RADIO HISTORY

OCTOBER

10¢

YOUR RADIO FAVORITES REVEALED

Is any Star Worth $5,000 a Week?

THE LIFE AND LOVE OF BURNS AND ALLEN

The Invention of Radio

Radio owes its development to two other inventions, the telegraph and the telephone, all three technologies are closely related. Radio technology began as "wireless telegraphy".

Radio can refer to either the electronic appliance that we listen with or the content listened to. However, it all started with the discovery of "radio waves" - electromagnetic waves that have the capacity to transmit music, speech, pictures and other data invisibly through the air. Many devices work by using electromagnetic waves including: radio, microwaves, cordless phones, remote controlled toys, television broadcasts, and more.

The Roots of Radio

During the 1860s, Scottish physicist, James Clerk Maxwell predicted the existence of radio waves; and in 1886, German physicist, Heinrich Rudolph Hertz demonstrated that rapid variations of electric current could be projected into space in the form of radio waves similar to those of light and heat.

In 1866, Mahlon Loomis, an American dentist, successfully demonstrated "wireless telegraphy." Loomis was able to make a meter connected to one kite cause another one to move, marking the first known instance of wireless aerial communication.

Guglielmo Marconi

Guglielmo Marconi, an Italian inventor, proved the feasibility of radio communication. He sent and received his first radio signal in Italy in 1895. By 1899 he flashed the first wireless signal across the English Channel and two years later received the letter "S", telegraphed from England to Newfoundland. This was the first successful transatlantic radiotelegraph message in 1902.

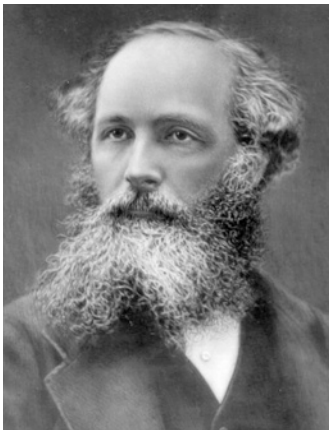
Nikola Tesla

In addition to Marconi, two of his contemporaries Nikola Tesla and Nathan Stufflefield took out patents for wireless radio transmitters. Nikola Tesla is now credited with being the first person to patent radio technology; the Supreme Court overturned Marconi's patent in 1943 in favor of Tesla.

Growth of Radio - Radiotelegraph and Spark-Gap Transmitters

Radio-telegraphy is the sending by radio waves the same dot-dash message (morse code) used in a telegraph. Transmitters at that time were called spark-gap machines. It was developed mainly for ship-to-shore and ship-to-ship communication. This was a way of communicating between two points, however, it was not public radio broadcasting as we know it today.

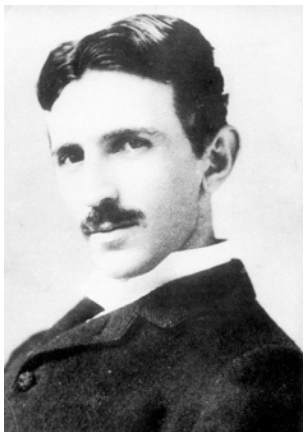
Wireless signals proved effective in communication for rescue work when a sea disaster occurred. A number of ocean liners installed wireless equipment. In 1899 the United States Army established wireless communications with a lightship off Fire Island, New York. Two years later the Navy adopted a wireless system. Up to then, the Navy had been using visual signaling and homing pigeons for communication.



James Clerk Maxwell

Heinrich Hertz

Guglielmo Marconi



Nikola Tesla

In 1901, radiotelegraph service was instituted between five Hawaiian Islands. By 1903, a Marconi station located in Wellfleet, Massachusetts, carried an exchange or greetings between President Theodore Roosevelt and King Edward VII. In 1905 the naval battle of Port Arthur in the Russo-Japanese war was reported by wireless, and in 1906 the U.S. Weather Bureau experimented with radiotelegraphy to speed notice of weather conditions.

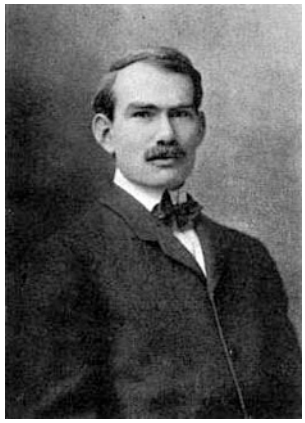
In 1909, Robert E. Peary, arctic explorer, radiotelegraphed: "I found the Pole". In 1910 Marconi opened regular American-European radiotelegraph service, which several months later, enabled an escaped British murderer to be apprehended on the high seas. In 1912, the first transpacific radiotelegraph service linked San Francisco with Hawaii.

Improvements to Radio Transmitters

Overseas radiotelegraph service developed slowly, primarily because the initial radiotelegraph transmitter discharged electricity within the circuit and between the electrodes was unstable causing a high amount of interference. The Alexanderson high-frequency alternator and the De Forest tube resolved many of these early technical problems.

Lee DeForest - AM Radio

Lee Deforest invented space telegraphy, the triode amplifier and the Audion. In the early 1900s, the great requirement for further development of radio was an efficient and delicate detector of electromagnetic radiation. Lee De Forest provided that detector. It made it possible to amplify the radio frequency signal picked up by the antenna before application to the receiver detector; thus, much weaker signals could be utilized than had previously been possible. De Forest was also the person who first used the word "radio".



Lee DeForest

The result of Lee DeForest's work was the invention of amplitude-modulated or AM radio that allowed for a multitude of radio stations. The earlier spark-gap transmitters did not allow for this.

Military Use and Patent Control

When the United States entered the first world war in 1917, all radio development was controlled by the U.S. Navy to prevent its possible use by enemy spies. The U.S. government took over control of all patents related to radio technology.

In 1919, after the government released its control of all patents, the Radio Corporation of America (RCA) was established with the purpose of distributing control of the radio patents that had been restricted during the war.

Radio Speaks

The first time the human voice was transmitted by radio is debateable. Claims to that distinction range from the phase, "Hello Rainey" spoken by Natan B. Stubblefield to a test partner near Murray, Kentucky, in 1892, to an experimental program of talk and music by Reginald A. Fessenden, in 1906, which was heard by radio-equipped ships within several hundred miles.

Reginald A. Fessenden

Canadian, Reginald A. Fessenden is best known for his invention of the modulation of radio waves and the fathometer. Fessenden worked as as a chemist for Thomas Edison during the 1880s and later for Westinghouse. Fessenden started his own company where he invented the modulation of radio waves, the "heterodyne principle" which allowed the reception and transmission on the same aerial without interference.

Reginald Fessenden

True Broadcasting Begins

In 1915, speech was first

transmitted across the continent from New York City to San Francisco and across the Atlantic Ocean from Naval radio station NAA at Arlington, Virginia, to the Eiffel Tower in Paris.

On November 2, 1920, Westinghouse's KDKA-Pittsburgh broadcast the Harding-Cox election returns and began a daily schedule of radio programs.

The first ship-to-shore two way radio conversation occurred in 1922, between Deal Beach, New Jersey, and the S.S. America, 400 miles at sea. However, it was not until 1929 that high seas public radiotelephone service was inaugurated. At that time telephone contact could be made only with ships within 1,500 miles of shore. Today there is the ability to telephone nearly every large ship wherever it may be on the globe.

Commercial radiotelephony linking North America with Europe was opened in 1927, and with South America three years later. In 1935 the first telephone call was made around the world, using a combination of wire and radio circuits.

Edwin Armstrong

FM Radio

Edwin Howard Armstrong invented frequency-modulated or FM radio in 1933. FM improved the audio signal of radio by controlling the noise static caused by electrical equipment and the earth's atmosphe. Until 1936, all American transatlantic telephone communication had to be routed through England. In that year, a direct radiotelephone circuit was opened to Paris. Telephone connection by radio and cable is now accessible with 187 foreign points.

Radio technology has grown significantly since its early development. In 1947, Bell Labs scientists invented the transistor. In 1954, a then small Japanese company called Sony introduced the transistor radio.

FM Antenna System

In 1965, the first Master FM Antenna system in the world designed to allow individual FM stations to broadcast simultaneously from one source was erected on the Empire State Building in NYC.

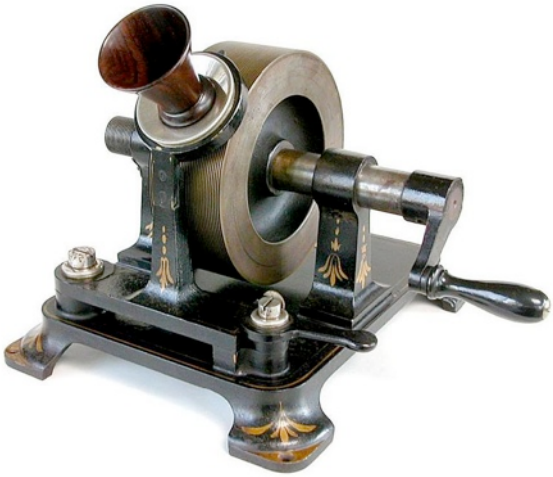
Marconi with his radio

Audio Recording Developed

In the early days of radio there was no way to record sound. Everything had to be done "live."

Although the first sound recording device can be traced back to Leon Scott de Martinville, in 1855, it was some time before the concept came out of the laboratory and developed to the point of being a practical way to record and playback sound.

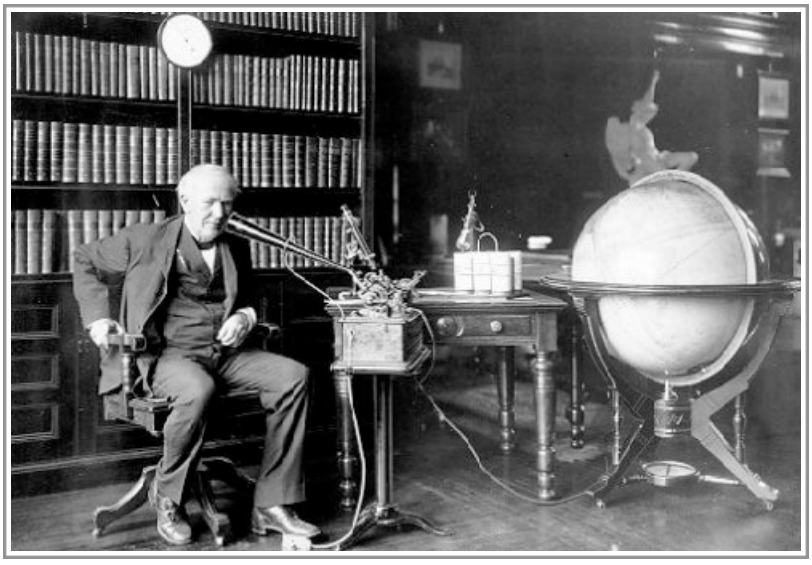
In 1877, Thomas Edison designed the "tinfoil phonograph," which is credited with being the first practical device to record and playback sound. Edison's phonograph consisted of a cylindrical drum wrapped in tinfoil and mounted on a threaded axle. He recited "Mary Had a Little Lamb" into the mouthpiece (horn) for the first demonstration. The horn served as both a microphone and a speaker.



Edison's Tinfoil Phonograph

Today, it's difficult to appreciate the impact that this recording device had. Despite the questionable quality, for the first time people could hear their own voice and could even hear music that wasn't being played live. In 1877, an amazed editor of the "The Scientific American," wrote:

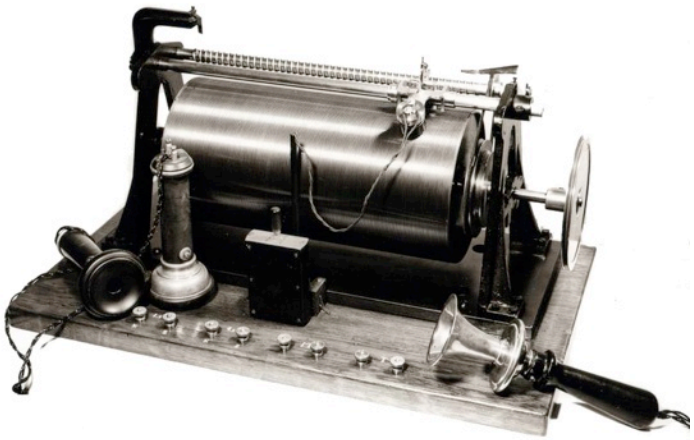
> *It has been said that Science is never sensational; that it is intellectual, not emotional; but certainly nothing that can be conceived would be more likely to create the profoundest of sensations, to arouse the liveliest of human emotions, than once more to hear the familiar voices of the dead. Yet Science now announces that this is possible, and can be done.... Speech has become, as it were, immortal.*



Edison recording in his library

Since there were no vacuum tube or transistor amplifiers the direct audio waves had to be relied upon to imprint the sound on the recording media. The first recordings were made on strips of tinfoil and on wax cylinders, both of which had a very limited life.

On December 1, 1898, Danish electrical engineer and inventor Valdemar Poulsen patented the telegraphone, the first practical magnetic sound recorder. Poulsen's recorder used magnetized steel piano wire as the recording medium.



Poulsen's Telegraphone

Soon, wire recorders begin to appear on the American market. They were sold as dictation machines and general purpose sound recorders. One of the best selling brands was the Webcor wire recorder shown on the left.

It was not until World War II that magnetic tape, common to tape recorders, was developed in Germany. Of course, today, even magnetic tape for audio recording is being replaced by newer technologies.

Frank Conrad, a Westinghouse engineer, started the first radio station to feature regular programming. Conrad initially played music by holding a microphone up to a phonograph. In a short while people were regularly trying to tune in, and Conrad became a mini-celebrity.

Westinghouse, who employed Conrad, took notice and decided they could sell a lot more radios at $10 each if they expanded Conrad's operations, andby 1920, radio was officially on the scene in the United States.

Frank Conrad "broadcasting"

The Early History of Radio

Once radio broadcasting was launched, people began to realize just how significant this new medium could be.

For starters, two radio stations broadcast the 1920 Harding-Cox presidential election returns — well in advance of the newspapers. People also took note of all the free music, information, and commentary that was suddenly available to anyone with a radio set.

But, something else was going on at the same time. Scores of people were building their own personal radio stations, probably motivated in part by the ability to be widely heard by friends, neighbors, relatives, and even strangers.

That created a major problem. Soon there were too many stations for the number of frequencies available to separate them on the radio dial. You might be listening to "uncle Charlie's station," and all of a sudden someone else would turn on their transmitter and drown him out.

When uncle Charlie found out about this, he might decide to solve the problem by shifting to a new frequency — which, unfortunately, drowned out someone who had been using that frequency (not to mention make everyone wonder where Charlie had gone).

Some thought the solution was simply to use more power to drown out the competition. So it got to be a power battle too. A few stations jacked up the power to the point that they were using ten times today's legal limit.

The Dawn of Broadcast Advertising

Then another element entered the picture — broadcast advertising.

In 1922, a station in New York, WEAF, ran a 10-minute talk on the merits of some co-op apartments in Jackson Heights, N.Y — and charged $50 for their effort.

That was deemed a toll broadcast — now better known as a commercial. At that point it was discovered that you could actually make money promoting products on radio — and, of course, things haven't been the same since.

Other countries had their own ideas about this new medium. Rather than let it be financed by commercials — maybe they could see ahead to what would happen if they did that — they decided it would be best to let the government pay for things.

In Great Britain this led to the establishment of the BBC (British Broadcasting Corporation) in 1923. The BBC used public taxes on radio receivers to pay for their broadcast system.

Later, the CBC (Canadian Broadcast System) was developed in Canada, patterned after the BBC. The problem in Canada was that a large percent of

the population spoke French. This meant that programming in both English and French had to be developed.

Although most counties of that era also adopted government sponsored radio broadcasting, the BBC and CBC are among the few that were able to insulate programming content from direct government influence. In other words, most countries used radio to further the political aims of those in power. Today, a great many still do.

There was also concern in the United States about government control if taxes were used to support broadcasting. And, of course, there was the issue of the money that could be made through advertising.

Even then the government responded to the political influence of big business. This influence included corporations like AT&T and Westinghouse, which had began to see the profit potential in this new medium.

The omnipresent, intrusive nature of broadcast commercials has been a part of U.S. broadcasting ever since. But, at the same time, money that commercials generated stimulated the vigorous growth of both broadcasting and advertising during this era.

Plus, given the choice between commercials and the risk of government control over broadcast content — not to mention the need to dip into tax revenues to pay for it all — most people in the U.S. felt that commercials were the lesser of the evils.

Government Regulation

With the advent of paid radio advertising in the United States, sponsors were, of course, insistent on having the commercials they paid for heard. But, with all the chaos in the airwaves at that time — remember uncle Charlie's problem? — that wasn't working out too well.

Stations and advertisers demanded that something be done.

So the U.S. Congress passed the Radio Act of 1927, which created the Federal Radio Commission (FRC). Its purpose was to organize the licensing of transmitters, including assigning radio station frequencies, call letters, and power limits.

In assigning call letters, the FRC saw that radio stations to the east of the Mississippi River started with "W," as in WNBC, WLS, etc., and stations West of the Mississippi start with the letter "K." Since a few stations were licensed before this plan was put in to effect, there are a few exceptions to the "W" and "K" rule.

In 1934, the FRC was reorganized into the agency that now controls U.S. broadcasting, the Federal Communications Commission (FCC). The FCC's regulatory powers expanded to include telephone and telegraph — and some years later, television.

Noncommercial Radio

One of the things the Federal Radio Commission did was reserve some frequencies for noncommercial radio — primarily stations representing educational and religious groups. But, the channels (frequencies) they were assigned were the least desirable, plus, they were limited in power — typically only 100 watts. (Major radio stations were operating on 50,000 watts of power.)

Many years later when FM (frequency modulated) radio came along, noncommercial stations were assigned to the low end of the RF (radio frequency) FM spectrum — an area with 20 different channels.

The Golden Age of Radio

The golden age of radio — the period when radio reached its peak popularity with general audiences — was in the 1930s and 1940s.

Strangely, part of this period was during the great depression in North America when people were doing without most luxuries, and even a few seeming necessities.

Radio and its wide range of live music, comedy, variety shows, and dramatic programming served as a welcome escape from those troubled times.

Even though many people couldn't afford payments on their washing machines, vacuum cleaners, or Model A Fords, they desperately struggled to keep up payments on their radios. (Keep in mind that not only were all of these things relatively expensive in the 1930s, but a large percentage of people were out of work.)

Note in the drawing on the left that radios of that era weren't just small devices in plastic cases; they were built into large wooden cases that amounted to elaborate pieces of furniture.

The large size was due mostly to numerous (rather large) vacuum tubes in the circuitry. It was not until decades later that vacuum tubes were replaced by transistors and integrated circuits.

Typically, these early radios also had large speakers that provided rich bass, and large loops of wire wound around an internal drum that served as an adjustable antenna for receiving distant stations.

By 1935, more than 22 million American homes had radios, and automobiles were being sold with radios.

Except for one very important thing, radio networks, the stage was set for radio's golden era.

The Beginning of the Radio Networks

Before programming could be recorded, radio stations had to produce all of their own programming "live," which was costly and demanded major resources.

In 1923, two AT&T stations, WEAF and WNAC on the East Coast of the United States decided they could share the cost of originating certain programs by connecting the two stations with special, high-quality telephone lines and broadcasting the same program at the same time. Of course, their parent company, AT&T, owned the telephone lines, so that was no real problem.

Other stations then joined and this select group of stations became known as the "telephone group," or more officially, the Broadcasting Corporation of America (BCA). Thus, the concept of the radio network was born.

During the early days of radio AT&T tried to take control of this new medium. It claimed that radio was just a "wireless telephone service," and since they controlled telephone services, that meant that they should control radio too.

This, of course, created a bit of a problem for the radio stations that weren't owned by AT&T.

Eventually, the U.S. Justice Department got involved and AT&T sold its BCA radio network and stations to several companies, including RCA. Even so, AT&T maintained its lucrative monopoly on radio network lines.

Losing that battle, AT&T then tried to ban the stations they had sold from using their network lines. They were out to control radio one way or another.

In response, non-AT&T stations owned by GE, Westinghouse and RCA networked their own stations; but they initially had to use inferior Western Union telegraph lines, which lowered sound quality.

To join the network radio stations had to sign a contract that required them to carry designated network programs. Since the programs included commercials, the stations received a share of the network revenue. At the same time, the affiliates could run their own local commercials around the network programs. This practice is still followed today by both radio and television network affiliates.

Then another major player in radio networks emerged, William Paley. Along with NBC President, David Sarnoff, he would become a corporate legend.

Paley's father, Sam Paley, owned a cigar company and William thought that by purchasing the struggling CBS radio network they could better sell their cigars. (The CBS radio network, which had just started, was having a hard time competing with NBC.)

Once he purchased CBS, it wasn't long before William Paley shifted his focus from selling cigars to building a strong rival to NBC.

After NBC ran into it's own monopoly problems it was forced to split its network into two parts: NBC Red and NBC Blue. The latter was then sold to a group of businessmen who renamed it the ABC radio network.

Before we get too far ahead in our narrative, there's another radio "war story" we need to cover.

An early Teletype machine

The Press-Radio War

When radio stations started broadcasting news, the newspapers yelled "foul," and tried to stop them — or at least badly cripple them.

Clearly, radio had a major advantage in being able to "be first with the news" (the motto of more than one radio station). Not only were radio stations scooping them on major stories, but they were siphoning off advertising revenue.

The newspapers, which had control of all the major news services, including the Associated Press (AP), the International News Service (INS), and the United Press (UP), launched a corporate war against the radio stations. This was quickly labeled the press-radio war.

News wire machines (teletypes) supplied the country's newspapers with regular summaries of news, feature stories, weather forecasts and bulletins.

Although the general flow and organization of the news was centrally controlled, individual newspapers could contribute their own stories using the keyboard shown.

Recognizing serious competition from the radio stations, the newspapers threatened to cut off their flow of news. Seeing the consequences of that, Paley and CBS set up their own newsgathering agency.

That move also represented a threat to the newspapers, so they demanded that CBS totally shut down its newsgathering operations. As if that wasn't enough, the newspapers further said that NBC could only broadcast two, five-minute news summaries a day — and then only after the morning and afternoon newspapers hit the street.

But, even that wasn't enough for the newspapers. They further stipulated that the newscasts could not be sponsored, lest the stations cut into newspaper profits. Clearly, the newspaper empire of the day had a lot of power — or at least thought it did.

After some time the radio stations eventually won that battle. Sadly, the radio stations willfully abandoned their victory a few decades later. At that point most radio stations decided that playing music was a lot cheaper than supporting a news staff to find, write, and report news. Ratings also supported the fact that most listeners were more interested in hearing music than news.

Today, very few radio stations are involved in their own newsgathering. Most of those who have newscasts switch to a audio network on the hour for a short news summary. In a few cases they have a local announcer read copy from a news service or local news gathered from a newspaper.

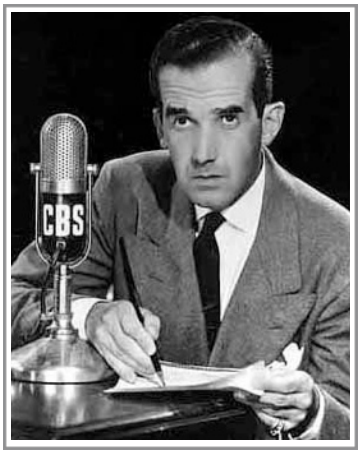
But while radio did actively cover news, it did it very well.

It did especially well at covering World War II. The most notable radio news personality of that era was Edward R. Murrow. He was an excellent writer and had a deep, dramatic voice.

Murrow made you feel as if you were a personal witness to the events that were taking place.

He did a live report once from London with the sounds of bombs falling around him (a particularly impressive feat in those days).

Murrow and oth-



Edward R. Murrow

ers like him during that era had an uncompromising sense of what constitutes legitimate news. They regularly battled with corporate executives who were prone to compromise news standards to lower costs, increase ratings, and protect advertising profits. (Much of this story is told in the highly praised film, *Good Night and Good Luck*, released in 2005.)

The Murrow radio era clearly represented the golden age of radio news.

The Audience

Now, back to our story of how this medium could hold families around their radios night after night and hold women around their radios every weekday afternoon with soap operas (radio dramas that were typically sponsored by soap companies).

For one thing, radio in the 1930s wasn't just designed to appeal to specific musical and philosophical tastes as it is today. It was a family medium.

Families sat around the radio and listened to shows like "Amos 'n Andy," "Gunsmoke," "The Shadow," "Our Miss Brooks," "Superman," "Ellery Queen, "Dick Tracey," "Buck Rogers," and the "Sixty-Four Dollar Question." (Yes, $64.00 was the top prize!)

Today's listeners, who use radio largely as a background to do other things, might wonder how radio could hold a listener's interest for several hours at a time. There's a one-word answer: imagination.

Not being "troubled" by the spelled out details in pictures, the people of the era could and did imagine what the people and situations looked like.

For this reason radio was personally involving. Fact is, when some of these shows made the transition to television, audiences were disappointed. The images of the people and surroundings that listeners had held in their minds just couldn't measure up to what they were seeing on TV.

This transition wasn't helped by the fact that some radio personalities, although possessing rich and dramatic voices, didn't photograph well. Once famous radio personality, who weighed close to 300 pounds, had to be replaced on the TV series by someone who sounded quite different.

Radio scripts were sprinkled with clues as to what was going on: "Emma, why are you going to the window?"; "I see that you are wearing your bright red dress, Clare."

Early sound effect experts

And then there were sound effects — the recorded or created sounds of footsteps, horse's hooves, doors being slammed, rain, thunder, car engines, dogs barking, babies crying, birds singing, fire crackling, etc. There were (scaled down) doors to slam, and telephone bells and door chimes to ring, etc.

But, some effects were a bit hard to bring into the studio and had to be created in other ways. For example, massaging a piece of cellophane next to a microphone created the sound of a crackling fire, and wiggling a large sheet of sheet metal created the sound of thunder. Strangely, many of these artificially created effects sounded "more real" than the sound of real thing.

Regulations

Despite the depression, as radio moved through the decade of the 30s it was riding high on popularity.

President Franklin D. Roosevelt, using an informal radio approach and bringing to bear his paternal, reassuring style, helped maintain confidence in conditions in the United States with his "fireside chats" from the White House. This was the first time radio had been used in this way.

Roosevelt contributed something else to the history of broadcasting: the Federal Communications Commission (FCC).

By 1934, radio and the electronic media were developing too rapidly for the original Federal Radio Commission's 1927 mandate.

Roosevelt then spurred Congress to pass the Communications Act of 1934, which set up a new governing body, the Federal Communications Commission.

Its purpose was to incorporate the powers of the FRC while expanding its mandate to regulate all of interstate electronic communications.

When it comes to broadcasting the FCC was (and is) the prime governing body. It's primarily responsible for issuing broadcast licenses (and occasionally suspending them for misconduct), for regulating station frequency, station power, and for occasionally levying fines for broadcast content it deems objectionable. (Howard Stern and the late comedian, George Carlin, among others, found out first hand about this particular FCC power.)

The FCC's prime directive is to see that broadcasting serves the public's "interest, convenience and necessity." However, since FCC members are appointed rather than elected, decisions tend to reflect political and business interests.

Today, the FCC still governs broadcasting, although its governing board was officially reduced from seven to five members in 1983, and its powers have been diminished by various "deregulation" measures. In 1996, the FCC's areas of responsibility were further reduced with the passage of the Telecommunications Act.

Franklin Roosevelt broadcasting one of his Fireside Chats

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