

U. S. Navy Short Wave Radio Receiver 1918

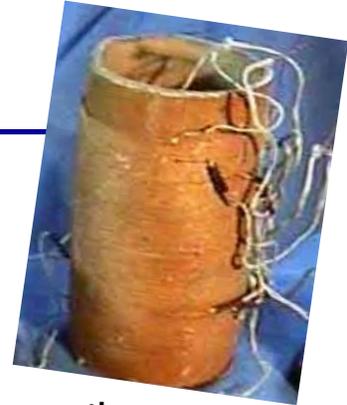


This radio receiver was manufactured by the Sperry Gyroscope Company for the Navy's Bureau of Steam Engineering. It is very similar to the "destroyer" receiver designed by Louis Hazeltine. However, it is likely that this particular receiver—with a range of 30 to 1000 meters—was part of the wireless communication equipment used by the Navy's Pre-WWI network of coastal stations.

Of particular note is (middle right) the lever which gives the options for "Audion, Send, Crystal," as well as the "Audion Coupler" (lower left). The "Audion" vacuum tube (1906) was a major technological contribution to the development of radio.

Tuning Coils

circa 1930



Tuning coils helped a transmitter or receiver tune to the correct frequency. You'll note that these three tuning coils have their wires spaced differently to bring in different frequencies.

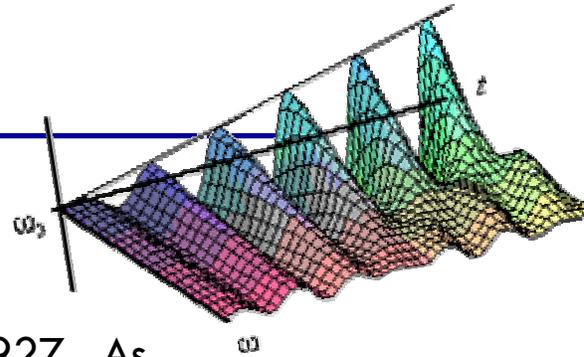
The coil on the left tunes from 2.5-5.0 megacycles; in the middle, from 5.0-10.0 megacycles; on the right, from 10-20 megacycles. These areas of the spectrum are generally known as the "shortwave" range—typically used for mobile communications.

Megacycle, equivalent to megahertz, was a common frequency unit prior to the 1960's .

Piezo Oscillator circa 1925

The Bureau of Navigation regulated the growing radio marketplace from 1912 to 1927. As part of that responsibility they needed equipment, such as this, to detect the frequency of transmitting stations.

It wasn't until piezoelectric crystals were fully developed during and after WWI that radio operators could reliably calibrate and control their frequency. Interference between radio stations was one of the issues that led to the establishment of the Federal Radio Commission in 1927.



Early Vacuum Tubes

circa 1915-1925

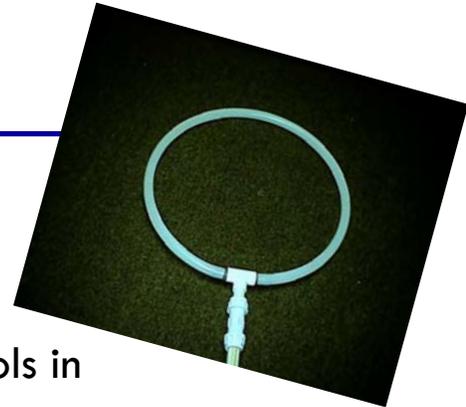
Use of vacuum tubes in radio dates to Ambrose Fleming in 1904. By adding a crude vacuum tube to a circuit containing a galvanometer, he was able to convert electric oscillations into continuous currents best suited to radio transmissions. By the end of the 1920's, standardized vacuum tubes had replaced almost all spark gap machines as the source for radio oscillations.

Among the tubes displayed here are two marked "Audion Amplifiers, 1915." The placement of a grid between the filament and a metal plate distinguished an Audion (triode) from Fleming's diode.



Loop Amplifier

circa 1950



Loop antennas and amplifiers were important tools in the early enforcement work of the Federal Communications Commission.

Loops were particularly useful when you needed to accurately pinpoint the direction of a radio signal. With the accompaniment of an accurate compass and a marked 360 degree circle (see the base of the loop), the exact bearing of the signal could be pinpointed.

Mobile Field Phone

1962

This is a Handie-Talkie FM Radiophone. This particular product line was first introduced in 1962, but grew from the many lessons in mobile communication learned during WWII.

While these early two-way radios did not utilize today's cellular concept, they did teach great lessons in portability. However, perhaps their greatest contribution was introducing FM radio to personal communication. FM usage reduces interference, consumes less power, and provides better signal lock-on.



Portable Test Set 1919



Early radio pioneers made routine use of Wheatstone bridges to develop radio equipment. These bridges could detect resistance, capacitance, inductance, and impedance. The 1928 *Radio Manual* by Sterling encouraged radio developers to use such instruments to ensure that the wiring within their radios met or surpassed the standards of the day.

This 1919 Portable Testing Set was manufactured by the Queen Company of Philadelphia. They were one of the Nation's most prominent makers of scientific and electrical instruments in the late 1800's. They supplied many of the instruments used by one of radio's noted pioneers—Reginald Fessenden.

DynaTac Cellular Phone

1973

First demonstrated in 1973 and introduced for sale in 1983, Motorola's DynaTac was the first cellular phone. It weighed two pounds when it went on the market and cost about \$3,500.



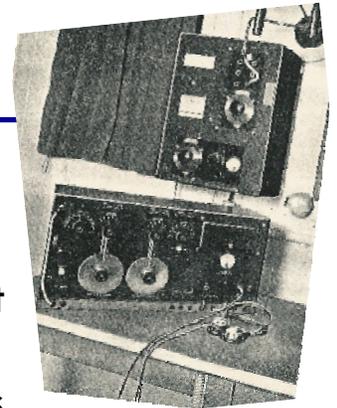
Cellular phones utilize FM radio and a frequency reuse scheme so that millions can use their phones simultaneously. Areas of the country are broken up into cells of about 10-square miles. Within each cell, each phone carrier can provide 56 or more voice channels (many more with digital signals). Calls are transferred from station to station as people move across cells.

Transmitter

circa 1940

The development of radio began on behalf of ships at sea. As early as 1898 the U.S. Navy began outfitting its ships with wireless communication equipment such as this radiotelegraph transmitter. The U.S. Weather Bureau also conducted early experiments with wireless transmission. Reginald Fessenden did his groundbreaking developments on sending voice (as opposed to dots-and-dashes) transmissions under contract to the Weather Service.

A typical shipboard radio room would contain transmitters, receivers, amplifiers, as well as connections to power supplies and aerials.



Audion Control Box

1918

An Audion Control Box served as an audio amplifier for a radio receiver. The Audion vacuum tube was invented in 1906 by Lee DeForest. This three-electrode (triode) tube boosted radio waves as they were received. When Edwin Armstrong introduced feedback into an Audion tube—inventing regenerative circuits and the superheterodyne circuit—the foundation for modern radio was in place.

This particular item was manufactured for the Navy Department by the Western Electric Company.



Omnigraph Code Machine circa 1910



Beginning in 1912, amateur radio operators had to be licensed. As part of their license testing, an amateur had to be able to send and receive Morse code. In 1912 they had to be able to do that at 5 words per minute (wpm). This was raised to 10 wpm in 1919, 13 wpm in 1936, and 20 wpm in 1951.

The Omnigraph was a Morse Code training device that was offered for sale through the Sears catalog as early as 1902. There were both hand-cranked and clock-driven models. This particular practice machine is serial number 90.

Nautical Liquid Compass

circa 1915

This nautical compass is filled with liquid—likely oil or rubbing alcohol. Compasses made in this way provided crews on ships, boats, and life craft with a steadier position heading. Bureau of Navigation employees, who enforced radio rules from 1912-1927, likely used such a compass in conjunction with a loop antenna to pinpoint the location of a radio signal.

This particular item was made by the Adolph Lietz Company of San Francisco. This particular company, founded in 1882, was known for its fine surveying and nautical instruments in the early 1900's.

