RADIO UNIT PLAN

Compelling Question	In what ways did 20th century broadcasting change history?
Standards and Practices	*C3 Historical Thinking Standards* – D2.His.1.9-12. Evaluate how historical events and developments were shaped by unique circumstances of time and place as well as broader historical contexts. *C3 Historical Thinking Standards* – D2.His.2.9-12. Analyze change and continuity in historical eras. *Common Core Content Standards* – CCSS.ELA-LITERACY.WHST.9-10.1.B Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
Staging the Question	Discuss the concept of *innovation* through a series of ads and photographs that depict the changes in the ways radios and televisions were marketed or used (1900-1970).

Supporting Question 1	**Supporting Question 2**	**Supporting Question 3**	**Supporting Question 4**
How do you turn equations into a technology?	Which individuals were most important in innovating technologies in the course of broadcast history, inventors or entrepreneurs?	How did changes in broadcast technology affect the use or sale of radio or TV in the early 20th century?	How did people in power use broadcasting to affect listeners politically or psychologically?
Formative Performance Task	**Formative Performance Task**	**Formative Performance Task**	**Formative Performance Task**
Produce a slide program file showing three or more steps that demonstrate the international nature of innovation.	Create a TIME™ “Person of the Century” magazine cover to promote the individual you think was most important to early broadcast history.	Write three paragraphs that detail with examples how innovation affects the use or sale of broadcast technologies.	Develop a claim supported by evidence to show how one or several broadcasts affected a country.
Featured Sources	**Featured Sources**	**Featured Sources**	**Featured Sources**

1A. "IEEE Milestone: Maxwell's Equations, 1860-1871" (2009). *Engineering and Technology History Wiki*. ethw.org/Milestones:Maxwell's_Equations,_1860-1871. Accessed January 19, 2017.

1B. Robert D. Friedel, "Lines and Waves: Faraday, Maxwell, and 150 Years of Electromagnetism" (1981). *Engineering and Technology History Wiki*. ethw.org/w/images/c/ce/LinesandWaves.pdf. Accessed January 19, 2017.

1C. J. Clerk Maxwell, "A Dynamical Theory of the Electromagnetic Field." *Philosophical Transactions of the Royal Society of London* 155 (1865). jstor.org/stable/108892. Accessed January 19, 2017.

1D. "Who invented radio? The Roots of Radio, 1862-1906" (2004). *David Sarnoff Library*. davidsarnoff.org/rcatechradio.html. Accessed January 23, 2021.

1E. United States and South Africa Spectrum Allocation Charts. ntia.doc.gov/files/ntia/publications/january_2016_spectrum_wall_chart.pdf (2016); ee.co.za/wp-content/uploads/2015/03/csir-035-02-2015_.jpg (2015). Accessed March 13, 2021.

2A. Lawrence P. Lessing, "Edwin Howard Armstrong." *Dictionary of American Biography* (1977). users.erols.com/oldradio/ehabio.htm. Accessed February 15, 2021.

2B. "Who Was David Sarnoff?" Parts I & II *Hagley Library* (2014). hagley.org/librarynews/sarnoff/who-was-david-sarnoff-part-i-1891-1929. Accessed January 19, 2017.

2C. *Edwin H. Armstrong (The Houck Collection)*. users.erols.com/oldradio/index.htm#W. Accessed February 15, 2021.

2D. Alexander B. Magoun, "Pushing Technology: David Sarnoff and Wireless Communications, 1911-1921." IEEE Conference on the History of Telecommunications (2001). http://ethw.org/w/images/1/1c/Magoun.pdf. Accessed February 15, 2021.

2E. John F. Rider, *Servicing Superheterodynes*. (Revised 3rd ed., 10th printing, 1942). worldradiohistory.com/BOOKSHELF-ARH/Rider-Books/Rider-Servicing-Superheterodynes-1934-Rider.pdf. Accessed October 1, 2020.

3A. Danny Goodwin, "Selling Stuff During the Golden Age of Radio." *OTR*. old-time.com/commercials/. Accessed January 19, 2017.

3B. *Ad*Access*, Digital Repositories at Duke University Libraries. repository.duke.edu/dc/adaccess. Accessed March 15, 2021.

3C. Thomas D. White, "Broadcasting becomes Widespread," *United States Early Radio History*. web.archive.org/web/20200216151830/http://www.earlyradiohistory.us/sec018.htm. Accessed March 16, 2021.

3D. 1925 Radio "Tune-in" and home entertainment REACH Video Resource (4:27 min.)

3E. Classroom Activity: Original Radio Program.

4A. Orson Welles and Howard Koch, *The War of the Worlds* (1938). *Internet Archive*. archive.org/details/OrsonWellesMrBruns. Accessed January 19, 2017.

4B. American President Speech Archive. *Miller Center*. millercenter.org/the-presidency/presidential-speeches#fdroosevelt. Accessed January 19, 2017.

4C. Joseph Goebbels, "Volk steh auf, und Sturm brich los! [Nation, Rise up, and let the Storm break Loose!]" (1943). *Internet Archive*. archive.org/details/19430218JosephGoebbelsRedeImBerlinerSportpalastZurTotalisierungDesKrieges1h44m. Accessed March 12, 2021.

4D. Randall Bytwerk, translator, "Goebbels's 1943 Speech on Total War." *German Propaganda Archive*. research.calvin.edu/german-propaganda-archive/goeb36.htm. Accessed January 29, 2017.

4E. *List of R.T.L.M. Transcripts by Language – RwandaFile: R.T.L.M. Tape 0131, 23 May 1994*. web.archive.org/web/20170504030754/http://rwandafile.com/rtlm/rtlm01

1F. A Prehistory of Radio, Part 1 (2019). REACH Video Resource (7:59 min).				31.html. Accessed March 14, 2021.
Summative Performance Task	**Argument**	How did broadcasting change history during the 20th century? Construct an argument (through a detailed slide show, website, poster, or essay) among three individuals, two historic and one contemporary, that answers the question, using specific claims and evidence from historical sources, while acknowledging competing views.		
	Extension	Express these arguments in a perspective-taking exercise using the medium of Instagram.		
Taking Informed Action	**UNDERSTAND:** Investigate a current wireless medium used by a large group of people to try to effect political, economic, or social-cultural change or revolution. This could be a cellphone, smartphone, or tablet. **ASSESS:** Examine the extent to which the current attempt at change is successful and state your personal stance on the justification for the revolution or whether it is, in fact, a revolution. **ACTION:** Write and share an editorial for a news outlet or social medium like Instagram supporting your ideas to effect change in this "revolution." Within the editorial, use a mixture of rational logic and emotional ideals to address the reasons for the need to change, your solution, its benefits, and the alternatives.			

TO THE TEACHER

All *REACH* Inquiry Units are intended to be "classroom-ready." Each unit begins with a *Unit Plan* in the form of a *C3 Inquiry Design Model*. The *Unit Plan* includes learning objectives, content standards, formative and summative tasks, links to primary and secondary resources, and a warm-up activity.

Units are organized around a *Compelling Question* designed to inspire curiosity and promote discussion among students. To that end, we have also included a brief student introduction to the topic entitled *Staging the Question*. Once students have been introduced to the topic, any number of *Formative Performance Tasks* may be completed using the included *Document Excerpts* (teachers may elect instead to utilize full-text documents linked within the *Featured Sources* section). *Document Excerpts* are print-ready in single-sheet format and keyed to the citations in the *Featured Sources* section of the *Unit Plan*. Teachers should select the *Formative Performance Tasks* and accompanying *Sources* that best suit their own instructional needs: content requirements, performance goals, student readiness, and time constraints. Upon the completion of each unit, students should be adequately prepared to complete the *Summative Performance Task* and *Taking Informed Action* sections of the *Unit Plan*.

A guiding principle of the IEEE REACH program is that students learn to be wary of technological determinism – the comfortable assumption that technologies, not people, determine and improve the state of society. Technologies are inert. People invent and use technologies as tools to solve problems. An inventor's solution is informed by their personality and knowledge of science and engineering, and by cultural, social, economic, and political assumptions and contexts in which they live. No one can predict all of the uses or consequences of a successful tool, for it can benefit some people at the expense of others, and a short-term solution may have long-term costs.

To further assist the teacher, we have included a *Background Information* section. This is intended to serve as professional reading prior to implementing the unit. Teachers may also wish to read or review the primary and secondary sources from which the shorter excerpts are taken.

STAGING THE QUESTION

Analyze the following images depicting changes in print marketing for radios and televisions (1922-1961), and photos of political leaders using radio broadcasting (1925-1952) to discuss the concept of *innovation*—the process from invention to consumer acceptance of a technology.

Radio Enters the Home, RCA instruction book and catalog, 1922, David Sarnoff Library collection, Hagley Library

"I'm looking for my Valentine." Greeting card, 1925. Jerry and Marsha Simkin Collection, courtesy Marsha Simkin.

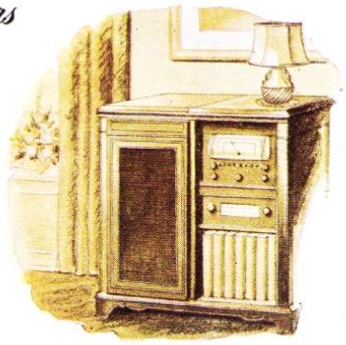
Magnavox... a lasting investment in gracious living

Today, in the relaxed comfort of your home, you can give a symphony concert. You can re-create the world's great music, precisely as the composer meant it to be played and as famous symphony orchestras interpret it. For the new Magnavox radio-phonograph reproduces the trueness of tone of the living performance. This superb instrument is one of the better things in life you can give your family.

INTERIOR: W & J SLOANE

Designed to hold its place over the years

Combining the wonders of radio science, F.M. and automatic record changing with the best in furniture craft, Magnavox is built to grace your home over the years. Authentic designs are made with all the skill of the cabinetmaker's art. Look for Magnavox in fine stores. Compare it with all other radio-phonographs. Once you hear Magnavox you won't be satisfied until you own one. Your choice of furniture models starting at $200. Regency Symphony shown, approximately $400.



Magnavox RADIO PHONOGRAPH *Symbol of Quality in Radio—Since 1915* The Magnavox Co., Fort Wayne 4, Ind

1946

Magnavox radio phonograph ad, 1946. Alexander Magoun Advertising Collection, Hagley Library.

"Television is very fine when you're the star My Valentine." Greeting card, c. 1948. Jerry and Marsha Simkin Collection, courtesy Marsha Simkin.

Diamond Televisor ad, Argentina, 1950. Alexander Magoun Advertising Collection, Hagley Library.

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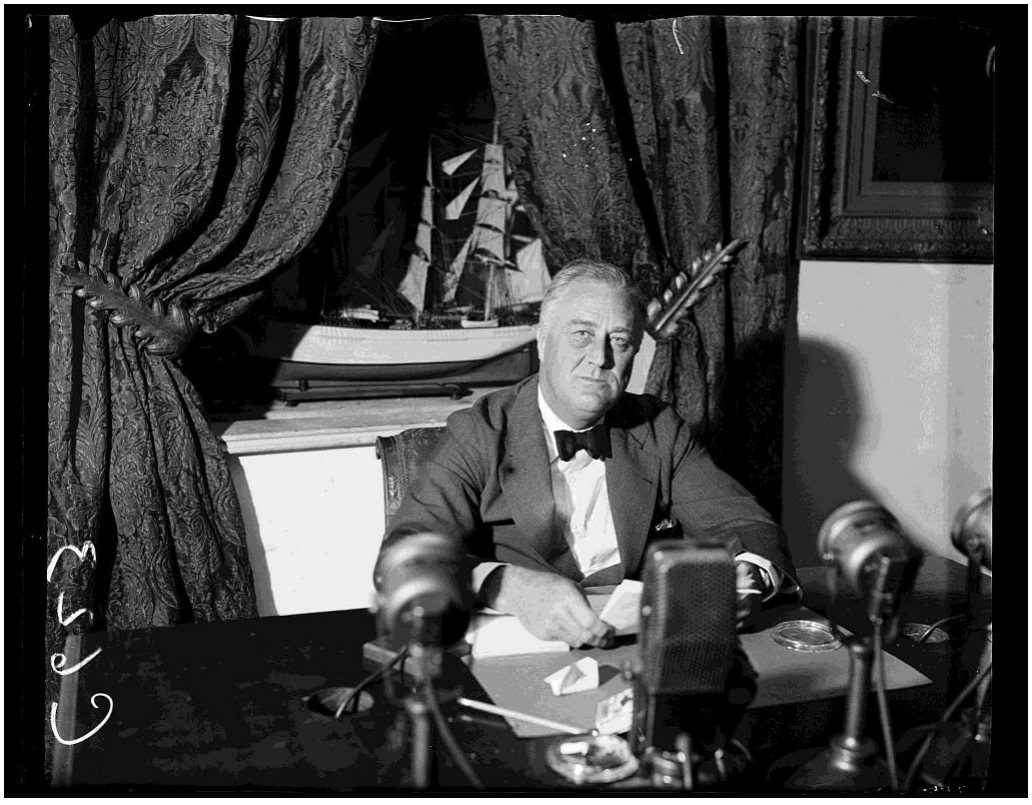
RCA Victor Color TV and remote control advertisement, 1959.
Alexander Magoun Advertising Collection, Hagley Library.

President Calvin Coolidge preparing to broadcast, c. 1925. "Presidents: A Techie History." *Senior Planet*. seniorplanet.org/presidents-a-techie-history/, accessed January 19, 2017.



President Franklin Roosevelt preparing to broadcast a "Fireside Chat," c. 1934. *Library of Congress*. loc.gov/pictures/resource/hec.47251/?loclr=blogpic, accessed January 19, 2017.

German propaganda minister Joseph Goebbels prepares to broadcast speech on Adolf Hitler's 50th birthday, April 20, 1939. "Biographies & Memoirs/Hitler." *Erenow*. erenow.com/biographies/hitler/hitler.files/image071.jpg, accessed June 8, 2017.

Berlin, Germany, children listen to Luftwaffe [Air Force] Day broadcast, March 1, 1939. Österreichische Nationalbibliothek, Austria. digital.onb.ac.at/rep/access/preview/BAG_1079975, accessed 17 February 2021.

Mao Zedong prepares to broadcast proclamation of the Central People's Government of the People's Republic of China, Tianamen Square, Beijing, October 1, 1949.
From "TIMELINE: China Under Communist Rule." *NPR*.
npr.org/2012/10/26/163729374/timeline-china-under-communist-rule, accessed January 18, 2017.

President Harry Truman broadcasts speech on the Voice of America network from new Voice of America ship, Washington, D.C., March 4, 1952. *Harry S. Truman Library*. trumanlibrary.gov/photograph-records/73-3752, accessed June 8, 2017.

PRINT DOCUMENTS

Document 1A

James Clerk Maxwell began his first serious work on electromagnetism when he was a Fellow at Cambridge University, 1854 – 1856. From 1860 – 1865 he was a Professor at King's College London, where he did some key experiments at the College and at his residence in Kensington. He began to spend his summers at Glenlair, Scotland, where he also conducted experiments. During his tenure at King's College, he published his two most important papers on electromagnetic theory: "On Physical Lines of Force" (1861), which added a critical correction to Ampère's circuital law; and "A Dynamical Theory of the Electromagnetic Field" (1865), which proposed light as an electromagnetic wave. In both cases he pioneered the use of mathematics in describing the behavior of light. From 1865 – 1871, Maxwell lived full-time at Glenlair as an independent scholar, during which time he wrote his magnum opus, *Treatise on Electricity and Magnetism* (published in 1873), which summarized the known theory of electromagnetism, including his own contributions. . . .

Maxwell deduced that light was an electromagnetic wave, thus revolutionizing the fields of electrical science and electrical engineering. He pioneered the use of calculus in electromagnetic science and independently derived three of the four modern equations that now bear his name. These are Gauss's Law, Gauss's Law for Magnetism, and Ampère's Law with Maxwell's correction … he also derived a full-time-derivative version of Faraday's Law … which is a more general version of the fourth modern Maxwell equation … [and] includes a term for the Lorentz Force, predating the work of Lorentz….

It was Oliver Heaviside who subsequently introduced the fourth modern Maxwell equation as a partial-time-derivative version of Faraday's Law, and recast the equations derived by Maxwell in their well-known vector calculus form, but he acknowledged that it was Maxwell who did the original work. Albert Einstein specifically acknowledged the importance of Maxwell in his development of special relativity. It was apparently Einstein who originally referred to them as "Maxwell's Equations," and this is the way they are known to the broader public.

$$\nabla \cdot \mathbf{D} = \rho \qquad \nabla \cdot \mathbf{B} = 0 \qquad \nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \qquad \nabla \times \mathbf{H} = \frac{\partial \mathbf{D}}{\partial t} + \mathbf{J}$$

Maxwell's Equations

Maxwell built on the earlier work of many giants, including Ampère, Gauss, and Faraday, but he himself was a giant who revolutionized the field of electrical and optical physics, and laid the groundwork for electrical, radio and photonic engineering, with his experiments, theories, and publications. The unification of the theories of electricity, magnetism, and light, which comes directly from Maxwell's equations, clearly sets Maxwell's work apart from similar achievements of the time.

SOURCE: Excerpted from "IEEE Milestones: Maxwell's Equations, 1860-1871." ***Engineering and Technology History Wiki*****. ethw.org/Milestones:Maxwell's_Equations,_1860-1871, accessed January 19, 2017.**

It was 150 years ago that the English scientist Michael Faraday discovered that he could generate electricity with magnets - the phenomenon we call electromagnetic induction. In the same year that Faraday made this discovery, there was born in Scotland the man whose brilliant mathematical interpretation of Faraday's ideas was to become the foundation of our modern concepts of electricity, magnetism and light, James Clerk Maxwell….

There were strong philosophical currents in the 18th and 19th centuries that led many experimenters to believe that all the forces of nature - light, electricity, magnetism, gravity - were all but forms of one basic source. Hans Christian Oersted, a Danish chemist was one of those who believed this. Therefore, in 1820, when he observed a compass needle moving under the influence of the electric current in a nearby wire, he was not surprised. He did, however, understand the importance of his discovery, and in a matter of months he sent out to scientists all over Europe his announcement of the magnetic effects of electricity. Written in Latin, the announcement caused a storm of excitement as others rushed to duplicate the simple experiment.

One of the many scientists who hastened to study the phenomenon discovered by Oersted was Andre Marie Ampère, Professor of Mechanics at the Ecole Polytechnique in Paris. Ampère extended the investigation of the magnetic effects of electricity to include the interaction between two current-carrying wires, which he showed to be the same as that between a wire and a magnet. Through an extraordinary series of careful experiments, Ampère established the foundations of the science of electrodynamics - the study of the relationship between electric, magnetic, and mechanical phenomena, earning himself the title, “the Newton of electricity.”

The first years of the 19th century were an exciting period in the history of electricity largely due to the discovery of Alessandro Volta, an Italian physicist. In 1800, Volta announced that he had found a new source of electricity - what we call the battery. Before that time, the only important means of generating electricity was by friction, as in the creation of static electricity by rubbing fur or hair. Volta showed how to construct a “pile” of discs, alternating silver and zinc, separated by pieces of moistened cloth, to create a source of electric current. The Voltaic pile caused a sensation and quickly became an indispensable tool for a vast number of new experiments.

No one made better use of Volta's pile than Humphry Davy at the Royal Institution. There Davy constructed a giant “battery” of piles which he then used in a variety of dazzling experiments. Since Davy was convinced that the source of Voltaic electricity was a chemical reaction, he proceeded to show how it, in turn, could cause other reactions. His most important results were the discovery, by electrolysis, of hitherto unknown chemical elements, including sodium, potassium, calcium, and magnesium. Learning from Davy, Faraday himself became skilled at electrolysis, and, much later (in 1834), discovered the laws that describe the relationship between the amount of a substance decomposed and the quantity of electricity used.

SOURCE: Excerpted from Robert D. Friedel, *Lines and Waves: Faraday, Maxwell, and 150 Years of Electromagnetism* (1981). *Engineering and Technology History Wiki*. ethw.org/w/images/c/ce/LinesandWaves.pdf, accessed January 19, 2017.

Assisted by the Voltaic cell, and spurred on by Oersted's discovery of electromagnetism, in the 1820's scientists throughout Europe and in America explored the nature of electricity and its relationship with other forces. In France, Francois Arago discovered the magnetic effect of a rotating copper disc, a mysterious phenomenon explained years later by Faraday. In England, Charles Babbage, famous as the pioneer of the digital computer, attempted to explain Arago's effect in terms of Ampère's electrodynamics. And in Germany, Georg Simon Ohm performed the experiments that led to the statement of his law, relating the current in a wire to the electromotive force (voltage) and the resistance in the circuit.

The excitement over electromagnetism was not confined to Europe, but it stirred up interest in the small scientific community of the United States. Unquestionably the most important American experimenter was Joseph Henry, who in the late 1820's was a teacher of mathematics and science in Albany, N.Y. Henry learned how to greatly increase the power of electromagnets, and was one of the first to seek practical uses for them. In 1831, he devised the first electromagnetic telegraph and carried out experiments that led him to the independent discovery of electromagnetic induction. Due to his failure to publish his discovery, he never received the same recognition as Faraday.

Most 19th century physicists rejected Michael Faraday's concept of lines of magnetic force. The idea seemed too fuzzy and crude to mathematically trained men, who felt comfortable only with motions and forces that could be precisely measured. Maxwell, however, after reading the work of William Thomson and of Faraday himself, believed that the lines of force did indeed represent something real. He then set out to show how Faraday's intuitive concept could be put into mathematical form. Beginning in 1856, with his paper "Faraday's Lines of Force", Maxwell produced a long series of articles which were to revolutionize ideas about electricity, magnetism, and light. In these papers he carefully explored the implications of Faraday's ideas, developed analogies and models to show how these ideas related to more familiar concepts, and finally formulated the mathematical expressions that made up his famous equations.… These equations were mathematical interpretations of Faraday's concepts, transforming the ideas about lines of force into precise formulas. Out of this transformation emerged a new picture of the relationship between electricity and magnetism. And from Maxwell's propositions about how electricity and magnetism were propagated through space came a startling new theory of electromagnetic waves, seen in their most familiar form as light.

SOURCE: Excerpted from Robert D. Friedel, *Lines and Waves: Faraday, Maxwell, and 150 Years of Electromagnetism* (1981). *Engineering and Technology History Wiki*. ethw.org/w/images/c/ce/LinesandWaves.pdf, accessed January 19, 2017.

Document 1C

THE most obvious mechanical phenomenon in electrical and magnetical experiments is the mutual action by which bodies in certain states set each other in motion while still at a sensible distance from each other. The first step, therefore, in reducing these phenomena into scientific form, is to ascertain the magnitude and direction of the force acting between the bodies, and when it is found that this force depends in a certain way upon the relative position of the bodies and on their electric or magnetic condition, it seems at first sight natural to explain the facts by assuming the existence of something either at rest or in motion in each body, constituting its electric or magnetic state, and capable of acting at a distance according to mathematical laws. In this way mathematical theories of statical electricity, of magnetism, of the mechanical action between conductors carrying currents, and of the induction of currents have been formed. In these theories the force acting between the two bodies is treated with reference only to the condition of the bodies and their relative position, and without any express consideration of the surrounding medium. These theories assume, more or less explicitly, the existence of substances the particles of which have the property of acting on one another at a distance by attraction or repulsion....

The mechanical difficulties, however, which are involved in the assumption of particles acting at a distance with forces which depend on their velocities are such as to prevent me from considering this theory as an ultimate one, though it may have been, and may yet be useful in leading to the coordination of phenomena. I have therefore preferred to seek an explanation of the fact in another direction, by supposing them to be produced by actions which go on in the surrounding medium as well as in the excited bodies, and endeavouring to explain the action between distant bodies without assuming the existence of forces capable of acting directly at sensible distances.

The theory I propose may therefore be called a theory of the Electromagnetic Field, because it has to do with the space in the neighbourhood of the electric or magnetic bodies, and it may be called a Dynamical Theory, because it assumes that in that space there is matter in motion, by which the observed electromagnetic phenomena are produced.

The electromagnetic field is that part of space which contains and surrounds bodies in electric or magnetic conditions. It may be filled with any kind of matter, or we may endeavour to render it empty of all gross matter, as in the case of Geissler's tubes and other so-called vacua…. We have therefore some reason to believe, from the phenomena of light and heat, that there is an aethereal medium filling space and permeating bodies, capable of being set in motion and of transmitting that motion from one part to another, and of communicating that motion to gross matter so as to heat it and affect it in various

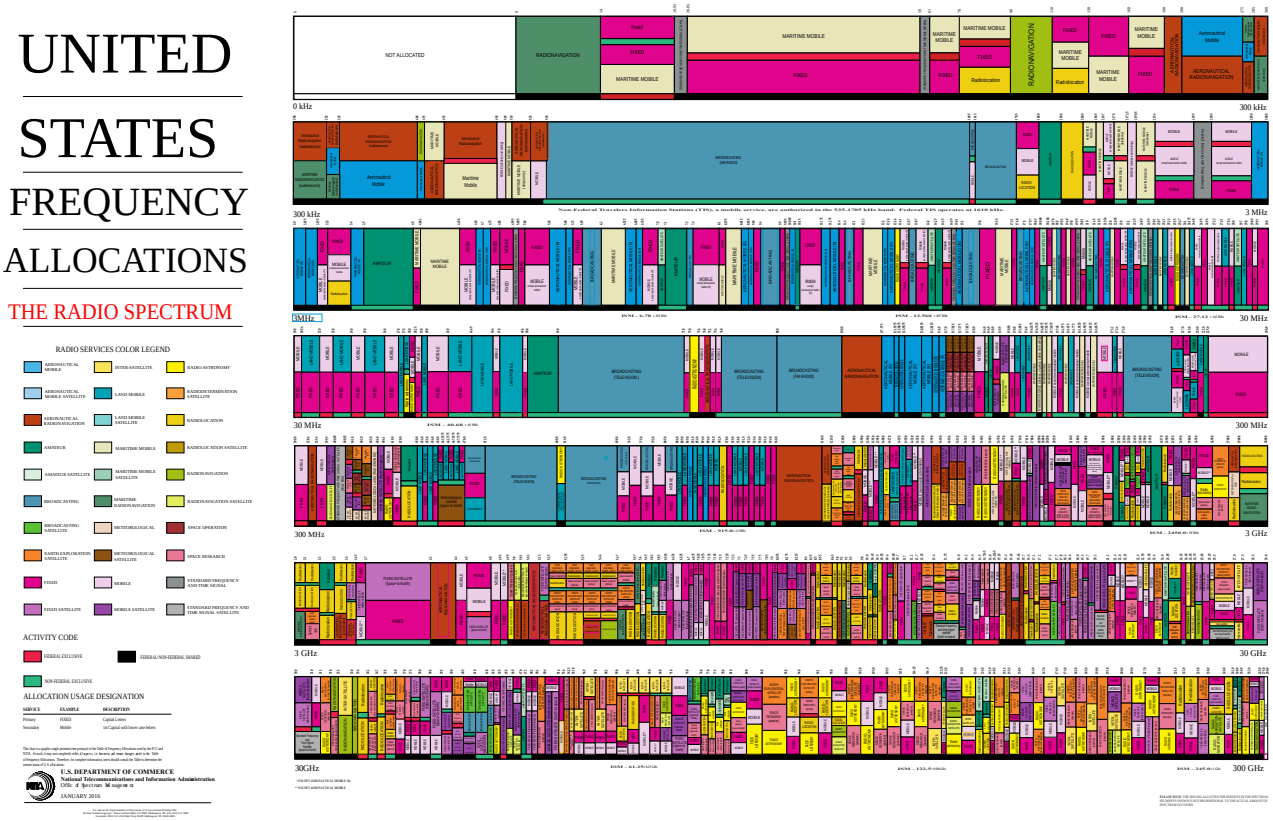
SOURCE: Excerpted from Maxwell, J. Clerk. "A Dynamical Theory of the Electromagnetic Field." ***Philosophical Transactions of the Royal Society of London*** **155 (1865), p. 459-512. jstor.org/stable/108892, accessed January 19, 2017.**

Document 1D

[This source is a website developed by Thomas H. White. According to White, it includes "articles and extracts about early radio and related technologies, concentrating on the United States in the period from 1897 to 1927." You might use this site and its related articles for research into a variety of topics connected with early radio.]

"Radio." ***The David Sarnoff Library*****. davidsarnoff.org/rcatechradio.html, accessed January 23, 2021.**

Document 1E



SOURCE: South Africa and United States Spectrum Allocation Charts. Accessed March 13, 2021: ee.co.za/wp-content/uploads/2015/03/csir-035-02-2015_.jpg. ntia.doc.gov/files/ntia/publications/january_2016_spectrum_wall_chart.pdf.

Document 1F

[This source is a video produced by the IEEE REACH team. It features Alexander Magoun, Outreach Historian at the IEEE History Center. Dr. Magoun leads you on a journey through the history of radio technology from James Clark Maxwell's theory of electromagnetism to Guglielmo Marconi's use of that theory in long-distance radio transmissions, which began the wireless communication industry.]

SOURCE: *REACH Video Resource* – *A Prehistory of Radio* (Part 1, 7:59 min) *Communication* Inquiry Unit Video.

Armstrong … was born in New York City, the first child of John and Emily Smith Armstrong…. His mother had been a teacher in the public schools and his father was vice president of the United States branch of the Oxford University Press. The family soon moved to the suburban town of Yonkers, N.Y., where they lived in a house on a bluff overlooking the Hudson River.

Armstrong decided to become an inventor when he was fourteen…. His imagination was fired by the *Boy's Book of Inventions* and by Guglielmo Marconi, who a few years before had sent the first wireless signals across the Atlantic. But wireless telegraphy was still in a primitive state. Its crude spark-gap transmitters produced electromagnetic wave signals so weak that sunlight washed them out through most daytime hours, while its iron-filing or magnetic receivers were cruder still, requiring tight earphones and quiet rooms to catch the faint Morse code signals that were all the early wireless was capable of transmitting. As a student at Yonkers High School (1905-1910), Armstrong built an antenna mast, 125 feet tall, on the family lawn to study wireless in all its aspects. He worked with every new device that came along, among them the so-called Audion tube invented in 1906 by Lee de Forest. But none of the instruments were able to amplify weak signals at the receiver, nor yet to provide stronger, more reliable power at the transmitter. On graduating from high school, Armstrong began to commute by motorcycle to Columbia University's school of engineering….

While a junior at Columbia, Armstrong made his first major invention. Long analysis of the action within the Audion tube suggested to him that it might be used to greater effect. The tube was based upon Thomas Edison's 1883 discovery in his early lamp of a tiny anomalous electric current that flowed across a gap from the filament to a metal plate. In 1904 an English inventor, John Ambrose Fleming, had shown that this effect could be used as a wireless receiver, two years later de Forest had added a vital element, a wire grid between the filament and plate. But in the usual receiver circuit the tube did no more than detect weak signals. In the summer of 1912 Armstrong devised a new regenerative circuit in which part of the current at the plate was fed back to the grid to strengthen incoming signals. Testing this concept in his turret room in Yonkers, he began getting distant stations so loudly that they could be heard without earphones. He later found that when feedback was pushed to a high level the tube produced rapid oscillations acting as a transmitter and putting out electromagnetic waves. Thus this single circuit yielded not only the first radio amplifier but also the key to the continuous-wave transmitter that is still at the heart of all radio operations.

Armstrong received his engineering degree in 1913, filed for a patent, and returned to Columbia as an instructor and as assistant to the professor and inventor, Michael Pupin. Before his new circuit could gain wide use … the United States was plunged into World War I and Armstrong was commissioned as an officer in the U.S. Army Signal Corps and sent to Paris. He was assigned to detect possibly inaudible shortwave enemy communications and thereby created his second major invention. Adapting a technique called heterodyning found in early wireless, but little used, he designed a complex eight-tube receiver that in tests from the Eiffel Tower amplified weak signals to a degree previously unknown. He called this the superheterodyne circuit, and . . . it is today the basic circuit used in 98 percent of all radio and television receivers.

SOURCE: "Radio." *Dictionary of American Biography*, Supplement Five (1977), p. 21-23. users.erols.com/oldradio/ehabio.htm, accessed February 11, 2021.

Armstrong returned to Columbia with the rank of major and the ribbon of France's Legion of Honor. By then, wireless was ready to erupt into radio broadcasting. In 1920, on a bid from Westinghouse Electric and Manufacturing Company, he sold rights to his two major circuits for $335,000.… Upon the success of early radio broadcasting, he became a millionaire, but he continued at Columbia University as a professor…. After a celebratory trip to Paris, he returned to court Marion MacInnes, secretary to the president of RCA, David Sarnoff. On December 1, 1923 they were married.

… Armstrong found himself enmeshed in a corporate war to control radio patents. His basic feedback patent had been issued on October 6, 1914. Nearly a year later de Forest filed for a patent on the same invention, which he sold with all Audion rights to the American Telephone and Telegraph Company (AT&T). As radio began to boom, AT&T mounted a broad attack to overturn Armstrong's…. The battle went through a dozen courts between 1922 and 1934. Armstrong … won the first round, lost a second, was stalemated in a third, and finally, in a last-ditch stand before the Supreme Court, lost again….

…. The Institute of Radio Engineers, which in 1918 had awarded Armstrong its first Medal of Honor for the invention, refused … to take back the medal.… [T]he Franklin Institute, weighing all the evidence, gave Armstrong the highest honor in U.S. science, the Franklin Medal.

… Armstrong doggedly continued to pursue his research. He had early set out to eliminate the last big problems of radio—static. Radio then carried the sound patterns by varying, or modulating, the amplitude (power) of its carrier wave at a fixed frequency (wavelength)—a system easily and noisily broken into by … electrical storms. By the late 1920s Armstrong had decided … to design an entirely new system, in which the carrier-wave frequency would be modulated, while its amplitude was held constant. Undeterred by current opinion … Armstrong in 1933 brought forth a wide-band frequency modulation (FM) system that … gave clear reception through the most violent storms and, as a dividend, offered the highest fidelity sound yet heard in radio.

But in the depressed 1930's the major radio industry was in no mood to take on a new system requiring basic changes in both transmitters and receivers. Armstrong found himself blocked on almost every side. It took him until 1940 to get a permit for the first FM station, erected at his own expense, on the Hudson River Palisades at Alpine, N.J.…

When, after a hiatus caused by World War II … Armstrong again found himself … challenged by a coterie of corporations on the basic rights to his invention. Facing another long legal battle … Armstrong committed suicide …. Ultimately his widow, pressing twenty-one infringement suits against as many companies, won some $10 million in damages. By the late 1960's … [n]early 2,000 FM stations spread across the country, a majority of all radio sets sold are FM, all microwave relay links are FM, and FM is the accepted system in all space communications….

SOURCE: "Radio." ***Dictionary of American Biography*****, Supplement Five (1977), p. 21-23. users.erols.com/oldradio/ehabio.htm, accessed February 11, 2021.**

David Sarnoff (1891-1971) was the iconic, even legendary, leader of the Radio Corporation of America (RCA) for most of the company's history. For many years the only Jewish executive in the communications field, Sarnoff was highly influential in the development of radio and television….

Sarnoff joined the Marconi Wireless Telegraph Company of America as an office boy in September 1906. In December, he met the Italian inventor Guglielmo Marconi and with astonishing rapidity gained his confidence and support. Sarnoff was soon promoted to a wireless operator and served in various roles at shore stations in Massachusetts and New York and aboard ships. In late 1912, Sarnoff was promoted to radio inspector for the New York District and became an instructor at the Marconi Institute. Within a year he was made chief radio inspector and assistant chief engineer for the entire company. The experienced cable executive Edward J. Nally became the Marconi Company's general manager in 1914. Unfamiliar with the wireless side of operations, he relied heavily on the expertise of his energetic and ambitious deputy. Before the year was out, Sarnoff had added the title of contract manager to his position. In 1915, Sarnoff wrote his famous "Radio Music Box" memo to Nally, which represented a revolutionary shift in the conception of radio. Rather than seeing wireless as a means for one-to-one communication, he imagined it as one-to-many. However, it would not be until the early 1920s that Sarnoff was in a position to implement his ideas.

When the Marconi Company established a Commercial Department in 1917, Sarnoff was appointed as its manager. He was still in that position when the Marconi Company became part of the new Radio Corporation of America (RCA) in 1919. Sarnoff became a promoter of having RCA expand into the domestic field in opposition to President Nally and others who wanted to stick to international communications. Chairman Owen D. Young sided with Sarnoff and subsequently made him lead the negotiations with AT&T, Westinghouse, and the United Fruit Company to create the RCA patent pool. This success, as well as Sarnoff's increasingly close relationship with Young, resulted in his appointment as general manager in 1921….

As RCA's fortunes, and stock price, soared upwards in the mid to late 1920s, Sarnoff proved his adroitness as a negotiator. In 1926, after a complex dispute between AT&T and RCA over radio broadcasting, he successfully negotiated a deal resulting in the creation of NBC in 1926. Two years later, Sarnoff proposed the takeover of the Victor Talking Machine Company….

The 1929 stock market crash ruined RCA's stock price…. Sarnoff, who had gotten out of the stock market before the crash, was elected as RCA's third president on January 3, 1930. Now possessing the title to match his control of RCA, Sarnoff was faced with the daunting task of guiding RCA through the Great Depression.

SOURCE: Excerpted from "Who Was David Sarnoff? Part I: 1891-1929." *Hagley Library*. hagley.org/librarynews/sarnoff/who-was-david-sarnoff-part-i-1891-1929, accessed January 19, 2017.

Although RCA recorded its first ever losses in 1932 and 1933, Sarnoff … had another technology in mind. In 1929, Vladimir K. Zworykin, then at Westinghouse, had approached Sarnoff with his ideas on television development. Although mechanical television systems had been successfully demonstrated in the 1920s, Zworykin argued that only an electronic system could solve the technical obstacles to widespread introduction. Sarnoff eagerly backed Zworykin's research….

… [T]he widespread introduction of television would not happen for another decade. Until 1941, a complex and extremely bitter dispute over national technical standards for broadcast and reception roiled the industry. Although Sarnoff dramatically inaugurated NBC's television service at the 1939 World's Fair in New York….the entrance of the United States into the Second World War again delayed television's arrival.

Sarnoff had entered the U. S. Army Signal Corps reserve as a lieutenant colonel in 1924 and been promoted to colonel in 1931. During the war, he was called up three times for active service.… In March 1944, he was assigned to the Supreme Headquarters, Allied Expeditionary Forces (SHAEF) in England and tasked with overseeing press communications and broadcasting for the invasion of France. Widely praised for his leadership…. Sarnoff was rewarded with a promotion to Brigadier General in November 1944 and was subsequently invariably referred to as "The General"….

When RCA started mass producing color televisions in 1954, it ran into an unexpected obstacle. Nobody wanted to buy them. This … pitted a grimly determined Sarnoff against waves of criticism from the media, industry, and government…. RCA was alone in manufacturing color televisions and each year it lost money on them. However, the corner was turned in 1960, when RCA, just barely, made a net profit on color. The next half decade was perhaps Sarnoff's finest hour, as RCA made massive profits over a runaway demand for color televisions and competitors belatedly attempted to jump into the field.

SOURCE: Excerpted from "Who Was David Sarnoff? Part II: 1930-1971." *Hagley Library*. hagley.org/node/997, accessed January 19, 2017.

Document 2C

[This source is Mike Katzdorn's large website of original documents and artifacts originally from Armstrong's assistant, Harry Houck. Consider the roles Armstrong played over his lifetime in the broadcasting industry: that of inventor, entrepreneur, or both. How did his training and skills at electrical engineering and invention affect his role as an entrepreneurial leader in commercializing FM broadcasting?]

SOURCE: *Edward H. Armstrong* [The Houck Collection]. users.erols.com/oldradio/index.htm#W, accessed February 15, 2021.

Document 2D

Between the creativity and advocacy of inventors and the realization of need or want by consumers, there exists a wide gulf. How does it happen that an idea, a proof of principle, meets the succession of markets that results in the addition of new technology to society? An inventor, after all, must persuade other technically competent people to join in making an invention practical, and a series of lawyers, investors, manufacturers, and marketers to join in agreeing that it is worthy of bringing to a market of ultimate consumers.

This applies not just to basic inventions, but to their further innovation and application in other markets. The company pushing its diffusion in the market with which it is most familiar may be less interested in bringing the technology to other markets, other consumers, who see its utility for quite different purposes. In that case, it is up to individuals within the company, or at other firms, or among the consumers, to advocate the broader application and try to bridge the space between the push or flow in one direction and the pull or pool of consumers in another.

This was David Sarnoff's role early in his career. During his twenties … he acted as advocate and medium for the expanded use of what we call radio … on ships, trains, and overland….

…AT&T demonstrated voice programs transmitted from Arlington, Virginia and received in Paris, San Francisco, and Hawaii. These took place in September and October 1915, and it would hardly be surprising for Sarnoff to propose a home receiver as another business opportunity to his superior, E. J. Nally…. The original memo on Sarnoff's "radio music box" does not exist—at least not in his papers, where there is reference to it in 1922 and evidence of a search in 1925….

…A broader, less technologically oriented population would need content, however, and in the summer of 1921, Sarnoff acted as patron for an event that helped accelerate interest in broadcasting as a mass medium. In a thorough history of the Dempsey-Carpentier boxing match broadcast, Thomas White credits Sarnoff with "the ability to spot good ideas." Sarnoff and the broadcast, however, had more effect than he gives them credit for. Recently promoted to general manager, Sarnoff made available $1,500 for … expenses, a high-power GE transmitter, and the Lackawanna Railroad terminal antenna in Hoboken. J. Andrew White, who oversaw the development of the broadcast program … submitted a 23-page report on the event to Sarnoff, who promptly circulated it … at RCA and GE.

The eight pages of listener responses indicated the positive word-of-mouth that broadcasting received …. Whether or not 300,000 people … heard the fight,… tube and component sales continued to build in the fall of 1921, when Sarnoff also helped open RCA's station WJY in Roselle Park, New Jersey.

SOURCE: Magoun, Alexander B. "Pushing Technology: David Sarnoff and Wireless Communications, 1911-1921." Presentation at the IEEE History of Telecommunications conference, Newfoundland, Canada (2001). ethw.org/w/images/1/1c/Magoun.pdf, accessed February 10, 2021.

Superheterodyne receivers were employed during the World War and its development at that time may be said to have been due to the vital need for the most sensitive receiver with the greatest degree of selectivity. Such names as Fessenden, Ferrie, Armstrong and Houck shall live forever in the radio field, as pioneers in superheterodyne research and development.

Strange as it may seem, the earliest type of superheterodyne still resembles the present-day receiver, for, despite numerous developments in design, the basic principles of operation have not changed. An examination of radio literature ten or fifteen years old shows the superheterodyne encumbered by numerous controls; whereas the modern-day receiver of this type, when viewed by glancing at the controls, resembles the simplest receivers of yesteryear.

The fame of the superheterodyne has always rested upon its marvelous sensitivity and high order of selectivity. With greater design knowledge in the hands of today's engineers and extremely more powerful tubes, the present-day receiver dims the early, and then marvelous receiver, into oblivion.

Perhaps you have wondered about the difference between the superheterodyne and the tuned radio frequency receiver. To express the difference between the t-r-f [tuned radio frequency] and the superhet receivers, we must take note of what happens to the original signal transmitted from the broadcasting station….

A broadcasting station, which transmits signals, when received with a radio receiver and made audible through a speaker appear as speech, music … is said to transmit a carrier wave which is modulated. The carrier wave is spoken of as having a certain wavelength or being of a certain frequency…. Thus station WABC operating in New York City is said to operate upon a wavelength of 348.6 meters or 860 kc. This means that the carrier wave radiated by this station has a wavelength of 348.6 meters and a frequency of 860 kc.

Now, the song, music, speech or whatever is to be transmitted to the listener is converted from sound impulses to electrical impulses and is superimposed upon the carrier wave. This action is known as modulation of the carrier wave by the audio frequencies representing the sounds present in the song, music, speech, or whatever is being transmitted. Hence the signal sent out from the broadcasting station consists of the carrier wave, which has a numerical frequency rating, and the modulating or audio frequencies superimposed upon the carrier….

What if any, are the advantages offered by the superheterodyne receiver?

SOURCE: Rider, John F. *Servicing Superheterodynes,* 3rd revised edition, 10th printing. (New York, NY: 1942). worldradiohistory.com/BOOKSHELF-ARH/Rider-Books/Rider-Servicing-Superheterodynes-1934-Rider.pdf, accessed October 1, 2020.

…. In the first place, the sensitivity of the superheterodyne receiver is not dependent upon the intensity of the broadcast carrier. In other words, the output signal is not determined solely by the intensity of the received modulated broadcast carrier. A definite gain is attained during the process of frequency conversion within the superheterodyne receiver.

Second, it is possible to secure more uniform amplification over the tuning band with a superheterodyne receiver than with a t-r-f receiver, because the major portion of the amplification takes place at a fixed frequency, namely the intermediate frequency.

Third, since the major amount of amplification takes place at a fixed frequency and the numerical value of this frequency is much below the r-f and short wave bands, maximum amplification is possible without sacrificing stability.

Fourth, since the maximum amount of amplification takes place at a fixed frequency, it is possible to design this amplifying system so that selectivity and amplification are available with minimum impairment of tone quality, in other words minimum side band cutting.

Fifth, the process of frequency conversion creates a condition as if the channel separation between stations has been increased. This means greater selectivity. For the moment we can present this condition by saying that what would normally be a frequency separation of from 1 to 2 percent in a tuned radio frequency receiver, becomes, because of the frequency conversion, about 3 to perhaps 6, 7 or 8 percent, in the superheterodyne.

SOURCE: Rider, John F. *Servicing Superheterodynes,* 3rd rev. ed., 10th printing. (New York, NY: 1942). worldradiohistory.com/BOOKSHELF-ARH/Rider-Books/Rider-Servicing-Superheterodynes-1934-Rider.pdf, accessed October 1, 2020.

Document 3A

[This webpage is devoted to radio commercials from the 1920s through the 1950s. The brief recordings, often less than a minute, are "air checks"—made by listeners at home. The author, who has collected the recordings since the 1970s, briefly describes their commercial contexts on individual pages. Most date from the late 1930s onward, when home recording equipment was more widely available. They are not necessarily from the specific years given, which are the first that a corporation began sponsoring a program.]

SOURCE: Goodwin, Danny. "Selling Stuff during the Golden Age of Radio," *OTR*. old-ime.com/commercials/, accessed January 19, 2017.

Document 3B

[This digitized collection of magazine and newspaper advertisements (1922-1957) is a subset of Duke University's J. Walter Thompson Company Competitive Advertisements Collection. You can select "Radio" or "Television" subject categories, or search those terms for more results. Searching for "TV" or "RCA" also generates additional ads. Looking at change and continuity over time, consider how these advertising campaigns appealed to consumers, which consumers they appealed to, and whether their efforts represent consumerism or the promotion of significant technical improvements.]

SOURCE: *Ad*Access*, Digital Repositories at Duke University Libraries. repository.duke.edu/dc/adaccess, accessed March 15, 2021.

Document 3C

[This is a section of an encyclopedic website that includes articles and extracts about early radio and related technologies, concentrating on the United States in the period from 1897 to 1927. You can use these primary sources and Thomas White's articles for research on the question of what broadcasting was good for in its first revolutionary year, 1922. What could one listen to on what sort of radio receiver, who was transmitting what sort of content, and why? What sort of publications could one read about radio?]

SOURCE: Thomas H. White, "Broadcasting becomes Widespread (1922-1933)," *United States Early Radio History*. web.archive.org/web/20200216151830/http://www.earlyradiohistory.us/sec018.htm, accessed March 16, 2021.

Document 3D

[This video was produced by the IEEE REACH team describe the functions and uses of early radio receivers. It features engineer Alan Klase of the New Jersey Antique Radio Club, who explains the effects that radio had on U.S. society and culture in the 1920s. Klase then demonstrates the challenges of tuning in a station on a restored 1925 Atwater Kent Model 20C radio receiver. This video helps to contextualize the other evidence connected with this Supporting Question and provides a firsthand experience with the operation of early radios. How does this compare with the use and purposes of radio and streaming software/apps today?]

SOURCE: 1920s Radio "Tune-in" and Home Entertainment (4:27 min).

Document 3E

[This Classroom Activity was designed by the IEEE REACH team to provide you with a creative way to experience and practice the skills of early broadcasters by writing, performing, and recording an excerpt of an original radio program like *The Shadow*, *The War of the Worlds*, etc. What are the differences between radio and video productions and their popular consumption? Are radio programs like *The Lone Ranger* essentially different in content or production from their modern video counterparts, or are the differences restricted to the technology itself?]

SOURCE: Classroom Activity: Original Radio Program.

Document 4A

[This source is a digitized recording of Orson Welles's 1938 radio broadcast of *The War of the Worlds* for the Columbia Broadcasting System (CBS). He and writer Howard Koch adapted and updated H. G. Wells's 1897 story of alien invaders as covered by CBS's radio station in New York City and its reporters in New Jersey. You can listen to the first 35 minutes, and consider the psychological and social impacts that it had on radio listeners when it aired on the night before Halloween. You may be amused to know that many listeners were convinced by the enactment and sound effects that the reporting was true. An adaptation that was broadcast in Ecuador in 1949, however, resulted in an angry mob setting fire to the station's building in the city of Quito, and at least six people died. The broadcasting of fiction as reported fact provides an opportunity to discuss the power of mass media platforms and their impact on popular thinking.]

SOURCE: *The War of the Worlds*. *Internet Archive*. archive.org/details/OrsonWellesMrBruns, accessed January 19, 2017.

Document 4B

[This source is a repository of archived recordings of the presidents of the United States, beginning with Warren Harding. Franklin Roosevelt realized that, as the percentage of American households with radios rose from 50 to 80 in the 1930s, he could speak directly to a majority of citizens without having reporters and editors for the largely conservative print media filter his thoughts or intentions. The Fireside Chat linked below on the country's role as an "arsenal for democracy" represented part of the president's effort to persuade Americans that the nation needed to increase and share its military resources with democracies and allies around the world who already enmeshed in World War II. Consider the social and political impact it may have had on radio listeners. Does the status of democracy around the world sound less or more secure than today? Besides content, is there a difference between Roosevelt's style and that of recent presidents using mass media?]

SOURCE: "Presidential Speeches." ***Miller Center*****.** **millercenter.org/the-presidency/presidential-speeches/december-29-1940-fireside-chat-16-arsenal-democracy, accessed January 19, 2017.**

Document 4C

[This is a recording of Nazi propaganda minister Joseph Goebbels's broadcast speech at a rally at the Berlin SportPalast on February 18, 1943. Two weeks before, the 91,000 surviving members of the German 6th Army surrendered to the Soviet Red Army, after suffering some 150,000 casualties in trying to capture the city of Stalingrad. The news marked the first Nazi admission of military defeat. Soviet armies were now regaining lost territory, the Afrika Korps was retreating in North Africa from Anglo-American armies, and on the tenth anniversary of Adolf Hitler's assumption of German leadership, British bombers had attacked Berlin during Goebbels's speech. In addition, President Roosevelt and British Prime Minister Winston Churchill had confidently demanded an unconditional surrender of Nazi Germany, news of which reached those Germans secretly listening to the British Broadcasting Corporation's (BBC) European Service.

Together with Hitler, Goebbels, who had a Ph.D. in psychology, had shaped and coordinated all the tools of mass media—radio, film, posters, the press, rallies—at the government's command to condition the German people to follow Hitler and the Nazi leadership since 1933. Now, after over three years of military conquests, it was time for the civilian population to start sacrificing and work full-time for the war effort. Total war, as the banners in the SportPalast announced, meant a shorter war. This recording should be used together with Document 4D, which is a translation of parts of the speech. Listen to this recording and think about the social and political impacts that Goebbels intended and that it may have actually had on radio listeners. What are the differences and similarities between Roosevelt's Fireside Chat and Goebbels's speech?]

SOURCE: Goebbels, Joseph. "Volk steh auf, und Sturm brich los! [Nation, Rise up, and let the Storm break Loose!]" (1943). *Internet Archive*.
archive.org/details/19430218JosephGoebbelsRedeImBerlinerSportpalastZurTotalisierungDesKrieges1h44m.
Accessed March 12, 2021.

Only three weeks ago I stood in this place to read the Führer's proclamation on the 10th anniversary of the seizure of power, and to speak to you and to the German people. The crisis we now face on the Eastern Front was at its height….

It was a moving experience for me, and probably also for all of you, to be bound by radio with the last heroic fighters in Stalingrad during our powerful meeting here in the Sport Palace. They radioed to us that they had heard the Führer's proclamation, and perhaps for the last time in their lives joined us in raising their hands to sing the national anthems. What an example German soldiers have set in this great age! And what an obligation it puts on us all, particularly the entire German homeland! Stalingrad was and is fate's great alarm call to the German nation! A nation that has the strength to survive and overcome such a disaster, even to draw from it additional strength, is unbeatable. In my speech to you and the German people, I shall remember the heroes of Stalingrad, who put me and all of us under a deep obligation.

I do not know how many millions of people are listening to me over the radio tonight, at home and at the front. I want to speak to all of you from the depths of my heart to the depths of yours…. The blows and misfortunes of the war only give us additional strength, firm resolve, and a spiritual and fighting will to overcome all difficulties and obstacles with revolutionary élan.

Now is not the time to ask how it all happened. That can wait until later, when the German people and the whole world will learn the full truth about the misfortune of the past weeks, and its deep and fateful significance…. When I jump over the past to look ahead, I do it intentionally. The time is short! There is no time for fruitless debates. We must act, immediately, thoroughly, and decisively, as has always been the National Socialist way….

It is understandable that, as a result of broad concealment and misleading actions by the Bolshevist government, we did not properly evaluate the Soviet Union's war potential…. That is why the battle our soldiers face in the East exceeds in its hardness, dangers and difficulties all human imagining. It demands our full national strength. This is a threat to the Reich and to the European continent that casts all previous dangers into the shadows. If we fail, we will have failed our historic mission. Everything we have built and done in the past pales in the face of this gigantic task….

I speak first to the world, and proclaim three theses regarding our fight against the Bolshevist danger in the East.

This first thesis: Were the German army not in a position to break the danger from the East, the Reich would fall to Bolshevism, and all Europe shortly afterwards.

Second: The German army, the German people and their allies alone have the strength to save Europe from this threat.

Third: Danger faces us. We must act quickly and decisively, or it will be too late.

SOURCE: Bytwerk, Randall, translator. "Goebbels' 1943 Speech on Total War." ***German Propaganda Archive*****. research.calvin.edu/german-propaganda-archive/goeb36.htm, accessed January 29, 2017.**

I turn to the first thesis. Bolshevism has always proclaimed its goal openly: to bring revolution not only to Europe, but to the entire world, and plunge it into Bolshevist chaos….

The goal of Bolshevism is Jewish world revolution. They want to bring chaos to the Reich and Europe, using the resulting hopelessness and desperation to establish their international, Bolshevist-concealed capitalist tyranny….

That is a direct threat to the existence of every European power. No one should believe that Bolshevism would stop at the borders of the Reich, were it to be victorious. The goal of its aggressive policies and wars is the Bolshevization of every land…. In the face of such undeniable intentions, we are not impressed by paper declarations from the Kremlin or guarantees from London or Washington. We know that we are dealing in the East with an infernal political devilishness that does not recognize the norms governing relations between people and nations…. The West is in danger. It makes no difference whether their governments and intellectuals realize it or not….

We also know our historic responsibility. Two thousand years of Western civilization are in danger. One cannot overestimate the danger. It is indicative that when one names it as it is, International Jewry throughout the world protests loudly. Things have gone so far in Europe that one cannot call a danger a danger when it is caused by the Jews….

My second thesis: Only the German Reich and its allies are in the position to resist this danger…. If the strongest military force in the world is not able to break the threat of Bolshevism, who else could do it? (The crowd in the Sportpalast shouts “No one!”)….

My third thesis is that the danger is immediate. The paralysis of the Western European democracies before their deadliest threat is frightening. International Jewry is doing all it can to encourage such paralysis. During our struggle for power in Germany, Jewish newspapers tried to conceal the danger, until National Socialism awakened the people….

…. A merciless war is raging in the East. The Führer was right when he said that in the end there will not be winners and losers, but the living and the dead….

Total war is the demand of the hour. We must put an end to the bourgeois attitude that we have also seen in this war: Wash my back, but don’t get me wet! (Every sentence is met with growing applause and agreement.) The danger facing us is enormous. The efforts we take to meet it must be just as enormous. The time has

come to remove the kid gloves and use our fists. (A cry of elemental agreement rises. Chants from the galleries and seats testify to the full approval of the crowd.)….

Now, people, rise up and let the storm break loose!
(The minister’s final words were lost in unending stormy applause)

SOURCE: Goebbels, Joseph. “Nation, Rise Up, and Let the Storm Break Loose! [Volk steh auf, und Sturm brich los!]” translated by Randall Bytwerk. *German Propaganda Archive*. research.calvin.edu/german-propaganda-archive/goeb36.htm, accessed January 29, 2017.

[This is an excerpt of a transcript from the broadcast of the privately funded Rwandan radio station R.T.L.M., which translates from its French name as "Free Radio and Television of the Thousand Hills." The most popular station in Rwanda, its broadcasts in 1993-94 helped groom and incite members of the majority Hutu ethnic group (85% of the population of twelve million) to slaughter some 800,000 members of the minority Tutsi ethnic group (15% of the population) in 100 days in the spring of 1994. In Africa's smallest country (similar in size to the state of Maryland), the low literacy levels and high poverty made broadcasting to cheap, small, transistor radios the most effective means of communicating to the mostly rural population.]

Speaker: Bernard Mukingo, editor of *Kamarampaka* newspaper

"About the situation on roadblocks, population stands firm. They have started to gather themselves determined to fight the enemy instead of continuing to flee. Now in Gitarama, all of them stand well. Young men claim [clamor] for more guns so that on the Ndiza hill, on roadblocks the situation is not good, two Inyenzi were arrested hiding and they were killed. They said that they have to fight the enemy instead of continuing to flee. We don't want to hear some people from Kigali who inspire fear saying that the situation is hard….

"I profit by this occasion to tell people who fled from Kigali and who, when they arrive in communes, make themselves more important by mistreating the refugees that we don't support this. They should let people flee, for example women, and control the enemy because I also noticed the infiltration of the Inyenzi, among the refugees. But people who man roadblocks are vigilant because I saw a lot of Inyenzi they arrested.

"Hello to all the displaced people who have lost their homes, a quite special hello also to all our soldiers, to all the security agents, to all the youths of the parties and all the volunteers who are at roadblocks and who are working.

"Hello also to our doctors, to our nurses, to all the people who are in charge of health care and who must have worked a lot today. So, today, it is Sunday 5th June 1994, we are still in Kigali with you. For the population of Kigali, do not get afraid. The few firing you heard this morning, we are giving a good hiding to the Inyenzi and that hiding is today the 5th of June, tomorrow it is the landing. And the landing, you know what that means. So, that does not mean that tomorrow—for all the people of Radio Muhabura who are listening to us too, that does not mean that for tomorrow we have planned something or not. That means that it is the period during which we are starting to become stronger, during which the Rwandan population, in their heart of hearts is starting to realize more and more that R.P.F. is manifestly just a barbaric machine, a machine of war, when more and more in Gitarama, in Butare, here in Kigali, now and yesterday, the people of Byumba started also to take shape. The people are determined to present a united front against the Inyenzi-Inkotanyi and to drive them out the country.

"It is true that it took some time for everybody to mobilize, for everybody to realize. However, this mobilization is in full swing it already starts to bear fruit. Already yesterday, it seems that, it is an unconfirmed piece of news; it seems that on the top of Kigali, they caught a recoilless gun that was shelling at the town. The day before yesterday, three days ago, they captured a machine gun that was shelling from Gisozi toward Muhima. Well, go on, mobilize, work, you all the young people all over the country. Come and work with your Army, come to work with your government to defend your country, because if not, where will you go to?"

SOURCE: ***List of R.T.L.M. Transcripts by Language – RwandaFile: R.T.L.M. Tape 0131, 23 May 1994*****. web.archive.org/web/20170504030754/http://rwandafile.com/rtlm/rtlm0131.html, accessed March 14, 2021.**

CLASSROOM ACTIVITY – ORIGINAL RADIO PROGRAM

Listen to the following 1937 broadcast of *The Lone Ranger*. Programs like this one were a staple of the early days of commercial radio. The story in this particular episode takes place outdoors, but the entire show was produced and performed inside a studio and all the sounds were created artificially. Watch the following video recording of *Guy Noir Private Eye*, a radio drama performed in the style of the 1930s programs. Pay attention to the sound effects artist on the left side of the stage and watch how he creates various sounds using everyday items. Finally, read a script from *Sherlock Holmes* and note how the dialogue and sound effects are intermingled so that each effect is timed to make the show seem more realistic.

Your task is to create an original radio program using the same techniques utilized in early radio studio productions. You will need to write and perform a scripted dialogue that includes at least five (5) sounds that must be created artificially in the studio. Practice recording each sound until you achieve the effect you wanted.

Use the space below to plan your episode.

Original Radio Program

TITLE _____

CHARACTERS _____

_____

SOUND EFFECTS CHART

Sound	Possible Tools

Outline your script on the back of this page.