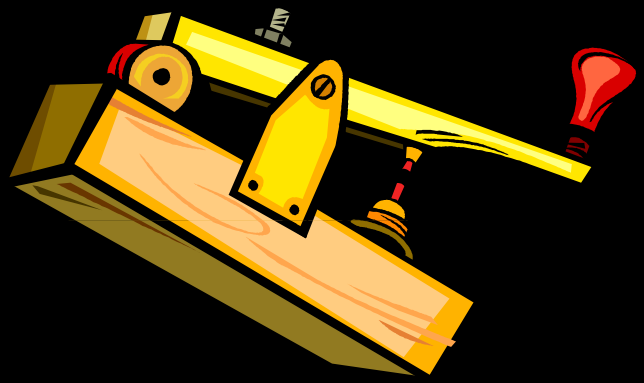
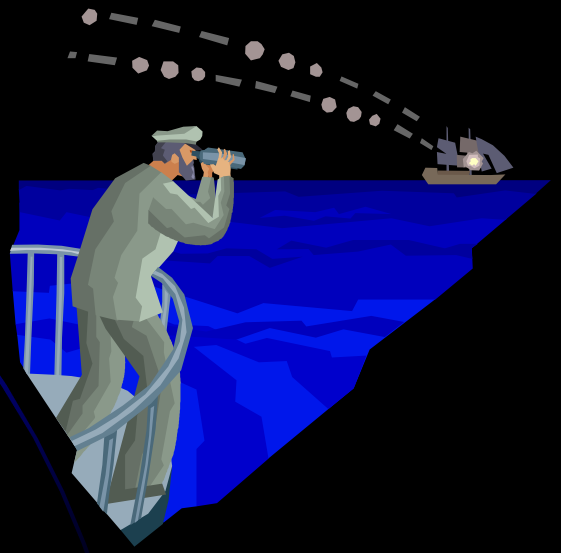
USES OF RADIO

Early uses were maritime, for sending telegraphic messages using MORSE CODE between ships and land.



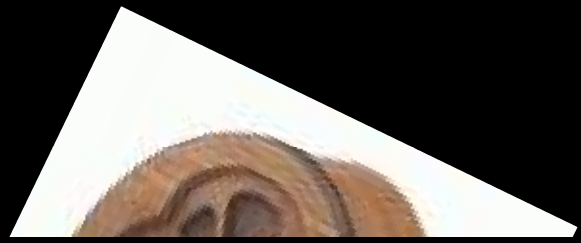
One of the most memorable uses of marine telegraphy was during the sinking of the RMS TITANIC in 1912, including communications between operators on the sinking ship and nearby vessels, and communications to shore stations listing the survivors.



Radio is one of our most important ways of communicating. Since the late 1800s, when radio was invented, it has played a huge role in our lives. Communication between two far distant places became quick and much more inexpensive than stringing telegraph wire. Suddenly, ship-to-ship and to-shore radios were saving thousands from disaster at sea, radio entertainment broadcasts were going into peoples' homes, and soldiers in the field were able to keep in touch with friendly units.

Broadcasting is the most well known use of radio. Radio stations arrange songs and programs of particular genres to broadcast to listeners who tune in to hear them.

Emergency personnel such as police, fire fighters, and ambulance crews use radio to stay in contact with their bases and with each other.



Commercial vehicles such as taxis, trucks, and airplanes use radios to receive directions and report difficulties. Construction crews, farmers, ranchers, and other groups use radio to send and receive information such as instructions and warnings. Radio is used extensively in the military to facilitate communication between bases, ships, planes, military vehicles, and field units. Private individuals may also use radio to communicate with others on citizens band radio.

Other uses of radio include remote controls used to direct toys, railroad cars, or unpiloted aircraft. Airplanes depend on radioed navigation signals to stay on course and a form of radio called radar is used to guide ships, submarines, and aircraft as well as to detect them. Radios may also transmit large amounts of data between electronic devices, such as computers. Devices called bugs allow others to listen in on private conversations to obtain information and are commonly used by intelligence agencies. Doctors can also use radio to diagnose stomach ailments by having the patient swallow a capsule radio and then studying the signals it transmits.

Radio was used to pass on orders and communications between armies and navies on both sides in WORLD WAR I;

Another use of radio in the pre-war years was the development of detection and locating of aircraft and ships by the use of RADAR (*RA*dio *D*etection *A*nd *R*anging).

Today, radio takes many forms, including wireless networks and mobile communications of all types, as well as radio broadcasting

USES OF RADIO

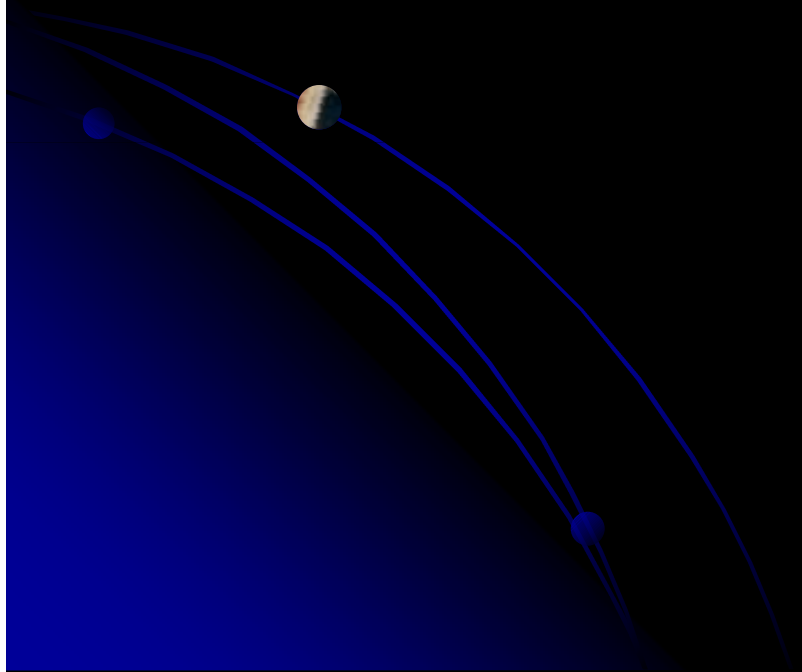
- AUDIO
- TELEPHONY
- VIDEO
- NAVIGATION
- RADAR
- DATA (DIGITAL RADIO)
- HEATING
- AMATEUR RADIO SERVICE
- UNLICENSED RADIO SERVICES
- RADIO CONTROL

AUDIO

Before the advent of television, commercial radio broadcasts included not only news and music, but dramas, comedies, variety shows, and many other forms of entertainment. Radio was unique among methods of dramatic presentation in that it used only sound.

AM radio uses amplitude modulation, in which the amplitude of the transmitted signal is made proportional to the sound amplitude captured (transduced) by the microphone while the transmitted frequency remains unchanged. Transmissions are affected by static and interference because lightning and other sources of radio that are transmitting at the same frequency add their amplitudes to the original transmitted amplitude.

FM broadcast radio sends music and voice with higher fidelity than AM radio. In frequency modulation, amplitude variation at the microphone causes the transmitter frequency to fluctuate. Because the audio signal modulates the frequency and not the amplitude, an FM signal is not subject to static and interference in the same way as AM signals.



During unusual upper atmospheric conditions, FM signals are occasionally reflected back towards the Earth by the ionosphere, resulting in Long distance FM reception. FM receivers are subject to the capture effect, which causes the radio to only receive the strongest signal when multiple signals appear on the same frequency. FM receivers are relatively immune to lightning and spark interference.

High power is useful in penetrating buildings, diffracting around hills, and refracting for some distance beyond the horizon.

FM subcarrier services are secondary signals transmitted in a "piggyback" fashion along with the main program. Special receivers are required to utilize these services.

Analog channels may contain alternative programming, such as reading services for the blind, background music or stereo sound signals.

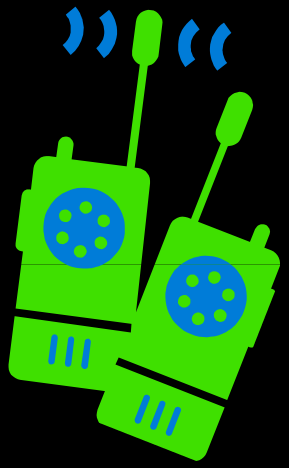
Aviation voice radios use VHF AM. AM is used so that multiple stations on the same channel can be received.

Marine voice radios can use single sideband voice (SSB) in the shortwave High Frequency radio spectrum for very long ranges or narrowband FM in the VHF spectrum for much shorter ranges.

Government, police, fire and commercial voice services also use narrowband FM on special frequencies. Early police radios used AM receivers to receive one-way dispatches.

Civil and military HF (high frequency) voice services use shortwave radio to contact ships at sea, aircraft and isolated settlements.

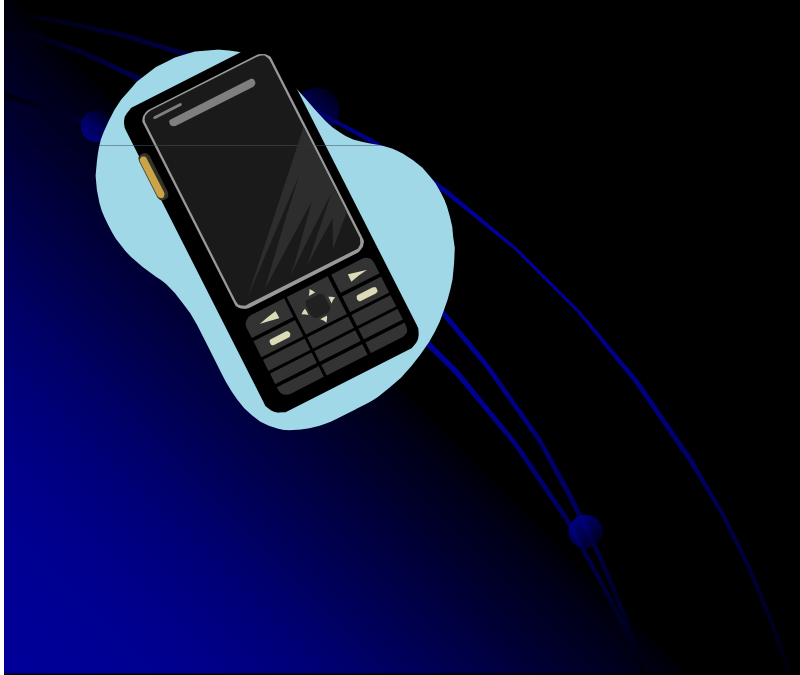
TETRA, Terrestrial Trunked Radio is a digital cell phone system for military, police and ambulances. Commercial services such as XM, WorldSpace and Sirius offer encrypted digital Satellite radio.



Telephony

Mobile phones transmit to a local cell site (transmitter/receiver) that ultimately connects to the public switched telephone network (PSTN) through an optic fiber or microwave radio and other network elements. When the mobile phone nears the edge of the cell site's radio coverage area, the central computer switches the phone to a new cell. Cell phones originally used FM, but now most use various digital modulation schemes. Recent developments in Sweden (such as DROPme) allow for the instant downloading of digital material from a radio broadcast (such as a song) to a mobile phone.

Satellite phone's use satellites rather than cell towers to communicate.



VIDEO

Television sends the picture as AM and the sound as FM, with the sound carrier a fixed frequency away from the video carrier. Analog television also uses a vestigial sideband on the video carrier to reduce the bandwidth required.

. High-definition television is possible simply by using a higher-resolution picture, but H.264/AVC is being considered as a replacement video codec in some regions for its improved compression. With the compression and improved modulation involved, a single "channel" can contain a high-definition program and several standard-definition programs.

Navigation

All satellite navigation systems use satellites with precision clocks. The satellite transmits its position, and the time of the transmission. The receiver listens to four satellites, and can figure its position as being on a line that is tangent to a spherical shell around each satellite, determined by the time-of-flight of the radio signals from the satellite. A computer in the receiver does the math

Radio direction-finding is the oldest form of radio navigation. Before 1960 navigators used movable loop antennas to locate commercial AM stations near cities. In some cases they used marine radiolocation beacons, which share a range of frequencies just above AM radio with amateur radio operators

A directional signal rotates like a lighthouse at a fixed rate. When the directional signal is facing north, an omnidirectional signal pulses. By measuring the difference in phase of these two signals, an aircraft can determine its bearing or radial from the station, thus establishing a line of position.

Radar

Radar (Radio Detection And Ranging) detects objects at a distance by bouncing radio waves off them. The delay caused by the echo measures the distance. The direction of the beam determines the direction of the reflection. The polarization and frequency of the return can sense the type of surface. Navigational radars scan a wide area two to four times per minute. They use very short waves that reflect from earth and stone. They are common on commercial ships and long-distance commercial aircraft.

General purpose radars generally use navigational radar frequencies, but modulate and polarize the pulse so the receiver can determine the type of surface of the reflector. The best general-purpose radars distinguish the rain of heavy storms, as well as land and vehicles. Some can superimpose sonar data and map data from GPS position

Search radars scan a wide area with pulses of short radio waves

Search radars scan a wide area with pulses of short radio waves

. Targeting radars use the same principle as search radar but scan a much smaller area far more often, usually several times a second or more.

Weather radars resemble search radars, but use radio waves with circular polarization and a wavelength to reflect from water droplets.

Data (digital radio)

Most new radio systems are digital, see also: Digital TV, Satellite Radio, Digital Audio Broadcasting. The oldest form of digital broadcast was spark gap telegraphy, used by pioneers such as Marconi. By pressing the key, the operator could send messages in Morse code by energizing a rotating commutating spark gap

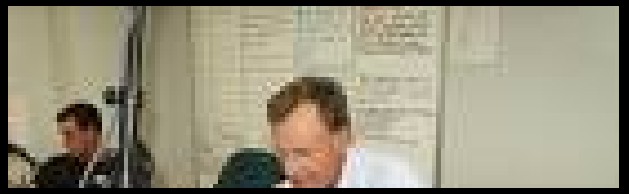
The next advance was continuous wave telegraphy, or CW (Continuous Wave), in which a pure radio frequency, produced by a vacuum tube electronic oscillator was switched on and off by a key.

Radio teletypes usually operate on short-wave (HF) and are much loved by the military because they create written information without a skilled operator. They send a bit as one of two tones. Groups of five or seven bits become a character printed by a teletype.

- Communication systems that limit themselves to a fixed narrowband frequency range are vulnerable to jamming.
- A variety of jamming-resistant spread spectrum techniques were initially developed for military use, most famously for Global Positioning System satellite transmissions. Commercial use of spread spectrum began in the 1980s.
- Bluetooth, most cell phones, and the 802.11b version of Wi-Fi each use various forms of spread spectrum

Heating

- Radio-frequency energy generated for heating of objects is generally not intended to radiate outside of the generating equipment, to prevent interference with other radio signals. Microwave ovens use intense radio waves to heat food. Diathermy equipment is used in surgery for sealing of blood vessels. Induction furnaces are used for melting metal for casting.



Amateur radio service

- Amateur radio (nicknamed Ham radio) is a hobby in which enthusiasts are licensed to transmit radio signals for their own enjoyment. They may also provide an emergency and public-service radio service. This has been very beneficial in emergencies, saving lives in many instances.[6] Radio amateurs are licensed to use frequencies in a wide range of narrow bands throughout the radio spectrum. They use all forms of encoding, including nostalgic and experimental ones. Several forms of radio were pioneered by radio amateurs and later became commercially important including FM, single-sideband (SSB), AM, digital packet radio and satellite repeaters. Some amateur frequencies may be disrupted by power-line internet service.

Unlicensed radio services

- Unlicensed, government-authorized personal radio services such as Citizens' Band Radio in Australia, the USA, and Europe, and Family Radio Service and Multi-Use Radio Service in North America exist to provide simple, (usually) short range communication for individuals and small groups, without the overhead of licensing.
- Free radio stations, sometimes called pirate radio or "clandestine" stations, are unauthorized, unlicensed, illegal broadcasting stations. These are often low power transmitters operated on sporadic schedules by hobbyists, community activists, or political and cultural dissidents. Some pirate stations operating offshore in parts of Europe and the United Kingdom more closely resembled legal stations, maintaining regular schedules, using high power, and selling commercial advertising time.

Radio control (RC)

- Radio remote controls use radio waves to transmit control data to a remote object as in some early forms of guided missile, some early TV remotes and a range of model boats, cars and airplanes. Large industrial remote-controlled equipment such as cranes and switching locomotives now usually use digital radio techniques to ensure safety and reliability.

Editores

- NUNO DINIS
- FRANCISCO
- HENRIQUE
- RÚBEN
- LUIS ALBUQUERQUE