) from other radio stations.	Choose a clear frequency for your QSO.

B. Interference to other services and equipment from your radio transmissions

INTERFERENCE TYPE	SOLUTION
Harmful interference to other services.	Only transmit on a frequency allocated for amateur radio. 
Interfering with another amateur radio station.	Listen carefully before transmitting. 
Radio signals picked up by other appliances with speakers.	Wind the speaker leads around a ferrite rod to make an RF choke.  Ferrite Rod Speaker Leads Place a low pass filter in your transmission line.
Transfer through the mains power lines	Place a mains filter in the power leads

1. If you have a portable radio tune across the AM band at night. Can you hear any weak stations? What makes them difficult to hear?
2. During a thunderstorm tune between AM radio stations on a portable radio to hear the static crashes
3. Relate these situations to the different forms of radio interference.
 - Listening to the teacher when students in the class are talking
 - Having a conversation in a large group of people
 - Chatting to a friend or listening to a podcast in a noisy work area
 - Taking a telephone call at a busy construction site




CB Handheld Radios

CB (citizen band) is a two-way radio system which transmits FM on UHF. It is very useful for short-distance communications and is divided into 80 channels. The service is for public access but transmission is not allowed on all channels and there are significant penalties for misuse of a CB radio.

CB handheld radios can be used for many games as well as being a valuable resource for camping and hiking. It is important that only Australian approved CB radios are purchased as overseas handhelds operate on different frequencies which are not legal to be used in Australia. Cheap low power units are available at most electronic suppliers but make sure that they have a CTCSS function which allows the user to only hear another station using the same tone encoding.

Always remember that radio transmissions can be received by other people so never transmit simulated emergencies or give out personal details.

CB Channels	Designated Use
9, 12-17, 19-21 24-28, 30, 39, 49-60, 64-70, 79 & 80	For general Use 
5 & 35	Emergency use only
10	4 WD Clubs & National Parks
11	Calling channel - Change to another channel once contact has been made
18	Caravans & Campers in convoy
22 & 23	Data use only
29	Road safety on Pacific Highway
40	Trucks
31-38 & 71-78	Input to repeaters (best avoided) "Duplex"
1-8 & 41-48	Output of repeaters (best avoided) "Duplex"
61-63	Must not be used as they are reserved for future allocation

CTCSS tones (Continuous Tone-Coded Squelch System)

CTCSS tones are specific inaudible tones which are set to prevent unwanted interfering transmissions being received. They are also often required to be transmitted to access certain repeater stations. CTCSS acts like an electronic password. Most CB radios can use CTCSS tones so that users only hear those signals with the same tone setting.

Check to see if your CB radio has CTCSS and use it to remove unwanted signals.

