

# History of Amateur Radio

**Pioneers of Wireless Communications**

**Evolution of Ham Radio**

**Audio Clip from Jean Shepherd, K2ORS\***

**Hams You May Have Heard Of**

**Some Interesting Books**

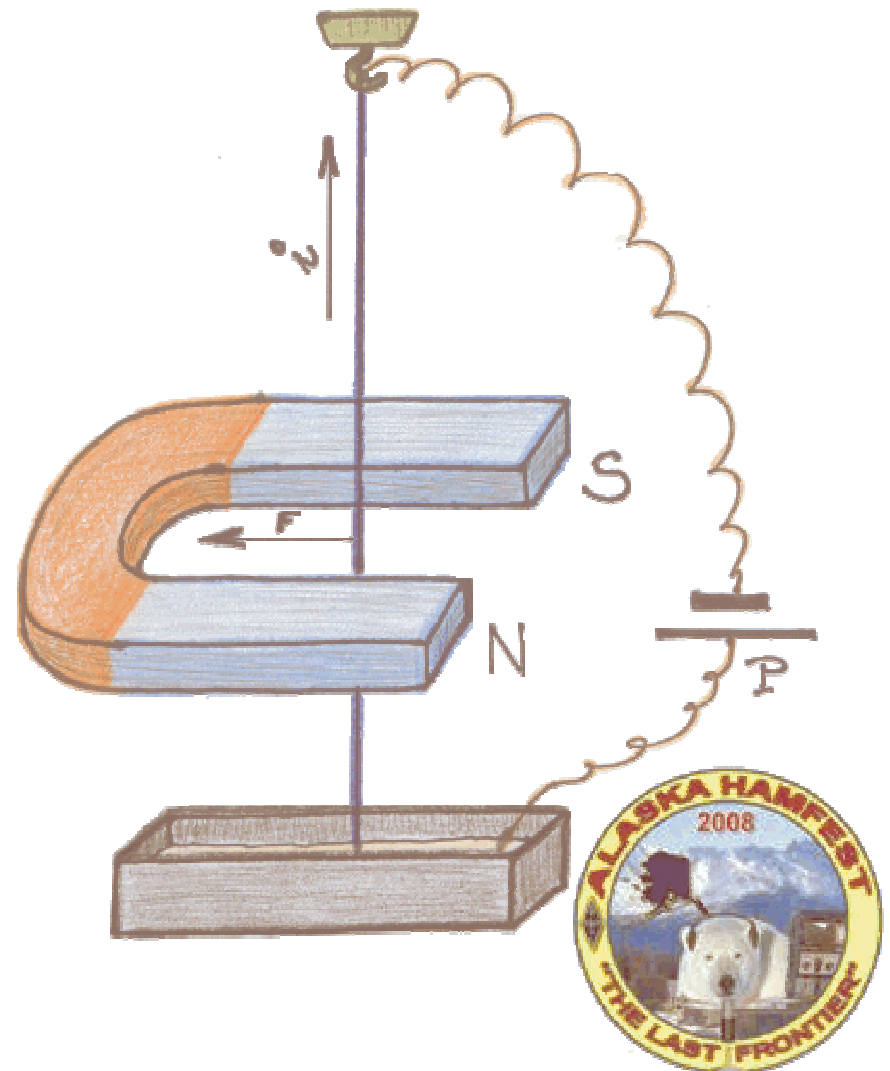
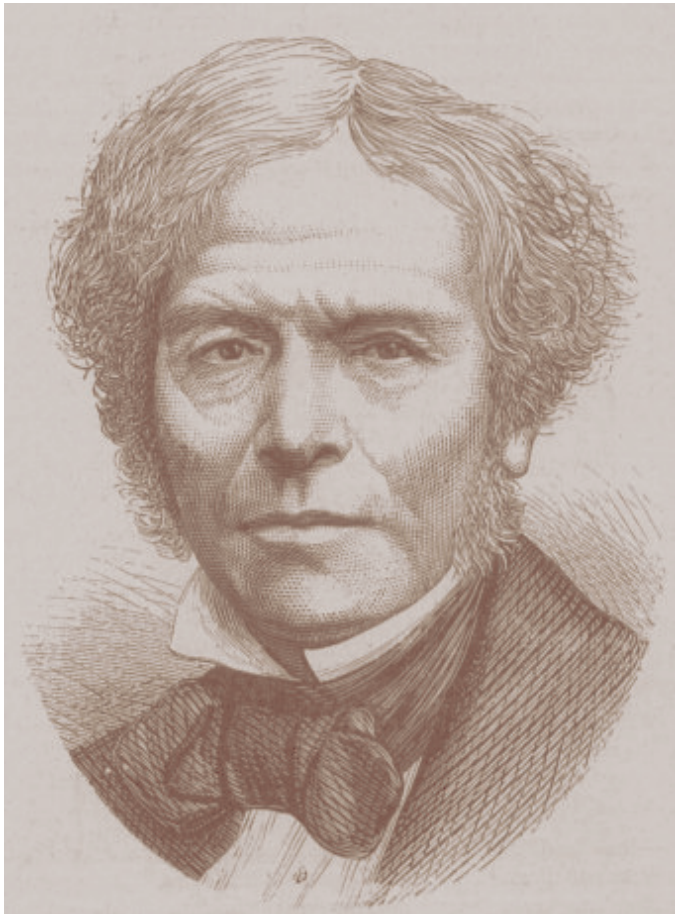
**Walter Cronkite video, “Amateur Radio Today”\***

\* Audio and video clips not included in this web version



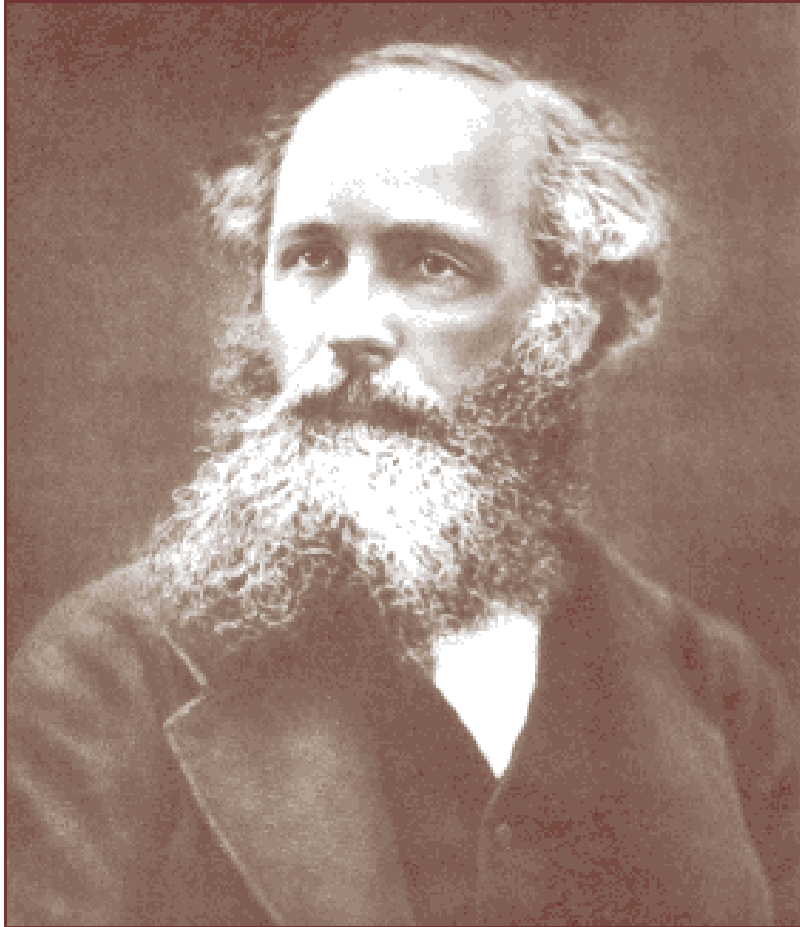
1831

**Michael Faraday Demonstrates Induction Principle:  
Electricity and Magnetism Are Related**



1850

## James Clerk Maxwell Advances Theory that Light is an Electromagnetic Wave



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

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

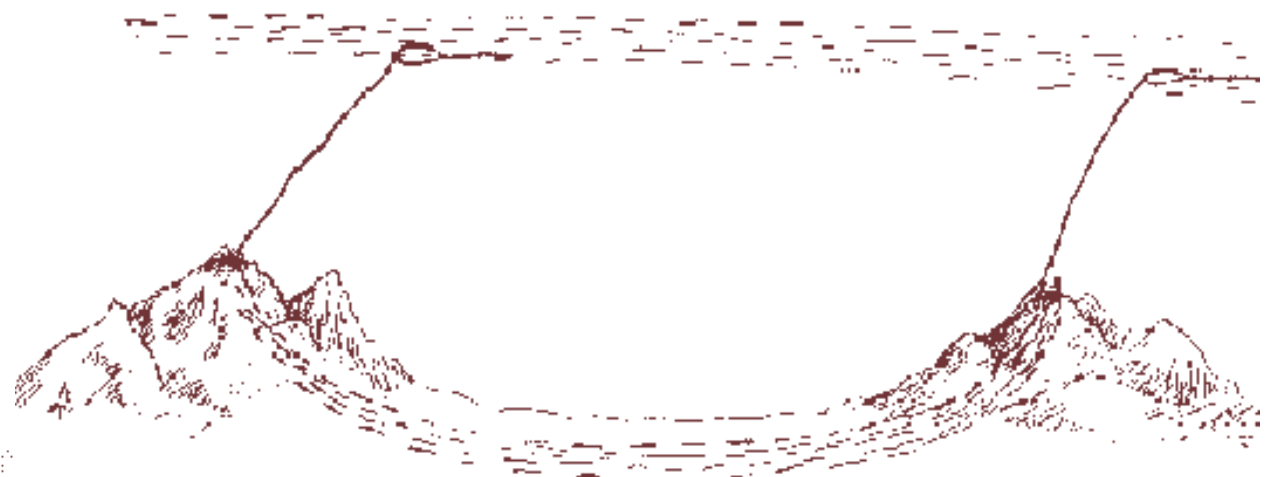
$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

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



1864

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



Cohocton Mountain N.Y. 18 miles apart Cromwell Hill N.Y.  
Spur of Blue Ridge Spur of Blue Ridge  
Sent signals by Aerial Telegraph. "Between these two stations by hoisting a kite on each mountain, consisting of which was a small copper wire, attached to galvanized iron ground rods dipping in water. The signals perfect during the cloudy part of the day. Extending about fifty thousand feet."

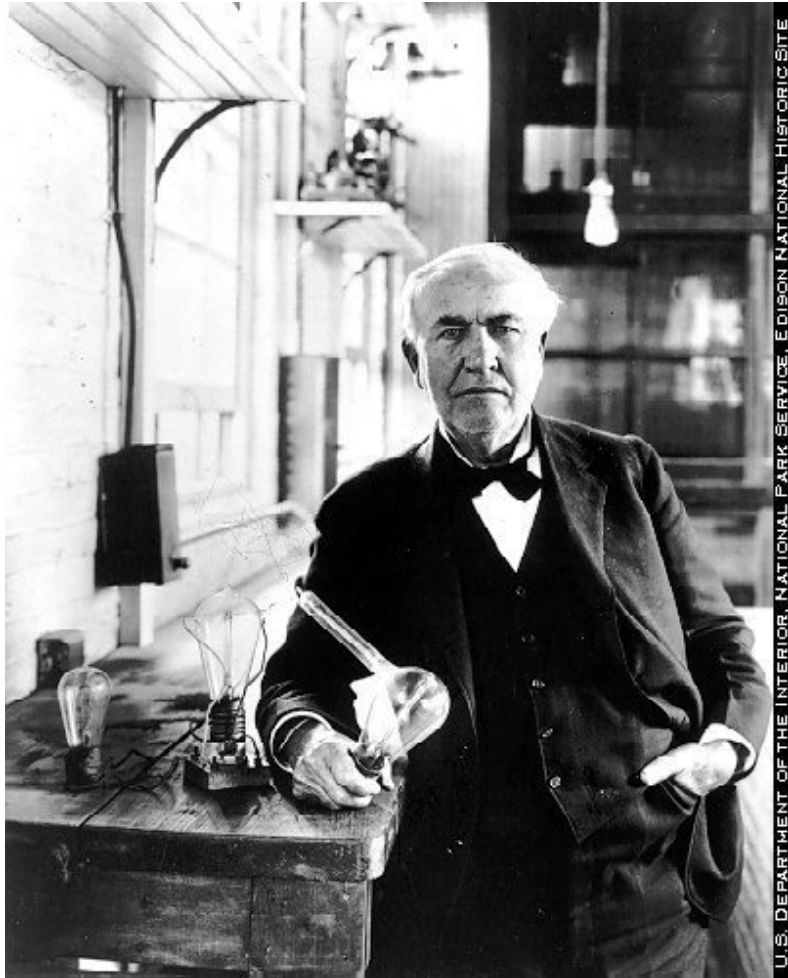
1870

**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<sup>1</sup> in pure science -  
Electrons flow from a heated filament to a cold plate through a vacuum**



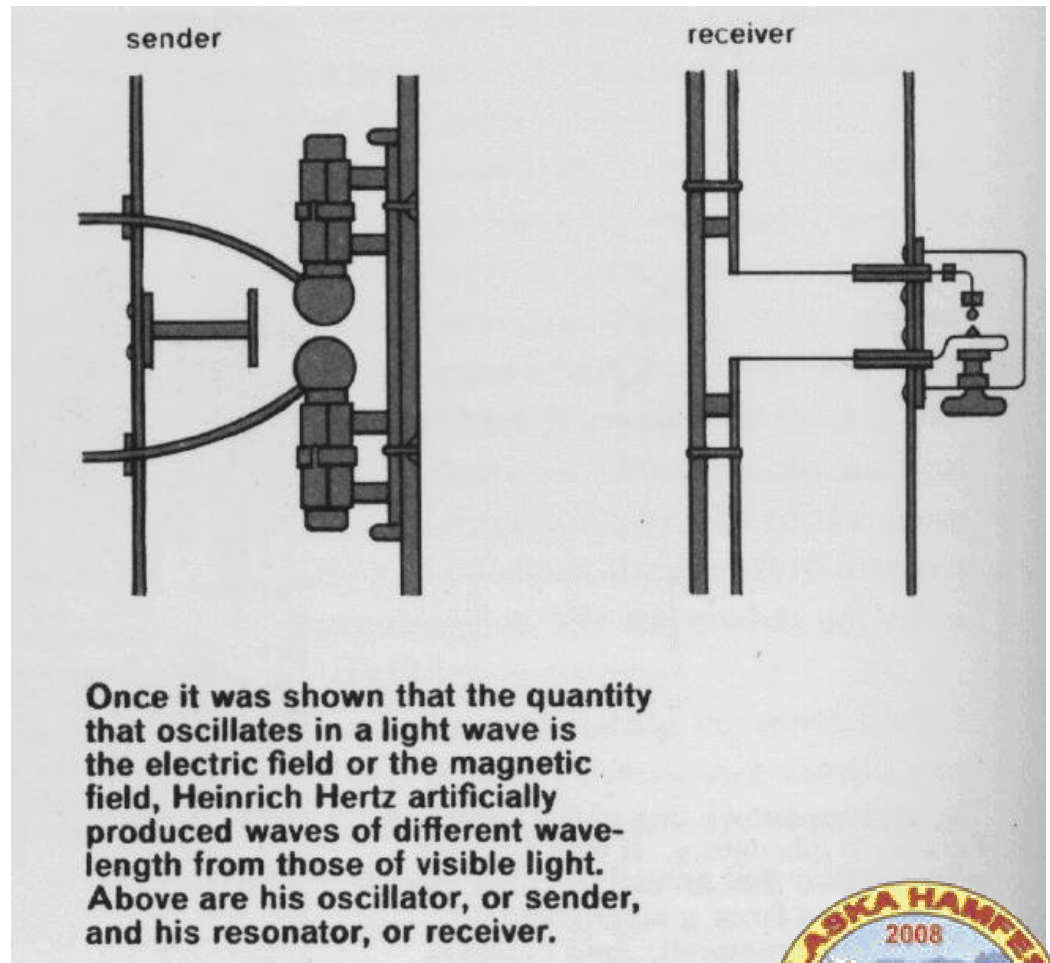
**Edison patented the idea  
but wrongly dismissed it as  
just a scientific curiosity  
with no practical use**

<sup>1</sup> 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



**1899**

**Marconi sends a wireless message across the English Channel**

**1901**

**Marconi sends a message across the Atlantic**

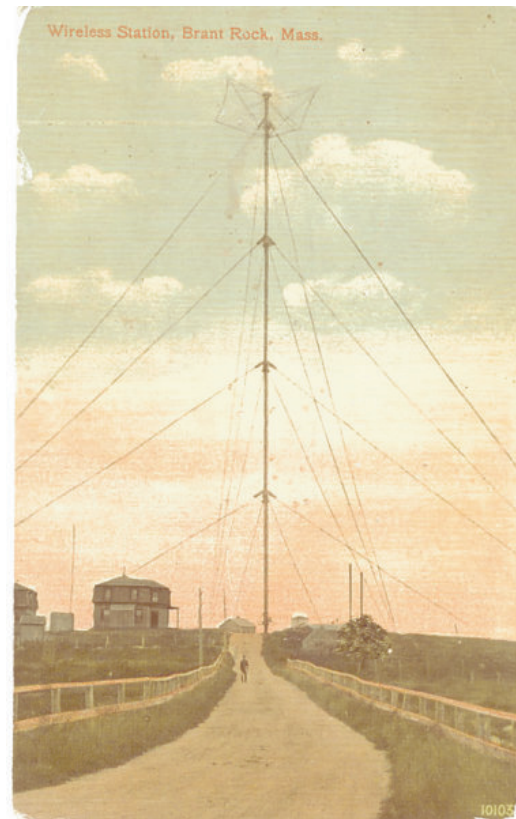


**1900**

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

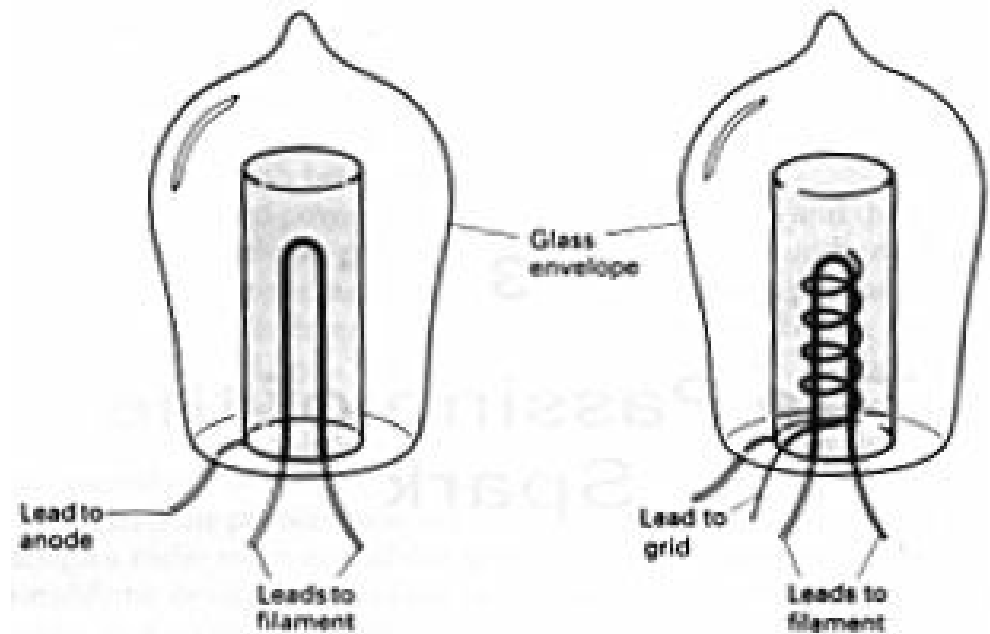
**December 24, 1906**

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



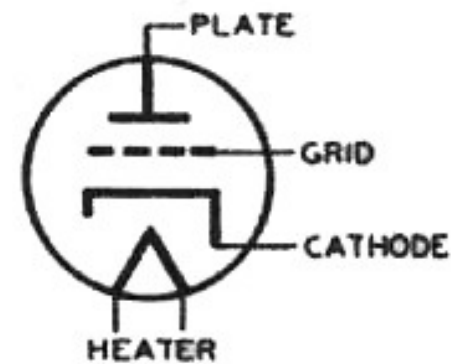
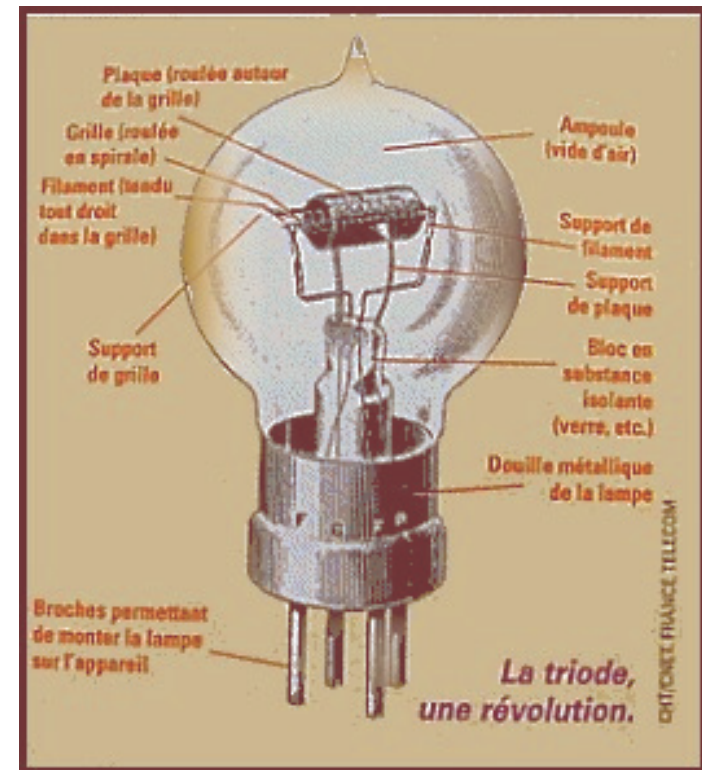
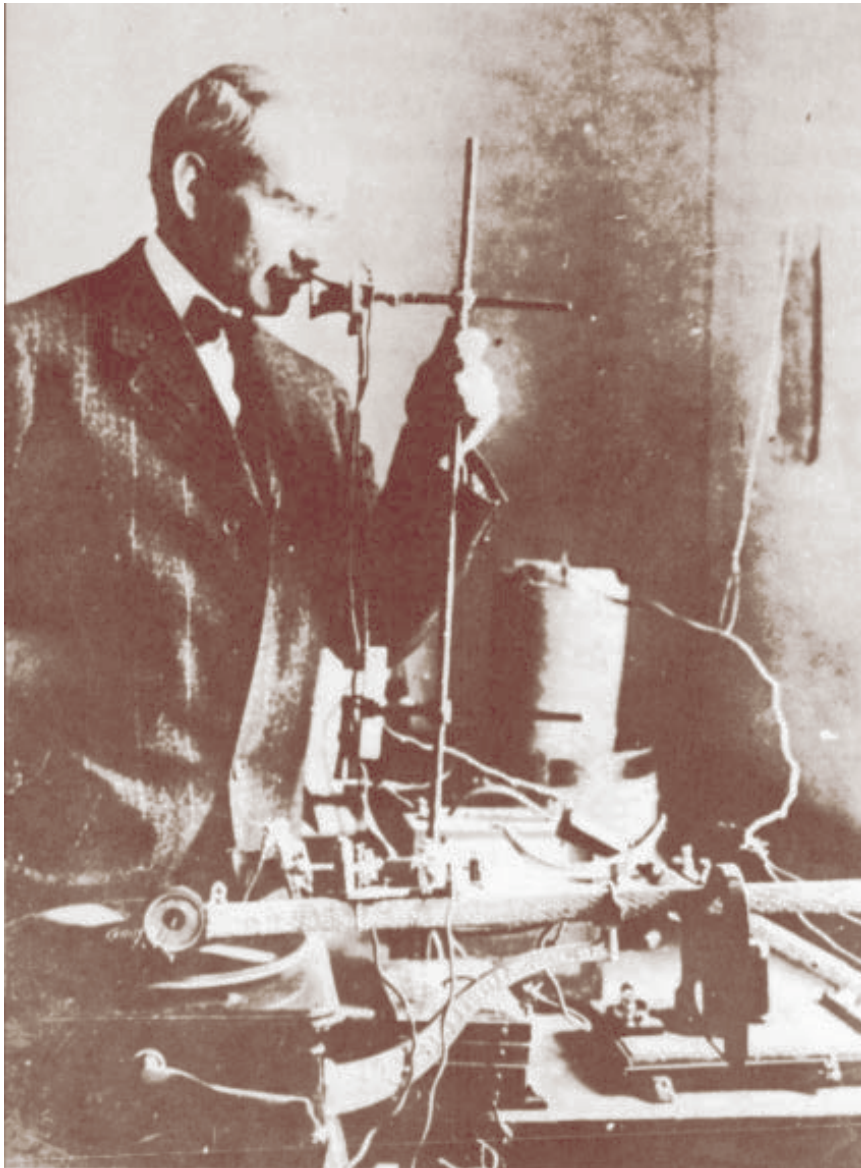
1904

**John Ambrose Fleming Introduces the “Thermionic Valve” – the first vacuum tube**



1906

## Lee De Forest Introduces the Audion

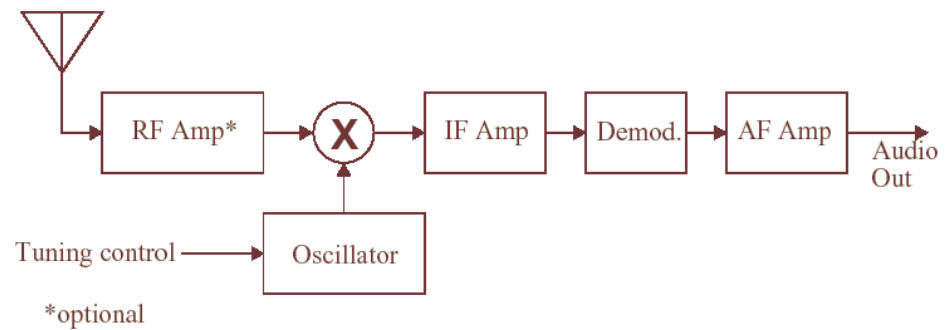


1918

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



Superheterodyne Receiver Block Diagram



## How did the term “Ham Radio” originate?

Here are a few popular theories that have no basis in fact . . .

**Ham – A Poor Operator; A ‘Plug’**

-G. M. Dodge's *The Telegraph Instructor*, a telegrapher's manual that pre-dates radio.

Three Harvard Wireless members in 1908 - Albert Hyman, Bob Almy and Peggie Murray - created the acronym from their last names.

British “cockney” pronunciation of “Ham” would sound like “Am”, which is short for “Amateur”

Combined initials of Hertz, Armstrong, and Marconi

Acronym for “Home Amateur Mechanic”



VE2OWL

# 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**

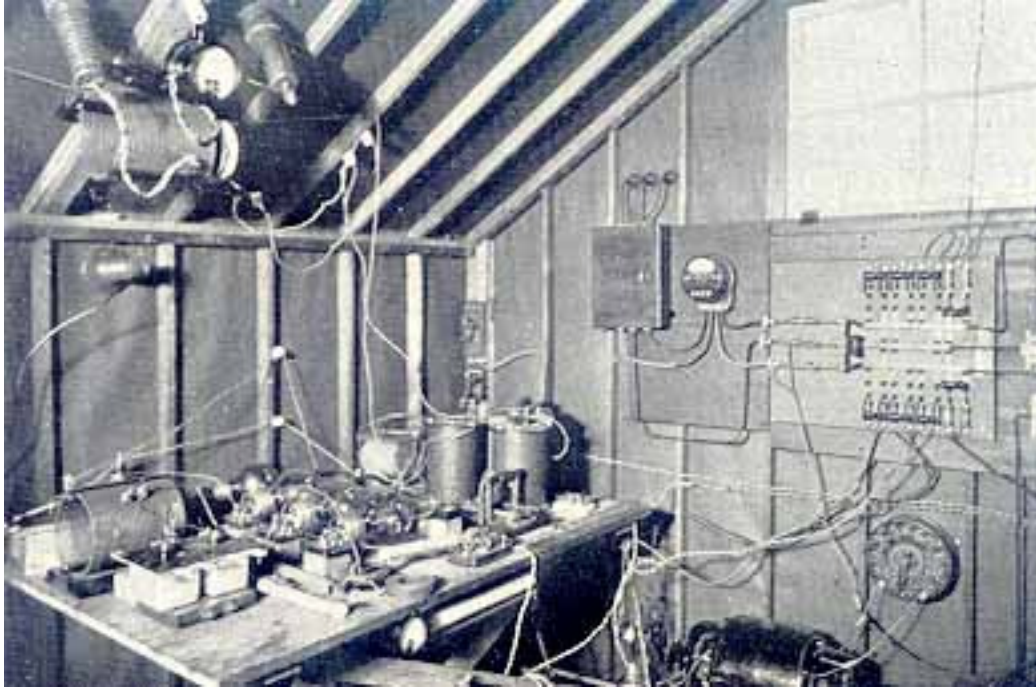
**1915 - Emma Candler, 8NH, becomes the first woman radio amateur**

**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 of 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”**

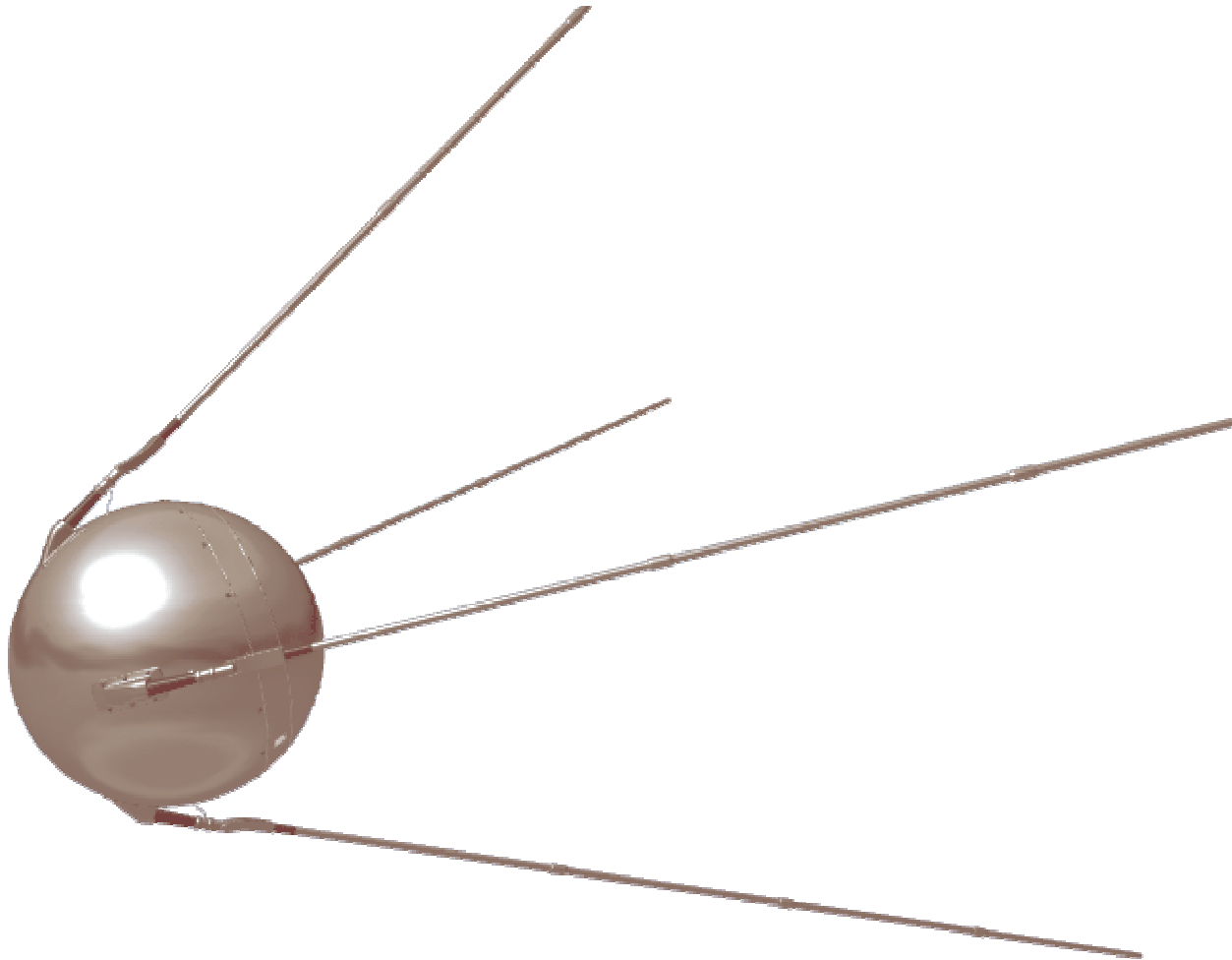
**By 1956 there are 140,000 hams; the ranks of Amateur Radio were growing at a rate of 10,000 new hams per year**



## 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**

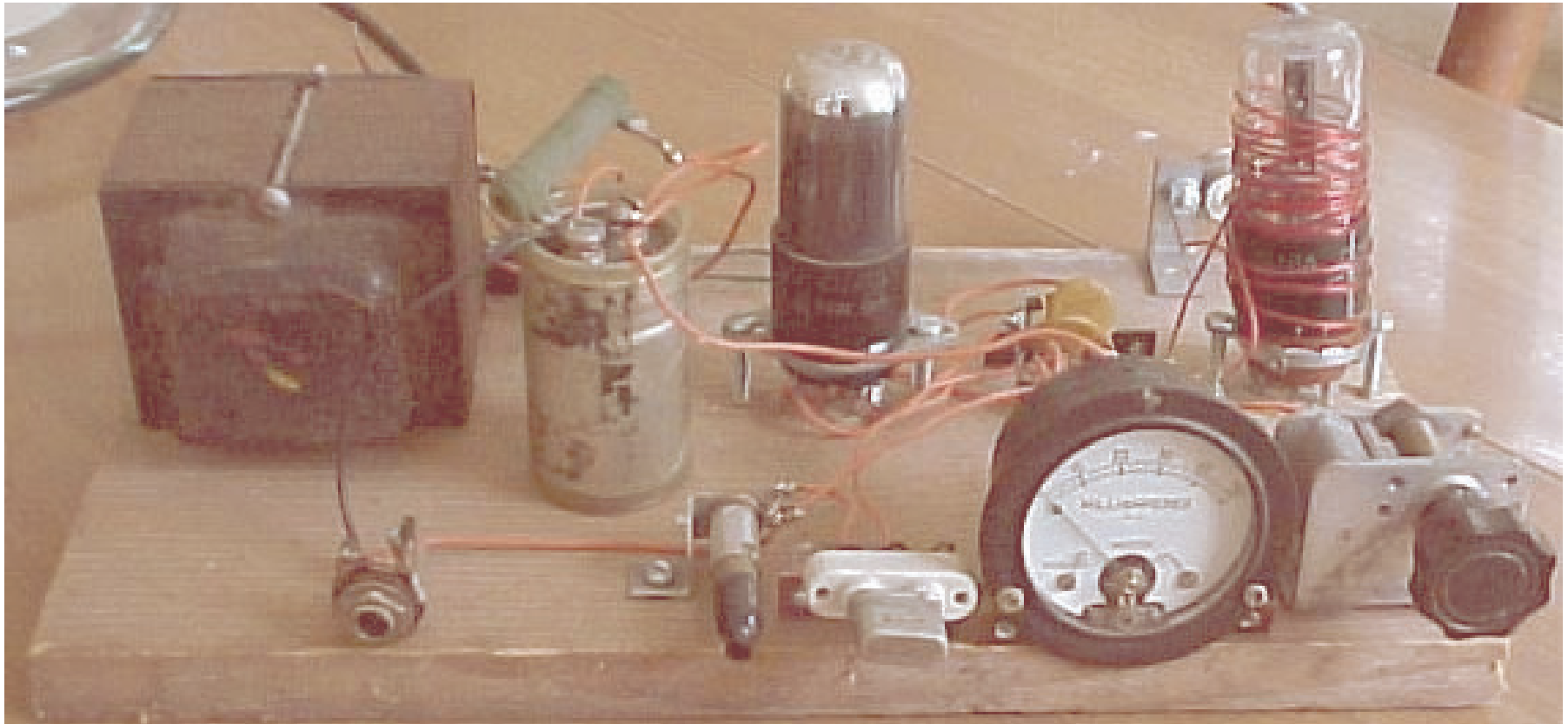
**Hams start building 6 meter FM repeaters – the principle on which Cell Phones are based**



## **Audio Clip from a 1965 broadcast by Jean Shepherd, K2ORS**



**Shep's "6L6" transmitter probably looked something like this**



**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**



## 21<sup>st</sup> Century

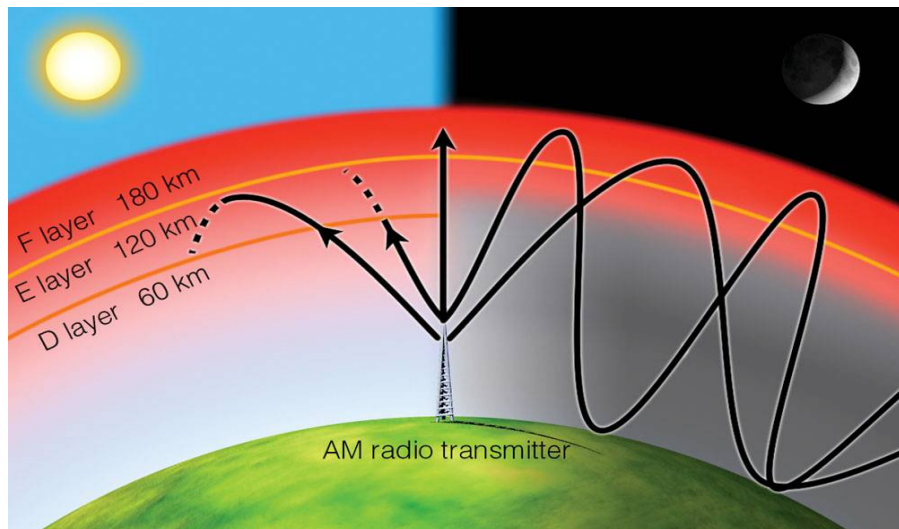
**Majority of ISS astronauts are Hams who talk regularly with hams here on Earth**

**FCC drops Morse requirements for all Amateur license classes**

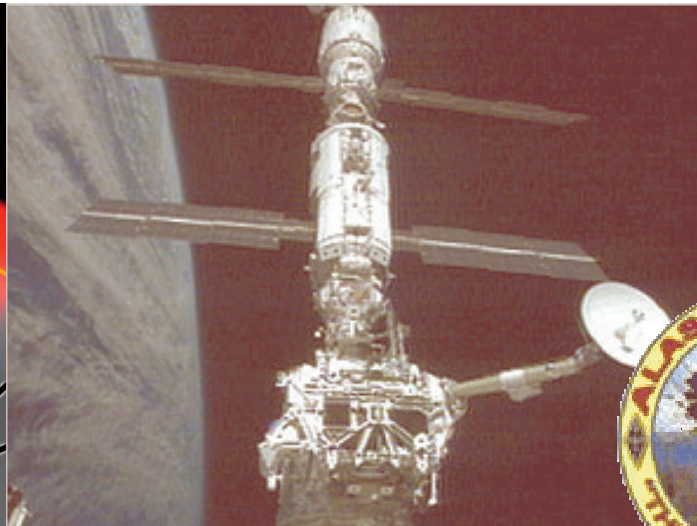
**750,000 hams in the USA. Japan has nearly twice as many.**

**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**



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## **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**

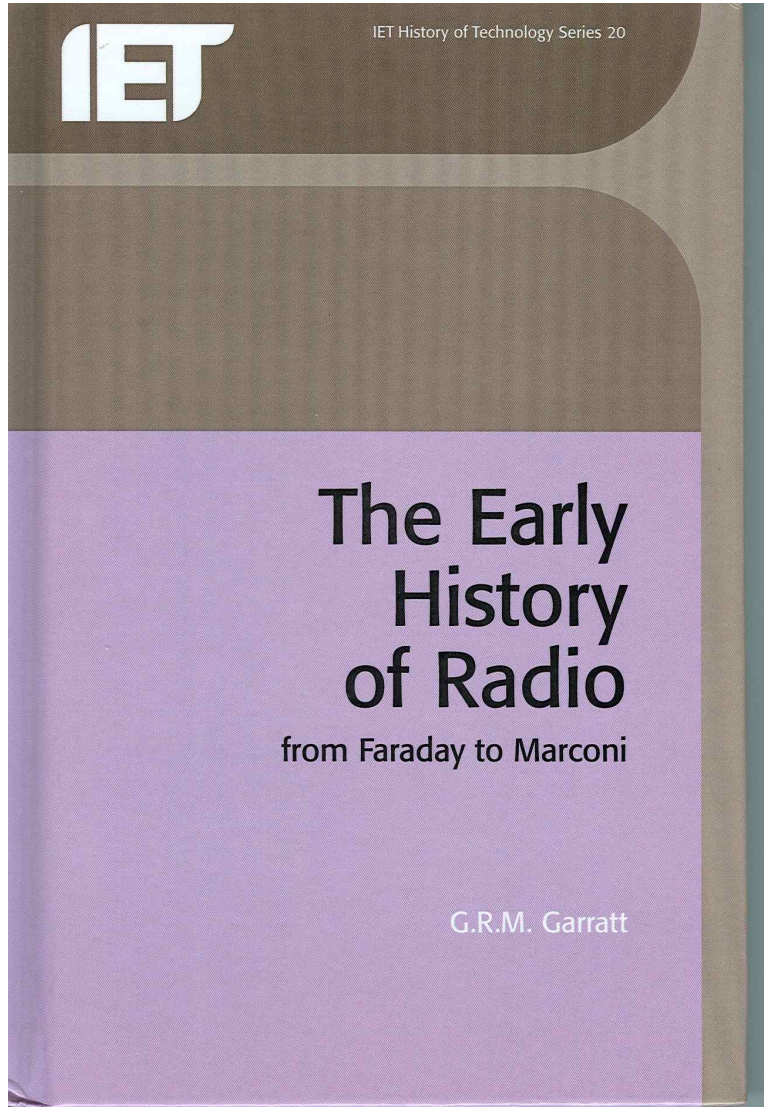
**Joe Walsh, WB6ACU**  
**Pop Music Singer and Guitar Player**

**Jean Shepherd, K2ORS**  
**Radio Talk Show Host**

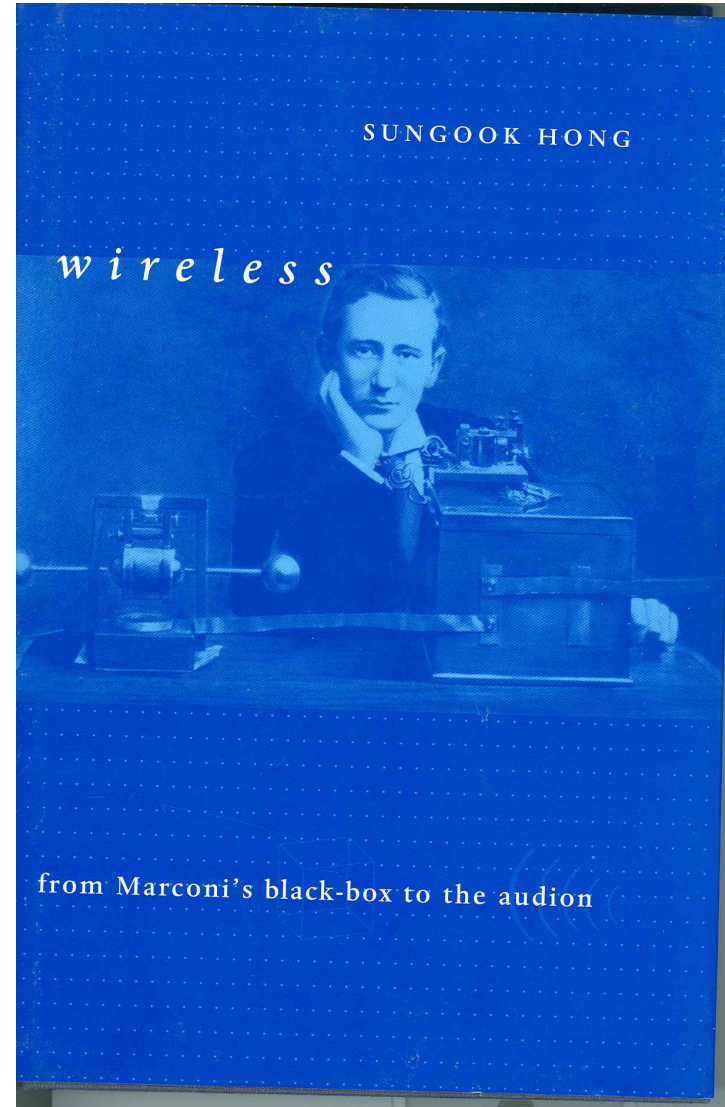


## Some Interesting Reading . . .

### The Pioneers of Radio

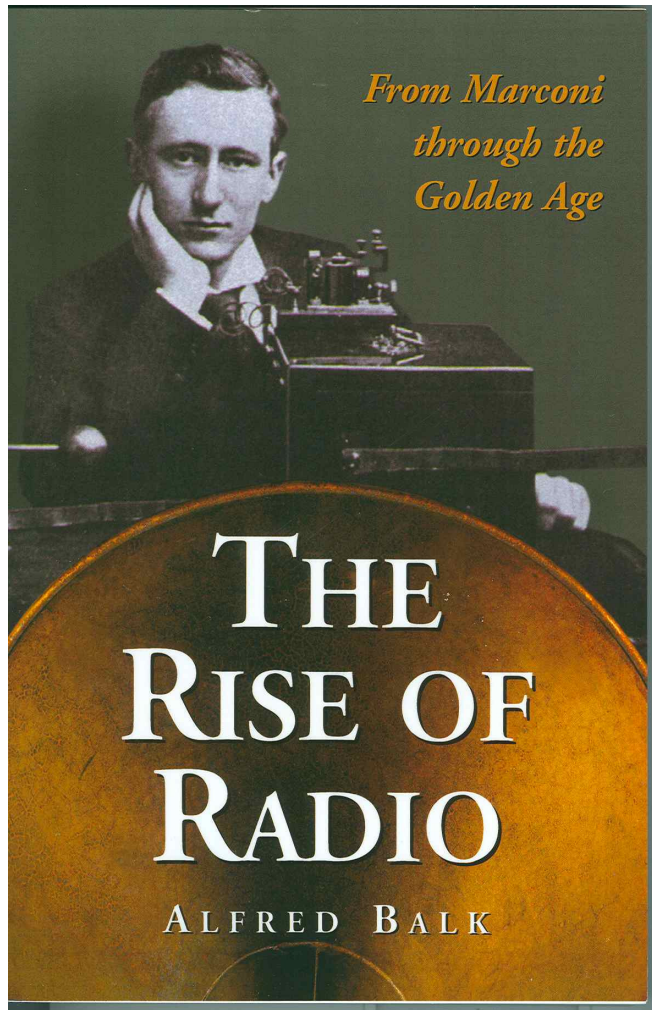


The Institute of Engineering and Technology, London, UK

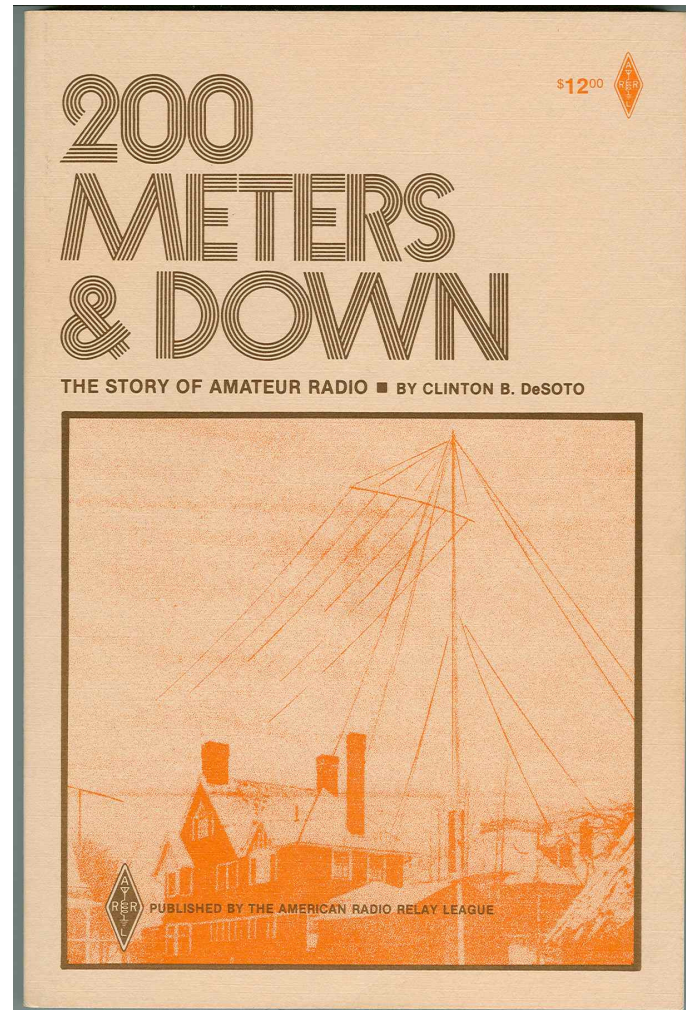


The Massachusetts Institute of Technology Press, Cambridge, MA

Some Interesting Reading . . .  
The Early Years of Radio

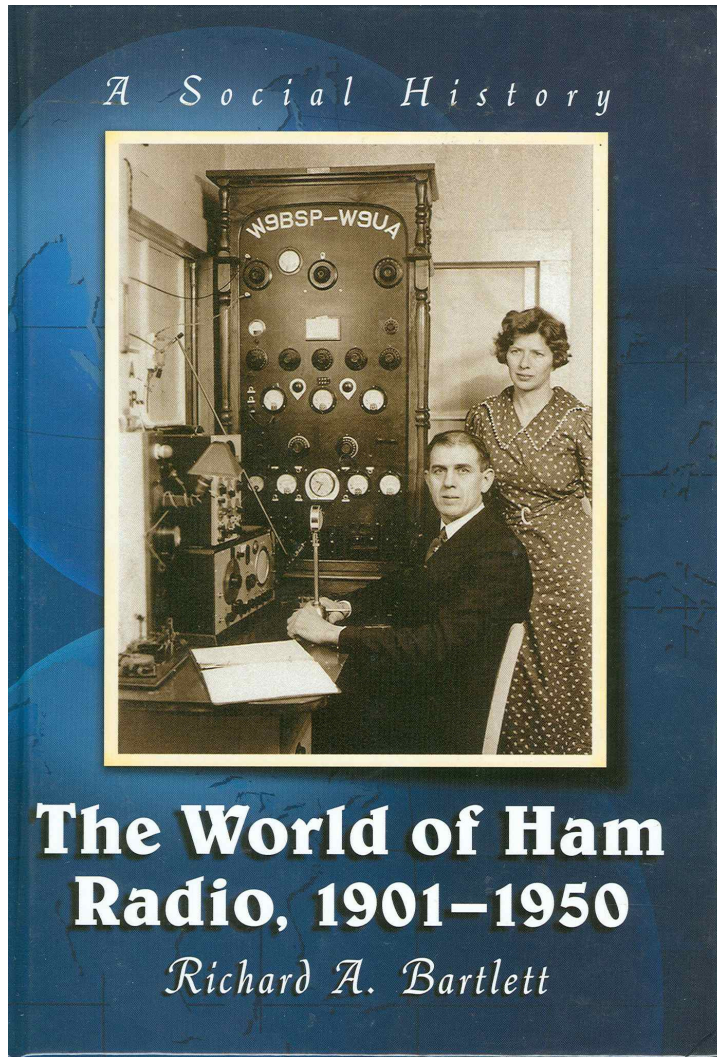


MacFarland and Company Publishers, Jefferson, North Carolina

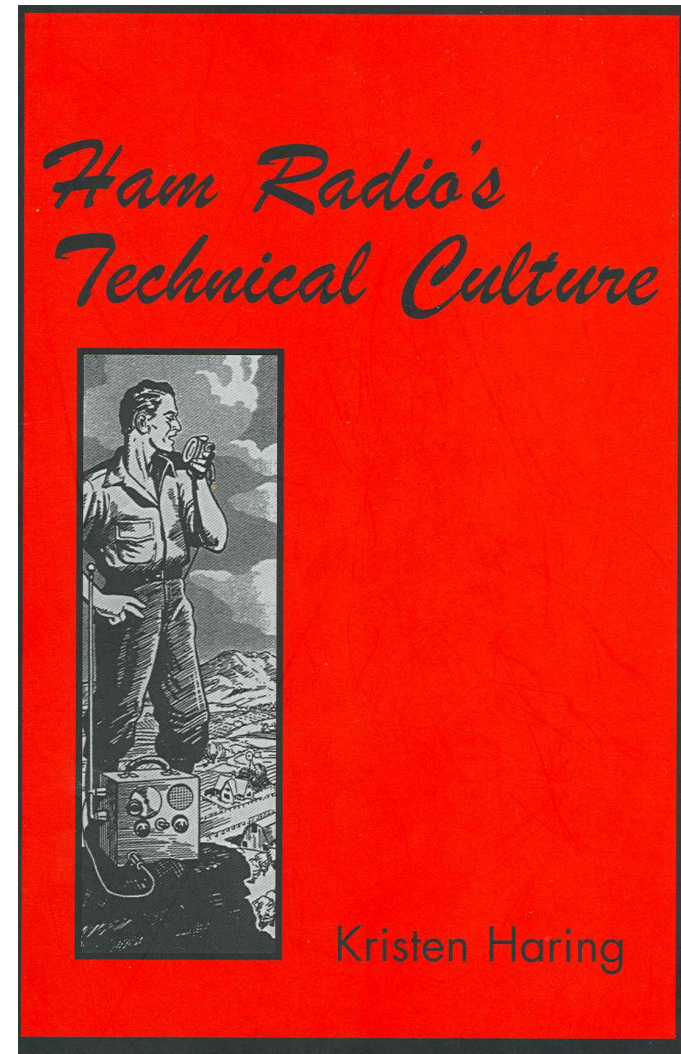


Amateur Radio Relay League, West Hartford, Connecticut

Some Interesting Reading . . .  
Social and Cultural Perspectives

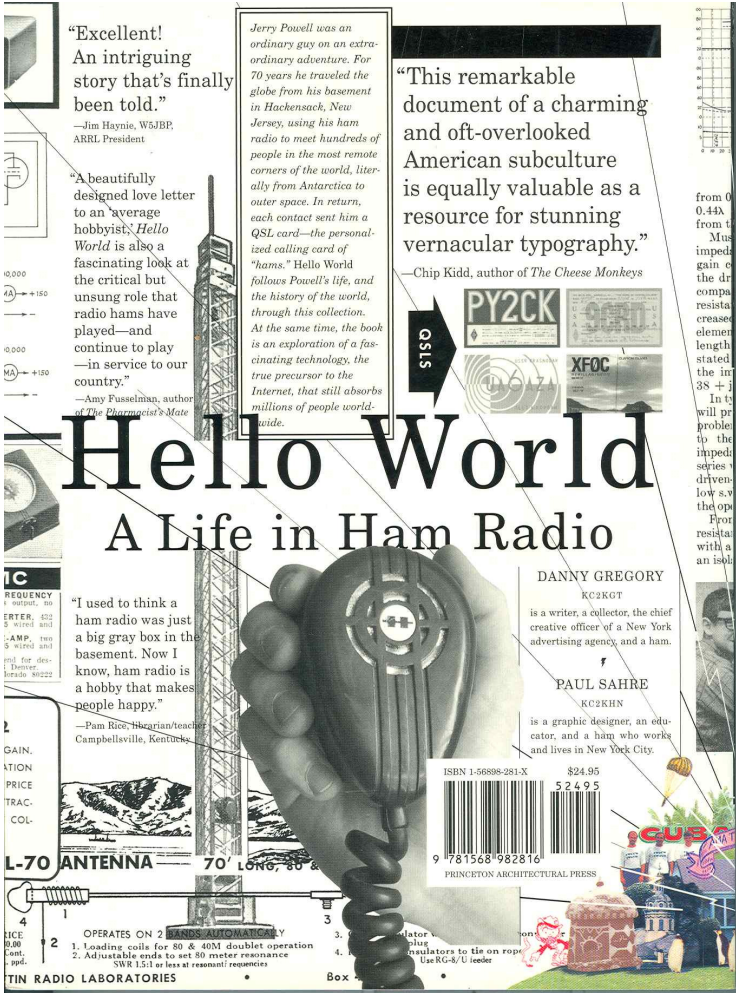


MacFarland and Company Publishers, Jefferson, North Carolina



The Massachusetts Institute of Technology Press, Cambridge, MA

# A Virtual Time Machine Documenting W2OJW, Jerry Powell's Life through his 369-card QSL collection



Princeton Architectural Press, New York, New York

Amateur Radio Today ©2003, ARRL Featuring Walter Kronkite, KB2GSD

Deleted from web version of presentation.  
You can download a copy from on [www.arrl.org](http://www.arrl.org).