History of Amateur Radio

Pioneers of Wireless Communications

Evolution of Ham Radio

Audio Clip from Jean Sheppard, K2ORS

Hams You May Have Heard Of

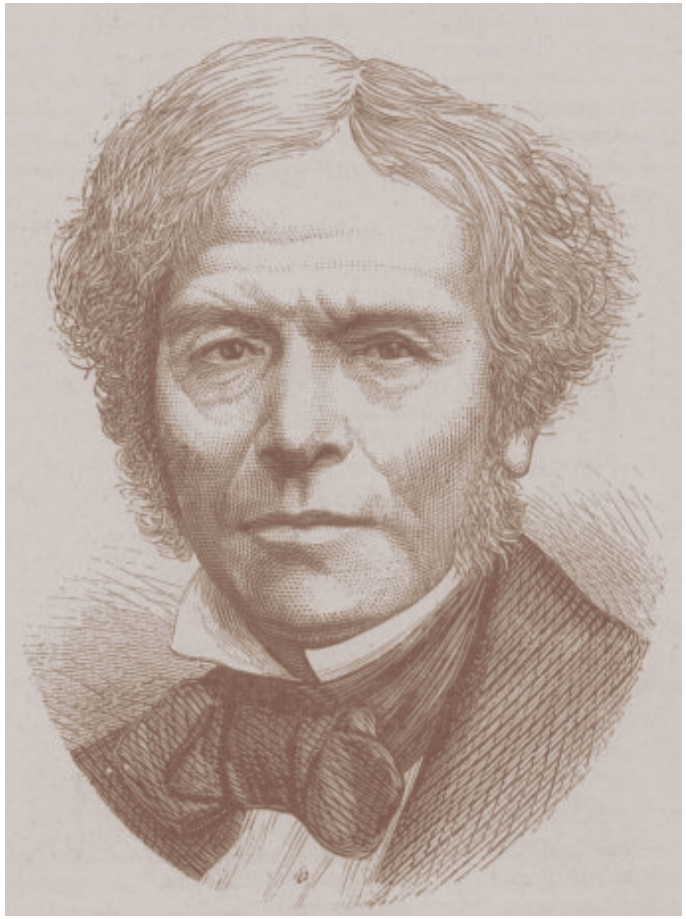
Some Interesting Books

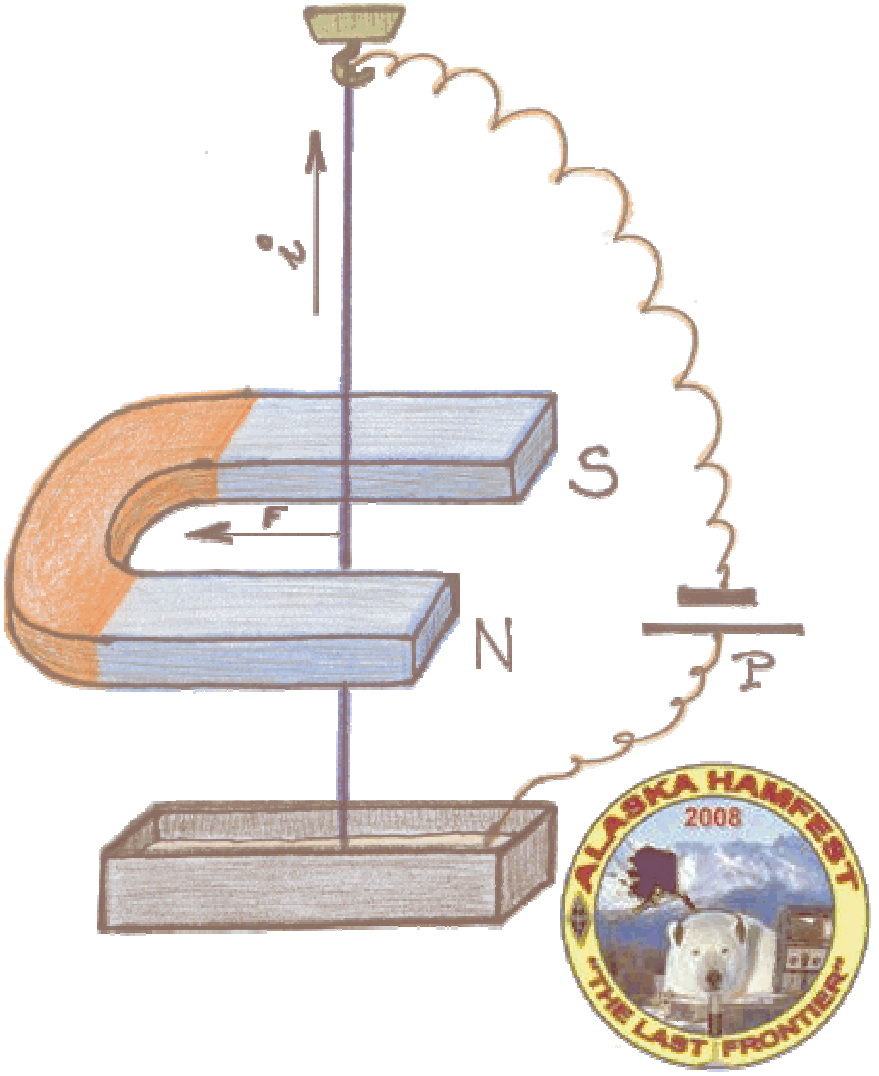
Walter Cronkite video, “Amateur Radio Today”

1831

Michael Faraday Demonstrates Induction Principle:

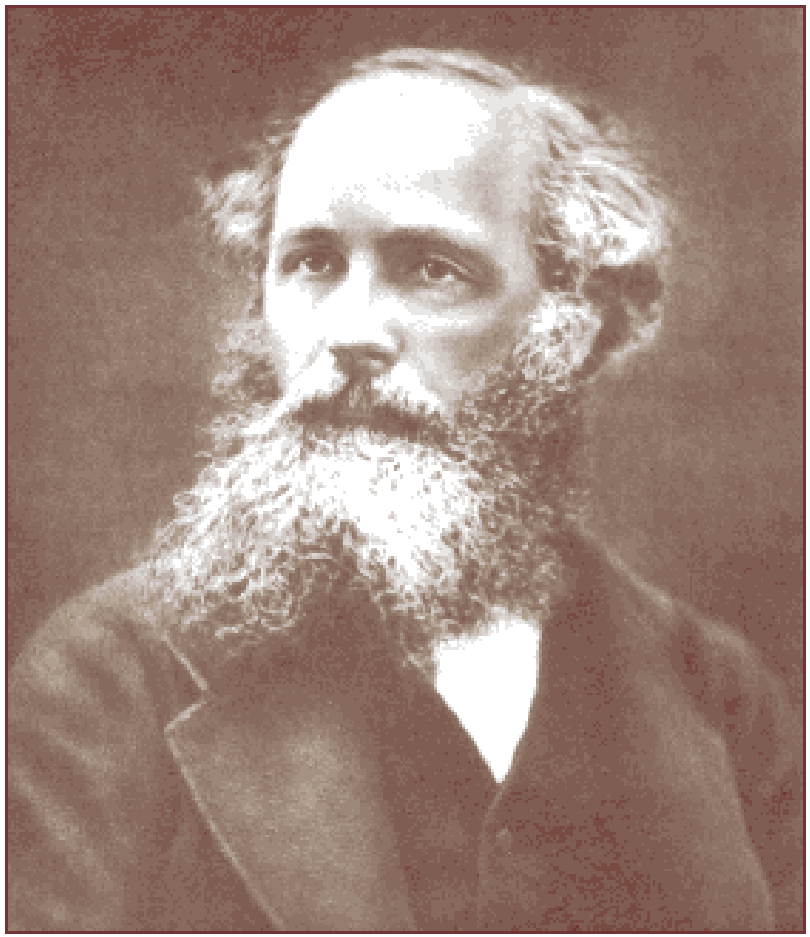
Electricity and Magnetism Are Related





1850

James Clerk Maxwell Advances Theory that Light is an Electromagnetic Wave



$$\nabla \cdot \vec{E} = \frac{\rho}{\epsilon_0}$$

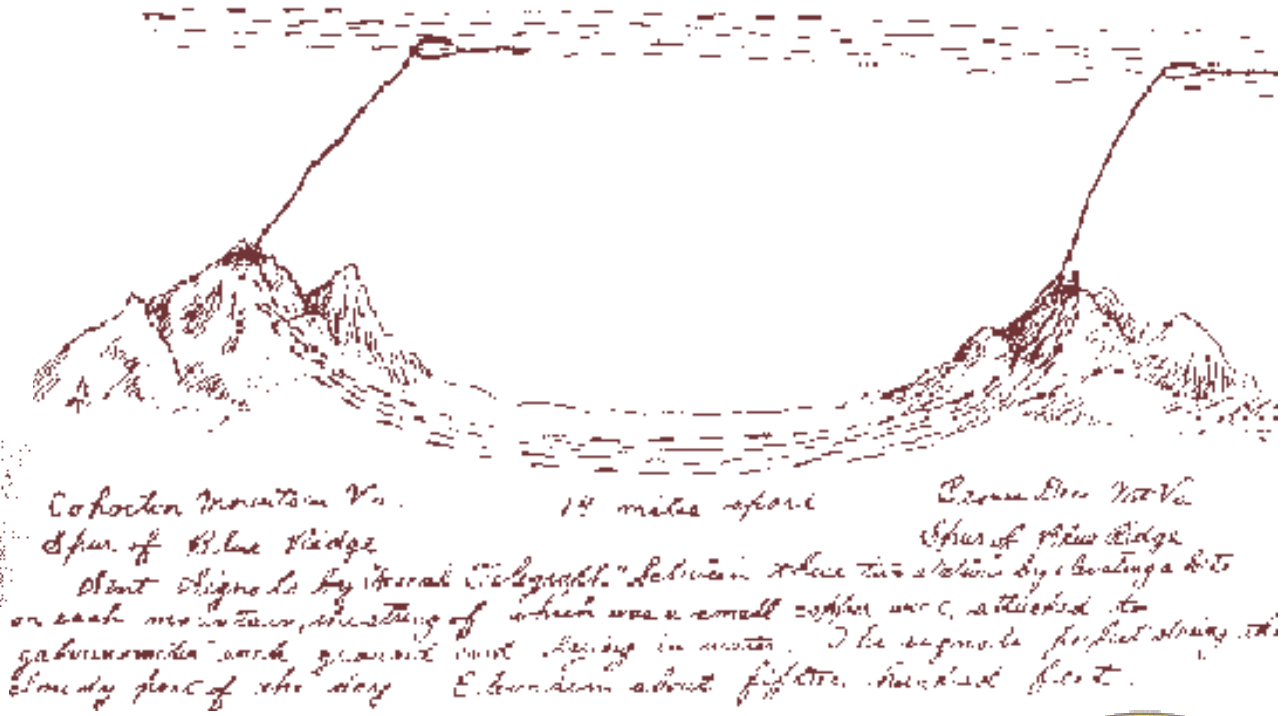
$$\nabla \cdot \vec{B} = 0$$

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\nabla \times \vec{B} = \mu_0 \left(\vec{j} + \epsilon_0 \frac{\partial \vec{E}}{\partial t} \right)$$

1864

Mahlon Loomis transmits wireless telegraphy 18 miles between two mountains using kites as antennas

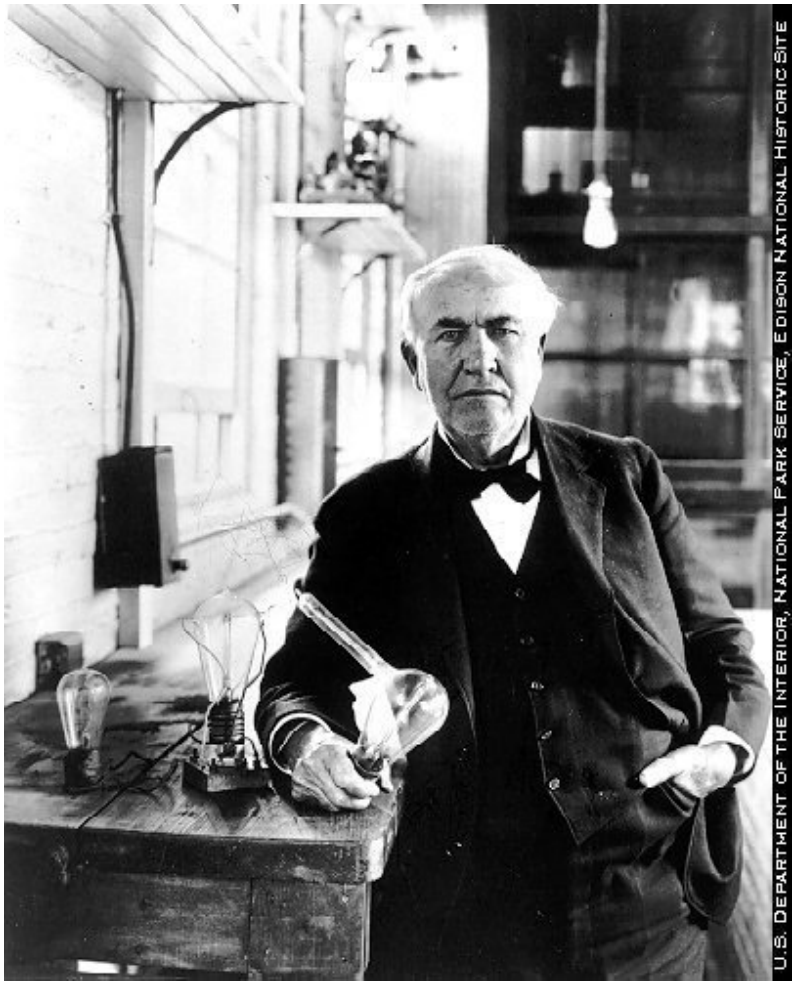


1870

Loomis accomplishes successful ship to ship wireless communications over two miles on the Chesapeake Bay under U.S. Navy sponsorship

1884

Edison Patents "The Edison Effect", his only discovery[1] in pure science - Electrons flow from a heated filament to a cold plate through a vacuum

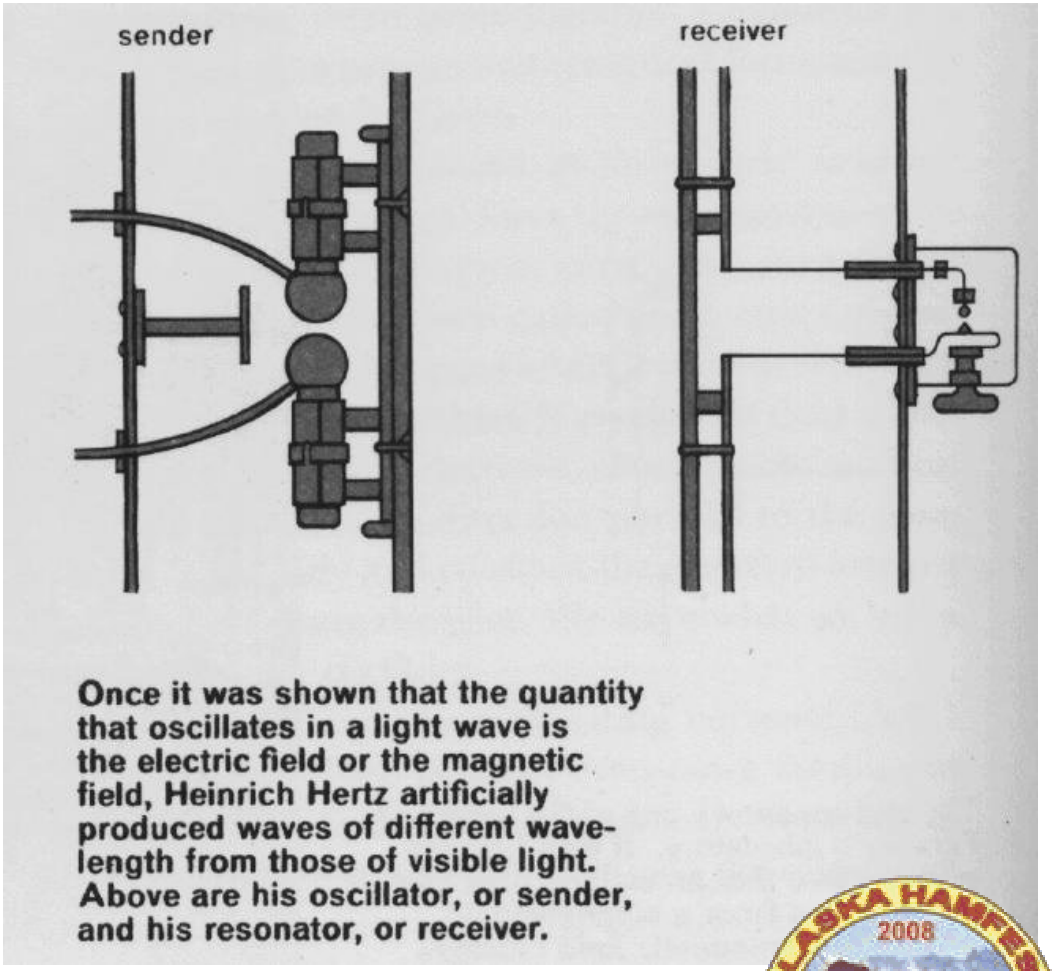


Edison patented the idea but wrongly dismissed it as just a scientific curiosity with no practical use

1 This phenomenon was actually discovered by British physicist Frederick Guthrie in 1873 and "re-discovered" by Edison in 1880

1886

Heinrich Hertz Proves Maxwell's Theory Through Experimentation



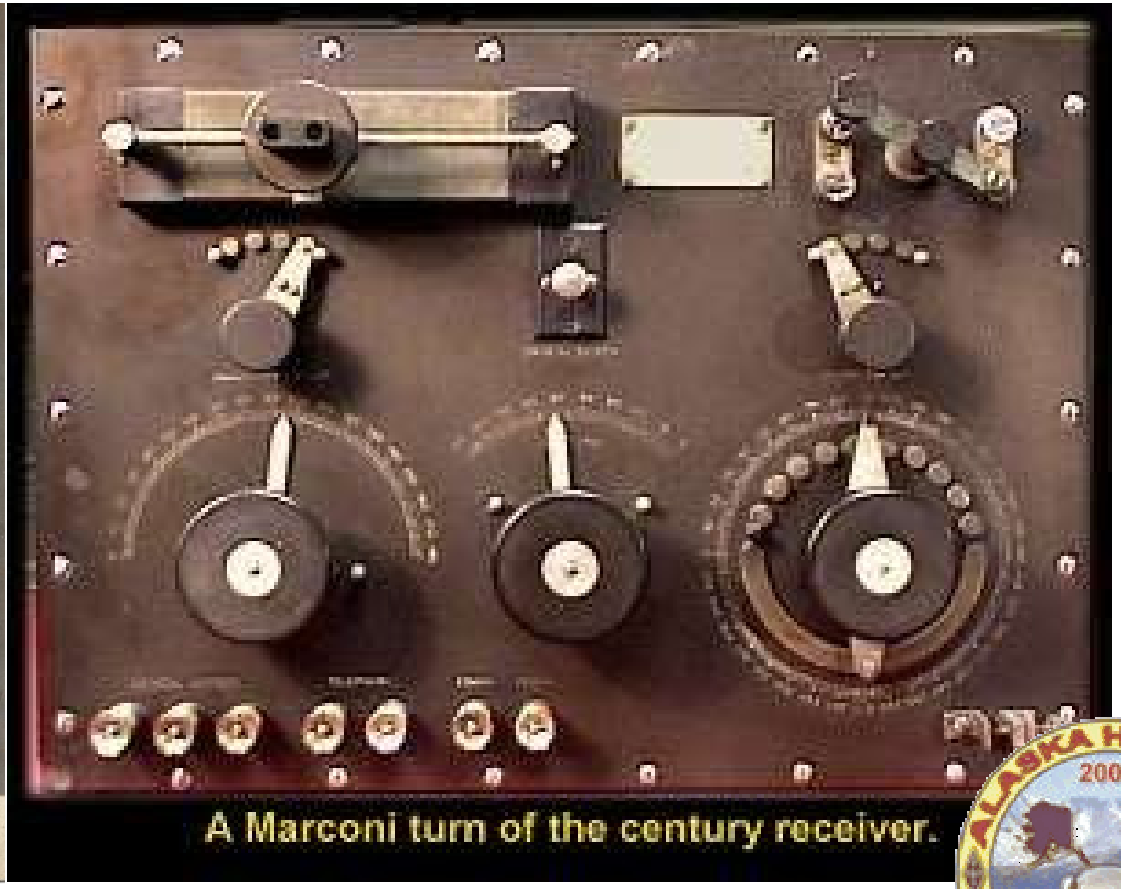
Once it was shown that the quantity that oscillates in a light wave is the electric field or the magnetic field, Heinrich Hertz artificially produced waves of different wavelength from those of visible light. Above are his oscillator, or sender, and his resonator, or receiver.

1899

Marconi sends a wireless message across the English Channel

1901

Marconi sends a message across the Atlantic

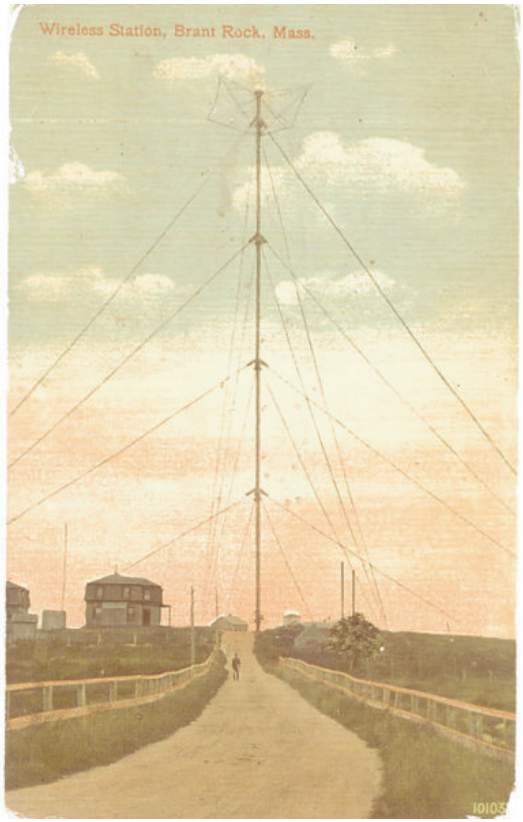

A Marconi turn of the century receiver.

1900

Reginald A. Fessenden succesfully transmits voice over a distance of 1 mile

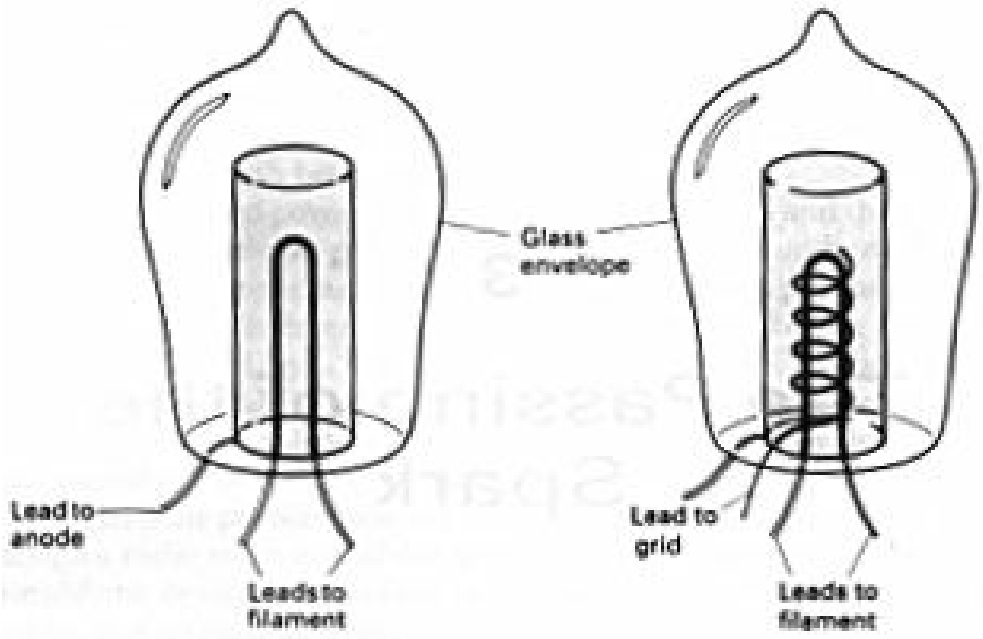
December 24, 1906

Prof. Fessenden demonstrates audio-modulated CW, presenting the world's first radio broadcast, including voice and music, from Brant Rock, MA



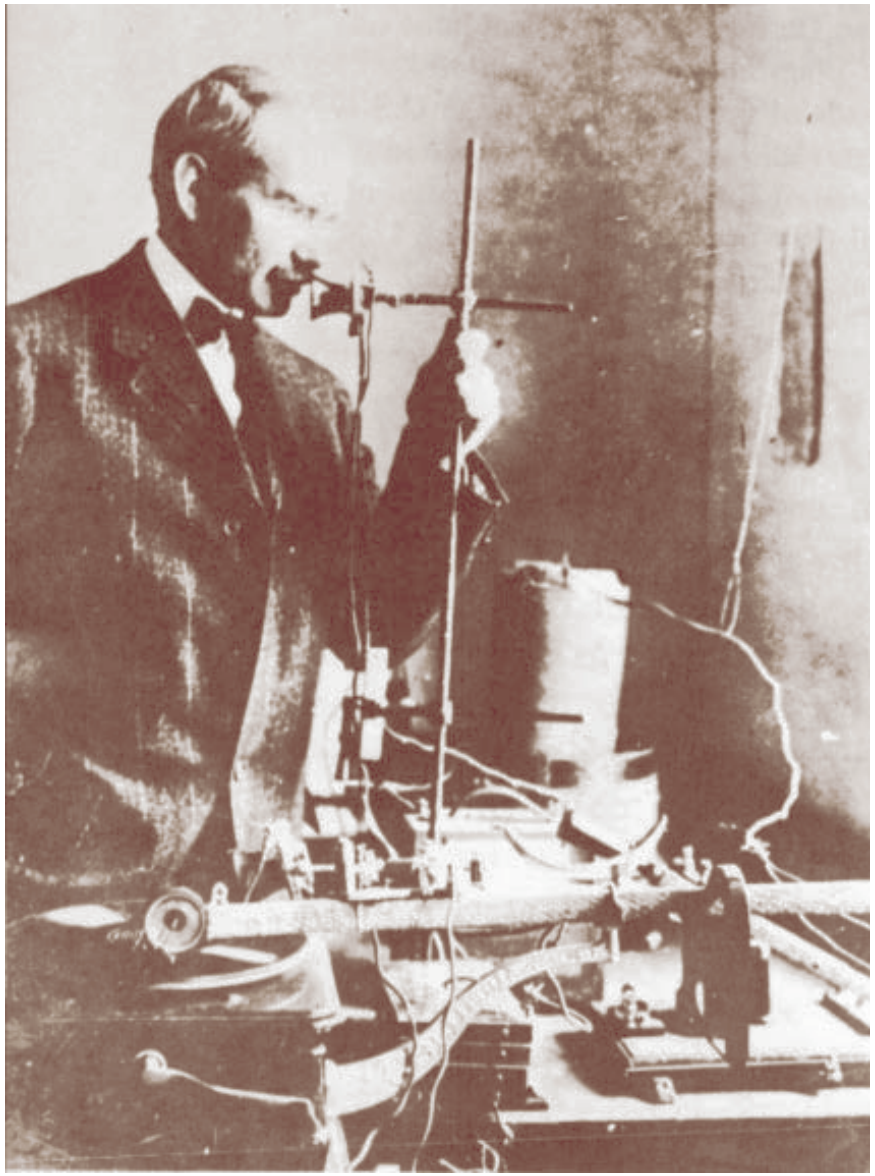
1904

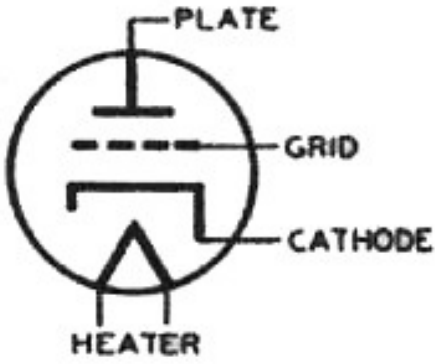
John Ambrose Fleming Introduces the "Thermionic Valve" – the first vacuum tube



1906

Lee De Forest Introduces the Audion

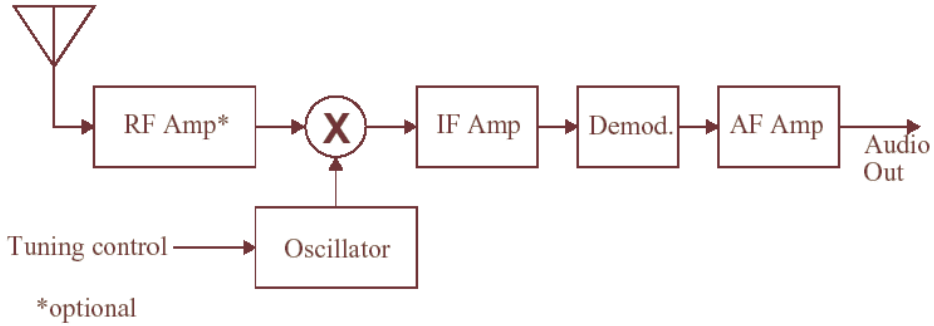




1918

Major Edwin Armstrong Discovers the Superheterodyne Principle – the basis for virtually all modern radios and televisions

Superheterodyne Receiver Block Diagram



*optional

How did the term "Ham Radio" originate?

AND NOW,
FOR A MORE
BELIEVABLE EXPLANATION

Basis and Purpose of Amateur Radio

- **Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.**

- **Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.**

- **Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communications and technical phases of the art.**

- **Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.**

- **Continuation and extension of the amateur's unique ability to enhance international goodwill.**

The Early Years

1909 – First Amateur Radio Club, the Junior Wireless Club is formed (later renamed the Radio Club of America)

1912 – Amateur Radio licensing begins under the Radio Act of 1912. Radio is regulated by the Department of Commerce. Irving Vermilya, 1ZE is granted "Skill Certificate # 1", making him the first U.S. licensed Amateur Radio Operator

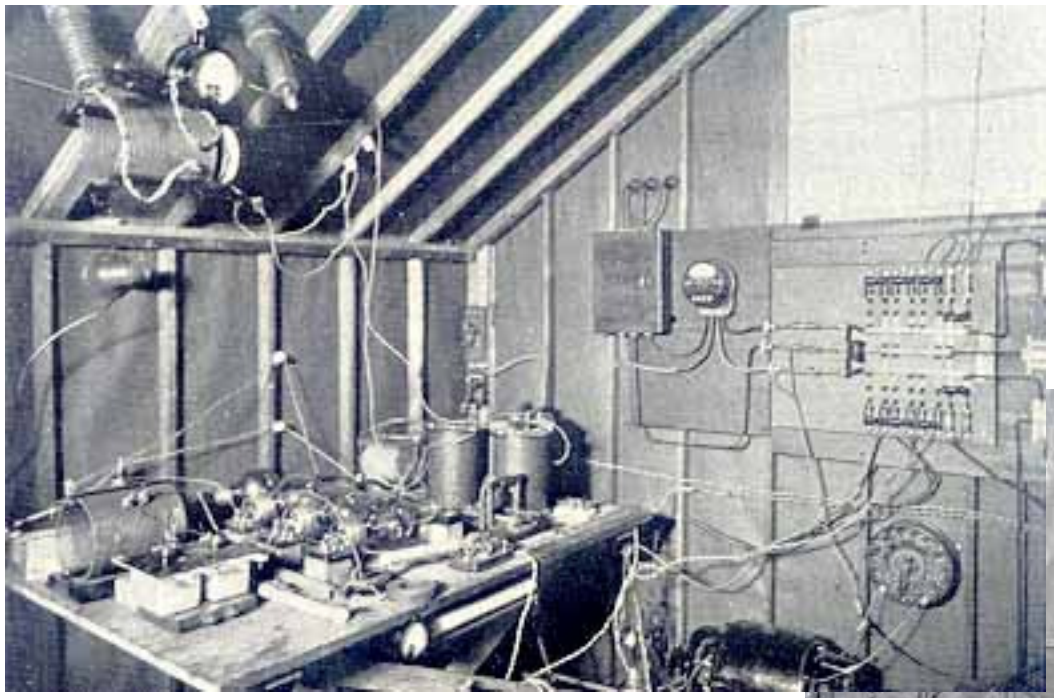
1914 – Hiram Percy Maxim organizes the American Radio Relay League

1915 - Emma Candler, 8NH, becomes the first woman radio amateur

1917 – 6000 Licensed Hams in the US. Amateur Radio is temporarily shut down as America enters World War I

1919 – Amateur Radio resumes after the end if WW I

1921 – Amateur Radio Station 1BCG
The Radio Club of America Club Station



Transmitter

Receiver

The 1920's

1921 – Paul Godley, 2ZE, and the Radio Club of America station, 1BCG, operated by E. H. Armstrong, Walter Inman, E. V. Amy, John Grinan, Minton Cronkhite, and George Burghard, demonstrate "short wave" communication from Greenwich, Connecticut to Ardrossan, Scotland

Hams prove airwaves "below 200 meters" are useful

Ionospheric Skip Discovered

Use of Vacuum Tube amplifiers and oscillators to develop and detect radio waves "electronically".

End of Spark Gap

The 1930's

1933 – First Amateur Radio "Field Day" Emergency Preparedness Drill

1934 Federal Communications Commission formed

Amateur Radio Licenses Restructured – Incentive Licensing is introduced

By 1936 there are about 42,000 licensed hams

Gus Gram, W6NXW in Los Angeles, Circa 1937

World War II

1940 – U.S. Hams prohibited from talking to other countries

June 1941 – Radio Tubes in Short Supply; Military asks Hams to donate parts and are flooded with whatever was needed

December 1941 – USA enters World War II and hams are once again off the air for the duration

- **51,000 licensed hams in the USA**
- **25,000 enlist in the Armed Forces and serve as radiomen and technicians**
- **25,000 more teach electronics, work for Defense contractors in the communications industry, or serve in the War Emergency Radio Service (WERS)**

1945 – Amateurs back on the air in limited capacity

1946 – Amateurs get most of their privileges back

The 1950's

Almost 90,000 licensed hams in the US in 1950

Transistor invented in 1948 but virtually all ham gear still uses tubes

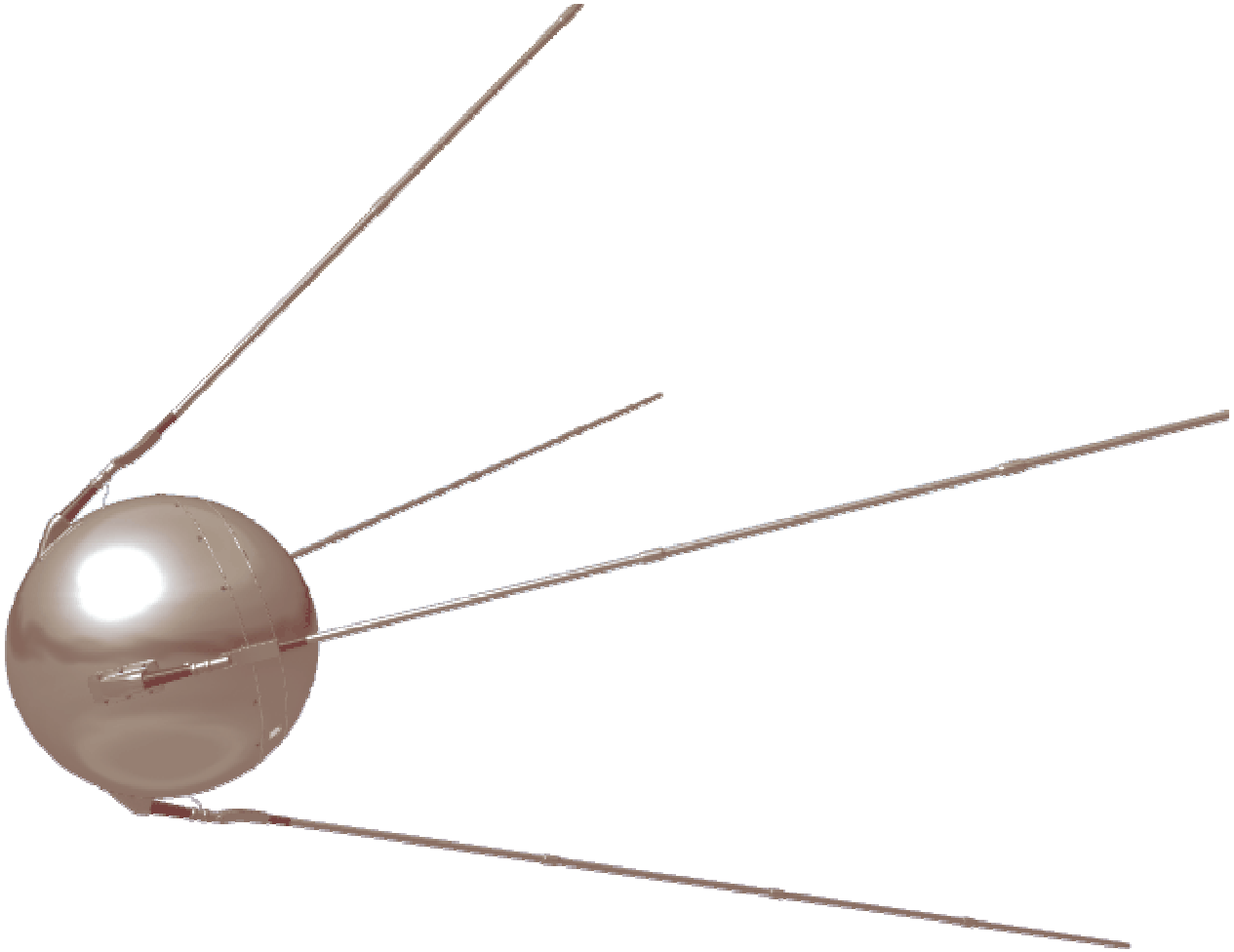
Single Sideband equipment becomes available to hams

Commercial Gear Starting to Overtake "Homebrewing"

By 1956 there are 140,000 hams; the ranks of Amateur Radio were growing at a rate of 10,000 new hams per year

A Well Equipped 1950's Ham Station

1957 – Russia launches Sputnik satellite, giving America a "Wake Up Call"



Hams were able to receive Sputnik's distinctive "beep-beep-beep" beacon signal

The 1960's

Hams help usher in the Space Age

1960 – First Moonbounce contact on 1296 MHz

1961 – First OSCAR (Orbital Satellite Carrying Amateur Radio) is launched into orbit

Homebrewers still building radios using parts from discarded television sets

Single Sideband begins to overtake AM

Transistors start infiltrating receivers; all solid-state transmitters still another decade away

Hams start building 6 meter FM repeaters – the principle on which Cell Phones are based

Jean Shepherd spoke fondly about the days when shortwave receivers had "romantic" names like "Sky Buddy"

This is an early Hallicrafter's Model S19 Sky Buddy, Circa 1935

The 1970's

Around 327,000 hams in the USA

Japan enters the US market

VHF Repeaters and FM become prominent

The home computer is introduced

The 1980's

By 1980 more commercial ham equipment is made in Japan than in the USA

Computers and Radios become a natural combination

Cell phones introduced in early 80's

SAREX program – First Amateur Radio contacts between hams and astronauts aboard the space shuttle

1989 – more than 500,000 hams

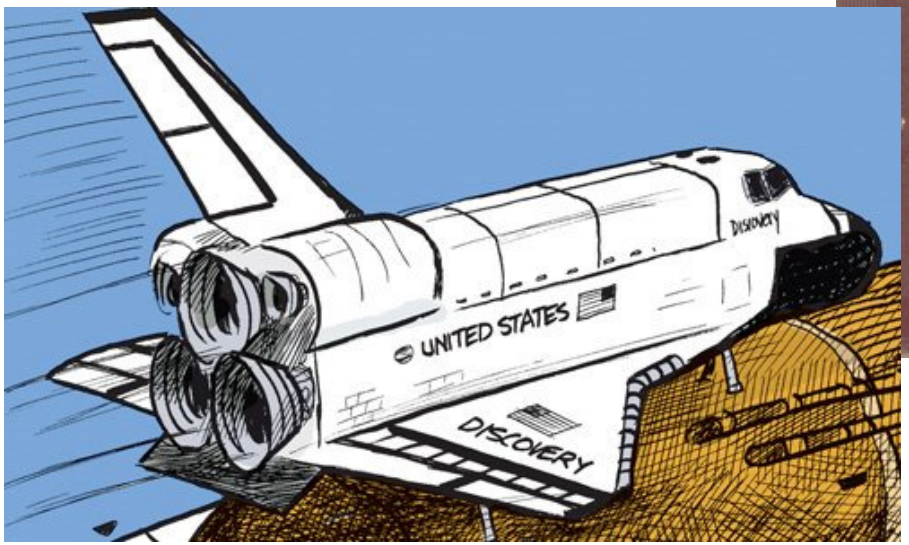
The 1990's

1991 – the newly introduced No-Code Technician license, which has no Morse Code requirement, creates a surge in popularity of ham radio

About half of those who start out as No-Code technicians eventually move on to learn Morse Code and upgrade to a higher license class

Hams routinely setting up communications with astronauts aboard the Space Shuttle for schools

Internet provides both competition and synergy with Ham Radio



21st Century

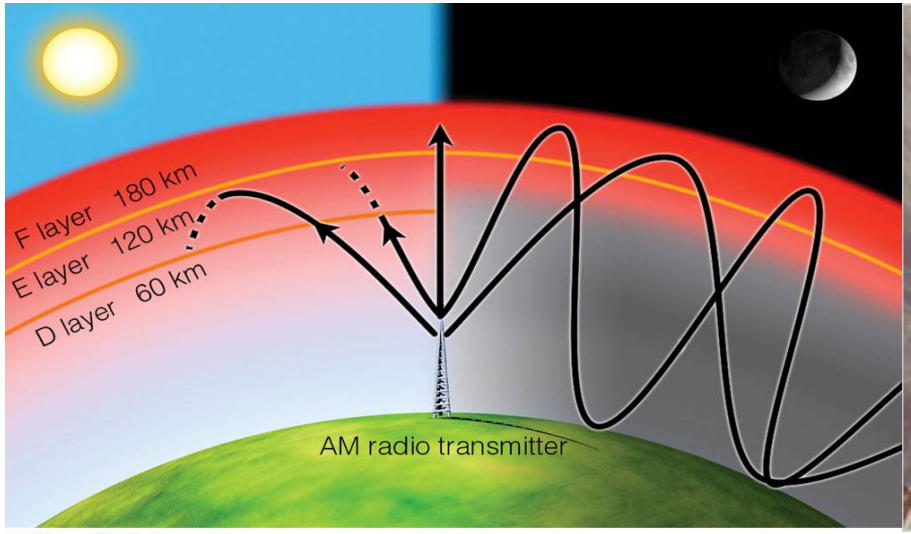
Majority of ISS astronauts are Hams who talk regularly with hams here on Earth

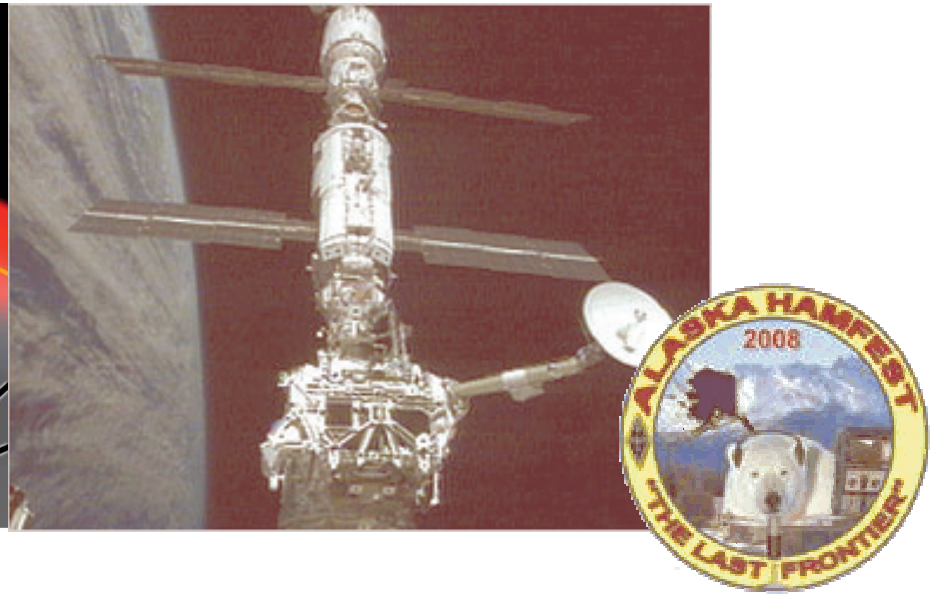
FCC drops Morse requirements for all Amateur license classes

750,000 hams in the USA. Japan has nearly twice as many.

Consumer electronics (cell phones, I-pods, WI-FI) overshadowing the "gee whiz" aspect of Amateur Radio

Ham Radio still has draw for people who are interested in the inner workings of radio equipment and signal propagation





Some prominent hams

Dr. Harold Beverage, W2BML
Long Islander, inventor of the Beverage antenna

Grote Reber, W9GFZ
Radioastronomy pioneer

Al Gross, W8PAL
Inventor of the Walkie Talkie, precursor to cell phones

Emma Candler, 8NH
First woman radio amateur, licensed in 1915

Wilson Greatbatch, W2QBO
Inventor of the Pacemaker

Bob Heil, K9EID
Prominent Audio Engineer, "live" recording pioneer in the 60's and 70's

Robert Moog, K2AMH
Electronic music pioneer, Inventor of the Moog Synthesizer

A few more hams you may have heard of

John Huston, 6UK
Famed Movie Producer

Barry Goldwater, K7UJA
US Senator and 1964 Republican Presidential candidate

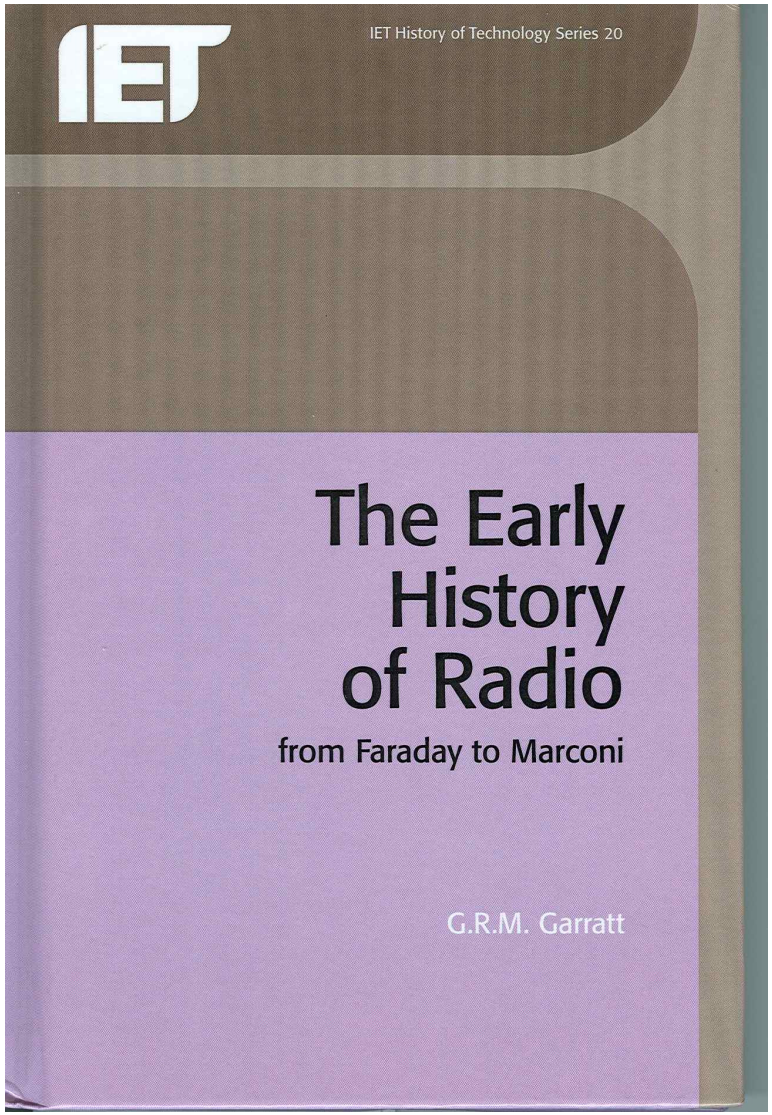
Chet Atkins, W4CGP
Guitar Player

Walter Kronkite, KB2GSD
Newscaster

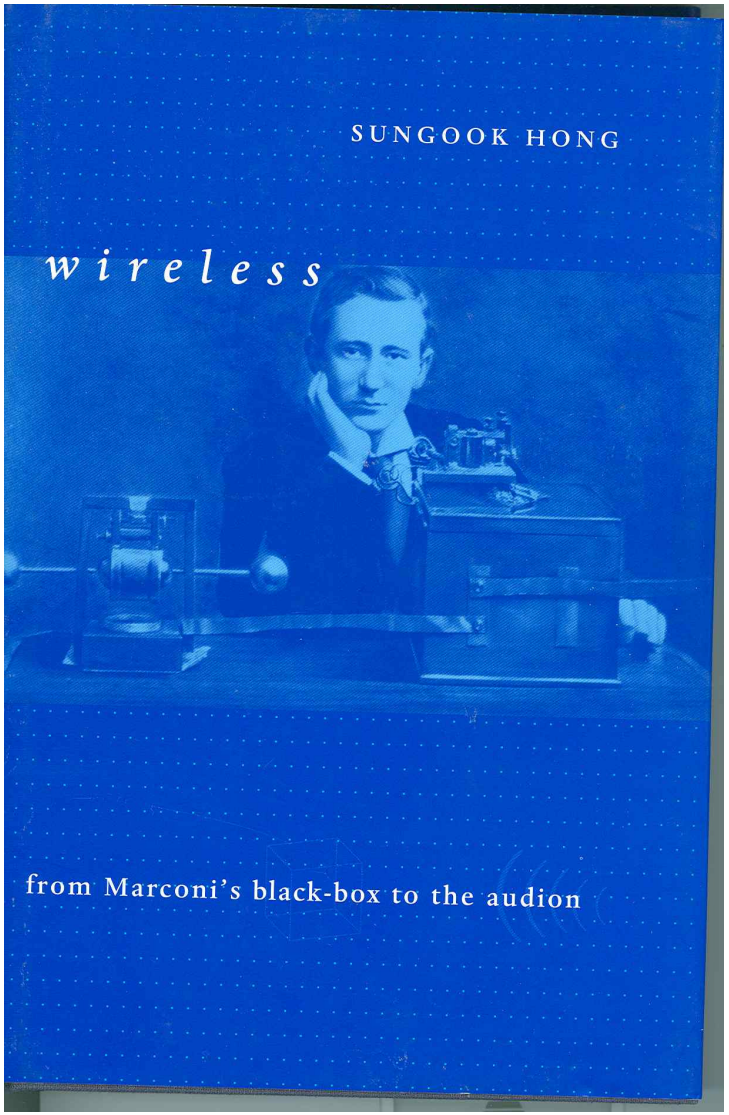
Joe Walsh, WB6ACU
Pop Music Singer and Guitar Player

Jean Shepherd, K2ORS
Radio Talk Show Host

Some Interesting Reading . . .
The Pioneers of Radio

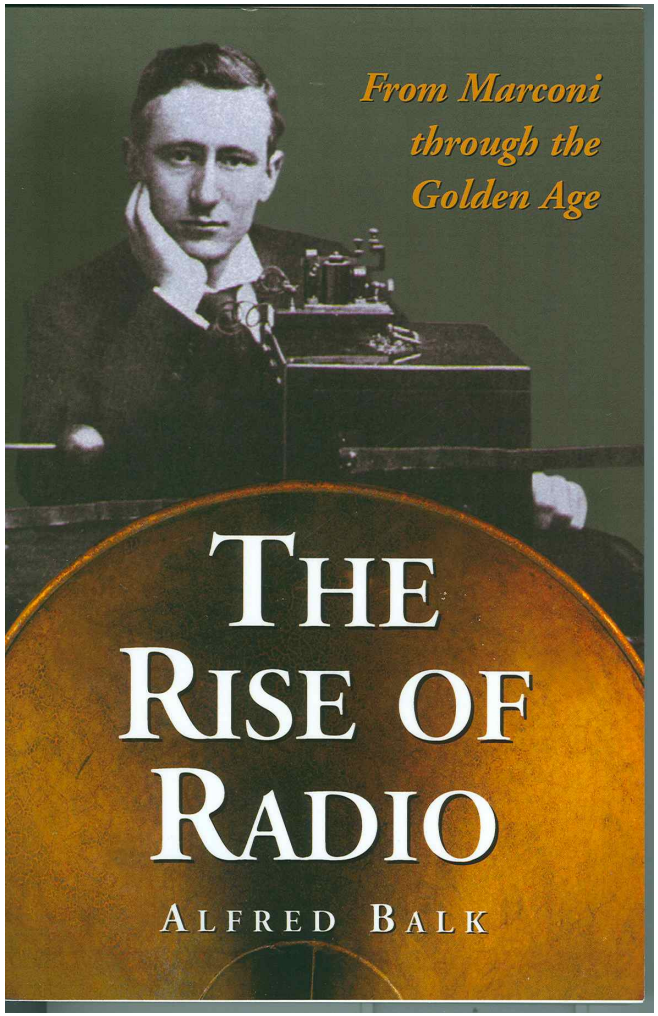


The Institute of Engineering and Technology, London, UK

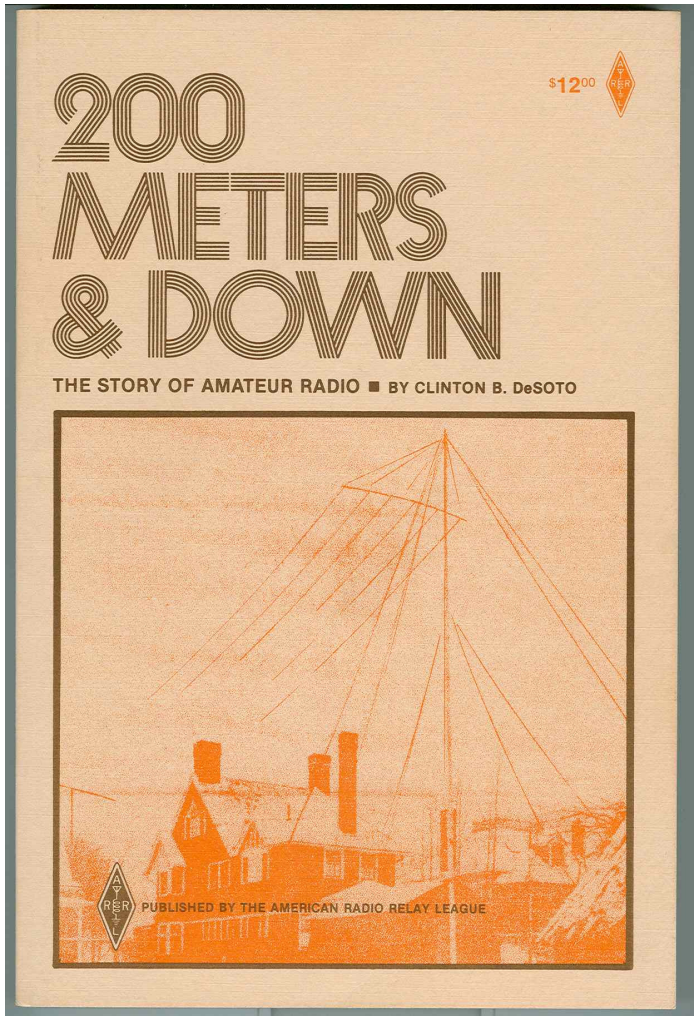


The Massachusetts Institute of Technology Press, Cambridge, MA

Some Interesting Reading . . .
The Early Years of Radio

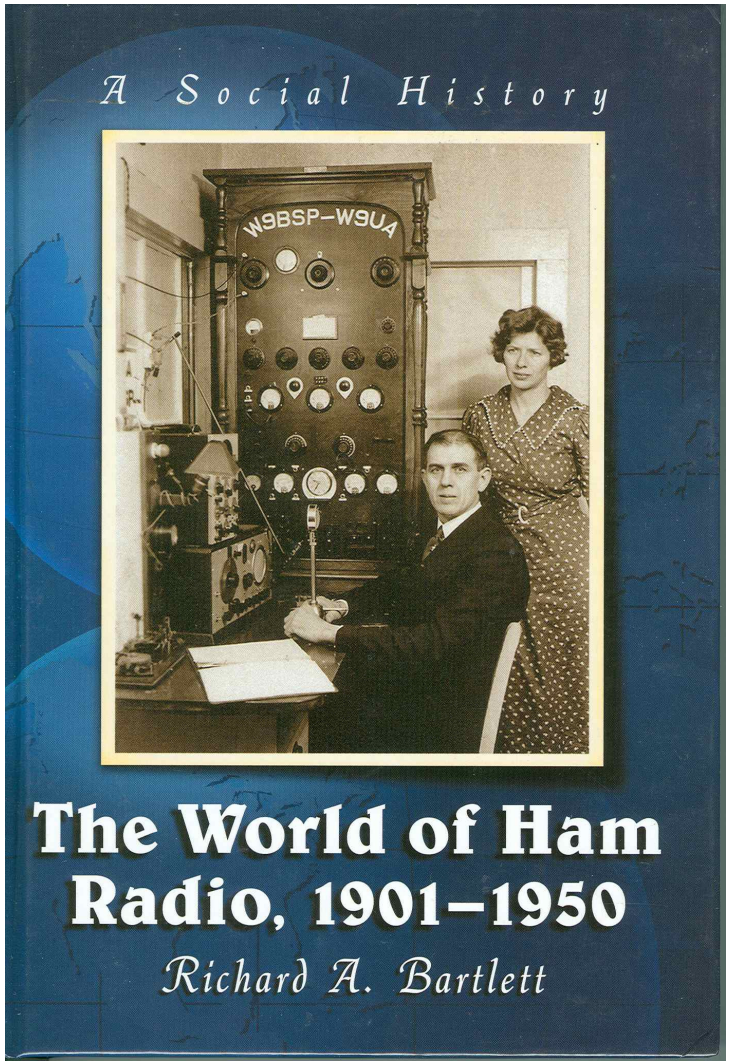


MacFarland and Company Publishers, Jefferson, North Carolina



Amateur Radio Relay League, West Hartford, Connecticut

Some Interesting Reading . . .
Social and Cultural Perspectives



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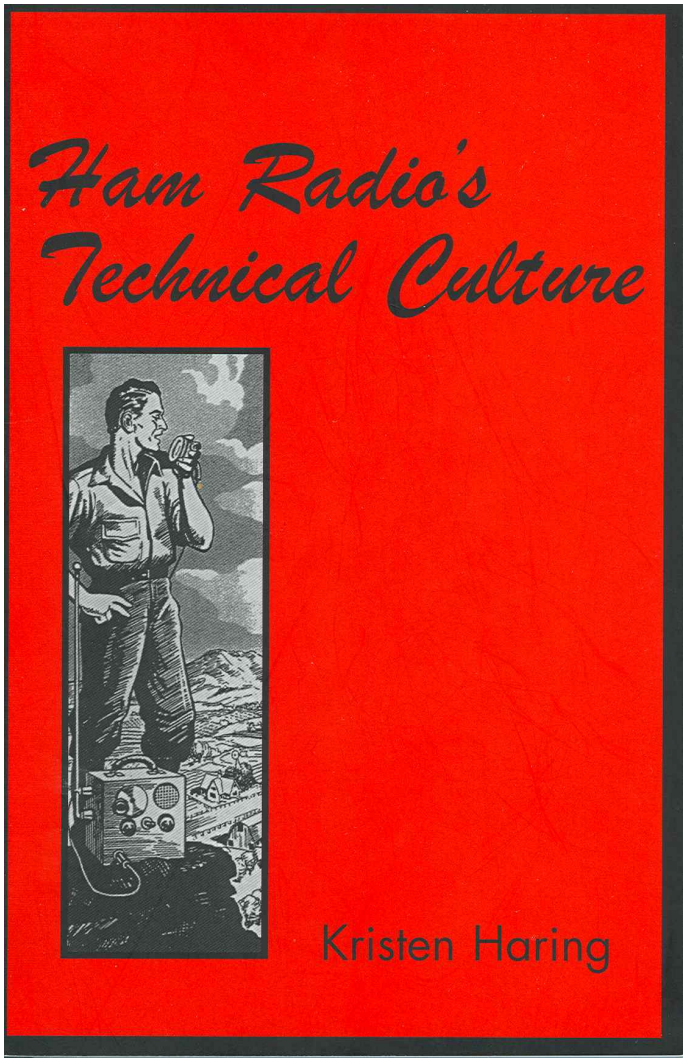

The Massachusetts Institute of Technology Press, Cambridge, MA

Some Interesting Reading . . .
A Virtual Time Machine Documenting W2OJW, Jerry Powell's Life through his 369-card QSL collection

Princeton Architectural Press, New York, New York