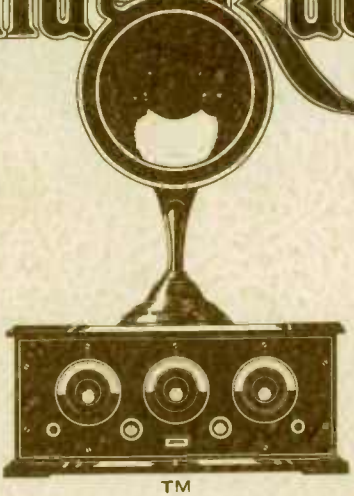
1887–1929

Vintage Radio



TM

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Classic Pictorial Album
Revised, Edited and Expanded
by
MORGAN E. McMAHON

This is a book about the most important invention of modern times. In forty short years, 1887 to 1927, man developed the ability to talk instantly to anyone anywhere, and to influence millions of people.

First, pioneers struggled to talk across the miles by wireless code. Then, families huddled over their home radios to hear far-away voices and faint music. Finally, radio became a part of everyday life. People even dared to think of sending pictures by radio, and called it "television".

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A Pictorial History of Wireless and Radio

SECOND EDITION

When Uncle Sam Wants to Talk to All The People.

VINTAGE RADIO

Harold Greenwood's
Historical Album
Expanded With More Old Ads,
Illustrations and Many Photos
of
Wireless and Radio Equipment

by
Morgan E. McMahon

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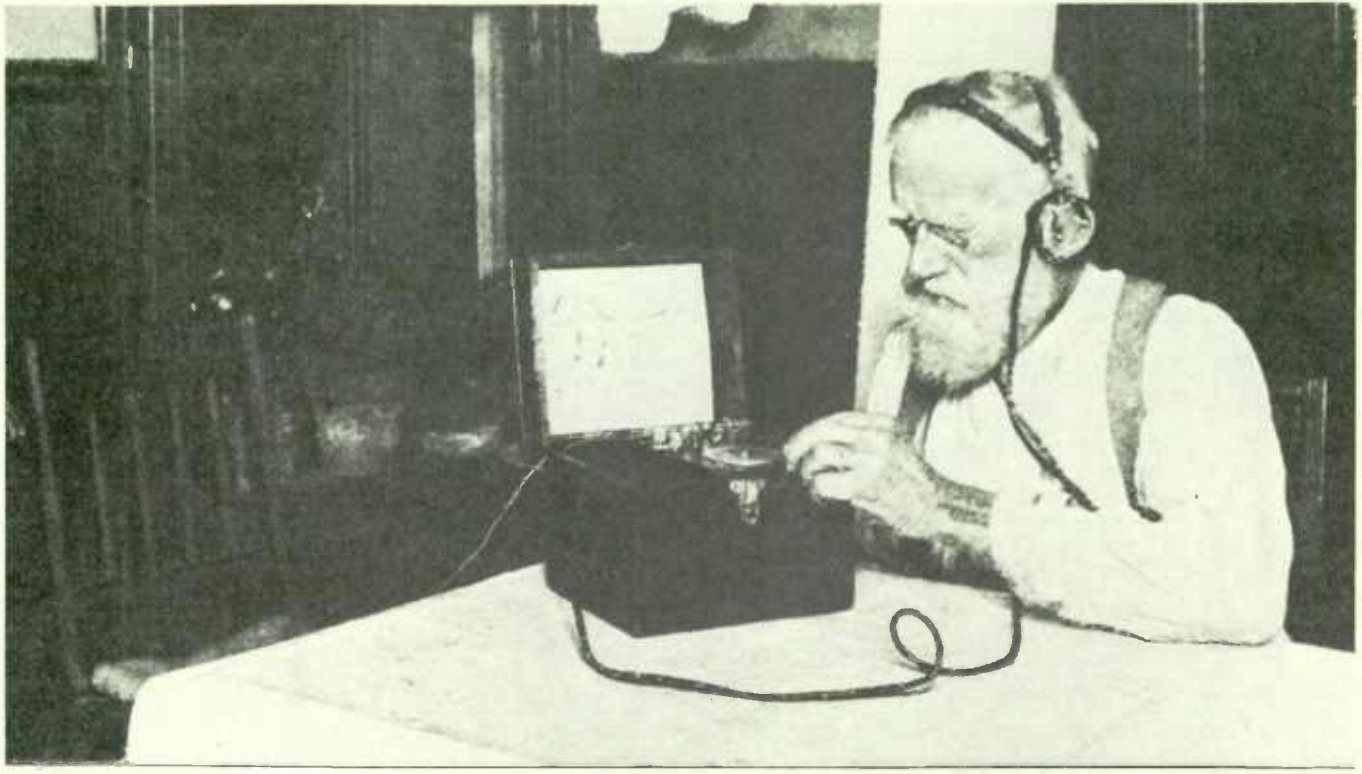


HEARING HIS FIRST OPERA

ACKNOWLEDGEMENTS

This book is dedicated to the pioneering spirit of the late Harold S. Greenwood, who authored the original historical Album of Wireless and Radio, and to Mrs. Greenwood for her help.

This book is enriched by the contributions of many people, who have by now become too numerous to list individually.

Equipment photographs are from the collections of Earl England, Paul Giganti, Harold Greenwood, Joe Horvath, Morgan McMahon, Vance Phillips, Ed Raser, Richard Sepic, Carl Sivertson, and other interested friends.

Thorne Mayes has made particularly valuable contributions of historical material, and Fred Shunaman helped greatly in pointing out opportunities for improvement over the first printing of this book.

Several manufacturers and publishers graciously consented to the reproduction of illustrations. We also received great help from various organizations, particularly the Antique Wireless Association (especially Bruce Kelley), the American Radio Relay League and the Smithsonian Institution.

My heartfelt thanks to all who helped with the book, particularly to my wife Gladie and the kids.

SPECIAL NOTE

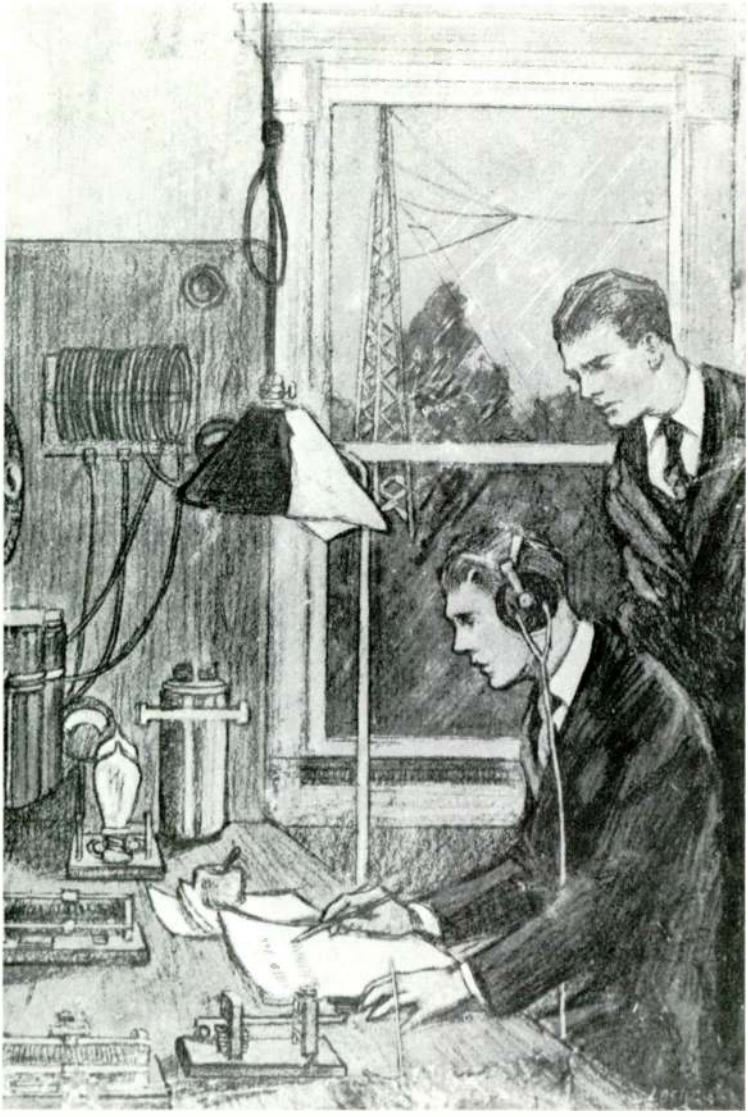
Dates and prices shown in photo captions are the year of introduction and the retail price at that time.

I have great admiration and high regard for Marconi the pioneer inventor of Wireless Telegraphic Communication

Thos A Edison

CONTENTS

RADIO BOY CRONIES OR BILL BROWN'S RADIO 1922



CHAPTER I
BIRD'S EYE VIEW

The story of early radio has its roots way back in 1887, and runs up to 1927 when A-C "plug-in" radios made the new miracle a part of everyday life. First there was "wireless" with the transmission of dots and dashes from spark machines across the miles to primitive receivers. Then came "radio," with the transmission of voices and music for the entertainment, education, and communication of all the world. There was a mixture of pioneering, excitement, success, failure and even fraud. Interestingly, some promoters of early wireless wound up in jail because their pioneering spirit was matched only by their financial audacity. These rough beginnings changed the course of mankind.

THE STORY

A man looks up from his scribbled notes in wonder. He has just produced a theory that says electrical waves can travel through space. The man is James Clerk Maxwell, and the year is 1865.

Another man makes an electric spark with a spark coil. Across the room, a tiny spark appears in a loop of wire. Heinrich Hertz has demonstrated the truth of Maxwell's theory. The year is 1887, and the wireless age has begun.

Guglielmo Marconi, a young Italian, shows that man can communicate across the miles. His miraculous wireless equipment is installed aboard ships and on shore, and commercial wireless is on its way. The year is 1899.

Wireless in still in its infancy. Communications are weak and undependable over long distances. Then Dr. Lee DeForest makes the step that revolutionizes radio; he invents the Audion vacuum tube, a device that can change small, weak signals into large, strong ones. This is the secret to real radio communications. The year is 1906.

The year is 1909. The S. S. Republic is feeling her way through wintry, miserable weather off Nantucket Island. A form looms through the gloom. There is a grinding crash. The S. S. Florida has rammed the Republic. The Republic, mortally wounded, wallows deeper and deeper in the waves. The ship is equipped with that new toy called "wireless." Jack Binns, wireless operator, cranks up his spark transmitter and his "CQD" distress message crackles across the sea. His call is heard at sea and on shore. Rescue ships

converge on the Republic, and it goes down with the loss of only six lives. The world applauds.

The mighty Titanic is on her maiden voyage. The year is 1912, and the "unsinkable" ship plows majestically along under cold, starlit skies. There is a long, grinding shudder, hardly noticeable to the passengers. But the ship is mortally wounded. A wireless plea for help carries across the miles. Ships respond, but by the time they arrive, people have drowned or frozen in the black, cold water. Later, a haunting fact comes to light; the S. S. California was within easy range to save all the Titanic's passengers. Unfortunately, her radio operator was off-duty. The world is shocked. International regulations are written making 24 hour wireless a must on seagoing vessels.

Wireless has captured the imagination of the world. Radio pioneers float stock issues to finance ill-conceived business ventures. Also, opportunists flock in to fleece the public. Companies are made and broken overnight. Fortunes are invested and lost. The early 1900's are as wild as ever seen in any business.

The "War To End All Wars" comes. As usual, World War I has a tremendous cost in suffering, death and waste. As is also usual, however, war spurs the advancement of technology. By the time of the 1918 Armistice, radio has become a faithful workhorse.

In 1910, Lee DeForest plays music over his primitive arc transmitter. Other west coast pioneers also transmit programs, but one ingredient is missing; the audience. In 1919 the time is ripe. Dr. Frank Conrad of Pittsburgh, Pennsylvania broadcasts from his garage, and people begin to listen to this miracle of speech and music. Dr. Conrad's employer (Westinghouse) sees the opportunity and takes over. KDKA, the first commercial broadcast station is born in time for the Warren G. Harding election of 1920.

Broadcasting's first big blooper occurs in 1921 when Mayor Lew Shank of Indianapolis stands in front of a live microphone and says, "Do you mean to tell me that people can hear me over this damned dingus?"

The early 1920's are the years of squeaks and squawks in every household, of batteries and battery chargers, and of outlandish stunts like radios in automobiles and "portable" radios (weight 40 pounds). There are only two legitimate radio broadcast frequencies, and stations "sneak" this way and that in order to find clear channels. Out of this chaos comes order, by the hard work of legislative bodies, technical teams and the business community. By the mid-1920's radio broadcast is well established. The various broadcast, amateur and commercial communications are "put to bed" with assigned frequencies. Squeaks and squawks are eliminated by new radio circuits.

But batteries are still the bane of home radio: Acid eats holes in mother's carpet. Sonny makes periodic trips, hauling the "A" battery

to the battery man for a re-charge. Father gulps at the high price of a home battery charger. Then comes the final big breakthrough; the A-C radio that you can plug right into the same electric outlet that runs your toaster, your fan and your electric hair curling iron. Radio has become as much a family member as the horse, the Model "T" car and the wind-up phonograph. The year is 1927.

A new world of news, adventure, music, comedy, drama and talk has been opened to every home. By 1929 everyone knows names like Eddie Cantor, H. V. Kaltenborn, Graham McNamee, Will Rogers, Rudy Vallee, Major Bowes, Joseph Duninger, Amos 'n Andy and the Gold Dust Twins.

The wireless-to-radio revolution has taken from 1887 to 1927, a remarkably short forty years. In the year 1927, people still don't realize that they've started a communications revolution that will change the habits and future of all mankind.

TECHNICAL MILESTONES

1865 JAMES CLERK MAXWELL develops a theory showing that electromagnetic waves can travel in space.

1883 THOMAS EDISON finds that current will flow from a heated filament in a vacuum. This "Edison effect" is the basis for vacuum tubes.

1884 PAUL NIPKOW invents the scanning disc giving first television images.

1887 HEINRICH HERTZ proves Maxwell's theories by sending and receiving radio waves across a room.

1895 GUGLIELMO MARCONI sends and receives messages by wireless.

1899 MARCONI's wireless is adopted for commercial ship-to-shore use.

1901 MARCONI receives first trans-Atlantic radio signal.

1904 J. AMBROSE FLEMING develops the vacuum tube diode.

1906 LEE DeFOREST invents the triode vacuum tube amplifier, most important discovery in radio.

1912, 1913 DeFOREST and EDWIN H. ARMSTRONG independently discover regeneration.

1915 First practical radiotelephone communications, by Bell Telephone Labs.

1918 ARMSTRONG invents the superheterodyne circuit.

1919 DR. FRANK CONRAD's radio broadcasts "catch on" and radio broadcasting is born. Picked up and commercialized by Westinghouse as station KDKA in 1920.

1922 ARMSTRONG invents super-regeneration.

1926 JOHN LOGIE BAIRD demonstrates first practical television.

1927 A-C "plug-in" radios are introduced, making radio a true household convenience.

JUST A FEW OF THE EARLY PIONEERS

DR. LEE DeFOREST
THREE ELEMENT AUDION
1906

GUGLIELMO MARCONI
SENT FIRST WIRELESS
MESSAGE 1895

HEINRICH HERTZ
ELECTROMAGNETIC WAVES
1887

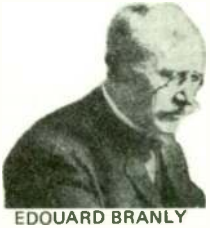
SIR OLIVER LODGE
METHODS OF TUNING

MAJOR ARMSTRONG
REGENERATION,
SUPERHETERODYNE,
SUPER-REGENERATION,
FREQUENCY MODULATION

DR. J. A. FLEMING
FLEMING VALVE 1905

HUGO GERNSBACK
PIONEER PUBLISHER

R. A. FESSENDEN
ELECTROLYTIC DET. 1903



EDOUARD BRANLY
COHERER DET. 1890

CHAPTER II
WIRELESS DAYS

People knew radio as "wireless telegraph" in its early days. In fact, the word "radio" was not used for some years. Scientists, engineers, amateurs, experimenters and businessmen were the pioneers that gave us this great new tool. Communications without wires were especially important to ships at sea, people separated by great distances, and to armies on the move. Wireless began with spark transmitters and coherer receivers, progressing to quenched-gap transmitters and crystal receivers, and finally to continuous-wave "C-W" transmitters and vacuum-tube receivers. Wireless paved the way for radio broadcasting, the greatest thing in mass media since the invention of movable type in the 1400's.

The wireless days saw a raw, rough industry being born, with all the adventure and intrigue typical of other new technical giants. The following paragraphs recount the early days of the wireless and radio industry as described by Thorn Mayes, an eminent historian:

In 1899 Guglielmo Marconi formed the Wireless Telegraph and Signal Company in England for the purpose of building and installing wireless on lighthouses and light ships along the English coast as he had demonstrated he could communicate over a distance of 15 miles by wireless which was sufficient for this application. This company later became the Marconi Wireless Telegraph Company which today is the most important radio company in England.

The first wireless company to be formed in the United States was the American Marconi Wireless Telegraph Company. It was incorporated under the laws of New Jersey, November 1899, with authorized stock of 2 million shares of $5 par value, to exploit the Marconi patents in the U.S.A. Their first installations were made on the Nantucket light ship and at Siasconset on the east coast of Nantucket Island. First exchange of messages over the 40 mile distance was in August, 1901.

The development of American-based wireless followed a different pattern. From 1900 thru 1915, many companies were formed for the purpose of issuing and selling wireless stock. This movement was given considerable impetus by Marconi's reception of signals across the Atlantic in December of 1901. Of these many companies, only one lasted until the WW-I period. Only the major operating companies will be covered in this review.

In 1901 the American Wireless Telephone & Telegraph Company was formed by Dr. Gehring to exploit the patents of Dolbear and Harry Shoemaker. Within a year, there were 9 subsidiary companies with a total capital stock of $50 million. Robert Marriott, who became one of the outstanding early wireless engineers, a founder

of the Institute of Radio Engineers May 1912, was engineer of the Pacific Wireless Telegraph Company, a western subsidiary. He designed and installed the first commercial wireless stations in the United States which started operations in July, 1902, between Avalon, Catalina Island and San Pedro, California. These two stations continued under several managements until 1920 when the Pacific Tel. & Tel. Company put in a wireless telephone link.

By 1902, most of the American wireless companies were broke and were reorganized into the Consolidated Wireless Tel. Company with capital stock of $7.5 million. The name was changed in 1903 to The International Wireless Tel. Company and in 1904 the remains of this company were taken over by the American DeForest Wireless Tel. Company.

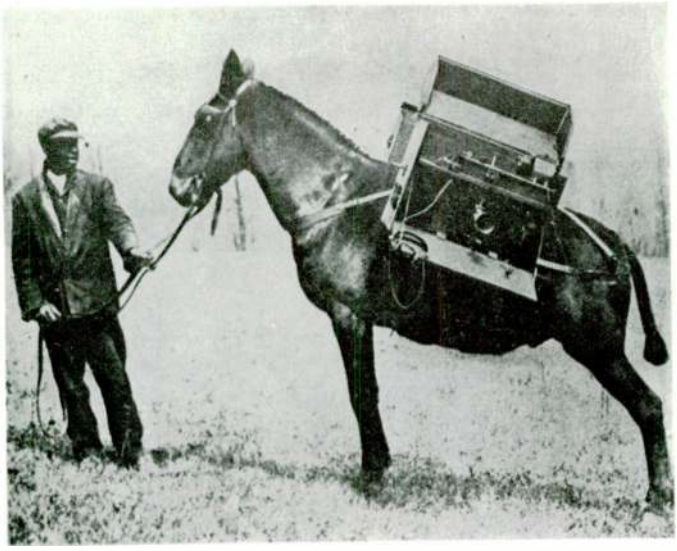
This next group was formed by Dr. Lee DeForest who organized the Wireless Telegraph Company of America in 1901 with a capital stock of $3,000. After meeting and joining an eastern promoter by the name of Abraham Schwartz, the company was changed in late 1901 to the DeForest Wireless Tel. Company with a capital stock of $1 million. In February 1902, a new DeForest Wireless Tel. Company was formed under the laws of Maine with stock of $3 million with Abraham Schwartz, President, and Dr. Lee DeForest Vice President and Scientific Director. November 1902 the capital stock was upped to $5 million and in 1903, the name changed to American DeForest Wireless Tel. Company with capital stock of $10 million.

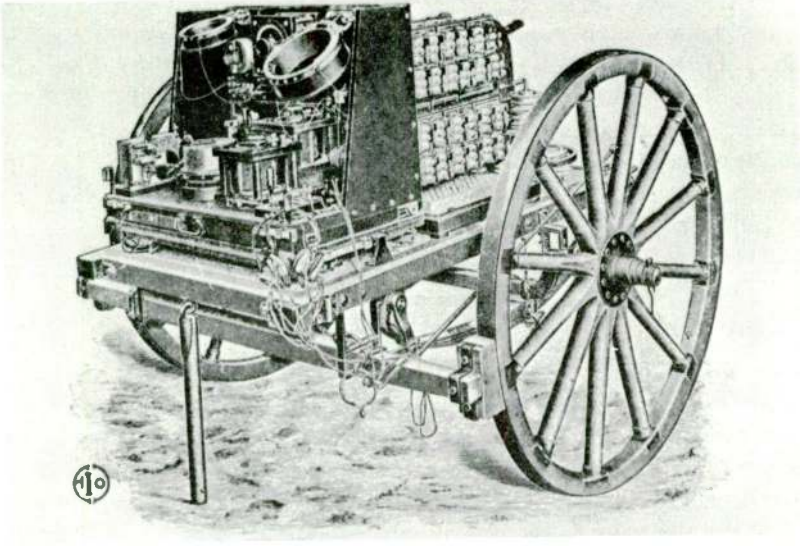
By 1906, the American DeForest Company was by far the largest operating company in the United States with 27 land stations. Typical sets consisted of a 1 or 2 K.W. high voltage transformer, bank of Leyden jars for the condenser and a helix completing the transmitter. Shipboard receivers used the DeForest responder or electrolytic detector with his syntonizer, which was a tuner made up of two slide tuning coils connected to work with the looped antenna. Land stations used the same detector with the more selective 3 coil tuner.

The Courts in 1906 judged the DeForest responder an infringement of Fessenden's electrolytic detector patent of 1900 so American DeForest Company had to immediately change all stations to use silicon detectors which had been patented in 1906 by General H. H. Dunwoody who was now an officer in the American DeForest Company. Because of this incident, DeForest resigned from the company in November 1906.

Abraham Schwartz, who had now changed his name to White, still President of American DeForest Company, formed the United Wireless Telegraph Company late in 1906 with capital stock of $20 million. United took over the American DeForest Company operations in February 1907. Early in that year, Colonel C. C. Wilson was successful in ousting White and became the President of United Wireless.

Even though a major objective of United's top management was





Early "Portable" Wireless Sets

selling stock, the operating people were doing their best to improve company performance. Harry Shoemaker, as Chief Engineer, set up a capable engineering group to design better equipment. United started with the American DeForest 2 & 3 coil syntonizers which they called their type A and B tuners. They developed three improved receivers, the type C in 1907 for tugs and small coastal ships. Early in 1908, the type D was introduced which became the standard receiver for ship and shore stations. It was produced in quantities and was in use on some ships thru World War I. The type E, the first commercial receiver to use a loose coupler, came out in 1911, but few were built for by this time United was in receivership. In May 1911, three United Wireless officers were convicted of fraudulent stock selling practices and were given sentences of up to three years in Federal prison.

American Marconi had filed suits against United for patent infringement. Modern Electrics of April 1912 reports that United lost the suit, and that the assets of the company were purchased by the British Marconi Company for $700,000. These were sold to the American Marconi Company who immediately took over operation of United's 70 land stations and 500 ship installations.

By 1906, when David Sarnoff was hired as office boy, American Marconi was operating 4 shore stations and had their gear on a total of four ships. In 1912, when they took over United, their shipboard installations had increased to 40.

Best known receivers developed by American Marconi, were the 101 of 1912, the 103 of 1913 and the 106 that came out in 1915. They also developed the panel type transmitters in this country. Their P-8 2KW 500 cycle quenched and synchronous rotary gap transmitters with various models of the 106 receiver were standard shipboard sets up to the end of the spark era.

American Marconi had a large well equipped factory at Aldene (Roselle Park) New Jersey that turned out much of the wireless equipment used by the U.S. in WW-I but it was still a British controlled company with the majority of its stock held in England.

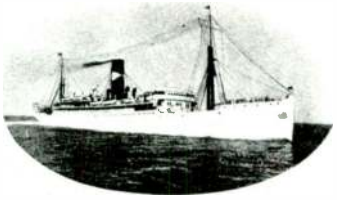
By the start of WW-I, the 50 KW arc transmitters had proved their superiority to the 300 KW Marconi timed spark sets. Dr. Alexanderson of the General Electric Company had for several years been working on the design of a high frequency alternator (A-C generator) which showed much promise as a continuous wave transmitter. During the war, the Navy installed a 200 KW alternator in the New Brunswick, New Jersey station which soon outperformed 500 KW arc sets indicating this to be the high power transmitter of the future.

Because of the importance of radio communication by the end of WW-I, the Navy and our Congress were convinced that our communication system should be American owned and operated.

RADIO TELEGRAPH *and* TELEPHONE EQUIPMENT

DESIGNED FOR

COMMERCIAL SHIP AND SHORE STATIONS
MILITARY INSTALLATIONS
PLEASURE YACHTS AND CRUISER AUXILIARIES
SCHOOLS AND COLLEGES
PRIVATELY-OWNED RESEARCH AND
EXPERIMENTAL STATIONS



United Fruit Company's Steamship *Pastores*

WIRELESS SPECIALTY APPARATUS COMPANY
ENGINEERS, DESIGNERS, AND MANUFACTURERS
BOSTON, MASS., U.S.A.

October, 1919

Before the radio stations were returned by the Navy to commercial ownership at the end of WW-I, the General Electric Company had purchased from Marconi Wireless Telegraph Company of England, their stock in the American Marconi Company. General Electric Company, Western Electric and later Westinghouse, pooled their radio patents and formed the Radio Corporation of America which through a stock transfer acquired the organization and assets of the American Marconi Company in November 1919.

G. E. Company took the tools and dies from the Aldene plant so they could continue to manufacture for R.C.A. the P-8 transmitters and 106 receivers as long as spark sets were used. In 1922, they modified the 106 receiver to use the Western Electric VT-1 detector tube, and it became the 106D model.

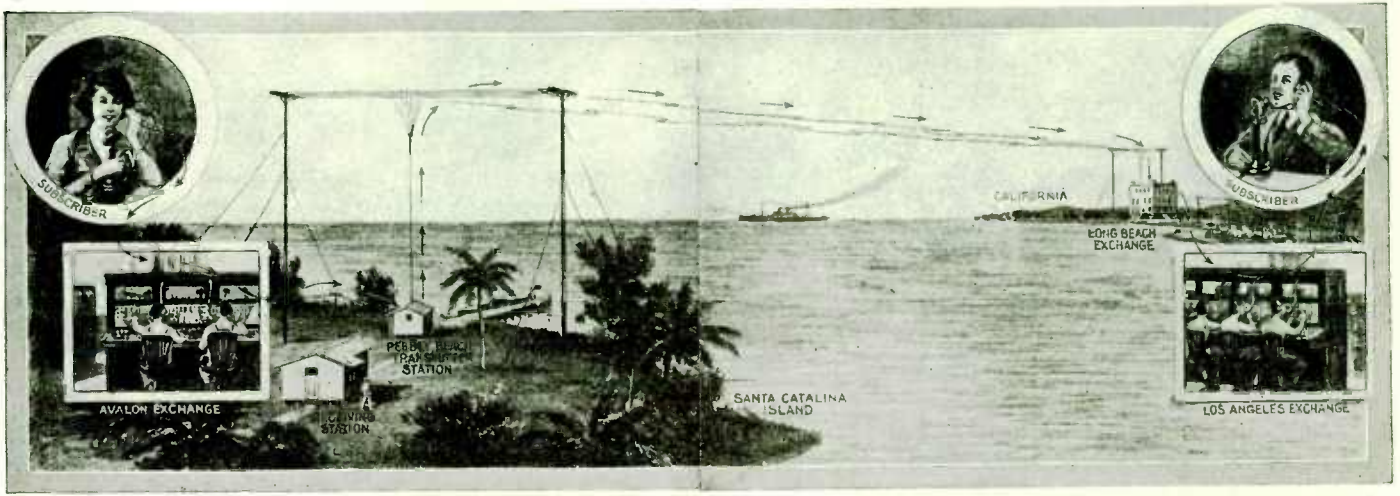
In March 1920, the Navy returned to their original owners the high power land stations in the United States. R.C.A. immediately installed a second Alexanderson alternator in their New Brunswick, New Jersey station, two in the Chatham, Massachusetts station for trans-Atlantic service and two in the Bolinas, California and Kahuku, Hawaii stations for trans-Pacific operation.

With the start of the broadcasting era, R.C.A. having no manufacturing facilities of its own, sold receivers made by both General Electric and Westinghouse and tube transmitters made by G.E. Company. Later they set up their own plants to build these equipments. This part of their business soon exceeded the volume of RCA's communications operation.

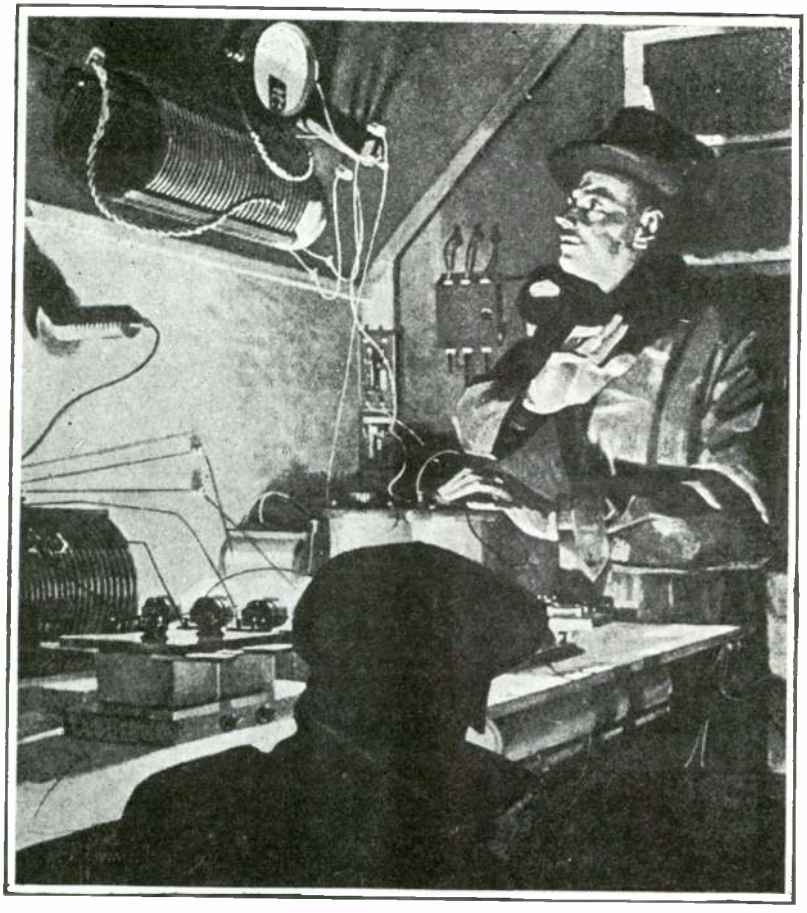
It is interesting to trace the business history of Dr. Lee DeForest, widely-known technologist of wireless and radio. When Dr. DeForest left the American DeForest Wireless Telegraph Company in 1906, the only patents he retained were on his audion detector which at that time were thought to be worthless.

Early in 1907, he formed the DeForest Radio Telephone Company for the purpose of developing a radiophone set using an arc as the generator of the high frequency oscillations for the carrier. He made a number of installations but his complaint expenses were high so the man went broke in 1911. DeForest then went to work for the Federal Telegraph Company in Palo Alto, California. He left Federal in the spring of 1913 to go east and that summer sold to A.T.&T. Company, the patent on his audion for telephone repeater service for $50,000.

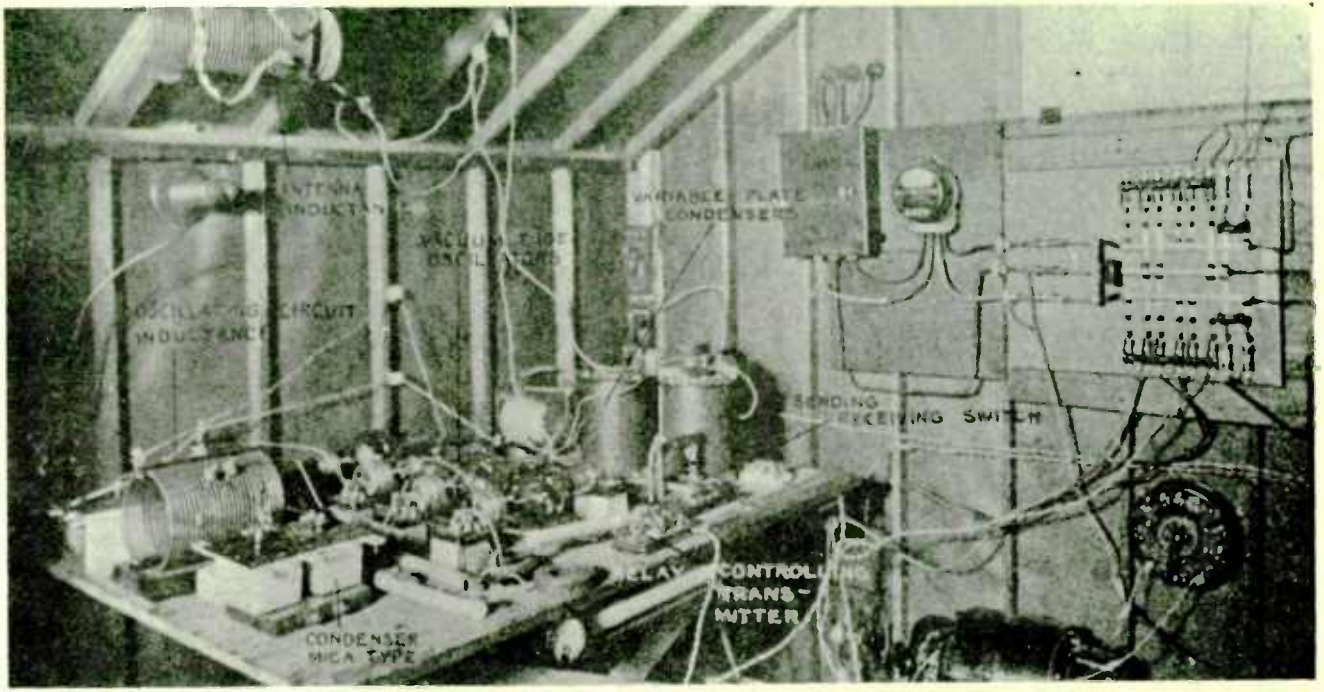
With this money, in 1914 he revived the DeForest Radio Tel. Company, changing its name to the DeForest Radio Tel. & Tel. Company which built radio equipment for the military during WW-I. After the war, the company continued to build commercial and amateur gear and developed several lines of receivers for broadcast reception. Around 1925, the company went out of business but by this time Dr. DeForest was spending full time on the development of talking motion picture equipment.



General scheme of the radio link as used between the California mainland and the island of Santa Catalina, connecting the mainland telephone system with that of the Santa Catalina Island and makingthem a single system. The radio link in this installation is a duplex arrangement, so that two messages can behandled at one time, or one in each direction.



LISTENING to the foremost citizens of the nation; keeping in touch with the affairs of the world; enjoying the classical and popular music of yesterday and of the very hour; spanning hundreds and even thousands of miles without physical conductors between the talker and the listener; handling current by the kilowatt and by the thousandth of a watt; starting with the simple receiver and culminating with a powerful transmitter, even one capable of spanning the Atlantic, as shown in this painting—all these features and many others make radio the fascinating subject which it is to layman and professional alike.



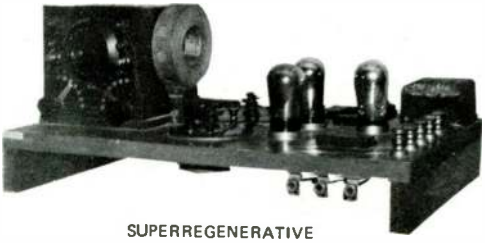
Amateur radio has always been a source of technical advancement, of emergency radio services and of trained people. The thrill of communicating directly with someone far away is immense. This CW station, IBCG, pioneered trans-Atlantic amateur communications in 1921.

WITH THANKS TO THE SMITHSONIAN INSTITUTION

EDWIN HOWARD ARMSTRONG

The one man most responsible for advancement in radio circuitry was Major Edwin H. Armstrong. He invented feedback, key to tube receivers and transmitters, in 1912. While in the Army in 1918, he invented the superheterodyne receiver, now the basic circuit of most radios. This was followed in 1922 by the super-regenerative receiver, the most sensitive single-tube circuit known. In 1933 Major Armstrong capped his career by inventing frequency modulation (FM). He participated in many other pioneer efforts, such as the earliest Trans-Atlantic amateur communications by 1BCG. Illustrated below are the original receivers built by Armstrong and his associate, Harry Houck.

REGENERATIVE
RECEIVER
1912-13



SUPERREGENERATIVE
RECEIVER
1922

ARMSTRONG'S SUPERHETERODYNE TUNER AND I-F AMPLIFIER
1918

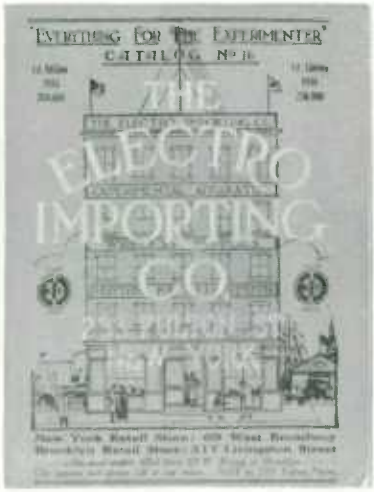
WHERE YOU COULD BUY IT

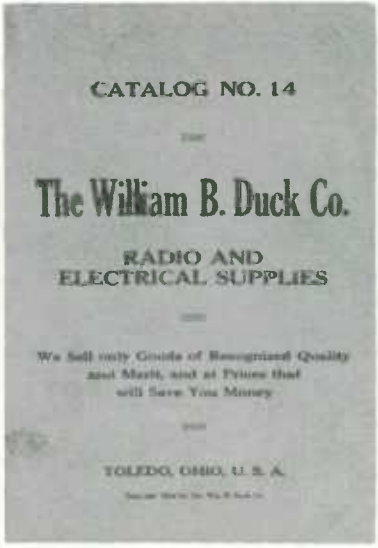
By 1906 wireless apparatus was on sale to the amateur and experimenter. The Electro Importing Co. of New York was formed by Hugo Gernsback and soon began making parts and sets for the amateur. J. J. Duck, and later his brother Wm. Duck at Toledo, Ohio, put out a Mail order radio parts catalog. Another mail order house was Manhattan Elect. Supply Co. F. D. Pitts of Boston put out a radio parts catalog containing testimonials. John First of New York sold the famous "Firso" line by mail.

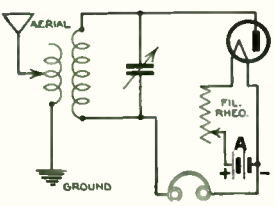
In 1914 Merker-Flocker Electric Co. of Pittsburgh offered wireless gear for sale. Pacific Laboratories of San Francisco sold the Audiotron and Moorhead tubes in 1916. National Radio Supply Co. of Washington, D.C. sold both amateur and commercial apparatus by mail order. An amusing advertisement of the period was that of the Electrical Supply Co., which read, "Be a detective and hear through the walls with our Skinderviken Button."

The DeForest Radio Tel. & Tel. Co. of New York issued catalogs after the war, selling their famous "unit parts" for the amateur.

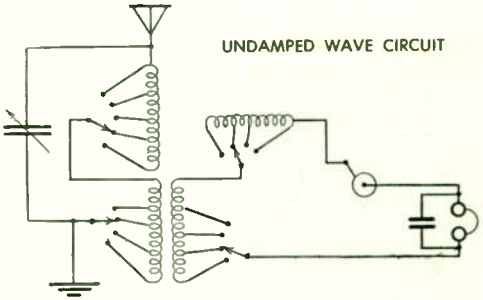
Publishing pioneers, particularly Gernsback, Doubleday and Scientific American were important to the growth of wireless and radio. Organizations such as the American Radio Relay League were also powerful forces in advancing this new technology.



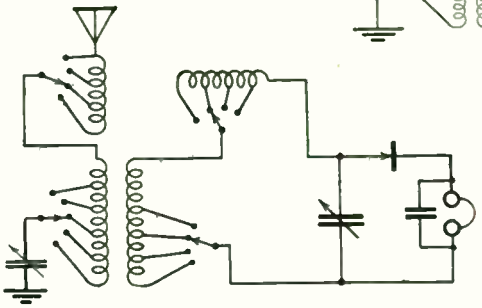




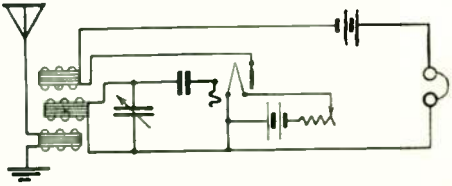
FLEMING VALVE CIRCUIT



UNDAMPED WAVE CIRCUIT

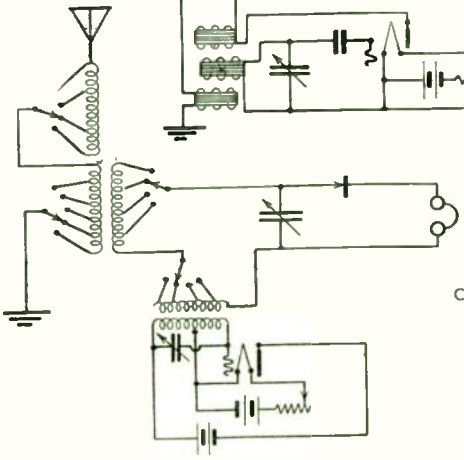


LONG WAVE CIRCUIT



HONEYCOMB COIL

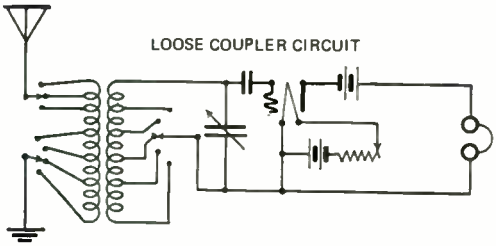
RECEIVER

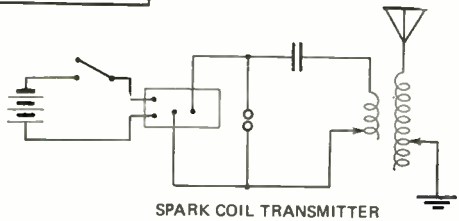


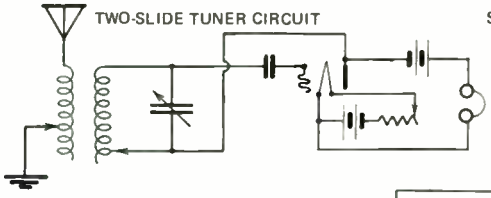
CIRCUIT USING OSCILLATOR TUBE

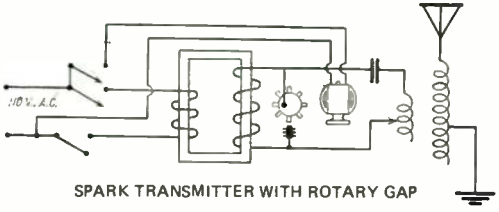
FOR UNDAMPED WAVES

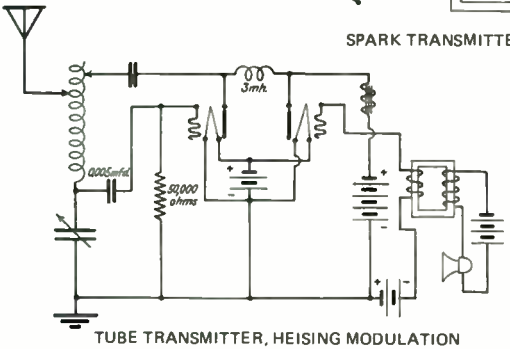
NOTE: Early circuits did not show grid leak resistors, probably because grid condenser leakage sufficed. Also, battery symbol polarity was not standardized; tube plates should be positive in polarity.









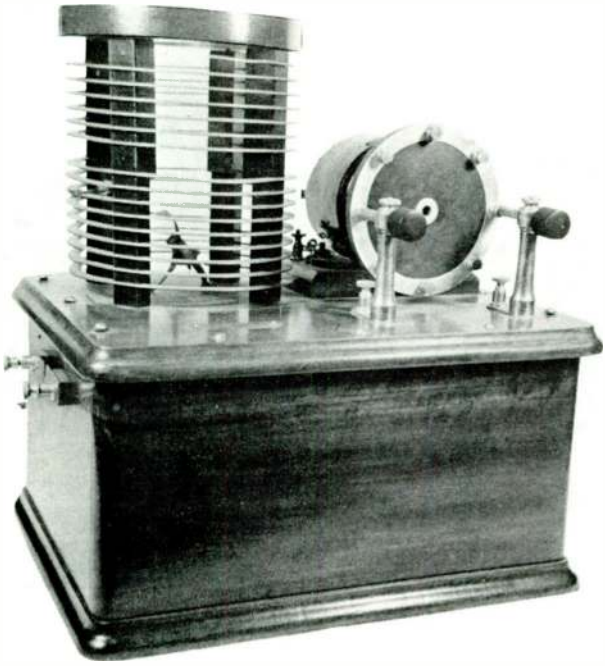


CHAPTER III
TRANSMITTERS

Spark transmitters began with the Ruhmkorff spark induction coil. They were rated by the number of inches of spark they produced. The one inch coil would send eight miles and the four inch 32 miles. Spark transmitters up to 12 inch size were in use; the small ones ran on batteries and the large ones by generators. The spark transmitter consisted of a spark coil or transformer, a spark gap, Leyden jar, a helix and a keyswitch. Initially using a simple two-electrode spark gap, later models had a rotary motor-driven gap, and later still some used a quenched gap. The original Leyden jar condenser gave way to glass plates with tin foil between them, immersed in oil. Then came the mica condenser. Spark gap transmitting stations needed a hot wire ammeter to tune the antenna, a send-receive switch, and a ground switch to earth the antenna.

Keys on small rigs were simple telegraph keys, but on KW transmitters ½ inch contacts were used as the key was in the primary circuit of the transformer. Some keys were enclosed to make them flame proof. Eventually the helix was made illegal and an oscillation transformer was used.

Antennas were usually a four-wire flat top or a five-wire cage for 200 meter; usually about 100 ft. long with a 35 foot rat tail and lead in. Commercial stations ran 100 KWs of power and operated to 31,000 meters. The radio act of 1912 put the amateur on 200 meters with a maximum of one kilowatt.



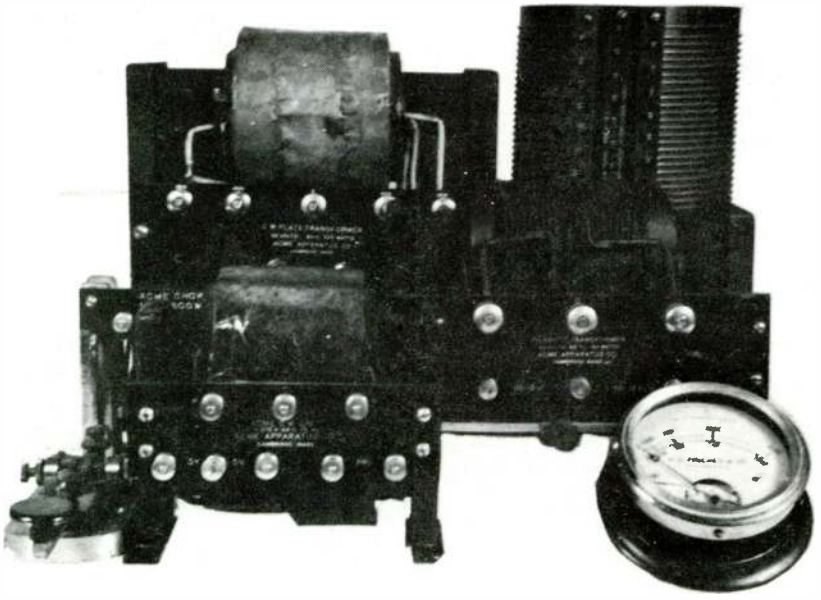
MURDOCK ONE KILOWATT SPARK TRANSMITTER

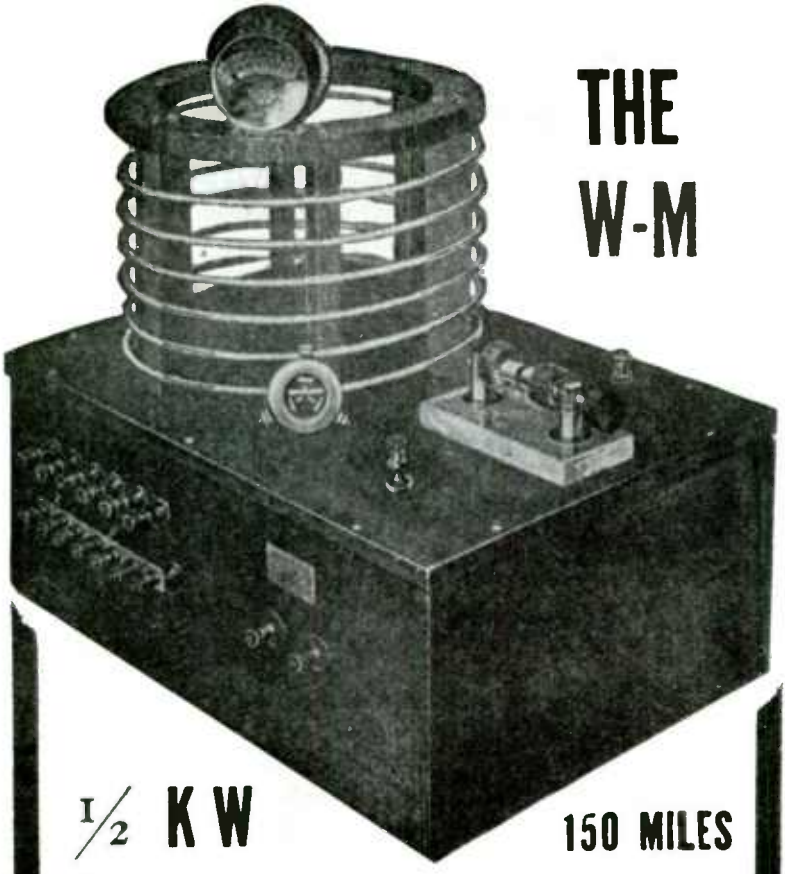
Immediately following W.W.I. amateur operators continued to use spark transmitters, but in 1921 G.E. made the Radiotron and Cunningham transmitting tubes, making Continuous Wave transmitters with tubes fairly common. RCA sold parts made by G.E. and also by Wireless Specialty Co. to build a complete C.W. or radiotelephone station. The Acme Apparatus Co. also made C.W. parts and transformers.

The early radiotelephone stations used Heising and grid modulation, and also modulated their antenna. Transmitters were self-excited oscillators of tubes in parallel. The tank coil used was a large tapped coil, tuning being accomplished by changing taps. It was soon found that using tubes the station could be tuned down to 175 meters with good output.

The M.O.P.A. transmitter followed, using a master oscillator with a power amplifier following; these were better than the parallel tube oscillator and the self-rectifying circuits.

Parts and tubes at this time were very expensive. The UV-204 250 watt tube cost $110.00. A 10 watt radiotelephone kit cost $150.00; a 100 watt kit cost $250.00 Thus many amateurs of the time wound their own transformers and coils. But the tube transmitters were clearly best, eliminating the interference of the spark transmitter, and giving about three times the range with the same antenna power while having much greater selectivity. By 1922 there were about 25,000 amatur radio transmitters in use, and about eight times that many receivers.





THE W-M

½ KW 150 MILES

150 Miles with the W-M ½ K.W. Complete Set

"Gentlemen:— Although I have had your ½ K. W. set in operation but a few days, I have already worked over 150 miles in the day time. (Signed) A. E. Gerhard. Omaha, Neb.

The "W-M" ½ K.W. Complete Set Boxed for Shipment $40.00

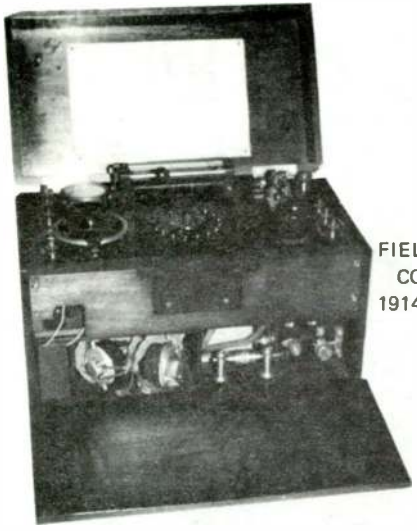
The "W-M" 1 K.W. Complete Set Boxed for Shipment $60.00

Send 2c. postage for our complete catalog "E" listing high power apparatus exclusively.

WORTS-McKISSON MANUFACTURING CO.

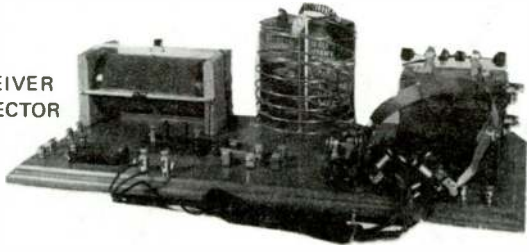
DEPT. M, TOLEDO, OHIO

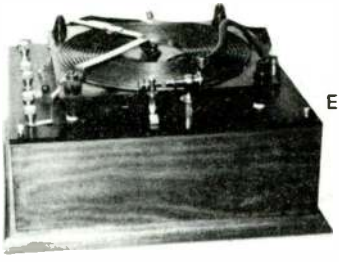
TRANSMITTERS



MARCONI I
FIELD ARTILLERY
COMMAND SET
1914 50 WATTS

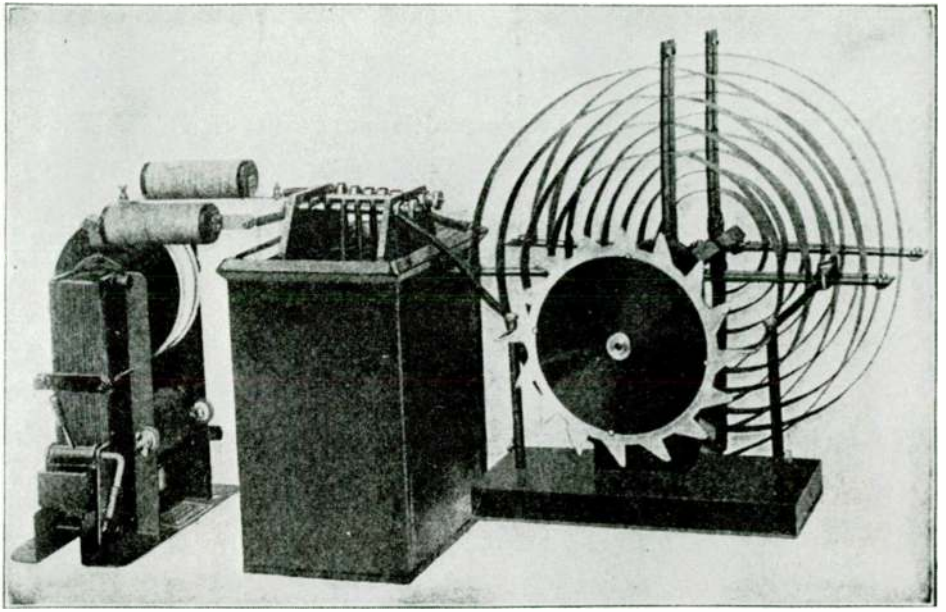
TRANSMITTER-RECEIVER
USING CARBON DETECTOR
1917





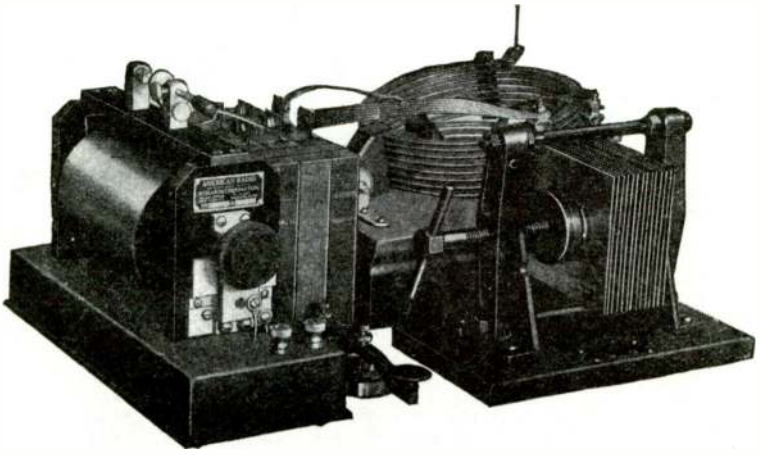
EARLY TRANSMITTER

CONNECTICUT T & E
U.S. ARMY SCR-65
FIRST TYPE USED IN
AIRPLANES 1918



Complete Amateur Radio Transmitter Designed for 200 Meters Wave Length. Built in Sizes from ¼ to 1 K.V.A.

Low Power D. C. Transmitting Equipment

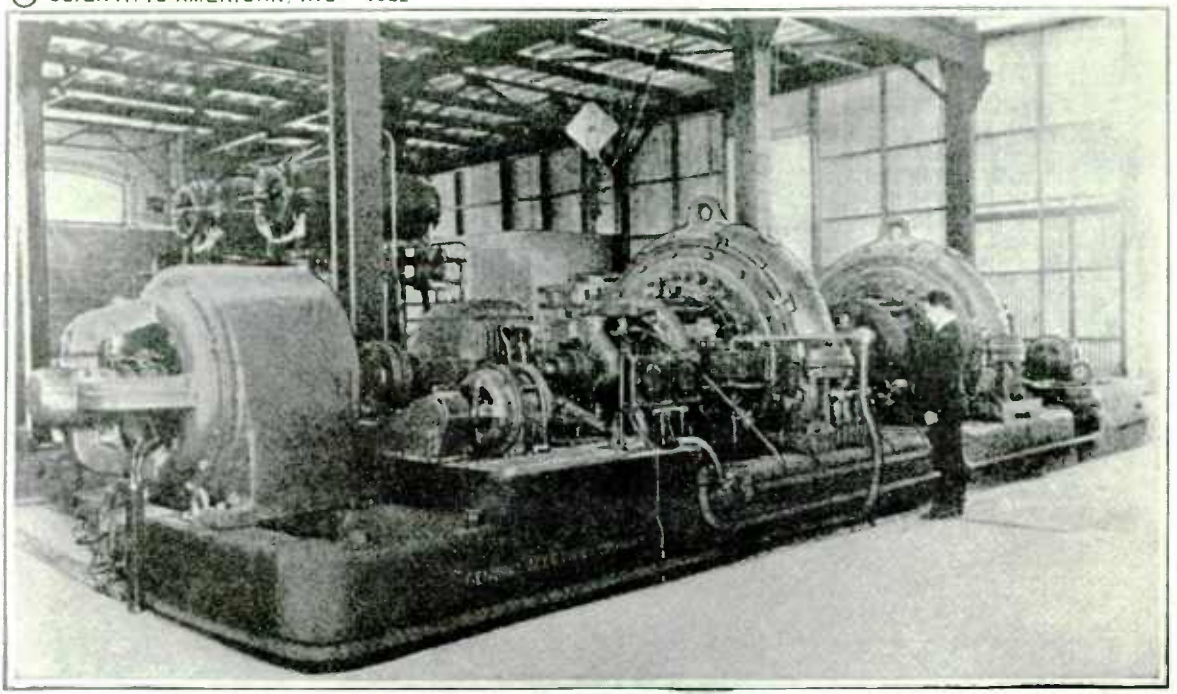


(Fig. 1)

A Complete Transmitter Consisting of Amrad Induction Coil, Amrad Quenched Gap, Murdock Oscillation Transformer and Condensers and Bunnell Key. The Entire Assembly May be Mounted in a Cabinet Measuring 20"x13"x10"

An Old Handicap Conquered

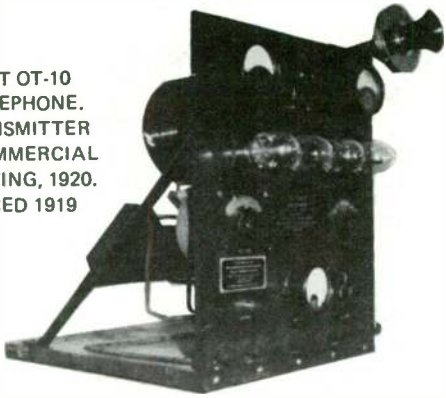
OWNERS of radio stations having no available supply of alternating current have heretofore been unable to obtain efficient and reliable transmitting equipment to operate with the power generated by batteries. With the advent of the Amrad Induction Coil and the special Amrad Quenched Gap the old handicap has been swept aside. These two instruments make the transmission of radio messages over distances of 25 miles and upwards an easily accomplished fact under ordinary conditions. Both instruments are of a design suitable for use with standard Oscillation Transformers and Condensers as illustrated above. The power supply may be obtained from either a 6 volt storage battery of the automobile type or from standard 32 volt farm lighting circuits.

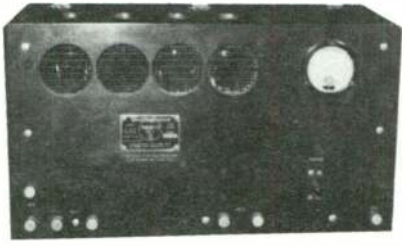


An Alexanderson 200-kilowatt high-frequency alternator as employed at the Radio Central wireless station and in other American long-distance stations. This machine generates high-frequency current and therefore takes the place of the usual spark oscillator.

TRANSMITTERS

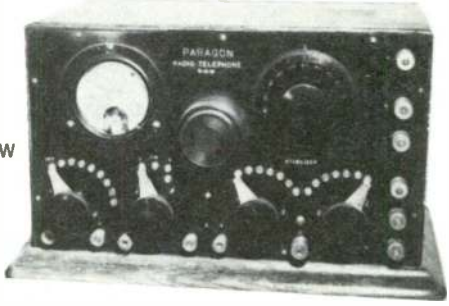
DE FOREST OT-10
RADIOTELEPHONE.
FIRST TRANSMITTER
USED IN COMMERCIAL
BROADCASTING, 1920.
INTRODUCED 1919

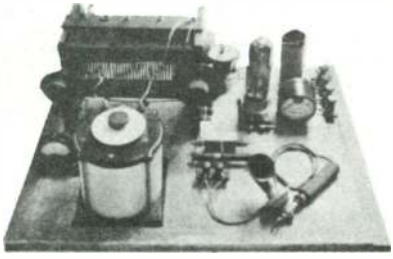




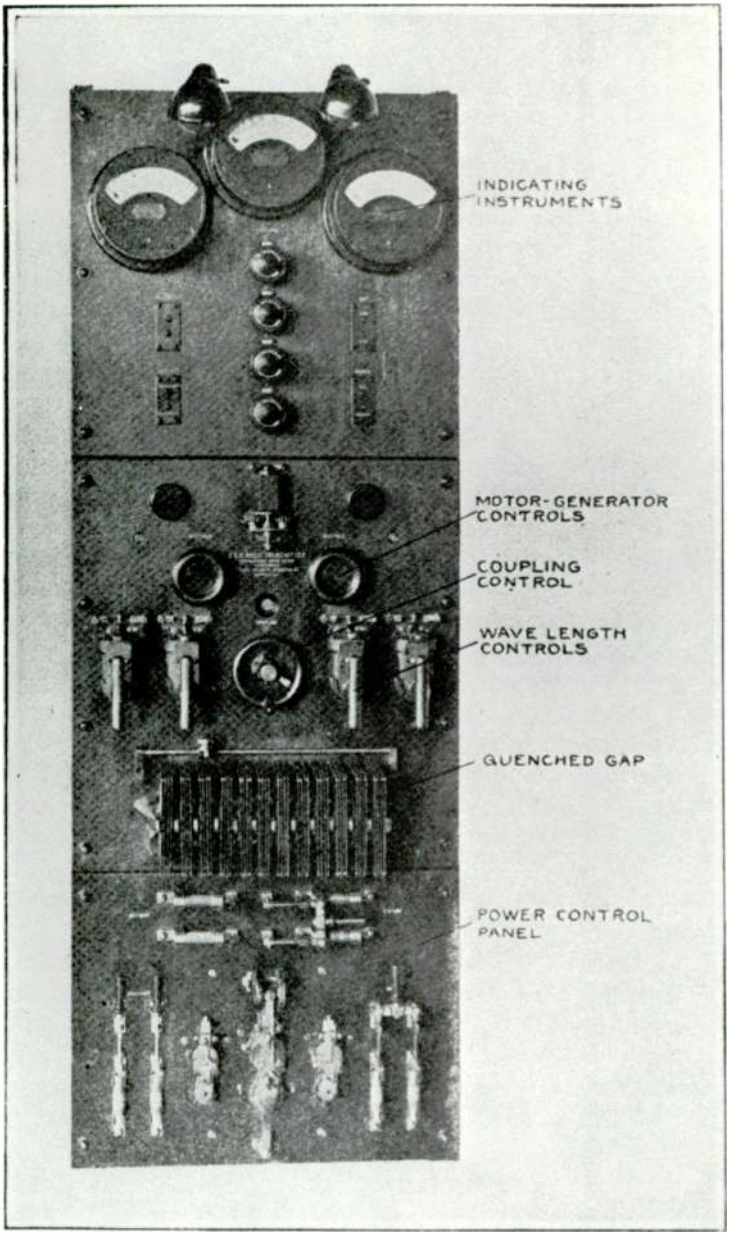
WESTINGHOUSE TF
AMATEUR TRANSMITTER.
10 W PHONE, 20 W CW,
COMPANION TO RADA
RECEIVER. 1921

PARAGON 2-5-U
TRANSMITTER
10 WATT PHONE/CW
1921

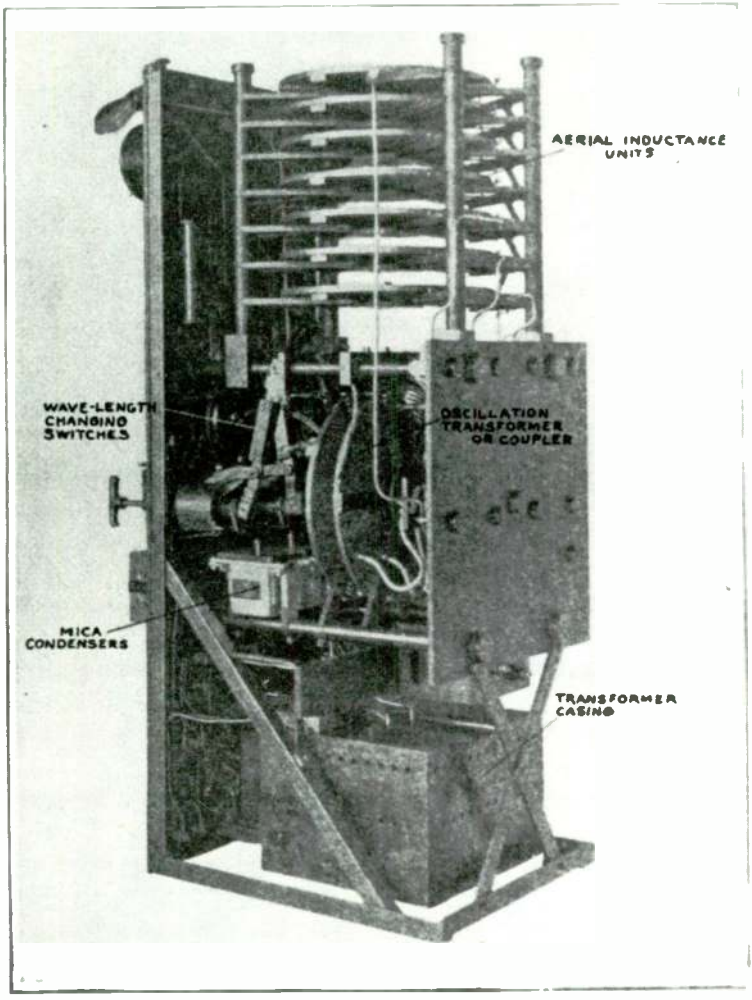




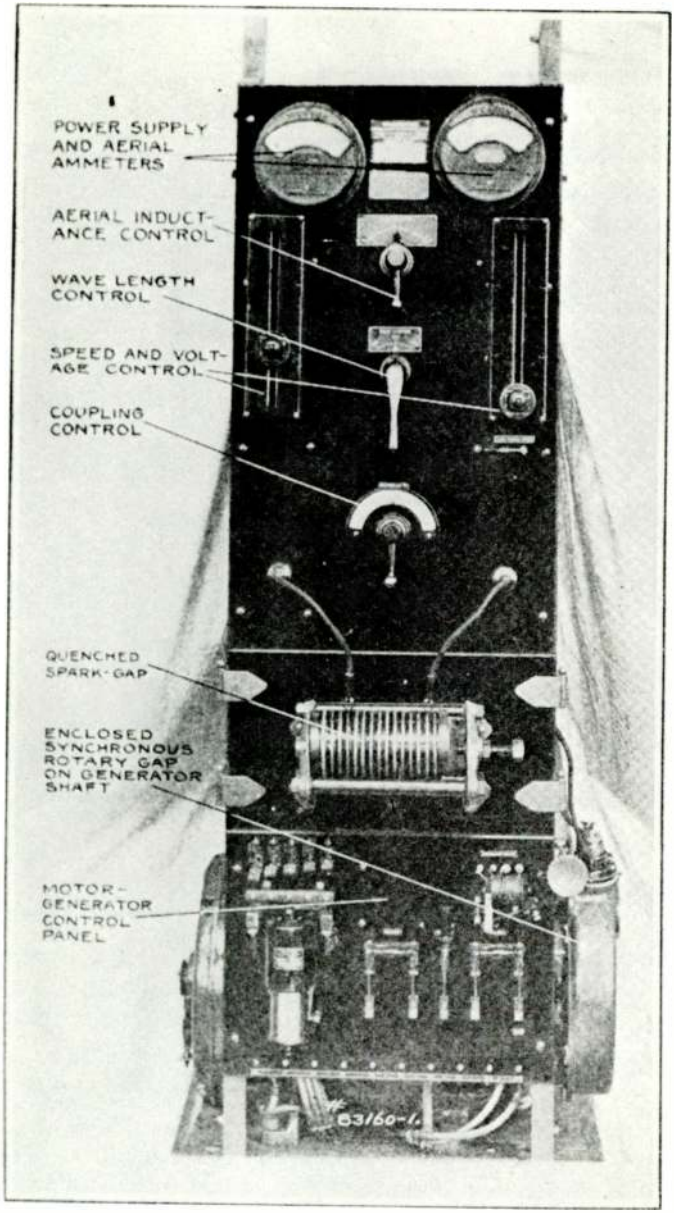
KFI'S FIRST
BROADCAST TRANSMITTER.
50 W 1922



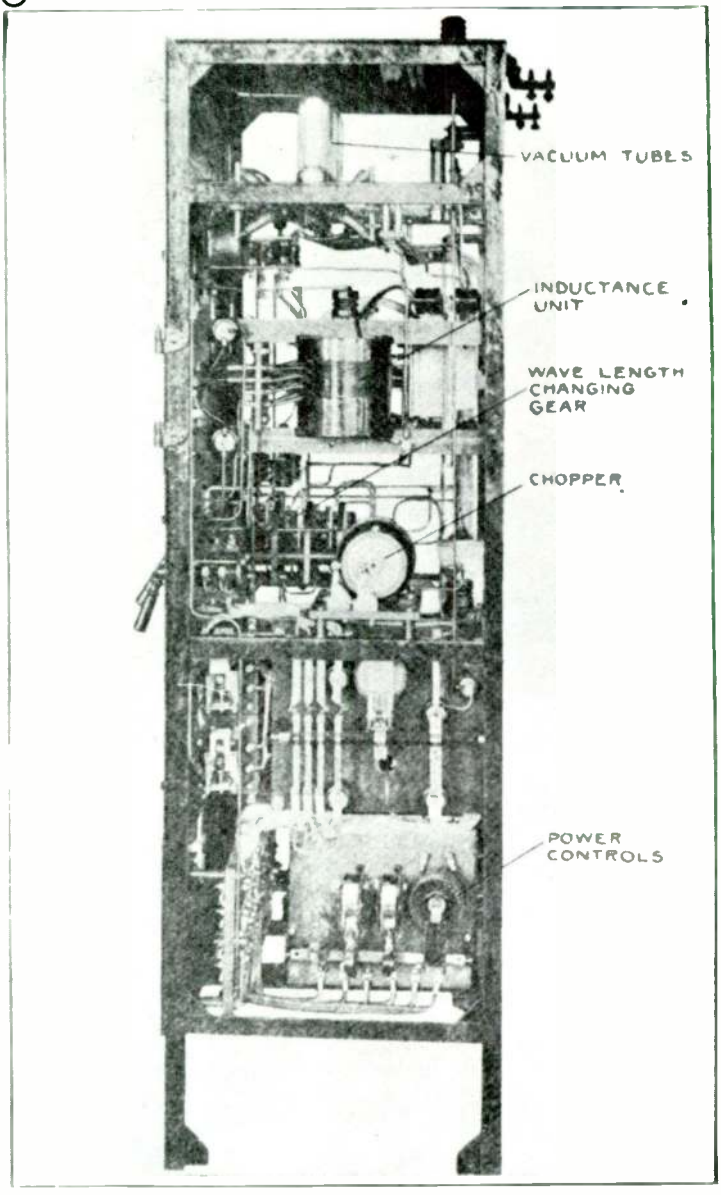
Panel type damped wave transmitter, such as is employed on board steamers. This transmitter makes use of a quenched gap, which is mounted on the front of the panel.



Panel type damped wave transmitter, the front view of which appears on page 40. Simple as the front view may seem, it will be noted that the transmitter is quite complicated with most of its mechanism mounted at the rear of the panel.

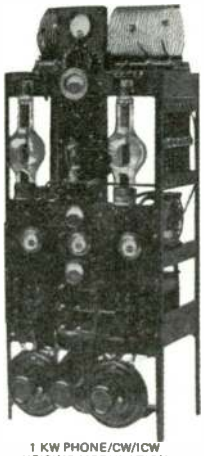


Another type of damped wave transmitter, such as is used on board ship. In this instance there are two methods of obtaining the oscillations or waves. There is the quenched gap mounted on the front of the panel, and the synchronous rotary gap mounted at the right.



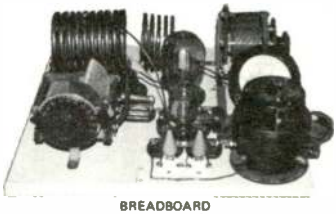
Mechanism of a commercial CW telegraph transmitter, using several 50-watt tubes and a chopper for producing modulated continuous waves.

HAM TRANSMITTERS

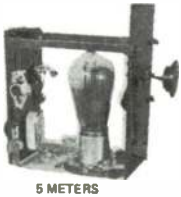


1 KW PHONE/CW/ICW
HEISING MODULATION
1922 (QST) 48Q

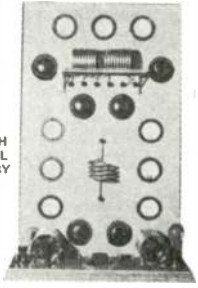
BENWOOD "CW"
PHONE/CW/ICW/BUZZER
1922 (QST) $350.00



BREADBOARD
UV-202 TUBE
1923 W8BJI

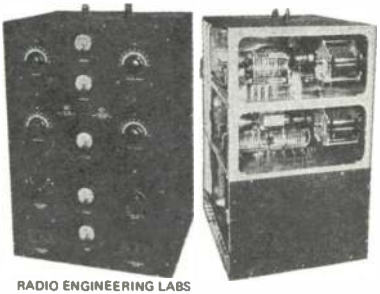


5 METERS
1928 (QST) 8CMP

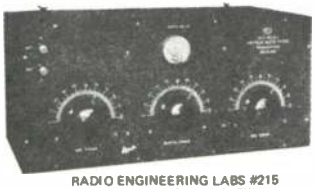


20/40M BRITISH
250W CW XTAL
1929 (QST) G5BY

200W 20-80M CW/ICW
XTAL CONTROL
210–PP210'S
1926 (QST)



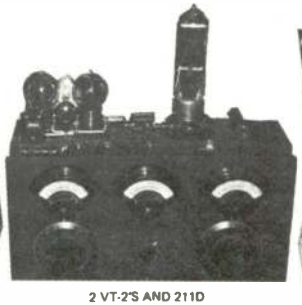
RADIO ENGINEERING LABS
250W CW M.O.P.A.
1928 (QST)



RADIO ENGINEERING LABS #215
M.O. – BUFFER – P.A. CW
227-224-245
1929 (QST)

"SINGLE CONTROL"
TNT CIRCUIT
1929 UX-210

LEEDS
7½W 201A OR 30W UX-210
1929 (QST) $57.50



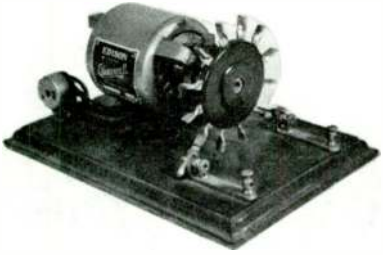
2 VT-2'S AND 211D
1930

6L6-6L6-PP 809'S
1936 WIPEG

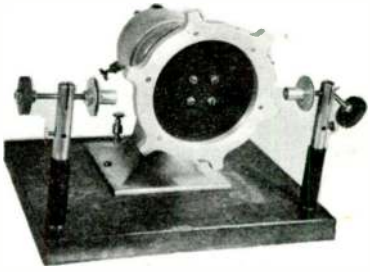
ROTARY SPARK

CLAPP-EASTHAM
ROTARY QUENCHED
1920

BENWOOD ROTARY SEMI
QUENCHED 1919



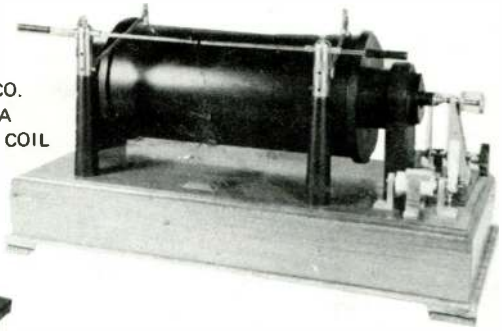
MURDOCK ROTARY GAP
1913 $20.00



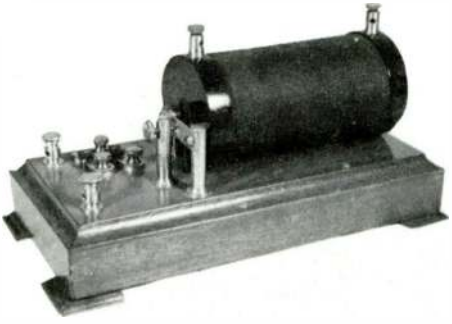
B. F. CHAMBERS ROTARY GAP
1915 $15.00

BENWOOD SPARK WHEEL
1919

MARCONI
WIRELESS TELEGRAPH CO.
OF AMERICA TYPE 10-A
10 INCH SPARK INDUCTION COIL
1910



E. I. CO.
1" SPARK COIL
1914 $4.00



RUHMKORFF SPARK
INDUCTION COIL
ABOUT 1915

AMRAD TYPE C
SPARK INDUCTION COIL
MADE FOR U. S. ARMY IN 1918.

E. I. CO.
½ KW SPARK TRANS.
1912 $6.00
SOLD BY DUCK

HELIX AND OSCILLATION TRANSFORMERS

HELIX
1 KW ABOUT
1914

AMCO OSC. TRANS.
1 KW MADE FROM KIT
ABOUT 1914

MURDOCK #424
OSC. TRANS.
1914

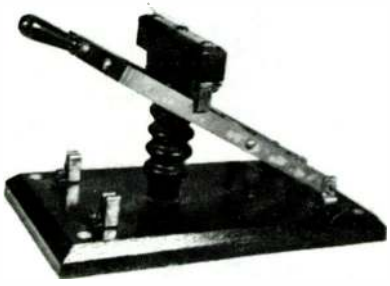
½ KW TRANSMITTING
TUNING COIL
ABOUT 1914

GENERAL RADIO
AUDIBILITY METER
1920

MURDOCK
KICK BACK PROTECTOR
#453 1914

EATON OSCILLATOR
1919 $15.00

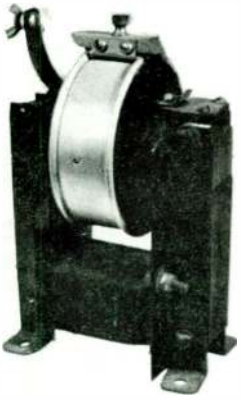
CLARK TONE TESTER
1919



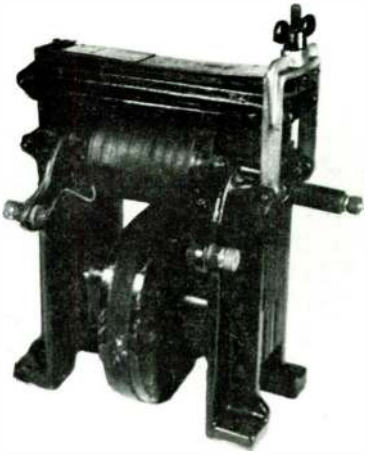
MESCO AERIAL SWITCH
1916

TRUMBULL GROUND SWITCH
100 AMP. 1915

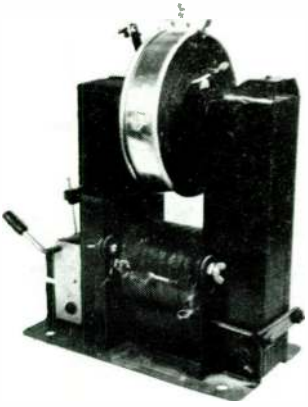
SPARK TRANSFORMERS



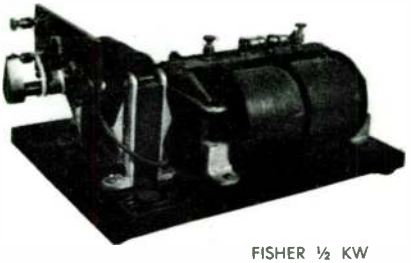
THORDARSON
¼ KW 1919
$15.00



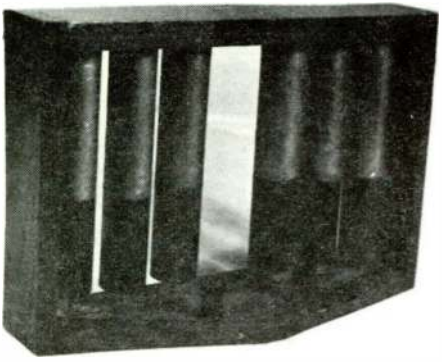
THORDARSON FLEXIBLE
1 KW 1915
$25.00



THORDARSON TYPE R
1 KW 1919
$25.00



FISHER ½ KW
WITH LINE
REACTOR



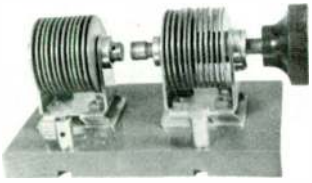
E. I. CO.
VAR. TRANS. COND.
LEYDEN JARS
1908 $2.50

MARCONI
.003 VAR. CONDENSOR
1906

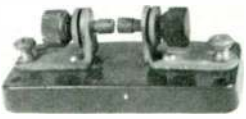
E. I. CO.
FIXED VAR. COND.
#1000
1912 $1.25

THORDARSON
OIL TRANS. COND.
1 KW. 1919 $32.50

WIRELESS APPARATUS



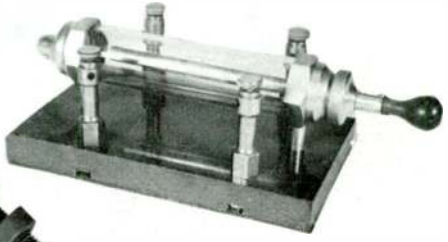
FISHER
1 KW. SPARK GAP,
AIR COOLED, 1919



MURDOCK #440
SPARK GAP
1919 90 CENTS

KNAPP
GENERATOR
1916

MESCO
SPARK GAP
1915



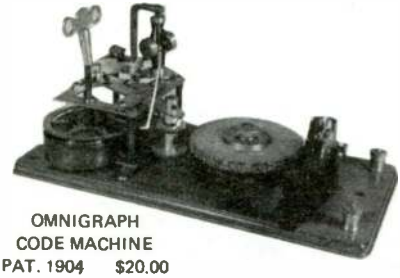
ENCLOSED SPARK GAP
1919

ELECTROSE INSULATORS
1912 TO 1920

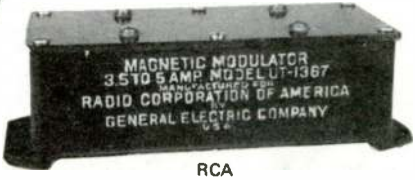
WIRELESS APPARATUS

GENERAL RADIO
FLAME PROOF KEY
1918

WIRELESS SPEC. APPARATUS
50 AMP KEY
ABOUT 1917



OMNIGRAPH
CODE MACHINE
PAT. 1904 $20.00



RCA
MAGNETIC MODULATOR
USED IN ANT. CIRCUIT
1922

WESTON
GALVANOMETER

SIDE WINDER KEY

STD. WIRELESS KEY
1916

VIBROPLEX
"BUG" KEY

MICROPHONES

Telephones were used as microphones in the early days, but the single button carbon unit was not good enough for music and singing. The simple carbon mike operated by variations of pressure on the carbon granules, varying the current. A double-button carbon mike was designed that still gave a carbon "hiss" and had to be mounted on springs to prevent vibration, but this did produce a somewhat better response.

The condenser microphone was then developed, operating on the principle that varying the space in a small condenser altered the voltage with pressure. Condenser mikes used gold plated backs with Dural diaphragms; nitrogen gas was sealed in the unit. These had a low output and were subject to heat and cold; they required a preamplifier. There were many circuit problems, but frequency response was excellent, 40 to 10,000 CPS. They were made by Western Electric, Remler, American and others.

Velocity or ribbon microphones were developed, and proved to be unaffected by temperature changes and hum from R.F. fields. They required a preamplifier and an output transformer to match the amplifier input, but had good frequency response. They were bad for close-up talking. They operated on the principle that a moving conductor in a magnetic field induces a current in the conductor.

Crystal mikes appeared in two types; the grille and the diaphragm. They work by the piezoelectric properties of Rochelle Salts; when a piezoelectric crystal is bent it generates a voltage. Crystal mikes have excellent response. They do not need a pre-amplifier, and up to 100 feet of mike cable can be used. The only drawback is that high temperature destroys the crystal.

Universal "Baby" microphone.

MICROPHONES USED IN THE 1920s

AMERICAN
CONDENSER MIKE
WITH PRE-AMP.
$100.00

WESTERN ELECTRIC
SINGLE BUTTON
WITH STAND

UNIVERSAL
SINGLE BUTTON
WITH STAND

MAGNAVOX
LOUD SPEAKING
TRANSMITTER

WESTERN ELECTRIC
DOUBLE BUTTON
WITH CASE

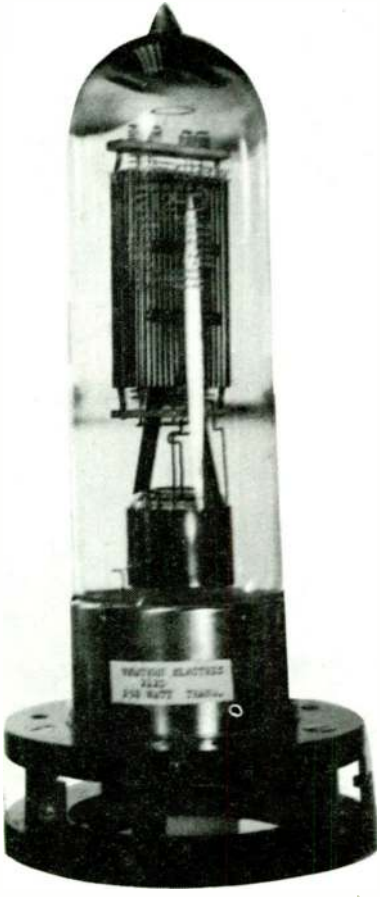
AMERICAN
DOUBLE BUTTON

UNIVERSAL
BABY MIKE

WESTERN ELECTRIC
HAND MICROPHONE

TRANSMITTING TUBES

Western Electric's 5 watt VT-2 "Baseball" was the first volume-produced transmitting tube, introduced in 1918. Western's type 211, brought out in 1919, had a 50 watt capability and the 212 handled 250 watts. DeForest and G. E. were other major transmitting tube manufacturers, with G. E. tubes being sold under the Radiotron and Cunningham names. G. E. UV-202, UV-203 and UV-204 types introduced in 1921 were particularly popular in the early days.

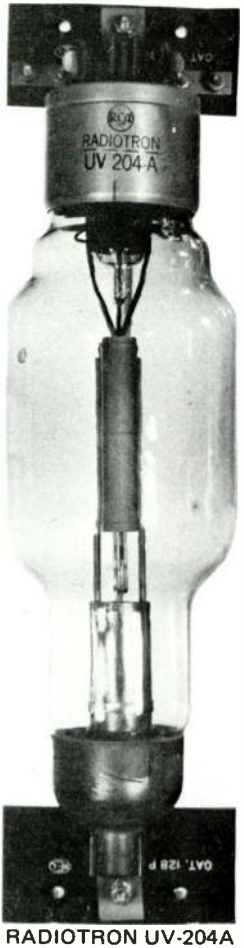


WESTERN ELECTRIC
212 D
250 WATT TRANS.

WESTERN ELECTRIC
VT2
5 WATT TRANS.
1918

TRANSMITTING TUBES

KENOTRON RECTIFIER
UV-216 1921



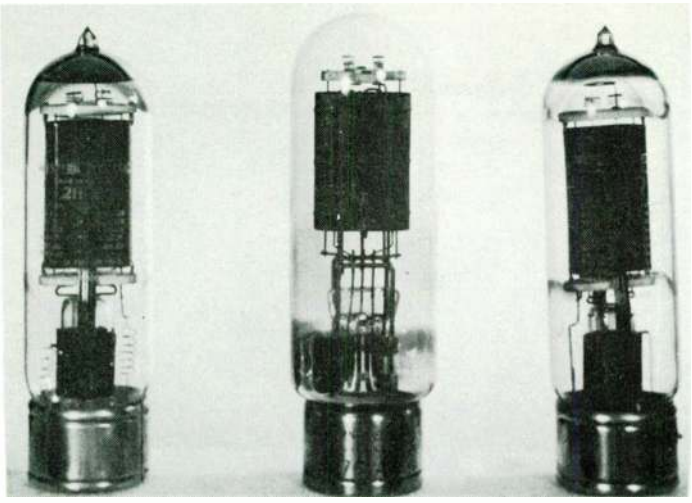
RADIOTRON UV-204A
250-WATT

RADIOTRON UV-203
50 WATT TRANSMITTER
1921 $30.00

RADIOTRON UV-202
5-WATT TRANSMITTER
1921 $8.00

KENOTRON RECTIFIER
UV-217 1921

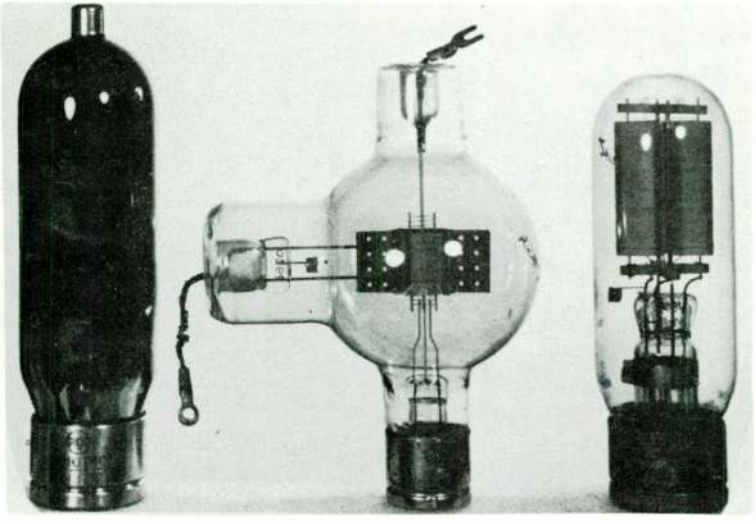
TRANSMITTING TUBES



WESTERN ELECTRIC
211E
50 WATT TRANS.

WESTERN ELECTRIC
276A
50 WATT

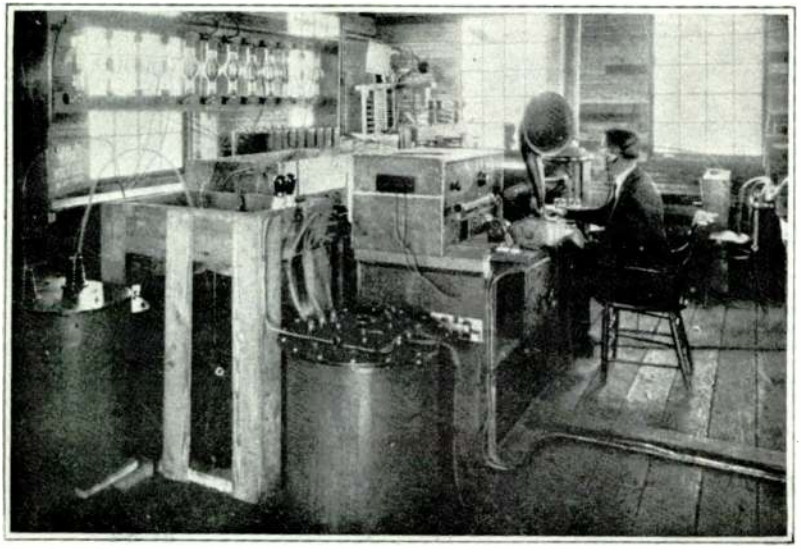
WESTERN ELECTRIC
211D
50 WATT TRANS.



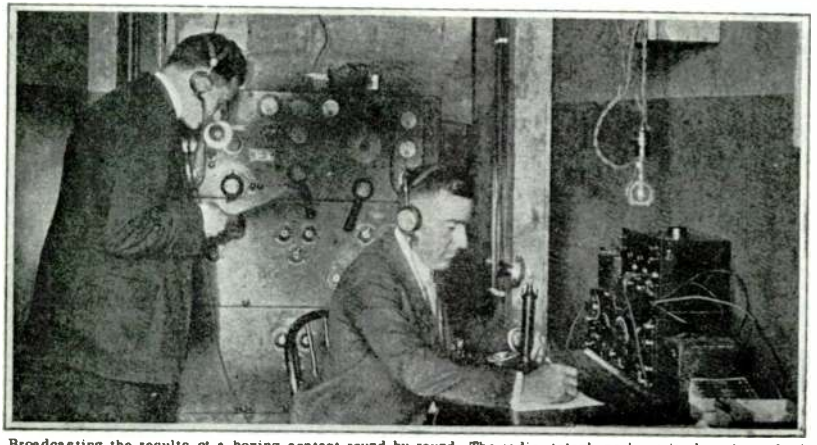
RADIOTRON
UV 872
HALF WAVE RECT.

DE FOREST
552
100 WATT TRANS.

DE FOREST
503A
50 WATT TRANS.



A corner of the experimental laboratory at WGY. 50KW was employed. The station was heard in England and on the Continent.



Broadcasting the results of a boxing contest round by round. The radio—telephone is at its best in work of this kind, and special efforts are being made to report all athletic events of surpassing interest in this manner. This photograph was made at the time of the Dempsey—Carpentier fight.

Still another radio–phone broadcasting station, showing the announcer and the receiving operators. This is KDKA of East Pittsburgh, Pa., the forerunner of all other radio–phone broadcasting stations in the United States.

The "announcer" of a radio–phone broadcasting station, and the receiving operator. The announcer speaks into the microphone transmitter which he holds in his hand. Alongside of his is the radio–phone transmitting apparatus, with the vacuum tubes for generating and modulating the radio waves. This is WJZ, the Newark radiophone.

GEORGE CLARK

CHAPTER IV
RECEIVERS

Early wireless receivers were beautifully hand-crafted, but were technically primitive. Their masters cursed them, yet gave them tender loving care. The earliest receivers used "coherers", detectors which would be a fine tribute to Rube Goldberg: Radio signals (A) causes filings (B) to stick together causing current (C) to close relay (D) causing telegraph clicker (E) to click and also causing hammer (F) to strike glass tube (G) holding filings (B) knocking them loose to be ready for the next signal. Coherers were not very sensitive and not very reliable, but they allowed wireless communication to come into being.

In the early 1900's, a new family of metal-chemical "electrolytic" detectors made wireless more practical. Other detectors using moving magnetic wire were used on board ships because of the motion and vibration. Crystal detectors were invented in 1906, leading to much more elegant and useful commercial receivers, and letting every youngster enjoy the wonders of radio with his own crystal set.

Dr. Lee De Forest's triode vacuum tube really launched large-scale radio communications and made practical home receivers possible. The time was right when Dr. Frank Conrad started broadcasting from his garage in 1919, and the broadcasting era exploded. Thousands of small shops started making radios. This vast number soon shook down to a few manufacturers whose names became household words; Atwater Kent, Crosley, De Forest, Federal, Freed Eisemann, Freshman, Gilfillan, Grebe, Fada, Kennedy, Magnavox, Paragon, RCA (first as a sales agent for General Electric and Westinghouse radios), Tuska, Stewart–Warner and Zenith. The Philadelphia Battery Company introduced the first Philco radio in 1928.

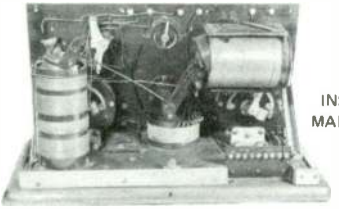
Early commercial and home receivers used a wide variety of circuits. Regenerative "blooper" circuits were soon replaced by tuned–radio–frequency "TRF" sets, including Hazeltine–licensed "Neutrodyne" hookups. The "superheterodyne" circuit was broadly accepted by 1930 and has been the standard receiver circuit ever since. These early receivers were very well made, and survive today as collectors' items. Loudspeakers were beautifully styled, and are also treasured by collectors.

The painful part of home radio in the 1920's was the inconvenience and expense of batteries. Attempts were made to ease the pain by selling home battery chargers and by building "battery eliminators". Then, in 1927, development of the A-C radio tube made true plug-in radios available at reasonable prices. The golden days of radio broadcasting were here.

WIRELESS RECEIVERS

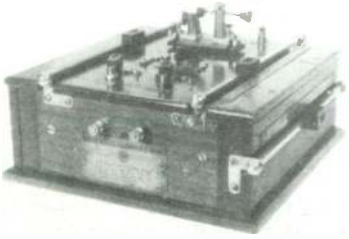
WIRELESS SPECIALTY APPARATUS CO.
IP-76
FIRST RECEIVER USING
CRYSTAL DETECTOR AND
LOOSE COUPLER. MADE FOR U.S. NAVY.
1907

MARCONI CA 294
250 TO 3100 M.
1917

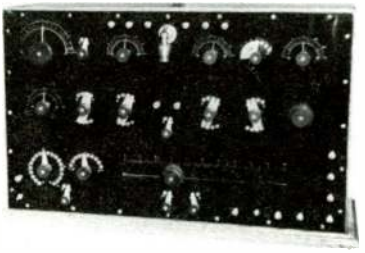


INSIDE VIEW
MARCONI 106D

MARCONI 106 1915
MODIFIED TO 106D BY
GEN. ELEC. FOR RCA. 1922

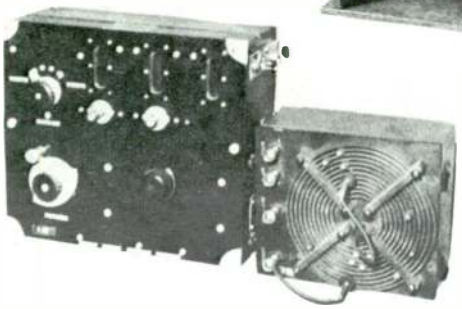


MARCONI TYPE D TUNER
AMERICAN MARCONI CO. 1912-1918
MADE BY UNITED WIRELESS.
DESIGNED 1907 BY H. SHOEMAKER OF
UNITED WIRELESS CO.



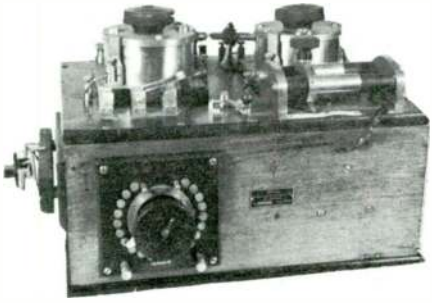
PACIFIC WIRELESS
SPECIALTY CO.
AUDION RECEIVER
1910-14

MASSIE TUNER
USED IN MASSIE WIRELESS
SYSTEM 1916



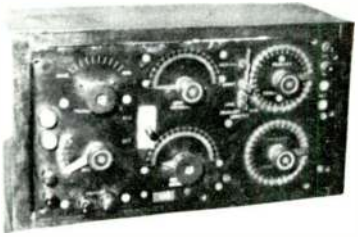
WESTERN ELECTRIC SCR-59
RECEIVER WITH COMPANION
CONNECTICUT T & E SCR-65A
TRANSMITTER WWI

TELEFUNKEN
RECEIVER
1914

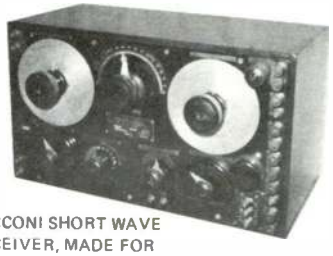


MARCONI OF AMERICA
MODIFIED FLEMING VALVE
RECEIVER 1914

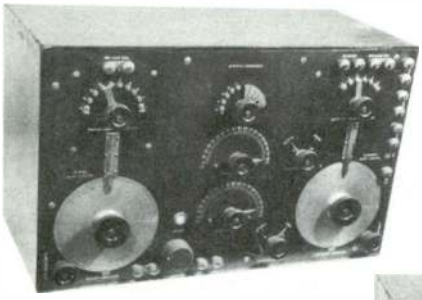
NATIONAL ELECTRIC
SUPPLY CO. NAVY
CN-112 SUBMARINE
RECEIVER WWI



WIRELESS EGERT ENG., INC.
TYPE 303 COMMERCIAL
RECEIVER



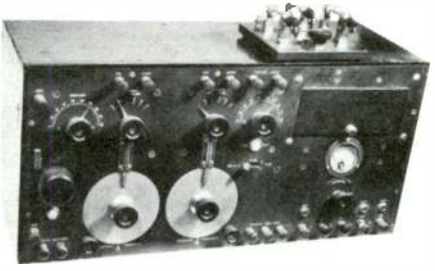
MARCONI SHORT WAVE
RECEIVER, MADE FOR
NAVY DEPT. BUREAU OF
STEAM ENGINEERING.
1917



1-P-500 (SE-143)
CRYSTAL DET. RECEIVER
1918 $425.00
150 TO 6,800 M

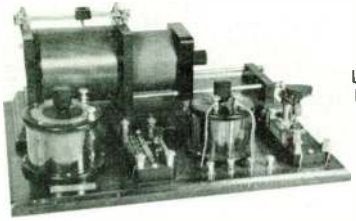
NATIONAL ELEC.SUPPLY CO.
CN 239
CRYSTAL DET. RECEIVER
1917 $425.00

1-P-501 (SE-1420)
250 TP 8,000 M.
CRYSTAL DET. & AUDION
1-P-503 LONG WAVE
LOADING UNIT TYPE B AMP.
1918 $600.00



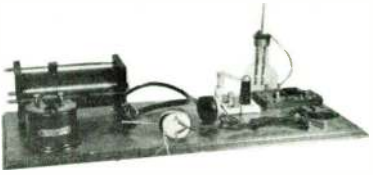
1-P-501A
250 TP 8,000 M.
CRYSTAL DET. & AUDION
TWO STEP AMPLIFIER
1920 $550.00

LONG WAVE RECEIVERS

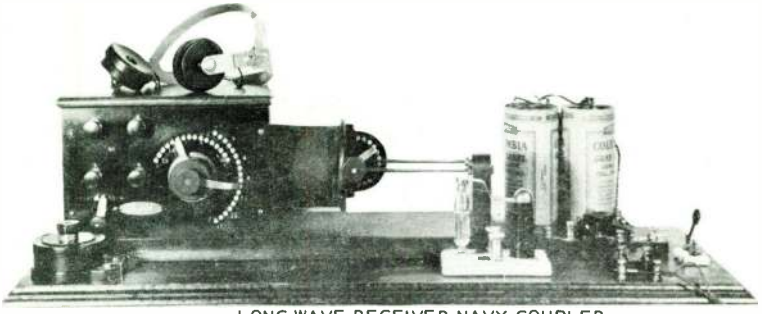


MURDOCK
LONG WAVE RECEIVER
LOADING INDUCTANCE
SILICON DETECTOR
1913 S.P. $50.00

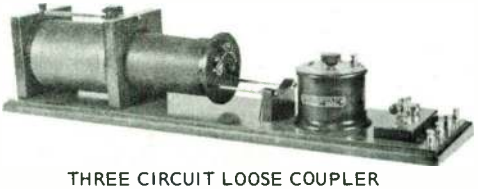
CLAPP–EASTHAM
LONG WAVE RECEIVER
1914 FERRON DETECTOR



THREE SLIDE COIL
RADIOSON ELECTROLYTIC
DETECTOR, WITH
PLUNGER BATTERY.



LONG WAVE RECEIVER NAVY COUPLER,
CONNECTICUT TEL. & TEL. VAR. COND.
RADIOSON DET. GRAPHITE POTENTIOMETER.
PHONE CONDENSOR. MURDOCK 55 PHONES.



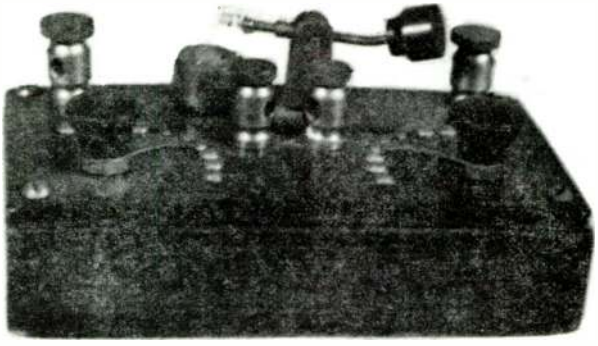
THREE CIRCUIT LOOSE COUPLER
RECEIVER FOR CRYSTAL DETECTOR OR AUDION. 1919

CRYSTAL SETS

Before the radio tube came into use there were several detectors available. In 1907 Pickard invented the mineral or crystal detector. In 1921 with many broadcast stations coming on the air and the Quaker Oats box already in use everyone could then have a radio. Nearly every man and boy living near a broadcast station made a crystal set, or bought one ready made. Factory made crystal sets cost from $10.00 to $35.00 complete.

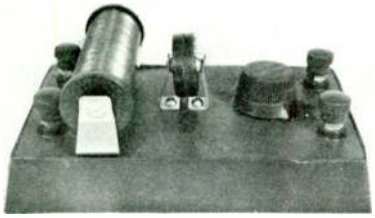
The two circut sets with spiderweb coils, or other low loss coils, and a good galena detector received stations up to 1500 miles away. A Quaker Oats box set would do fine if you had a neighbor near by with a good regenerative receiver that radiated the station he was listening to. As more broadcast stations came on the air more selectivity was needed, and was often secured by separating the primary and secondary circuits by about five inches; this cut down the volume and good headphones were then needed.

The crystal set required a good outside aerial and a good ground connection. The two most common crystals used were galena and silicon. Galena was most sensitive but took longer to find a good sensitive spot with the "cats' whisker." The silicon was louder and it was easy to find a good spot. Crystal detectors were priced from 50c to $4.00 for a good one. They were sold in fancy boxes, marked with guarantees as to volume, distance and clarity. Fixed detectors were available, and while they required no adjustments they were not as sensitive as the cat's whisker type. Crystal detectors are still being made and sold today.



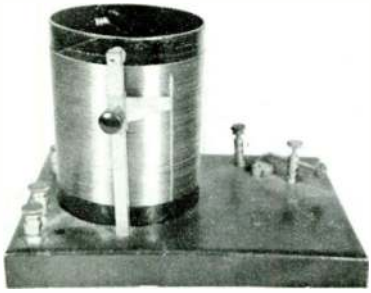
Baby Grand, one of the smallest Crystal sets made; 2 in. x 4 in.

CRYSTAL RECEVING SETS



AIRPHONE GOLD GRAIN
DETECTOR RECEIVER
$6.00

COMMERCE RADIOPHONE
1919



REMLER CRYSTAL SET
1921 $5.00

G. E. ER–753
1921

VICTOR
CRYSTAL SET

TWO CIRCUIT
CRYSTAL SET

CRYSTAL RECEIVING SETS

NATIONAL RADIOPHONE
CRYSTAL DET. RECEIVER
1922

MEEPON CRYSTAL SET
1923

STANFORD ELECTRIC CO.
MINIATURE 3" DIAMETER

AEREX CRYSTAL SET
KING OF THE AIR
1922

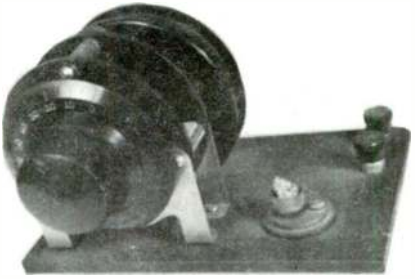
LEMCO
CRYSTAL SETS
1922

CRYSTAL RECEIVING SETS

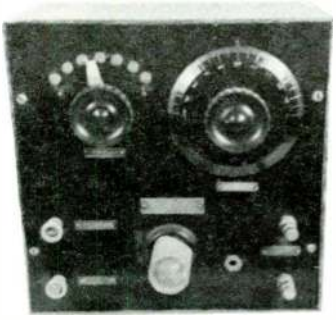
PANDORA CRYSTAL SET
1922 $2.50

BROWNIE CRYSTAL SET
BROWNIE CO. SAN FRANCISCO

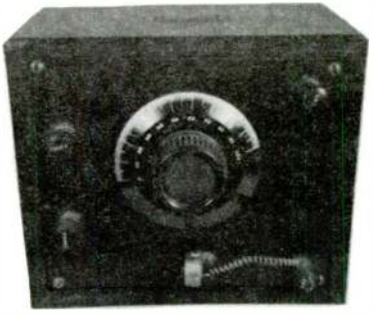
AMPLIFIER FOR CRYSTAL SET
CARBON MIKE DIRECT COUPLED
TO A RECEIVER. OPERATES A
LOUDSPEAKER WITHOUT TUBES.



ECLIPSE CRYSTAL SET
ECLIPSE MFG. LOS ANGELES



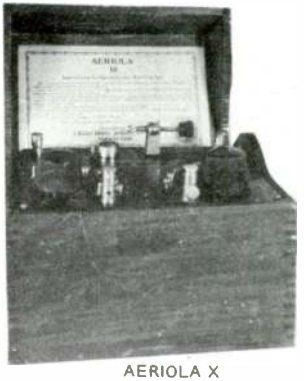
RAD-SCO CRYSTAL RECEIVING SET
RADIO SUPPLY CO.



C. D. T. CRYSTAL SET
TANNER CO. LOS ANGELSE

CRYSTAL RECEIVING SETS

MONTE BLUE
CRYSTAL SET

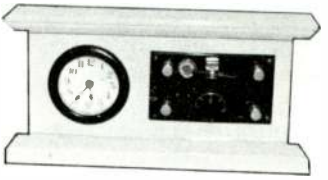


AERIOLA X
NOT MADE BY
WESTINGHOUSE
1924

MULTIPHONE CRYSTAL SET 1924

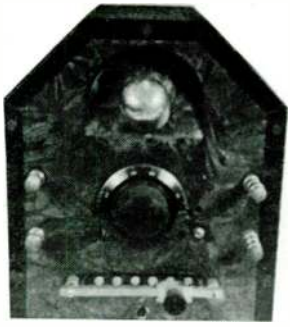
BETTA–PHONE
CRYSTAL SET
1924

RADIO SERVICE CO.

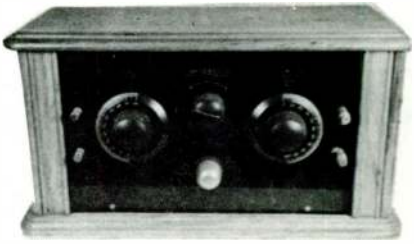


INDIA IVORY CO.

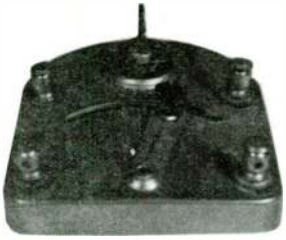
CRYSTAL RECEIVING SETS



PHILMORE CRYSTAL SET



MIRACLE CRYSTAL SET
UNCLE AL'S RADIO SHOP
OAKLAND, CALIF.



WORLD CRYSTAL SET

BABY GRAND CRYSTAL SET
ONE OF SMALLEST MADE

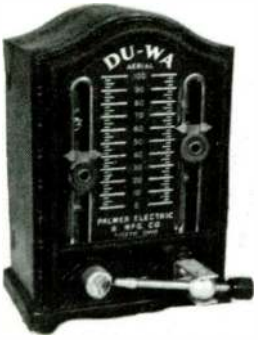
A. C. GILBERT
CRYSTAL SET
1922 $10.00

GREG-SOR CRYSTAL RADIO
STERLING MFG.
BERKELEY, CALIF.

RECEVING SETS

UNCLE AL'S CRYSTAL SET
ONE STAGE OF AUDIO

STANDARDYNE THREE TUBE SET
USING MULTIVALVE TUBE
THREE TUBES IN ONE 1925



DUAL-WAVE CRYSTAL
DETECTOR RECEIVER
1924

EISEMANN
VARIO-COUPLER
SWITCH POINTS INSIDE

HOWE CRYSTAL RECEIVER
1925

CRYSTAL DETECTOR
RECEIVER

ATWATER KENT

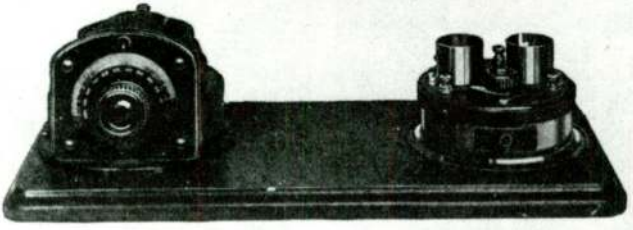
Atwater Kent started as an electrical manufacturer. He introduced a line of high quality do-it-yourself "breadboard" radio components starting in 1921. He presented his famous Model 5 about the end of 1921, but concentrated on components until late 1923. Atwater Kent manufactured top quality products until 1936, when he decided to quit the business due to rising costs and cheap competition.

Atwater Kent Model 5

RADIO 1923

ATWATER KENT

RADIO RECEIVING SET



THE two instruments shown above comprise an excellent and complete receiving set. The Coupled Circuit Tuner and Detector Amplifier on the mahogany board present a beautiful appearance. Complete outfit as above, unwired, $32.00

ATWATER KENT MANUFACTURING COMPANY

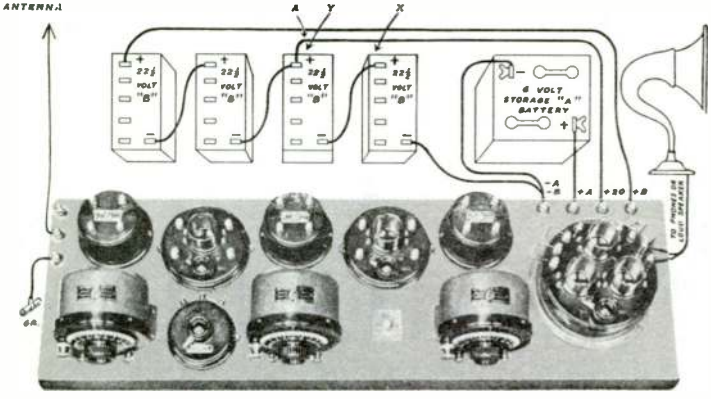
4947 STENTON AVE. *Radio Dept.* PHILADELPHIA, PA.

ATWATER KENT

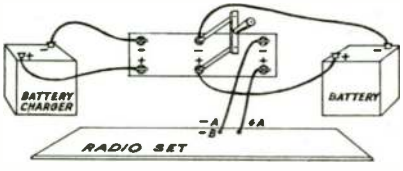
Instructions for Installation

of

Model 10 Receiving Set



Connections shown above are for five ¼ ampere tubes with 45 volts on the plate circuit of the detector tube. When a one ampere 5 volt tube is used as a detector, decrease its plate voltage to 22½ volts by reset disconnecting wire A from point Y and connecting it to point X.

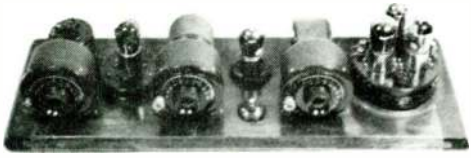


If Battery Charger is used, a switch is recommended and should be connected, as shown in diagram.

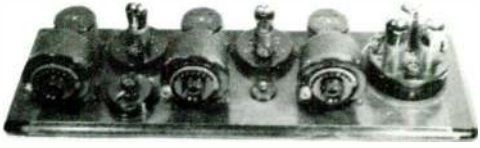
ATWATER KENT RECEIVERS

ATWATER KENT
MODEL 9
1924 $65.00

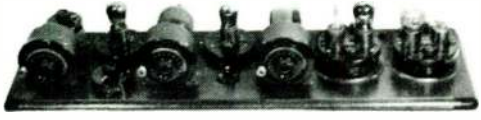
ATWATER KENT
TUNED R.F. REGEN. DET.
1922 $70.00



ATWATER KENT
MODEL 10
1923 $100.00

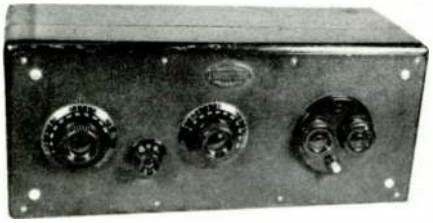


ATWATER KENT
MODEL 10B
1924 $104.00



ATWATER KENT
MODEL 12
1924 $105.00

ATWATER KENT RECEIVERS



ATWATER KENT
MODEL 19
4 TUBE T.R.F.
1924 $60.00

ATWATER KENT
MODEL 20 C COMPACT
5 TUBE TRF
1925 $80.00
("BIG BOX" MODEL 20
WAS ANNOUNCED IN 1924)

ATWATER KENT
MODEL 30
6 TUBE T.R.F.
1926 $85.00

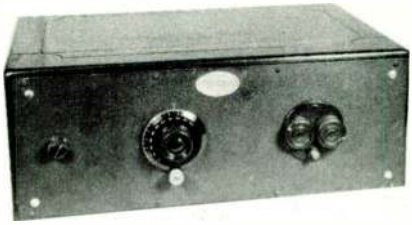
ATWATER KENT
MODEL 32
6 TUBE T.R.F.
1926 $95.00

ATWATER KENT
INSIDE VIEW
MODEL 20 C

ATWATER KENT
MODEL 33
6 TUBE T.R.F.
1927 $98.00

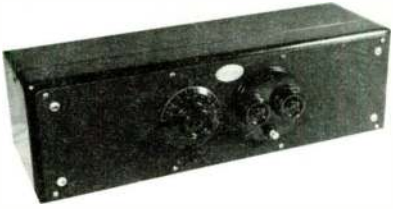
ATWATER KENT RECEIVERS

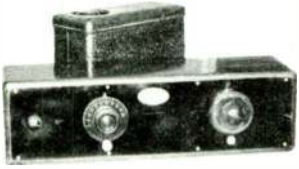
ATWATER KENT
MODEL 50
7 TUBE T.R.F.
1928 $125.00



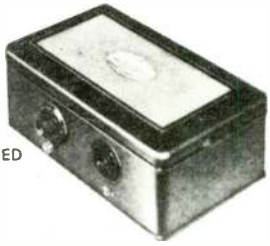
ATWATER KENT
MODEL 35
1926 $75.00

ATWATER KENT
MODEL 48
6 TUBE T.R.F.
1928 $80.00





ATWATER KENT
MODEL 36
EXTERNAL POWER SUPPLY
1927 $77.00 7 TUBES
A-C



ATWATER KENT
MODEL 40
FIRST SELF-CONTAINED
A-C MODEL A.K.
1928 $77.00

ATWATER KENT
MODEL 55
1929 $88.00 7 TUBES
A-C

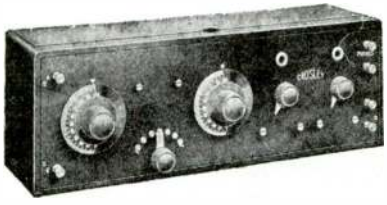
ATWATER KENT
MODEL 44
1928 $106.00 7 TUBES
A-C

CROSLEY

Powell Crosley Jr. Pioneered the manufacture of inexpensive broadcast receivers, calling them the "Model T" of radio. He sold millions of sets, giving good results at low prices. Crosley was one of the first with good regenerative receivers, using spider-web coils for low loss. He used his famous "book" tuning condensers (invented by Hugo Gernsback) for low cost. Crosley acquired Amrad in 1929. Powell Crosley's original ham call was 8CR, and he later owned radio station WLW in Cincinnatti, most powerful in the world at that time.

Crosley VI one stage R.F. Regenerative Detector.

CROSLEY
RADIO APPARATUS
Better-Costs-Less
Making distance records everywhere

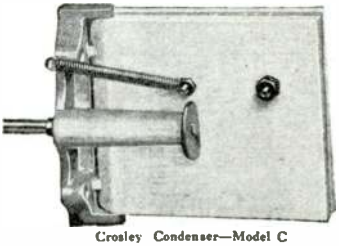


Crosley Receiver Model X

The most complete receiving set on the market. A 4 tube set consisting of one stage of tuned radio frequency, detector, and two stages of audio frequency amplification. It was on this instrument that Sebring, Fla. heard Honolulu. Price, without batteries, tubes and phones $55.00.

V-T Socket
40c

Socket Adapter with bushings and screws 70c. Without, 60c. Makes it possible to use 1½ volt tubes in Crosley Sets.



Crosley Condenser—Model C

CROSLEY MANUFACTURING CO.

ALFRED STREET MARCH 1922 CINCINNATI, OHIO

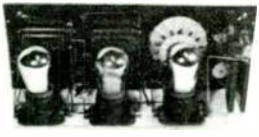
CROSLEY RECEIVERS

CROSLEY PUP
1925 $10.00

CROSLEY MODEL 50
1924 $14.50

CROSLEY MODEL 51
51A 2 STAGE AMP.
1924 $47.50

INSIDE VIEW
CROSLEY 52



CROSLEY MODEL 51
PORTABLE
1924 $28.50

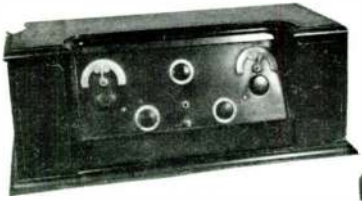
CROSLEY RECEIVERS

CROSLEY MODEL 52
THREE TUBE REGEN.
1924 $30.00

CROSLEY MODEL X
FOUR TUBE REGEN.
1922 $60.00

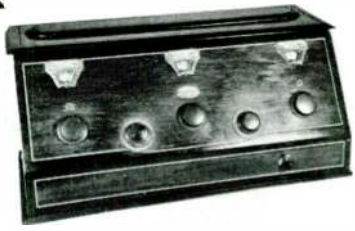
CROSLEY MODEL XJ
FOUR TUBE RECEIVER
1923 $55.00

CROSLEY TRIRDYN
NEUPORT 1924
$100.00



CROSLEY TRIRDYN
SPECIAL
1924 $75.00

CROSLEY MODEL 5-38
1926 $38.00

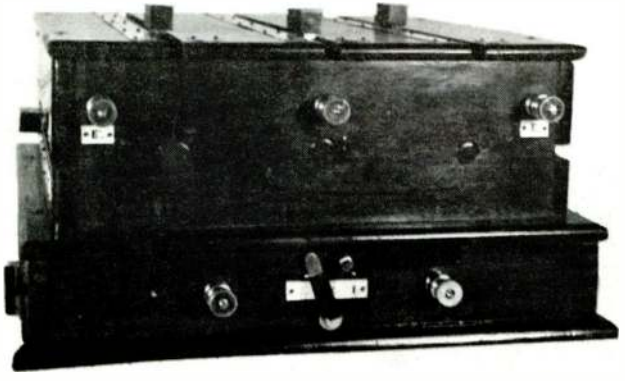


CROSLEY 608 GEMBOX
6 TUBES
FIRST SELF–CONTAINED
A–C CROSLEY 1928
$65.00

DE FOREST SYSTEM

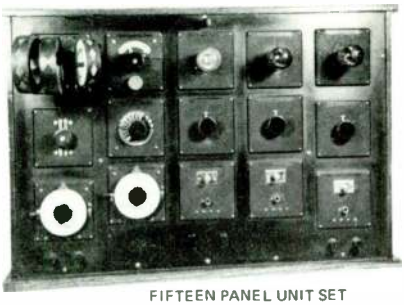
Dr. DeForest, early in 1903, tried out an electrolytic detector which Reginald Aubrey Fessenden had patented. He found it superior to the chemical detector he had been using in the Responder. Fessenden's detector used a Wollaston wire (invented by the man of the same name) which was a platinum wire sealed in a glass rod and dipped into a dilute acid solution. DeForest had Clifford Babcock make what he called a "Spade Electrode", a piece of platinum leaf sealed into glass. In 1905 the courts ruled that this was in infringement on Fessenden's patent and prevented DeForest from using it. However, by this time, DeForest had a carborundum detector and was developing the audion detector. With the spade electrode this pioneer was employing a three-slide and a five-slide tuner. He called these the two-coil and three-coil "Syntonizers" and they made up the receiving equipment for the DeForest system.

DE FOREST "RESPONDER"



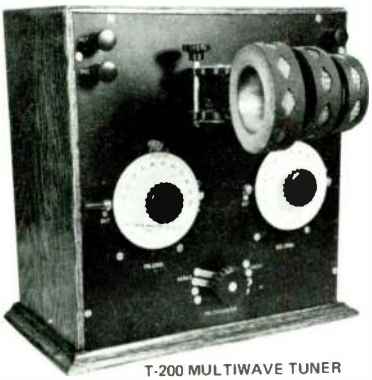
DE FOREST THREE–COIL SYNTONIZER

DE FOREST

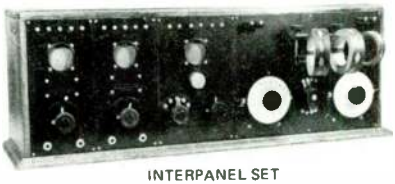


FIFTEEN PANEL UNIT SET
1919 $160.00

P-300
AUDION-ULTRAUDION
1919 $88.50



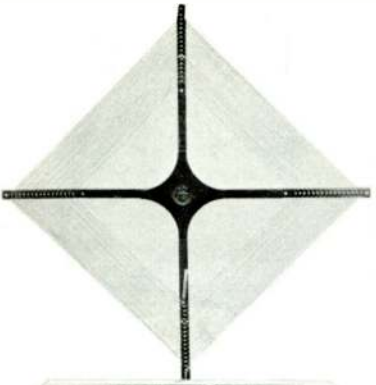
T-200 MULTIWAVE TUNER
1920 $87.50



INTERPANEL SET
1921 $125.00

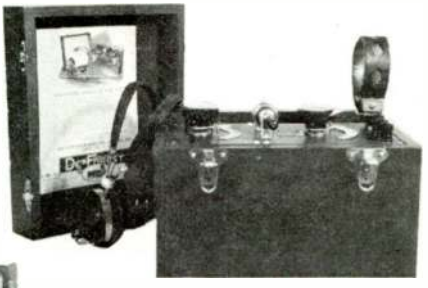
80X RECEIVING SET
1919

RADIOCRAFT D6
REGENERATIVE
1923 3 TUBES



DEFOREST F–5
RADIO PHONE
5 TUBE T.R.F.
1924 $75.00

RADIOPHONE TYPE D–10
PORTABLE REFLEX 4 TUBE
1923 $150.00



THE EVERYMAN CRYSTAL SET
1923 $31.50

DEFOREST
RADIOHOME

DECEMBER, 1919

Federal's

(There's Much in a Name)

Telephone & Telegraph Co.

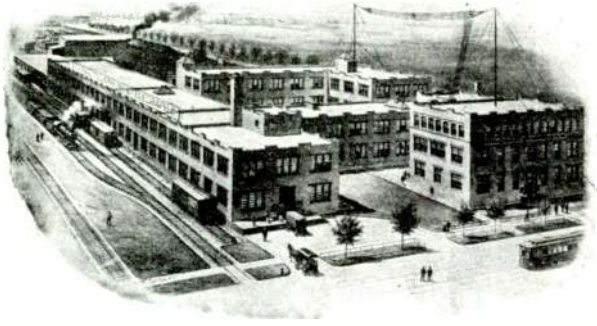
MANUFACTURERS

TELEPHONE. TELEGRAPH AND RADIO APPARATUS AND ACCESSORIES

FACTORY AND HOME OFFICE

Buffalo, New York, U. S. A.

RADIO TELEGRAPH AND TELEPHONE APPARATUS



Home of Federal Radio Apparatus

BRANCH SALES OFFICES:

NEW YORK CITY
2158 Woolworth Bldg.

SAN FRANCISCO
693 Mission St.

CHICAGO
504 Plymouth Bldg.

BOSTON
99 Bedford St.

BRIDGEBURG,
ONTARIO

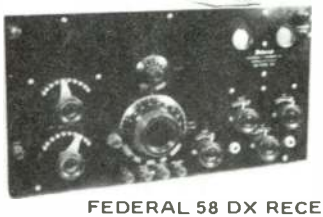
PHILADELPHIA
1008 Drexel Bldg.

FEDERAL TELEPHONE & WIRELESS CO.

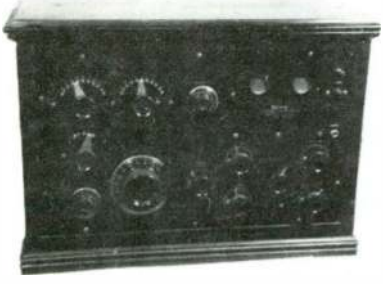
FEDERAL JR.
CRYSTAL RECEIVING SET
1921 S.P. $25.00

INSIDE VIEW
FEDERAL 57 RECEIVER

FEDERAL 57 RECEIVER
SINGLE TUNED RECEIVER
1 STAGE R.F. DET. 2 STAGE
AUDIO 1922 S.P. $98.00



FEDERAL 58 DX RECEIVER
DOUBLE TUNED RECEIVER
1 STAGE R.F. DET 2 STAGE
AUDIO. 1922 S.P. $116.00



FEDERAL 59 RECEIVER
DOUBLE TUNED RECEIVER
2 STAGE R.F. DET. 2 STAGE
AUDIO 1923 S.P. $177.00

FEDERAL 61 RECEIVER
3 STAGE R.F. DET. 2 STAGE
AUDIO 1923 $223.00

FREED-EISEMANN RADIO BROADCAST RECEIVERS

FREED-EISEMANN
FE-15 5 TUBE T.R.F.
1924 $90.00

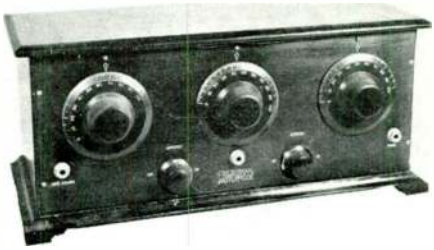
FREED-EISEMANN
NR-7 6 TUBE NEUTRODYNE
1924 $150.00

FREED-EISEMANN
NR-5 5 TUBE NEUTRODYNE
1923 $150.00

INSIDE VIEW
NR-7

FRESHMAN MASTERPIECE RECEIVERS

FRESHMAN MASTERPIECE
5 TUBE T.R.F.
1925 $60.00



FRESHMAN MASTERPIECE
5 TUBE T. R. F.
1925 $60.00

FRESHMAN MASTERPIECE
5 TUBE T. R. F.
1924 $60.00

GILFILLAN RECEIVERS

GILFILLAN GN–3
NEUTRODYNE
1925 $75.00

GILFILLAN GN–2
5TUBE NEUTRODYNE
1924 $135.00

GILFILLAN MODEL 10
5 TUBE NEUTRODYNE
1925 $125.00

GILFILLAN GN–5
NEUTRODYNE
5 TUBES
1926

SIX TUBE PORTABLE
1925 $65.00

A. H. GREBE & CO., INC.

Manufacturing GREBE RADIO Apparatus

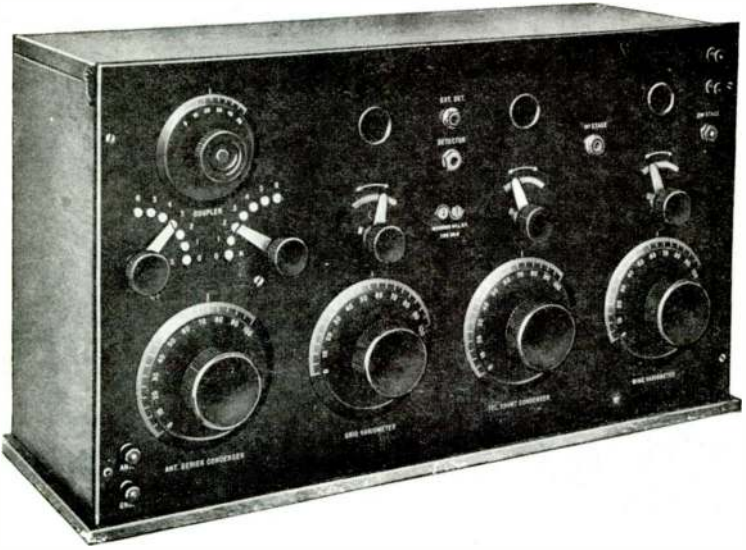
RICHMOND HILL NEW YORK CITY

TRADE MARK

FEBRUARY, 1920

SHORT-WAVE REGENERATIVE RECEIVER AND TWO-STAGE AMPLIFIER TYPE CR-6

Wave-length range: 170 to 680 meters

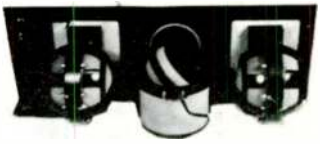


FOR the radio amateur and experimenter who is satisfied only when he knows that he posesses the very last word in radio receiving apparatus, there is but one answer: the short-wave regenerative receiver and two-stage amplifier, known as Type CR-6. This is one of the most popular receiving sets now in use, because of its remarkable completeness, efficiency, and ease of operation.

The electrical design of the CR-6 embodies the most suitable arrangement for high efficiency and smoothness of operating control, for the wavelengths covered. The antenna circuit consists of an adjustable inductance in series with a variable capacity, giving a very wide range of settings.

A. H. GREBE CO. RECEIVERS

GREBE CR-3
150 TO 680 M.
1920 $60.00

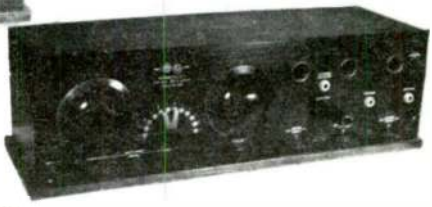


INSIDE VIEW CR-3

GREBE CR-6
THREE TUBE REGEN.
170 TO 680 M.
1919 $180.00

GREBE CR-5
ONE TUBE REGEN.
150 TO 3,000 M.
1921 $80.00

GREBE CR-9
THREE TUBE REGEN.
150 TO 3,000 M.
1921 $110.00



GREBE CR-8
ONE TUBE REGEN.
150 TO 1,000 M.
1921 $80.00

A. H. GREBE CO. RECEIVERS

GREBE CR–18
10 TO 200 METERS
ONE OF THE FIRST
10 METER RECEIVERS
1926 $100.00

GREBE SYNCHROPHASE
5 TUBE T. R. F.
1925 $125.00

GREBE RORK
2–STEP AMP.
$55.00

GREBE RORB
DET. 2 STEP AMP.
$75.00

GREBE A–C SIX
7 TUBES A–C
1928

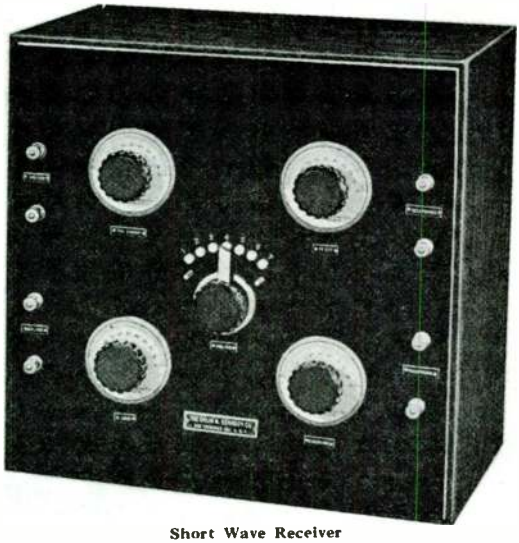
The Colin B. Kennedy Co.

Manfuacturers of

Radio Apparatus

Office and Salesrooms

Rialto Building San Francisco, California

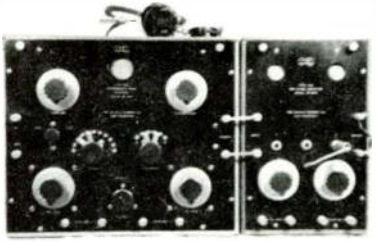


Short Wave Receiver

The 200 meter wave to which the amateur is limited by government regulations, does not permit of high efficiency at the transmitting end. It is possible to more than offset this, however, by the use of super sensitive receiving apparatus—a fact that is well demonstrated by the way amateurs consistently communicate over greater distances than do commercial stations although obviously the latter work under more favorable conditions.

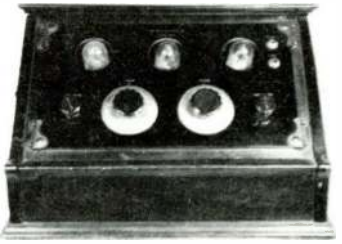
COLIN B. KENNEDY RECEIVERS

KENNEDY 110 UNIVERSAL
175-25,000 METERS
1922 S.P. $325.00

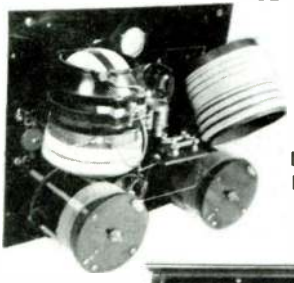


KENNEDY 220 INTERMEDIATE
175 to 3100 METERS
1921 S.P. $210.00

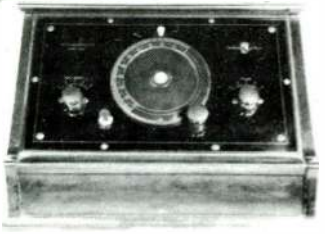
KENNEDY 281 & 521 AMP.
175 to 620 METERS
1921 S.P. $200.00



KENNEDY MODEL V
1923 S.P. $86.50



BACK VIEW
MODEL 220



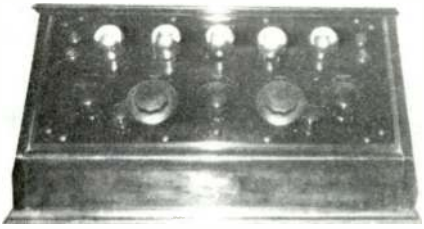
KENNEDY
MODEL 22
5 TUBE
1924

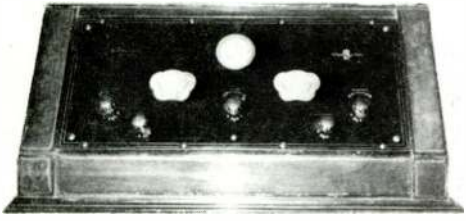
KENNEDY PORTABLE
1923 S.P. $75.00

COLIN B. KENNEDY RECEIVERS

KENNEDY XI
1924 $185.00

KENNEDY XV
TYPE 430
1924 $142.50





KENNEDY XXX
TYPE 435
1925

MAGNAVOX Radio

Receiving Set TRF-5 with Reproducer M4 - $125.00

EXPERIENCED radio users have stated that this Magnavox equipment (illustrated below) represents the highest standard of real value and usefulness ever offered in the radio field.

The Magnavox 5-tube circuit is a special development of tuned radio frequency in which a splendid balance of selectivity, range and volume have been attained. The one dial Station Selector eliminates all tuning adjustments; while the Magnavox Reproducer insures sonorous, pleasing tone for all programs.

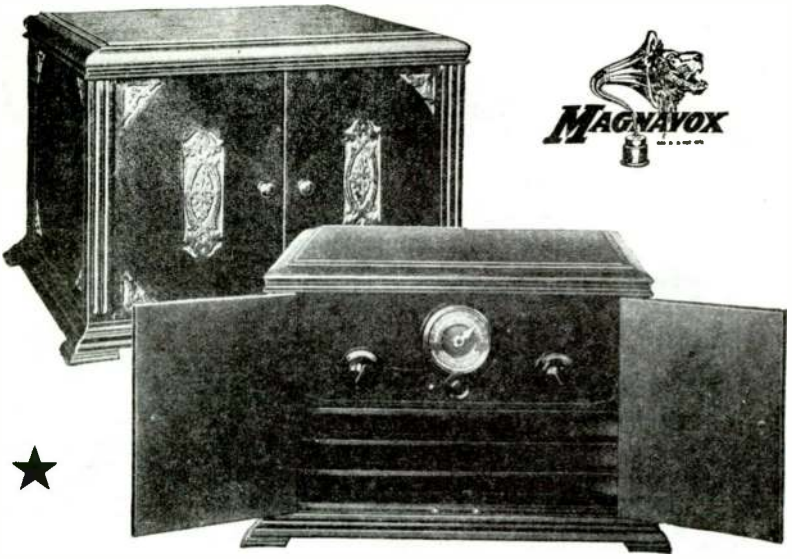
★ *Magnavox Radio Receiving Sets, Tubes and Reproducers are carried by reliable dealers. Illustrated booklet on request.*

THE MAGNAVOX COMPANY
OAKLAND, CALIFORNIA

New York:	*Chicago:*	*San Francisco:*
350 West 31st St.	162 N. State Street	274 Brannan St.

Canadian Distributors: Perkins Electric Limited, Toronto, Montreal, Winnipeg

2R



TRF-50
(as illustrated)

A 5-tube tuned radio frequency receiver with built-in Magnavox Reproducer unit which consumes no battery. Cabinet measures: height, 14¾ in.; length, 20½ in.; depth, 18¾ in.

Without tubes or batteries . . $150.00

TRF-5

This is identical with the above but encased in smaller cabinet without built-in Reproducer. Cabinet measures: height, 9⅝ in.; length, 20½ in.; depth, 14¾ in.

Without tubes, batteries or reproducer $125.00

MAGNAVOX

New Broadcast Receivers combining supreme efficiency, convenience and beauty

HERE at last is the perfected instrument permitting you to enjoy *simultaneously* the most desirable elements of broadcast reception.

Three decisive advantages go with the Magnavox: unequalled simplicity of control, reproduction of exceptional clearness — handsomely carved period cabinets.

Magnavox Radio Receivers, Vacuum Tubes, Reproducers, Power Amplifiers, and Combination Sets are sold by reliable dealers everywhere

THE MAGNAVOX CO., OAKLAND, CALIF.
New York: 350 W. 31st Street *San Francisco:* 274 Brannan Street
Canadian Distributors: Perkins Electric Limited, Toronto, Montreal, Winnipeg

10R

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS

The amateur will tell you that the Paragon three-circuit receiver, because of its greatly superior selectivity and sensitivity, can pick and choose between broadcasting stations of about the same signal strength with less than one per cent differential.

This means that with a Paragon receiver you get what you want when you want it—complete messages and clear music from the station you tune in on, without interruption and jamming. Until you have listened in with a Paragon three-circuit receiver, you cannot guess the real pleasure and fascination of radio.

Long before broadcasting popularized radio with the general public, Paragon equipment was the choice of the experienced amateur. He will tell you today that if you want quality and satisfaction, Paragon Radio Products are the best and safest buy on the market.

An illustrated Catalog of Paragon Radio Products is Yours For the Asking

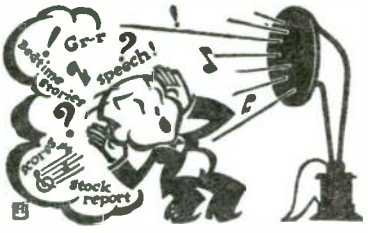
DEALERS — The Adams - Morgan Company has an interesting proposition to make to reputable radio dealers who believe in quality merchandise. Details on request.

ADAMS-MORGAN COMPANY
6 Alvin Ave., Upper Montclair, N. J.

Also Manufacturers of PARAGON

Radio Telephone Transmitters	Amplifier Transformers
V. T. Control Units	Control Dials
Rheostats	Amplifiers
Potentiometers	Receivers
V. T. Sockets	Switches
Detectors	Variometers

Type RD-5 Regenerative Receiver and Detector—$75.00
Type A-2 Two-Stage Amplifier—$50.00
(Licensed under Armstrong Patents.)



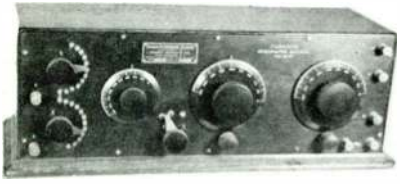
September, 1921

If you had a dozen ears

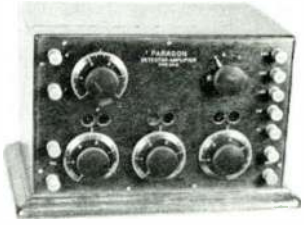
You would need them all to hear what you get nowadays with a single circuit receiver.

With several hundred powerful broadcasting stations, all operating on one narrow wave band, it takes real selectivity and sensitivity to get a satisfactory radio programme.

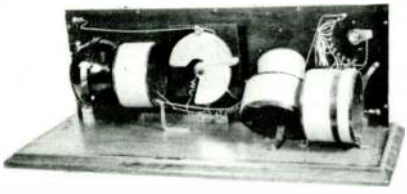
PARAGON RECEIVERS
ADAMS - MORGAN COMPANY



PARAGON RA TEN AMPLIFYING
SHORT WAVE RECEIVER
1921 S.P. $75.00



PARAGON DA 2
DETECTOR 2 STAGE AMP.
1921 S.P. $65.00

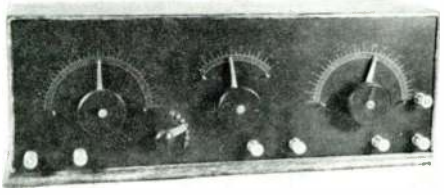


INSIDE VIEW RA 10

III A
3 TUBE REGEN
1923 $175.00

PARAGON RA 10 DA 2

PARAGON RA-6
ADAMS MORGAN
FIRST RECEIVER TO USE
ARMSTRONG REGENERATIVE
CIRCUIT. 1916 $35.00



RADIO CORPORATION OF AMERICA

The Radio Corporation of America was and is one of the largest and oldest manufacturers of radio sets. After the first World War the Alexanderson alternator patents were offered for sale. The British Marconi Company were making arrangements to secure these, but the U.S. Government intervened in the interests of maintaining our nation's lead in the radio field. So R.C.A. was formed on October 17, 1919 with Ed J. Nally as President, and Owen D. Young as Chairman. A month later, on November 20th, American Marconi Co. was taken over by RCA.

They became the largest distributor of radio receiving sets in the world, selling the entire output of the General Electric Company and Westinghouse. RCA took over the Marconi Institute, founded in 1913, and renamed it the Radio Institute of America; it offered technical radio courses and commercial radio operator's courses to thousands of students.

RCA World Wide Wireless in 1920 sold transmitting and receiving commercial sets made by G.E. and Westinghouse, and also some made by Wireless Specialty Apparatus Company. RCA sold ship-to-ship and ship-to-shore stations complete. Portable mule pack sets, military tractor sets, spark transmitters from one to 20 KW, tube transmitters and interfleet radio telephones were all distributed by RCA at this time.

RCA Communications Inc. kept two 100 K.W. alternators in daily use to handle radiograms to 43 foreign nations. Radiograms were also handled by Western Union Telegraph Company. In 1926 RCA purchased radio station WEAF in New York for one million dollars and founded the National Broadcasting Company; M.H. Aylesworth was President. There were more than five million home radio receivers in use at this date.

Completing Sets at the Westinghouse Electric and Manufacturing Company's Radio Works, Springfield, Massachusetts

Radio Corporation of America

WORLD WIDE WIRELESS

WOOLWORTH BUILDING — NEW YORK CITY

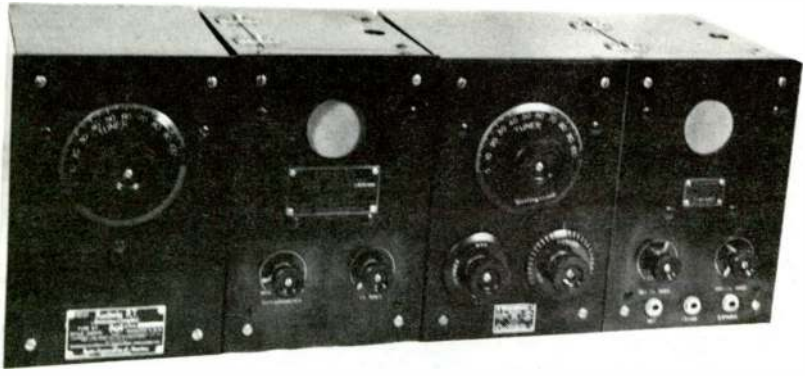
Section of Radio Assembling Room at Immense Plant of General Electric Company, Schenectady, N. Y.

RADIO CORPORATION OF AMERICA

Westinghouse Regenerative-Vacuum Tube Receiver Combination No. 4

RC	Short Wave Regenerative Receiver, 170-700 meters, less tubes	$132.50
CB	Load Coil	6.00
UV-200	One Radiotron Detector	5.00
UV-201	Two Radiotron Amplifiers	13.00
6HR-9	Storage Battery, 6 volts, 100 A. H.....	24.00
UD-790	Brandes Telephones...	8.00
UD-824	Telephone Plug	1.75
	Two "B" Batteries....	6.00
AD	Receiving Antenna Equipment	7.50
LV	Vocarola (Loud Speaker)	30.00
285168	Rectigon Battery Charger, 5 amperes.....	28.00
	Total.....	$261.75

RADIO CORPORATION OF AMERICA

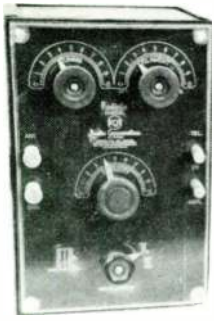


RADIOLA SIX TUBE RECEIVER WITH RE-ANT TUNER. AR-THREE STAGE R.F. AMP. RA-REGEN RECEIVER. DA-DET TWO STEP AMP. MADE BY WESTINGHOUSE 1922 S.P. $225.00

RADIOLA SENIOR TYPE RF REGEN. USES WD-11 TUBE MADE BY WESTINGHOUSE 1923 S.P. $65.00

AERIOLA JR. MODEL RE CRYSTAL SET 1922 S.P. $25.00 MADE BY WESTINGHOUSE

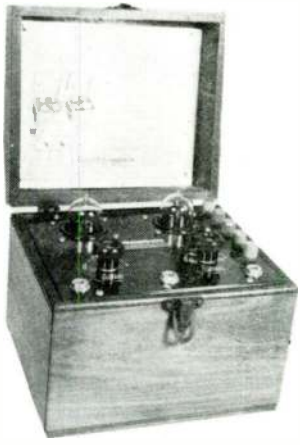
RADIO CORPORATION OF AMERICA



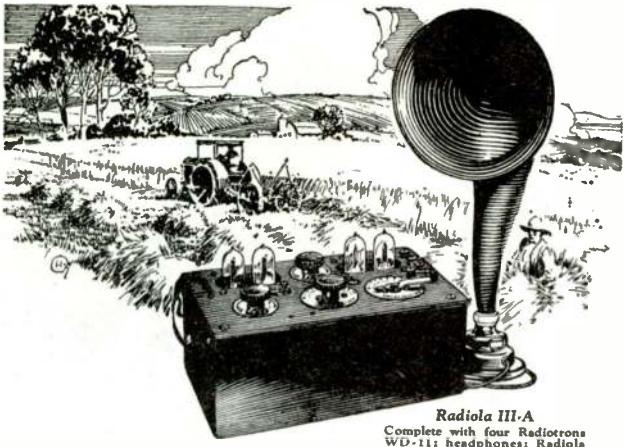
RADIOLA SPECIAL
ONE TUBE REGEN.
170 TO 500 M.
1923 $30.00
WIRELESS SPEC. CO.

RADIOLA
CONCERT RECEIVER
CRYSTAL SET
170 TO 2650 M.
WIRELESS SPEC. CO.
1922 S.P. $40.00

AERIOLA SR. RECEIVER
REGENERATIVE USES WD11
MADE BY WESTINGHOUSE
1922 S.P. $65.00



AERIOLA AMPLIFIER
2 .STEP WD 11 TUBES
MADE BY WESTINGHOUSE



Radiola III-A
Complete with four Radiotrons WD-11; headphones; Radiola Loudspeaker; everything except the batteries. A remarkable price achievement at $100
Operates on dry batteries

What will your wheat bring?

What will your corn bring? Your livestock? Will it be top price? It will, if you keep in touch with the market—with a RADIOLA.

Practical, dependable and economical is the new RADIOLA III-A. It is achieving distance records greater than sets at far beyond its price—getting cross-country reception with its four tubes. Every word comes in clear and true—music and fun from far away sound as real as if they were in the room. It is the set for the farmer who wants to guide his day's work by the weather reports—guide his marketing by the crop reports—entertain his evenings with good music.

Radiola III
—two tube receiver. With two Radiotrons WD-11 and headphones $35

"There's a **Radiola** *for every purse"*

Radio Corporation of America
Sales Offices:
233 Broadway, New York City 10 So. La Salle St., Chicago, Ill.
433 California Street, San Francisco, Cal.

Radiola

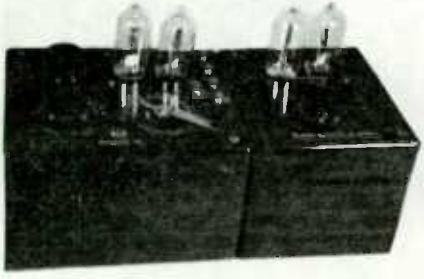
REG. U.S PAT. OFF.

RADIO CORPORATION OF AMERICA

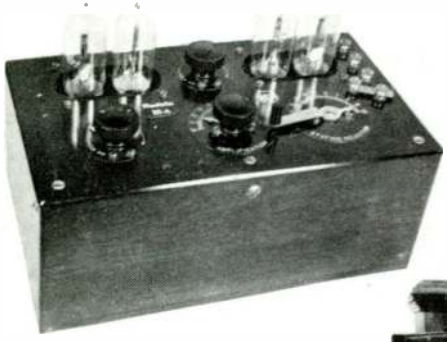
RADIOLA I
TYPE ER-753-A
MADE BY GENERAL ELEC.
1922 S.P. $25.00

RADIOLA II AR-800
2 TUBE REGENERATIVE
PORTABLE RECEIVER
USED TWO 199 TUBES
1923 S.P. $60.00
MADE BY GEN. ELEC.

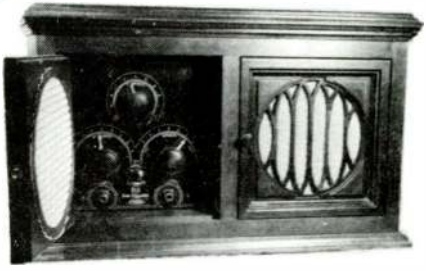
RADIOLA III AR-805
WITH BALANCED AMPLIFIER
REGEN. DET. ONE STEP
AUDIO. ONE STEP PUSH
PULL AUDIO. 1923
S.P. $65.00



RADIOLA TYPE RS
MADE BY
WESTINGHOUSE
1923

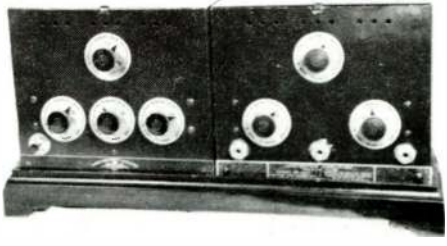


RADIOLA IIIA AR 806
REGEN. DET. ONE STEP
AUDIO. ONE STEP PUSH
PULL AUDIO. 1924
S.P. $65.00



RADIOLA IV AR-880
THREE TUBE RECEIVER
REGEN. DET. 2 STAGE
AUDIO. 1922
MADE BY GEN. ELEC.

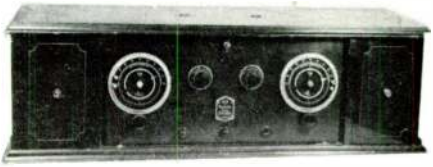
RADIOLA V AR-885
AR-1300 CRYSTAL DET.
RECEIVER
AA-1400 TUBE DET.
TWO STEP AUDIO
1922 MADE BY GEN. ELEC.
$250.00 COMPLETE



RADIOLA VI AR-895
AA-1520 3 STAGE R.F.
AA-1400 3 STEP AUDIO
TUNES 200 TO 5000 M.
1922 MADE BY GEN. ELEC.

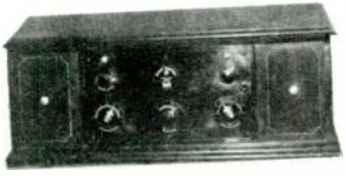
RADIO CORPORATION OF AMERICA

RADIOLA VIIB & IX
2 CIRCUIT TUNER
5 TUBE DET. AMP.
AR-907
1923 S.P. $245.00



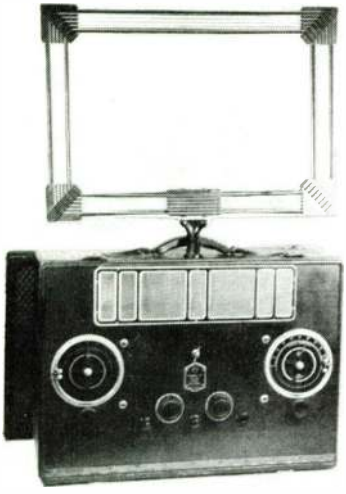
RADIOLA VIII
6 TUBE SUPER.
PORTABLE
1924 S.P. $286.00

RADIOLA X
REGENOFLEX
4 WD 11 TUBES
1924 S.P. $245.00

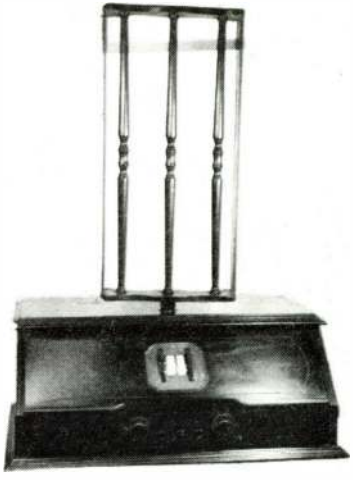


RCA REGENOFLEX
1924 $191.00

RADIO CORPORATION OF AMERICA



RADIOLA 24 AR-804
6 TUBE SUPER
USING 199 TUBES
PORTABLE
1925 S.P. $160.00



RADIOLA 25 AR-919
6 TUBE SUPER
USING 199 TUBES
LOOP RECEIVER
1925 SP $165.00

RADIOLA 26
6 TUBE SUPER
PORTABLE
HOME BATTERY BOX
WITH ANT. TUNER
1925 S.P. $225.00

RADIOLA 16 AR–924
6 TUBE RECEIVER
UX 201As
1927

RADIOLA GRAND
4 WD 11 TUBES
REGEN. RECEIVER
1922 S.P. $150.00

RADIOLA 20 AR–918
5 TUBE T.R.F.
1925 S.P. $180.00

RADIOLA 17 AR–927
ONE OF THE FIRST
AC RECEIVERS
1928

RADIOLA 60
FIRST RCA A–C
SUPERHETERODYNE
1928 $147.00

1926 (COURTESY ZENITH RADIO CORP.)

Why Zenith is Here to Stay——

If you own a Super-Zenith it is not necessary to tell you why the instrument is here to stay.

If you are contemplating the purchase of a radio and want one that will be thoroly satisfactory years from today—this message is for you.

In the beginning we confronted a grave question—the choice of one or the other of two business policies.

One way open was to make radios "at a price" in large quantities.

This plan we discarded and chose the other road—the road of business soundness—customer satisfaction and absolute permanence.

We designed and manufactured a superior instrument—the finest radio of its kind humanly possible to produce.

We chose this policy—not because we felt it would be the most profitable immediately, but because we knew it would be best in the long run.

As a result of that decision, Zenith has maintained a steady and ever-growing volume and owner endorsement.

Every Super-Zenith is a perfectly balanced radio instrument—simple yet responsive and highly sensitive—giving distance with ease—yet preserving clear, wonderfully true tones.

Literature gladly sent on request.

Super-Zeniths priced from $240 to $335

DeLuxe Art Model Cabinets from $500 to $2,000

Other Zenith Sets $100 and $175

Again Commander Donald B. MacMillan chooses Zenith for his Arctic Expedition. When human lives may depend upon the reliability of radio performance, only one reason can explain his choice: Zenith has proved to be the best obtainable at any price.

ZENITH RADIO CORPORATION, Straus Building, Chicago

ZENITH
LONG DISTANCE RADIO

It Costs more - but it Does more

Z-NITH LONG DISTANCE RECEIVER
1922

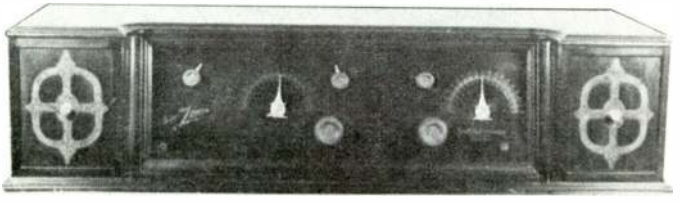
ZENITH 3R LONG DISTANCE RECEIVER
1923 4 TUBES $175.00

Ralph Matthews (9ZN) and Karl Hassel set up the Chicago Radio Laboratory in 1919, making equipment for radio amateurs, developing the name Zenith from their call letters. Zenith became a major manufacturer of quality radio equipment.

ZENITH 4R
REGENERATIVE RECEIVER
1923 4 TUBES $100.00

ZENITH SUPER PORTABLE
FIRST MANUFACTURED
PORTABLE RADIO
WITH BUILT-IN SPEAKER
1924 6 TUBES $224.00

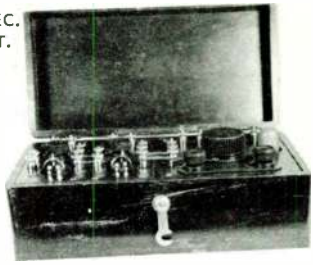
ZENITH SHORT WAVE RECEIVER
USED BY MACMILLAN
POLAR EXPEDITION
1925



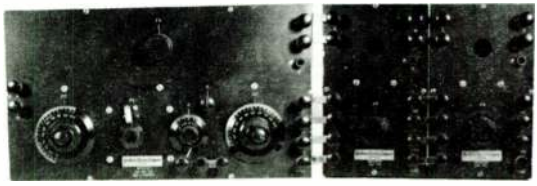
SUPER-ZENITH VII BASIC CIRCUIT FOR ZENITH'S EARLY CONSOLE FAMILY
1924 $230.00 6 TUBES A-C VERSION 1926

RECEIVERS

CONNECTICUT TEL. & ELEC.
SODION NON-REGEN. DET.
2 STAGE AUDIO



BOSTON SCALE & MACHINE
105 TUNER WITH 100 DETECTOR
2-STAGE AMPLIFIER. 1920



FIVE TUBE RECEIVER
2 STAGE FIXED TUNED R.F.
REGEN. DET. 2 STAGE AUDIO
USING W. E. 215 AS
NORTHERN ELEC. CANADA

REZODON
PAUL G. NIEHOFF CO.
FIVE TUBE REGEN.
1921

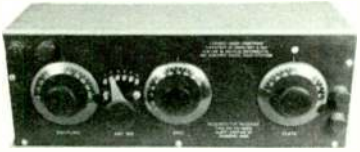
MU-RAD 2 MA 13.
2 STAGE UNTUNED R.F.
DET. 2 STAGE AUDIO
1922 S.P. $125.00

CANADIAN MARCONI
TYPE-C RECEIVER:
ST-1 TUNER, VD-1
DETECTOR, AA-1
2-STAGE AMPLIFIER
1922

REGENERATIVE ONE TUBE RECEIVERS AND AMPLIFIERS

AMRAD
REGENERATIVE RECEIVER
DETECTOR & 2 STEP AMPLIFIER
1921 $57.50
AMERICAN RADIO & RESEARCH

AMRAD
REGENERATIVE RECEIVER
VARICOUPLER & DETECTOR
1921 $30.00

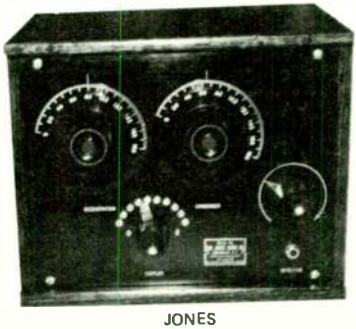


CLAPP-EASTHAM ZRF
REGENERATIVE TUNER
2 VARIOMETERS 1 VARIOCOUPLER
1919 $38.00

SLEEPER TYPE 3300
REGENERATIVE RECEIVER
1920 $35.00

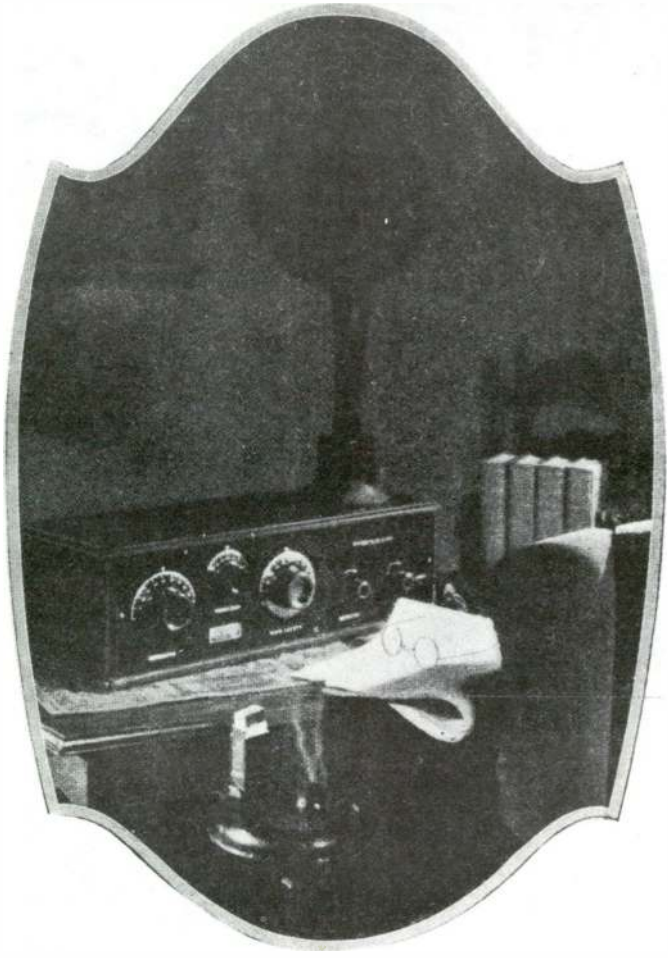
CLAPP-EASTHAM
REGENERATIVE RECEIVER
DET. 2 STEP AMP. 1921
$60.00 LESS TUBES

WIRELESS SHOP
REGENERATIVE RECEIVER
A. J. EDGECOMB LOS ANGELES



JONES
REGENERATIVE DETECTOR
1 TUBE

TUSKA



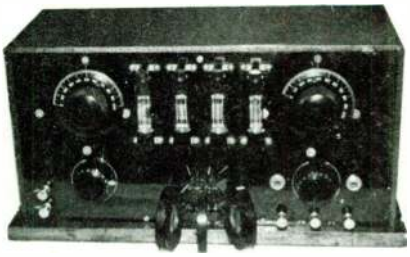
Michigan hears Honolulu

"On Saturday night my Tuska and I picked up Station KGU, Honolulu Advertiser, and listened to them for an hour through my loud speaker. It was wonderful!

THE C. D. TUSKA CO.
Hartford, Conn.

TUSKA TRADE MARK REG. U.S. PAT. OFF. RADIO

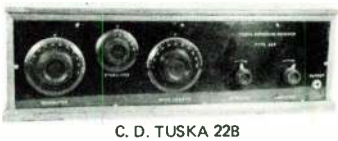
RECEIVERS



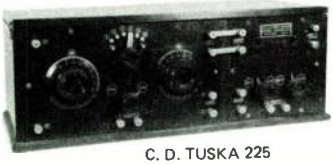
INDUSTRIAL RADIO SERVICE
BABY ULTRA 400
1922 4 TUBES

KODEL C11
ONE OF THE LITTLEST
ONE TUBE SETS MADE
1924 S.P. $10.00

REMLER RECEIVER
TYPE 400 COIL MOUNTING
TYPE 300 DET. CONTROL
PANEL 1921 $22.00

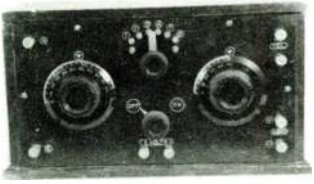


C. D. TUSKA 22B
SUPERDYNE
1924 $120.00



C. D. TUSKA 225
THREE TUBE REGEN.
1922 $90.00

KELLOGG ONE TUBE REGEN.
1922



C. D. TUSKA 224
ONE TUBE REGEN.
1922 $75.00

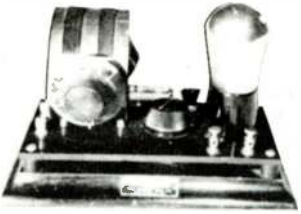
FAMOUS J. L. REINARTZ
RECEIVER
ONE OF THE BEST FOR C.W.
1921

BROADCAST RECEIVERS

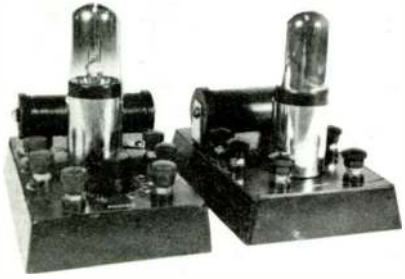
GAROD TYPE RAF.
4 TUBE NEUTRODYNE
1923 S.P. $135.00

MURDOCK C. S. 32
5 TUBE NEUTRODYNE
1925 S. P. $130.00

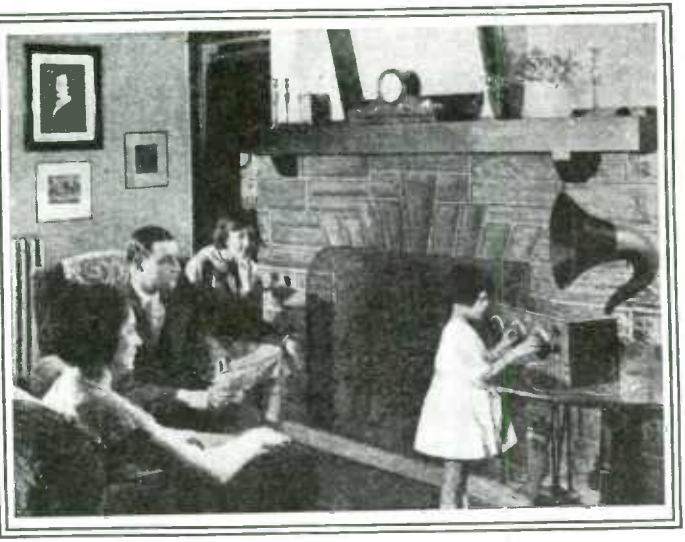
MARCONIPHONE
MADE IN ENGLAND
1923



CARCO
CARTER MFG. CO.



NATIONAL MONODYNE
1 TUBE RECEIVER &
1 STAGE OF AUDIO
1923 S.P. $18.00



The Neutrodyne principle as applied to the FADA "One Sixty" has produced a radio receiver that is simplicity itself. Once the notations have been made of the dial settings of any stations, *anyone* can reset the dials in the given positions and listen to that station at will.

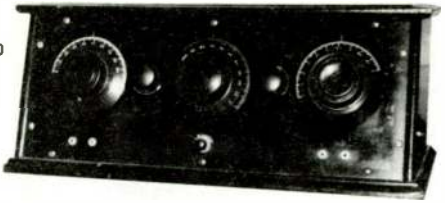
The pleasing design of the cabinet and its beautiful finish make it an ornament to any home. Its efficiency makes it a delight to all who listen. It is a receiver that you will be proud to own. See the FADA "One Sixty" at your dealer's. Price, exclusive of tubes, batteries and phones, $120.

F. A. D. ANDREA, INC., 1581 Jerome Ave., New York

FADA Radio

F.A.D. ANDREA INC. LICENSED BY INDEPENDENT RADIO MANUFACTURERS INC. NEUTRODYNE

TREGO
1924 5 TUBES $45.00

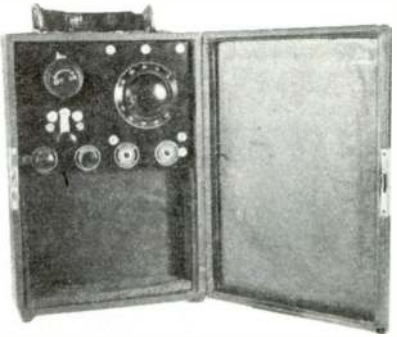


WARE 3 TUBE NEUTRODYNE
1924 $72.00 TYPE T

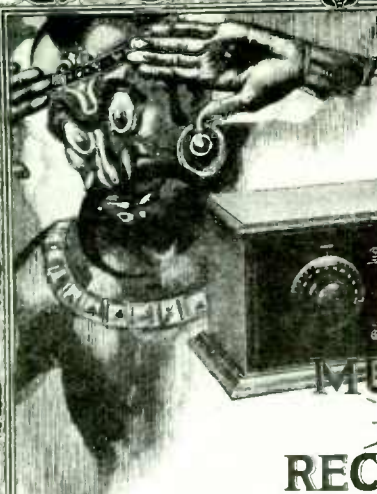
FADA 175A
5 TUBE NEUTRODYNE
1924 $160.00
F.A.D. ANDREA CO.

MUSIC MASTER TYPE 60
1925 $95.00

FADA 480B
FOLD-IN LOOP ANTENNA
R80B CHASSIS
1927 8 TUBES $300.00



KODEL PORTABLE
"THE CAMERA RADIO"
IN A CAMERA CASE
1924 S.P. $16.00



Perfect Mastery of Radio

MU-RAD

RECEIVERS

MA-15

"I am ready to obey thee as thy slave, and the slave of those who have that lamp in their hands"

—*The Arabian Nights*

MORE wonderful even than Aladdin's Lamp is your perfect mastery of radio's unlimited resources with the *Mu-Rad MA-15 Receiver*. Distance beyond imagination, sensitivity as quick as thought, itself, all with control that obeys your wishes easily and simply. Loud speaker reception, using only a two foot loop. The most highly developed circuit—two stages of audio and three stages of radio frequency amplification with detector.

RECEPTION CONSERVATIVELY GUARANTEED ⅁ 1000 MILES

WRITE FOR ILLUSTRATED LITERATURE

Establishes a New Horizon for Radio

MU-RAD LABORATORIES, INC.

801 FIFTH AVE. ASBURY PARK, NEW JERSEY

ECHOPHONE MODEL 4
RADIO SHOP
LONG BEACH, CALIF.

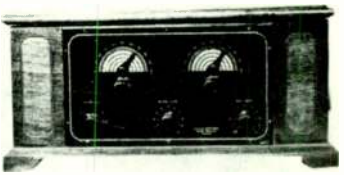
ECHOPHONE MODEL A
RADIO SHOP
SUNNYVALE, CALIF.

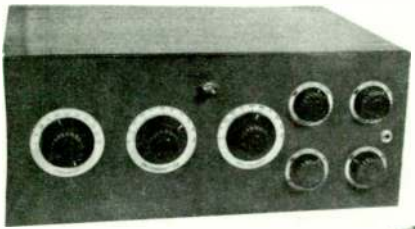
ECHOPHONE MODEL J
SUNNYVALE, CALIF.
RADIO SHOP

ONE TUBE REGEN. RECEIVER

SIGNAL
SINGLE CIRCUIT REGEN.
ONE TUBE $25.00

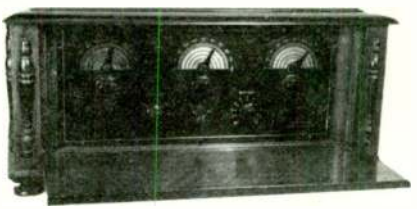
DAVID GRIMES 5B
BABY GRAND DUPLEX
1925 5 TUBES $59.50





CUTTING & WASHINGTON
11A 3 TUBE REGEN.
1922 $85.00

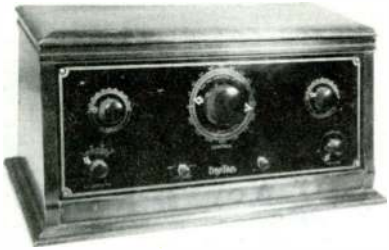
DAVID GRIMES
INVERSE DUPLEX REFLEX
TYPE 4DL 4 TUBE
SAME AS 6 TUBE SET
1924 $160.00



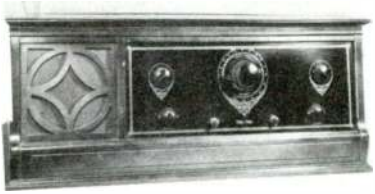
ERLA
5 TUBE T.R.F.
1924 $75.00

ARBORPHONE
5 TUBE T.R.F.
1925 $90.00
CONSOLIDATED RADIO CORP.

WURLITZER 5D
5 TUBE T.R.F.
1924 $85.00



DAY-FAN
5 TUBE T.R.F.
1924 S.P. $125.00



DAY-FAN
6 TUBE T.R.F.
WITH SPEAKER
1924 S.P. $150.00

MAGNAVOX
TRF-5
TELOS VARIO-
TRANSFORMERS
1924 S.P. $150.00

RADIODYNE WC-12
WESTERN COIL & ELEC. CO.
6 TUBE T.R.F.
1925 $150.00

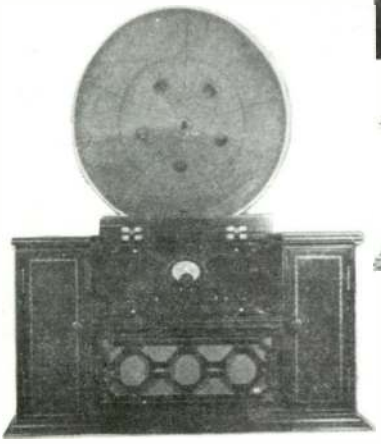
MICHIGAN RADIO MRC-2
2 TUBE REGENERATIVE
1924 $32.50

RADIODYNE WC-15 JR.
WESTERN COIL & ELEC. CO.
5 TUBE T.R.F.
1926 $49.50

ERLA
1925

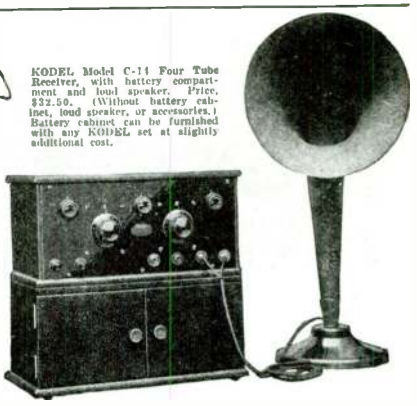
ACME REFLEX
1923

BROWNING-DRAKE 5R
1926 5 TUBES $95.00



FALCK REFLEX

HARKNESS REFLEX
1925 $33.00



KODEL Model C-14 Four Tube Receiver, with battery compartment and loud speaker. Price, $22.50. (Without battery cabinet, loud speaker, or accessories.) Battery cabinet can be furnished with any KODEL set at slightly additional cost.

Model S-1 KODEL crystal set. Sensitive, selective low priced. Price, $5.00

Model P-11 One Tube Portable—the Camera of Radio. Price, $16.00 without accessories. Tube, batteries, head phones, antenna, and ground wire all self-contained. Weight 4¾ lbs. complete.

Model P-12 Two Tube Portable. (Model P-11 with additional tube added, which increases distance and volume many times) $22.50.

KODEL—An astonishing new receiver that will make radio history

KODEL is the name of a circuit discovered by an itdependent experimenter. So wonderful is the KODEL circuit that it picks up stations 1,000 miles away, using only one tube, and *no antenna*, when conditions are right. Add tubes and you increase distance and volume until you succeed in covering 3,000 miles on the loud speaker. All this with only a single dial to turn!

If you travel—KODEL Portable. If you cannot erect an antenna—KODEL. If you want distance and quality—KODEL. If you want simplicity—KODEL. If your pocketbook is limited—KODEL. Even if you want results regardless of cost—KODEL.

See the KODEL line at your dealer's. If he cannot supply you, send us his name and address with check or money order and we will ship direct to you. Money returned if any KODEL set does not more than satisfy you.

ALL KODEL sets use the unique KODEL circuit and may be operated from either storage or dry batteries at will, and without an outdoor antenna if desired.

FREE. Write for instructive KODEL Catalogue, entitled "Radio for Every Purpose and any Purse." FREE!

DEALERS: the KODEL is a sensation wherever introduced. Write for terms.

Kodel Manufacturing Company

Under same Management that made the Homcharger famous.

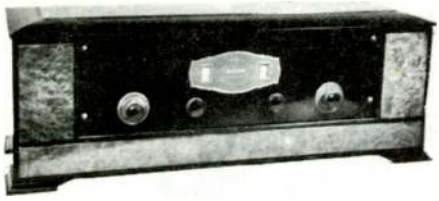
128 West Third Street **Cincinnati, Ohio**

Model C-11 One Tube Receiver—The biggest value in a one tube radio set to-day. Price, $10.00.

Model C-12 Two Tube Receiver—$18.00. A great distance getter; puts local stations on the horn; single dial tuning.

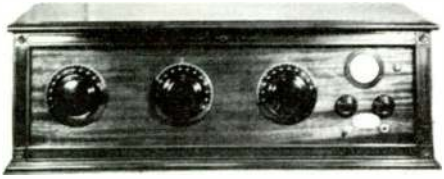
Model C-13 Three Tube Receiver—$28.00. Gives five tube volume with only three tubes due to reflex amplification.

RADIO FOR EVERY PURPOSE AND ANY PURSE—$5. TO $32.50



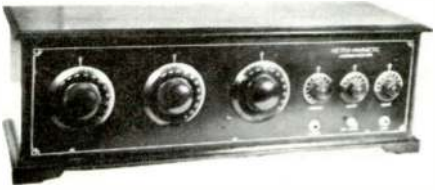
BOSCH AMBOROLA
6 TUBE NEUTRODYNE
1924 $160.00
AMER. BOSCH CO.

SPLITDORF
5 TUBE T.R.F.
1924 $125.00



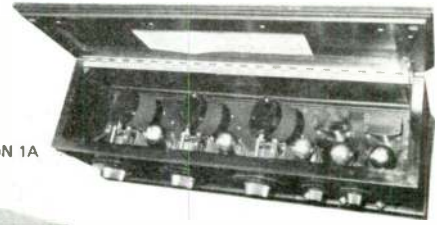
GAROD V
6 TUBE NEUTRODYNE
1923 $195.00
GAROD RADIO CORP.

HETRO-MAGNETIC
TYPE 5H
5 TUBE T.R.F.
1923 $140.00
SIDBENEL RADIO EQUIP.



BROADCAST RECEIVERS

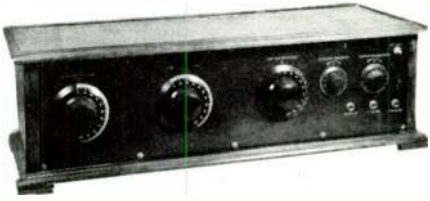
STROMBERG–CARLSON 1A
5 TUBE NEUTRODYNE
1924 $180.00



INSIDE
STROMBERG-CARLSON 1A

EAGLE NEUTRODYNE
BALANCED RECEIVER
1923 $175.00

HOWARD A6
6 TUBE NEUTRODYNE
1926 $200.00

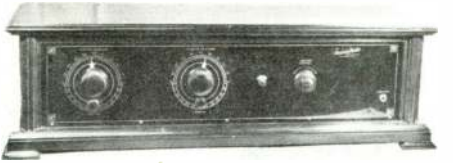


FIVE TUBE
NEUTRODYNE KIT
1924 $80.00

BROADCAST RECEIVERS

THOROLA
5 TUBE T.R.F.
1924 $85.00

PREMIER RADIO MODEL 7A
5 TUBE REFLEX
3 STAGES OF R.F. CRYSTAL
DETECTOR 3 STAGES AUDIO
1924 $250.00

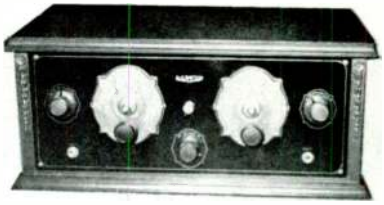


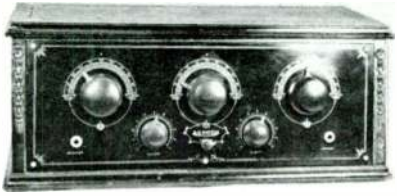
SILVER–MARSHALL
SILVER SIX
1924

ELECTROLA
5 TUBE T.R.F.
1923 $90.00

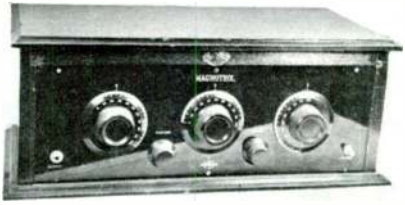
BROADCAST RECEIVERS

A–C DAYTON XL–25
5–TUBE T.R.F.
1926





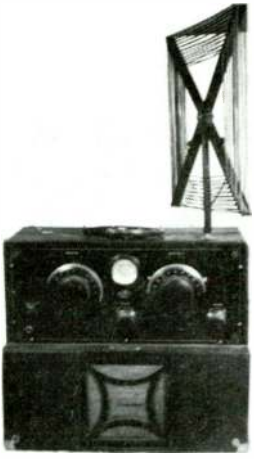
A–C DAYTON XL–5
5 TUBE T.R.F.
1924 $95.00



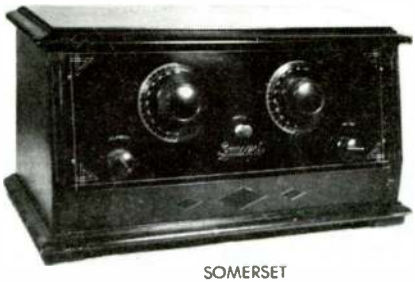
MAGNUTROL
5 TUBE T.R.F.
MAGNUS CO.
1924 $90.00

RADIO SERVICE LABS R212
5 TUBE NEUTRODYNE
1924 $120.00

PACIFIC CLARATONE
5 TUBE T.R.F.
1925 $75.00



KEMPER PORTABLE
K-52
1925 $90.00

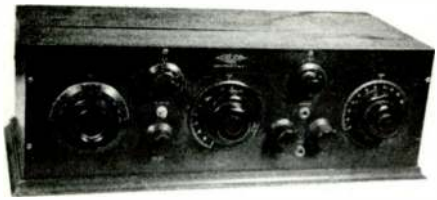


SOMERSET
5 TUBE T.R.F.
1924 $85.00

PARMAK 5 TUBE T.R.F.
1924 $85.00

TRAV-LER PORTABLE
5 TUBE
1925 $75.00

HALES CALIFORNIAN
5 TUBE T.R.F.
1925 $80.00



MELCO SUPREME
AMSCO PROD. INC.
1924 $140.00

STEWART WARNER
MODEL 305
5 TUBE T.R.F.
1925 $120.00

STEWART WARNER
MODEL 300
5 TUBE T.R.F.
1925 $75.00

SLEEPER SERENADER
5 TUBE T.R.F.
1925 $190.00

KELLOGG
WAVEMASTER
1925 $125.00

STEWART-WARNER
MODEL 385
1927 6 TUBES $75.00

GOEDEN MORGEN

("*Good Morning,*" *Dutch*)

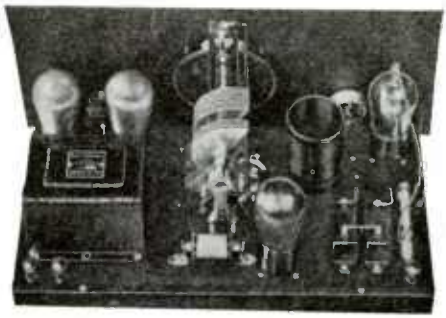
Scene near Station PCLL, Kootwijk, Holland.

Operates from NATIONAL Velvet-B

Write us today for full details

It gets short-waves
AND *Broadcasts*
All in One

Write us today for full details



Not so easy for all of us to read. But it is much easier to hear this cheery greeting and lively music all the way from Holland when you tune in on station PCLL with the THRILL Box.

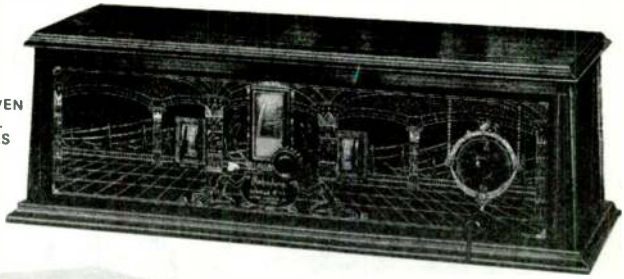
Words and music from 20 different countries in a dozen different languages, may be heard with the NATIONAL Screen-Grid THRILL-BOX. This new Radio is full of new and ingenious features for your convenience and pleasure.

NATIONAL

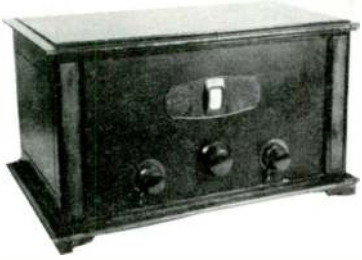
4-Tube THRILL BOX SW-4

NATIONAL CO. INC., Malden, Mass.

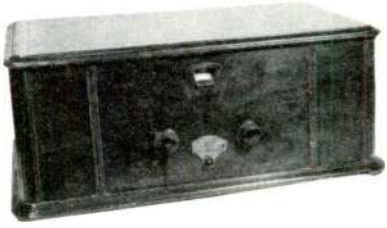
Est. 1914



METRODYNE SUPER-SEVEN
METRO ELECTRIC CO.
1926 $75.00 7 TUBES



KOLSTER
6 TUBE T.R.F.
GANGED TUNING
1926 S.P. $150.00
FEDERAL-BRANDES



KING
5 TUBE NEUTRODYNE
ONE DIAL TUNING
1926 $125.00

THREE CIRCUIT REGEN.
4 TUBES
1923 KIT $30.00

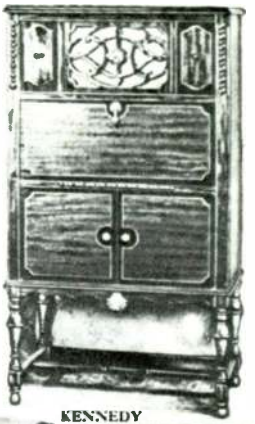
MOHAWK
5 TUBE T.R.F.
1924 S.P. $125.00

ADVANCE AUTOMOBILE ACCESSORIES CO. NEUTROWOUND SUPER-6 1926 $95.00

ZENITH

ADLER-ROYAL

BUCKINGHAM



KENNEDY

DERESNADYNE

GLOBE

PRECEL

MOHAWK

PFANSTIEHL

MUNN-LANDON

MURDOCK

NEUTROWOUND

THERMIODYNE


RADIODYNE


MU-RAD


DRAY


VALLEY-TONE


MERCURY


WRIGHT DE COSTER


HARTMAN

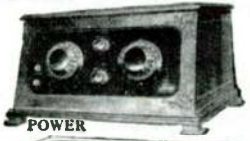

ECHOPHONE


ELKAY

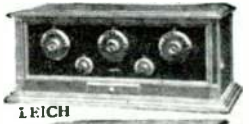

SILVER-MARSHALL


HUNTINGTON

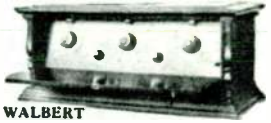

NEWPORT


POWER


AUDIOLA


LEICH


TORODYNE


WALBERT


HOWARD


EAGLE


SUPERIOR


OZARKA

SUPERHETERODYNE SETS

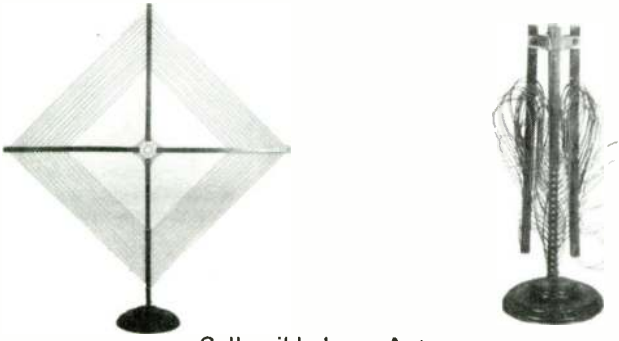
In 1918 Major Armstrong invented the superheterodyne circuit; the heterodyne principle was not new, having been used in undamped wave wireless telegraphy. This was the ultimate in a receiver, for it gave better selectivity and had a low noise ratio. The front end of the superheterodyne used a loop antenna, an oscillator and a frequency changer or mixer. The intermediate frequencies were fixed at from 45 to 60 KC. A second detector and transformer-coupled audio stage followed. Initial problems with the "super" sets were bad radiation and two-spot tuning.

When RCA brought out their first superheterodyne sets in 1924 they used a revised circuit devised by Armstrong and Hauck which employed a second harmonic from the oscillator and cut down radiation. J. H. Pressley developed a circuit, the Autodyne, which combined the oscillator and mixer in one tube. This circuit used a tuned front end and increased the gain while at the same time prevented radiation.

LOOP ANTENNAS

The loop antenna was first used for direction finding, and is still thus employed. In the early broadcast era the loop was used where an elaborate antenna could not be erected, and to prevent radiation and cut out strong local stations. For home receivers loops were made from about 12 to 24 inches square; they were often made to fold for storage purposes. Eventually loops became smaller and were placed within the sets, as they are today.

Norden-Hauck 10 tube Navy Super, 1925, $250.00



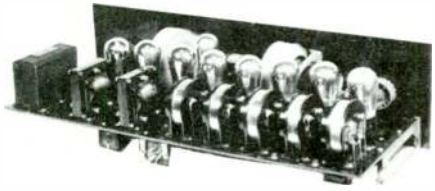
Collapsible Loop Antenna

WESTERN ELECTRIC
48 SUPER
1923

CHARLES R. LEUTZ
MODEL C SUPERHET
160-600M
1924 7 TUBES

REMLER
9 TUBE SUPER
45 KC. IFs
1925 KIT $90.00

MAGNAFORMER
9 TUBE SUPER
RADIART LABS
1926 $200.00

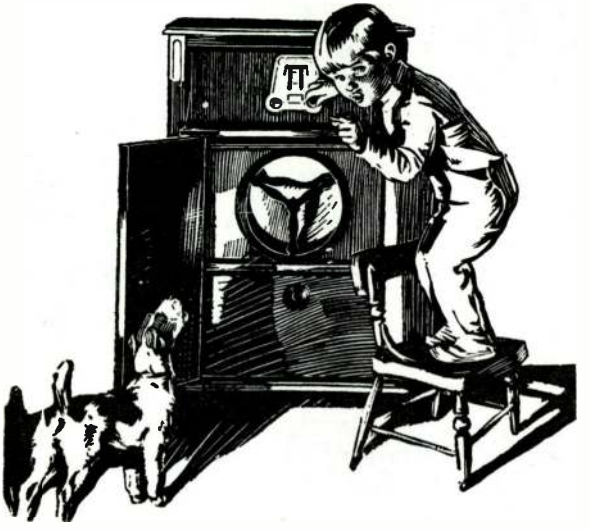


INSIDE VIEW
MAGNAFORMER SUPER

CUSTOM-BUILT
SUPERHET

See also pages 112 and 113.

THE ELECTRIC RADIO



Freshman EQUAPHASE

acids
trouble
batteries

no

water
excuses
makeshifts

Model G-7, illustrated, panelled entirely of genuine mahogany, contains a large cone speaker mounted on a Baffle Board, which is placed in a remarkably resonant tone chamber, rendering exceptionally fine tone quality and "true-to-life" reproduction.

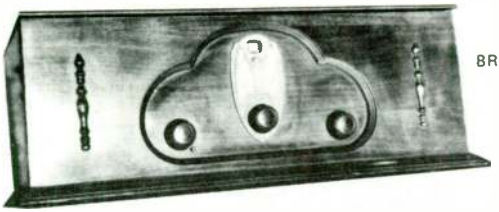
$185 COMPLETE
Ready to operate with new RCA AC ELECTRIC TUBES

A Freshman development—licensed under patents; RCA—General Electric Co.—Westinghouse Electric & Mfg. Co., and American Tel. & Tel. Co.

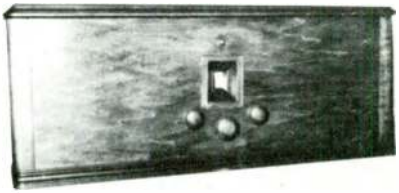
Sold on Convenient Terms

By Authorized Freshman Dealers

CHAS. FRESHMAN CO. *Inc.*, Freshman Bldg., New York



BRANDES B-10
BRANDES DIVISION, KOLSTER RADIO
1929 7 TUBES $85.00



NATIONAL CARBON CO.
EVEREADY MODEL I 1927

PILOT A-C SUPER WASP
SHORT WAVE RECEIVER
PLUG IN COILS
5 TUBES 1928

PHILADELPHIA STORAGE BATTERY CO.
PHILCO MODEL 514
1928 7 TUBES $125.00

STROMBERG-CARLSON
WITH UTAH SPEAKER 1928

BRUNSWICK 5WO
(RCA 60 CHASSIS)
1928 9 TUBES

See Also Pages 77, 81, 94, 113, 116.

CONSOLE RADIOS

Console radios were available in the early 1920's, but were not really popular until A-C radios swept the market. By 1929 there was a console in almost every living room, and it was an important member of the family.

SUPER ZENITH VIII
1924 6 TUBES $260.00

FRESHMAN MASTERPIECE
1925 5 TUBES

FALCK
"NO-BATTERY RADID"
5 TUBES AC $150.00 1927

RCA RADIOLA 30
1927 8 TUBES AC $575.00

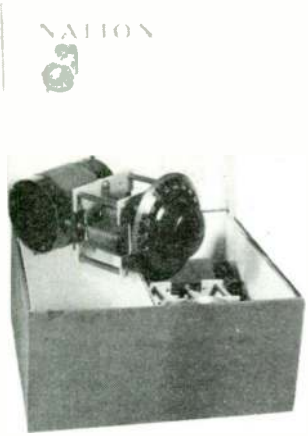
ATWATER KENT 44
POOLEY RADIO-CELLARETTE
1928 8 TUBES AC $536.00

GRIGSBY-GRUNOW
MAJESTIC
1928 8 TUBES AC $138.00

STROMBERG-CARLSON 638
1929 8 TUBES AC $380.00

PHILCO 86
NEUTRODYNE PLUS
1929 8 TUBES AC $275.00

ALL-AMERICAN MOHAWK
LYRIC
1929 10 TUBES AC $169.00



NATIONAL
BROWNING DRAKE KIT
1 STAGE R.F. REGEN.
DET. 2 STAGE AUDIO
1925 S.P. $22.00

BRANSTON
SUPER KIT
1924 S.P. $36.50

BREMER-TULLY
6 TUBE KIT
1925 S.P. $38.00

SAMSON
SUPER KIT
1925 S.P. $30.00

SCANNING-DISC TELEVISION

The principle of television was discovered in 1884 by Paul Nipkow who developed the Nipkow Scanning Disc. By 1928 scanning-disc TV was out of the laboratory. By 1932, Don Lee's W6XAO, at 7th and Bixel in Los Angeles and W2XF operated by RCA and broadcasting from Al Smith's Empire State Building were on the air with programming. By 1937 both Los Angeles and New York residents could receive transmissions on cathode ray tube reproducers. RCA, Gilfillan and others had console sets on the market. Meissner and Farnsworth were marketing kits. The DuMont Company, a pioneer in developing the VonArdenne C.R. tube had a 9" tube made by the Corning Glass Co. In 1940 RCA offered the 1" Iconoscope for amateur radio TV transmitters. Television started into full swing in 1946 with 3", 5", 7" and 10" receivers available to the public.

COMPLETE SCANNING DISC TELEVISION KIT — 1928

36-aperture scanning disc

Daven television Lamp — 1½ sq. in picture

1700 rmp motor for disc

Synchronizer control

Daven resistance coupled television amplifier

Television coil kit for receiver

CHAPTER V

RECEIVER COMPONENTS

In this chapter we describe the parts that were pieced together to make useful wireless receivers. Then we move on to the add–on parts that were needed to make broadcast receivers play.

In wireless days, the entire receiver was pieced together. A "syntonizer" tuner would be coupled to a detector, and the detector would be coupled to an output device (headphones, usually, or maybe a tape printer). For weak signals a sensitive relay or an amplifier tube would be used. Great skill and tender loving care were needed to make a wireless receiver do its job. In the right hands. the conglomerate receiver was a faithful work–horse. In the wrong hands, it was worse than useless.

Later, in the early days of broadcasting, buying a radio was like buying an automobile without engine, wheels, or tires. As the proud new owner, you found you needed an antenna (or aerial, as it was called), a ground wire, a lightning arrestor, batteries , tubes and headphones or speaker. Your original $60.00 outlay would spiral to $85.00, $100, or $125, depending on how fancy you wanted to be. This wasn't all bad; you were proud of your "Baldy" headphones, or exquisitely–curved horn speaker. You were willing to discuss the merits of your special sodion detector tube as compared to the 200A gas tube or the more pedestrian 201A vacuum tube. It was a big thing to get your radio aerial up an extra ten feet high, or to find a way to make it twenty feet longer. All these add–on parts helped in the race to hear more stations farther away than your neighbor could.

Dealer: "How do you like your new radio set?"
Scotsman: "The music is fine, but the wee little light is too dim to read by."
–1927

Home Set Builder: "I built that receiver all by myself and a thousand wouldn't buy it."

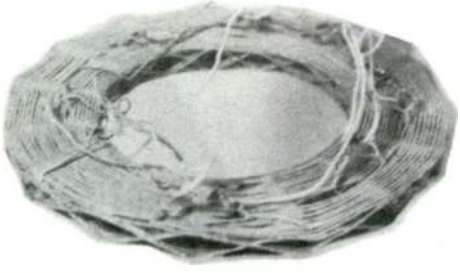
Neighbor: "You're right. I'm one of the thousand."
–1928

WIRELESS TUNING INDUCTANCES

Syntony or tuning was used as early as 1900. Brass tubes, Leyden jars, coils and variable resistors were used to tune the transmitter and receiver. The coils were tapped every ten turns and switch points were used. Then the slide tuner appeared, using up to three sliders. But the slider would wear out the wire on the coil and deposit copper between the turns. The E. I. Company corrected this in 1910 with a ball bearing slider. Litz wire came into use; this was many strands of small enameled wire wound into a cable.

The two–circuit or "loose coupler" next arrived, using a secondary winding sliding within the primary, and greatly increasing selectivity. By 1917 receivers were being made with a panel on which were found vario–couplers and variometers, making it possible to calibrate a dial.

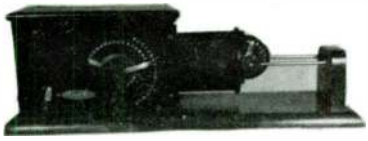
The honeycomb coil was used by DeForest and others and produced the first all band receivers. By changing coils one could tune from 200 to 31,000 meters without using the former loading coils. In the 1920s, with the coming of the tuned radio frequency receiver, many coils appeared on the market. Toroidal (doughnut) coils, spiderweb, figure–8, binocular and basket weave coils. The spider webs had a low loss as no coil form was used.



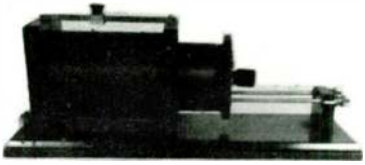
REINARTZ COIL

GREBE VARIO–METER

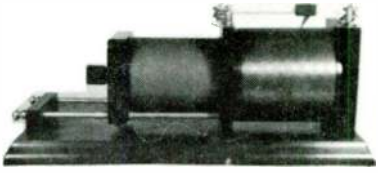
RECEIVING TYPE TRANSFORMERS
LOOSE COUPLERS



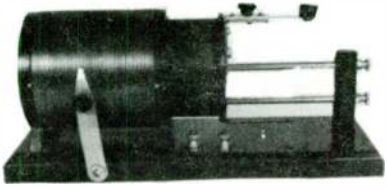
NAVY TYPE RECEIVING
TRANSFORMER 5A
WM. DUCK 1915 $19.50



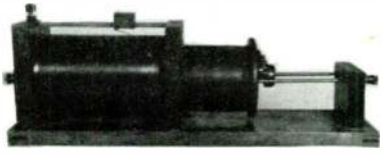
MURDOCK 337
1914 $12.00



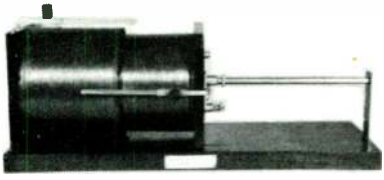
MURDOCK 334
1913 $25.00



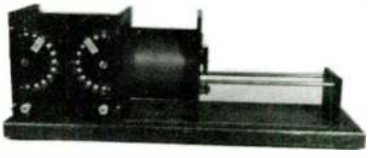
MURDOCK 335
1913 $13.50



ARLINGTON RECEIVING TRANSFORMER
WM. DUCK 1915 $9.00

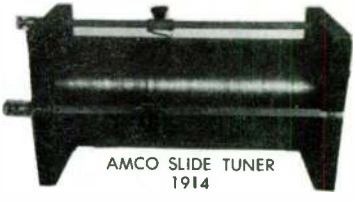


CLAPP-EASTHAM
1914

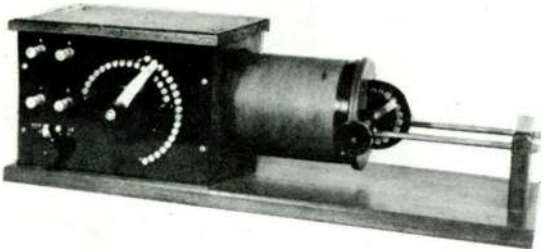


NAVY TYPE COUPLER

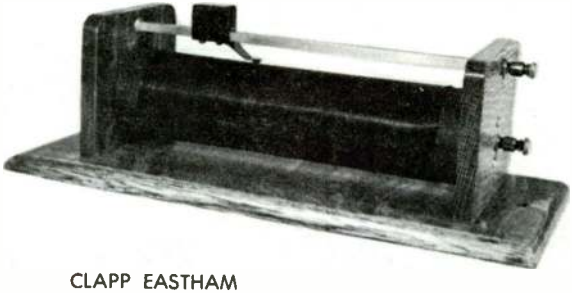
TRESCO LOADING COIL



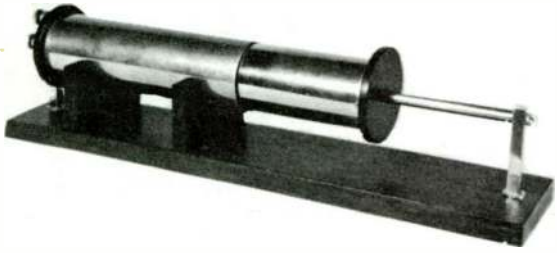
AMCO SLIDE TUNER
1914



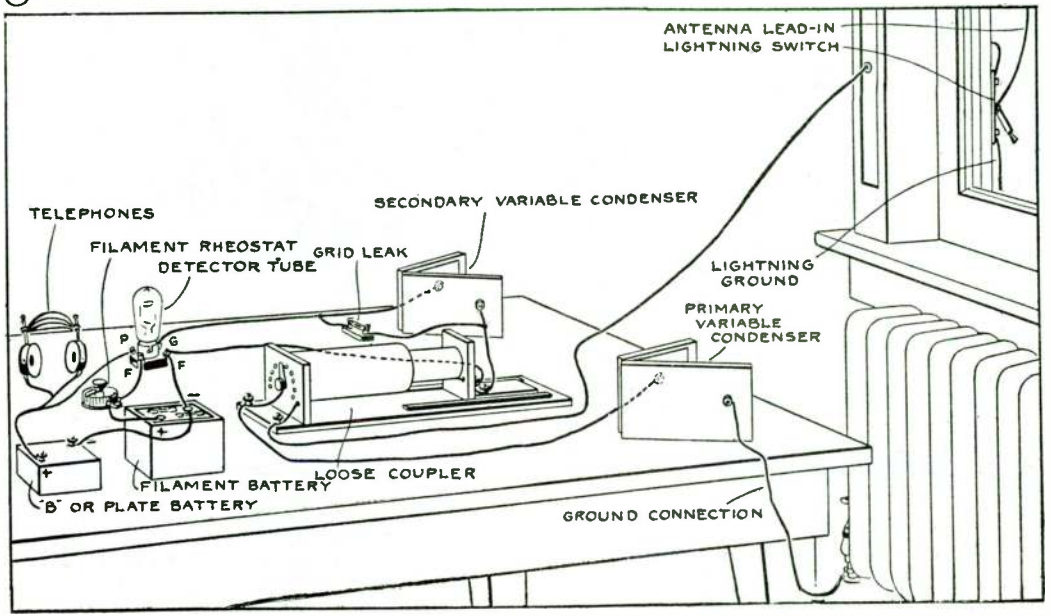
WIRELESS SHOP
A. J. EDGCOMB
NAVY TYPE TUNER
1917 S.P. $24.00



CLAPP EASTHAM
SLIDE COIL TUNER
1912

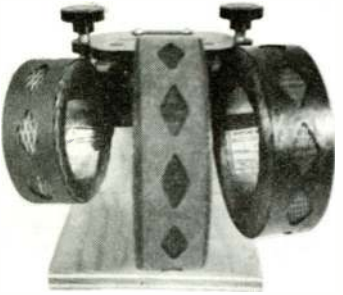


VARIABLE SLIDING CONDENSOR
ABOUT 1912



Assembly of vacuum tube receiving set and how it is connected with the ground and antenna. The location and connections for the lightning switch and lead-in insulator are also shown.

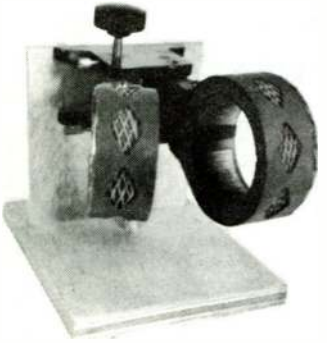
DUO-LATERAL HONEYCOMB COILS & MOUNTINGS



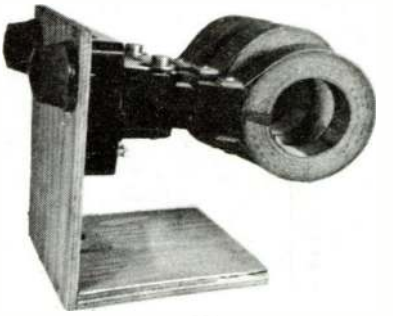
DEFOREST
COILS & MOUNTING
$16.50

SIGNAL
MOUNTING
FEDERAL COILS
$15.00

REMLER
COILS & MOUNTING
$15.00

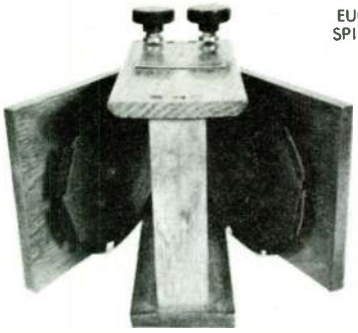


CROWN TWO
COIL MOUNTING
COTO COILS $10.00

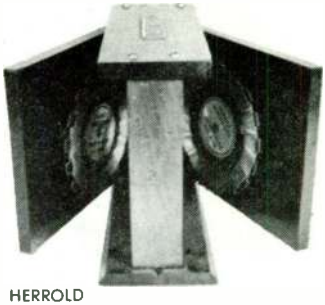


BRANSTON
COILS & MOUNTING
$17.50

TUNING UNITS



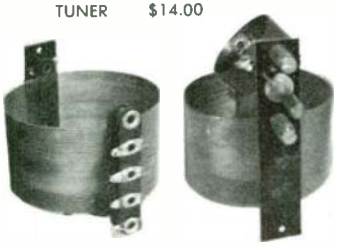
EUGENE TURNEY
SPIDERWEB COILS
$8.00



HERROLD
SPIDERWEB COILS
$8.00

ATWATER KENT
COUPLED CIRCUIT
TUNER $14.00

SIMPLEX
ADAMS MORGAN
VARIOCOUPLER 1920
$7.00



BROWNING DRAKE
COILS $3.50

MADISON MOORE
M5 R. F. TRANS.

VARIOMETERS & VARIOCOUPLERS
1919 TO 1923

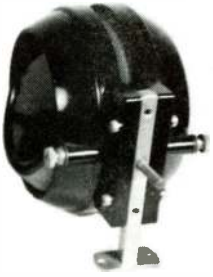
$6.00

RPM VARIOMETER
RADIO PROD. MFG.
CHICAGO $6.00

CHI-RAD
VARIOMETER
CHICAGO RADIO
APARATUS CO.
1919 $5.00

ATWATER KENT
VARIOCOUPLER
1922 $8.00

ATWATER KENT
VARIOMETER
1922 $7.00



REMLER
VARIOMETER
$7.50

Kellogg Radio Accessories

THE Kellogg Switchboard and Supply Company have been manufacturing complete telephone exchange equipment, telephones, switchboards, apparatus and supplies for over twenty-five years. Our plant in Chicago is probably the largest factory of its kind in the world. Our floor space covers fourteen acres, and our manufacturing equipment is complete, up to date and of high efficiency.

The Kellogg Company is known throughout the telephone world, it may be said, but we include this brief explanatory statement in this bulletin which is addressed to the Radio trade.

The Kellogg Switchboard and Supply Company has been foremost in the production of standard, high efficiency telephone equipment. Its extensive laboratories and experienced engineering personnel guarantee Kellogg products to be of the utmost reliability.

In theory, design, and practice, Kellogg circuits and apparatus are conservative, yet known to be of the greatest dependability. Kellogg insulating products, such as receiver shells, transmitter mouthpieces, and the many forms of insulators necessary in the telephone field are in the front rank.

With such equipment and such experience it is reasonable that Kellogg radio apparatus should take first place in reliability and economy, as it has done. We are receiving the most satisfactory reports from the trade generally at the fine performance of the Kellogg head sets, and other Kellogg equipment. The engineer, the practical radio man, and the amateur, all acknowledge this superiority.

In extreme sensitiveness, accuracy, sound reproduction, and convenience in use, the Kellogg radio telephones are in a class by themselves.

For twenty-five years, our motto has been, "Use, is the Test."

June 15, [illegible].

VARIABLE TUNING CONDENSERS

About 1905 both receivers and transmitters were being tuned with some type of variable condensers. Some of the early types were just a series of fixed condensers with switch taps, some were brass plates that slid in and out like a drawer. Marconi built a condenser with rotor and stator plates much like those in use today. Crosley used a "book" condenser. Murdock was famous for its variable condensers and made some with Bakelite cases that could be filled with oil to increase the capacity.

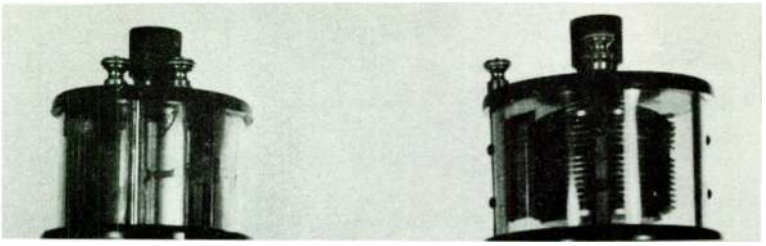
When broadcast stations began to crowd the band a condenser that spread the stations at the high end was needed. Some makers elongated the plates, others cut away part of the plate to make them elliptical. Then came the low-loss era; Bakelite end plates were left off or replaced with metal ones. C. J. Fitch used triangular plates which operated like a clamshell. Remler used square plates that operated the same way. Both of these gave a straight line frequency condenser which spread the stations and gave a high maximum and low minimum capacity.

Soon simpler tuning was needed and one and two dial receivers appeared in which the condensers were ganged with metal belts, chains, universal joints and levers. Ten gang condenser units were known. There were also compression types, but losses were very high.

Marconi, 1906.

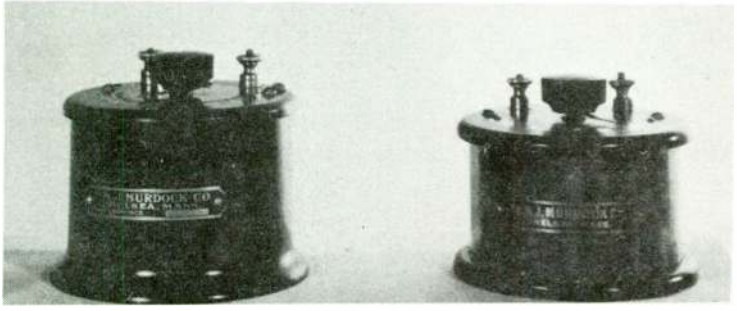
E. I. Co., No. 1000.

EARLY TUNING CONDENSERS



MURDOCK 360
7 PLATE .0005
1913 $5.00

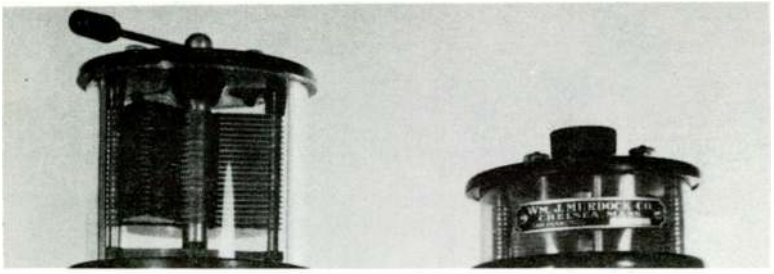
MURDOCK 361
TAPPED DISC. O TO .001
1913 $8.50



MURDOCK 367
43 PLATE .001
1914 $4.50

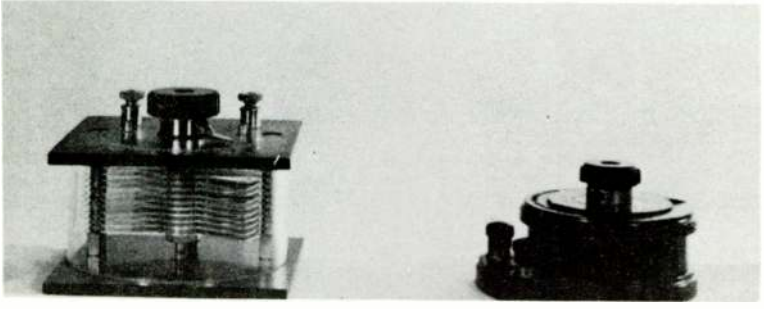
MURDOCK 366
43 PLATE .001
1914 $4.50

EARLY TUNING CONDENSERS



BLITZEN
CLAPP-EASTHAM .001
43 PLATE 1914 $5.00

MURDOCK 368
23 PLATE .0005
1914 $4.50



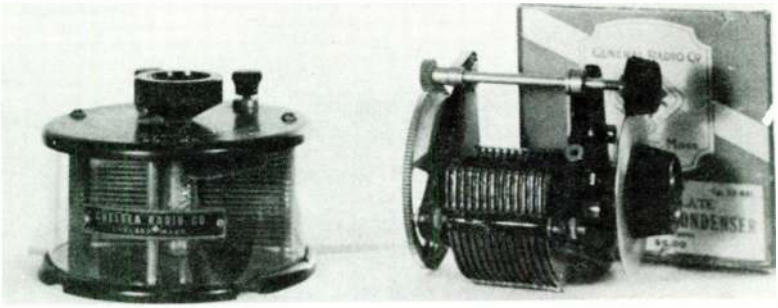
TEWNO #53
21 PLATES .0005
1916 $4.75

CONNECTICUT
COMPRESSION TYPE
1910 .001 $6.50

EARLY TUNING CONDENSERS

Camfield Type 888

Acme A-600



Chelsea 1919

General Radio Vernier

WIRELESS DETECTORS

The first detector was a "coherer," simply a glass tube containing iron filings. A strong wireless signal passing through it caused the filings to cling together. But the top code speed was about 15 words per minute, too slow for commercial use; land telegraph lines were then doing 45 WPM.

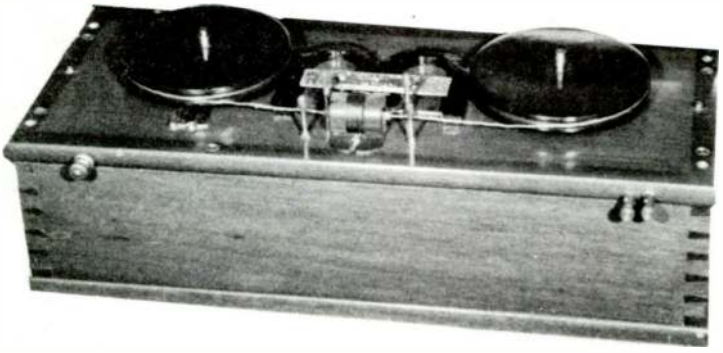
In 1899 Lee DeForest read articles by Ashkinas and Neugschwender, who had found that a piece of tin foil on a glass plate, when cut into with a razor blade, would detect electric waves if a drop of alcohol and a battery was attached across the cup gap. DeForest developed this detector by using tin for the gap and peroxide of lead paste as the electrolyte. This detector was self-restoring and could be used at any code speed.

Magnetic detectors were introduced in 1902, using the properties of an iron wire moving through magnetic fields.

About 1902 Pickard used two needles and a carbon block as a detector; Fessendsen patented the electrolytic detector about the same time. This was a carbon cup of diluted acid with a platinum wire immersed in it; this like the carborundum detector required a battery. H. H. Dunwoody patented the silicon crystal detector in 1906, followed by Pickard with other crystals.

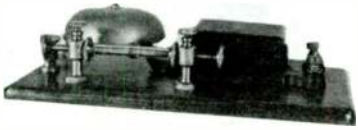
Other types followed: The Barr mercury cup, the Perikon using two minerals, the Ferron and the famous Crystaloi using a hollow button filled with a sensitive mineral powder and many needle points; it only needed to be revolved to find a sensitive spot. When arc, alternator and tube transmitters came in, producing an undamped wave, the crystal detector would not receive them. So a buzzer circuit was inductively coupled through the antenna or a "ticker wheel" was used to break the signal into audio frequencies. A motor driven chopper wheel at the transmitter achieved the same purpose.

In the 1920's the crystal detector was made in many types; fixed for the reflex sets, and the common Galena with "cats whisker."



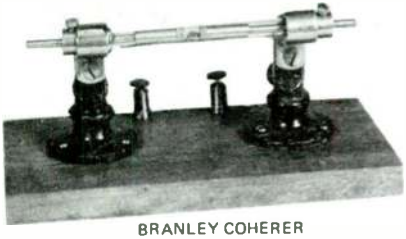
Marconi Magnetic Detector, 1905

BRANLEY COHERER AND DECOHERER
WITH KEY WIND TAPE PRINTER
ABOUT 1902 TO 1905



ELECTRO IMFORTING CO.
E. I. CO.
PRECISION COHERER
1910

SENSITIVE RELAY
USED
WITH COHERER DET.
1910

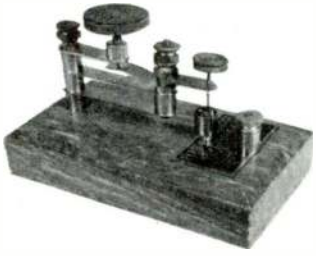


BRANLEY COHERER
ABOUT 1902

CRYSTALOI
WIRELESS DETECTOR
TYPE AA ABOUT 1914
$6.00

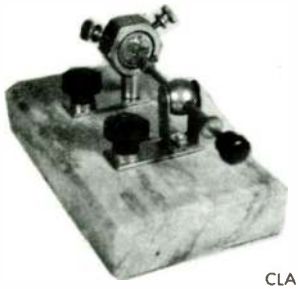
ELECTRO IMPORTING CO.
RADIOSON ELECTROLYTIC
DETECTOR, ABOUT 1914

MURDOCK
SILICON DETECTOR
WITH CONDENSOR
1913 $4.50



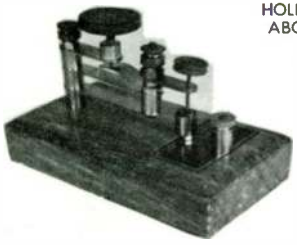
J. J. DUCK FERRON DETECTOR
HOLLAND BLUE MARBLE BASE
1913 $4.00

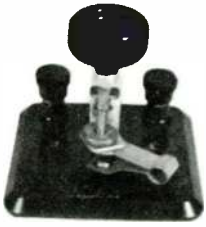
WIRELESS DETECTORS



CLAPP-EASTHAM
FERRON DET.
HOLLAND MARBLE BASE
ABOUT 1914 $3.25

ELECTRO
GALENA DET.
F. I. CO., 1914



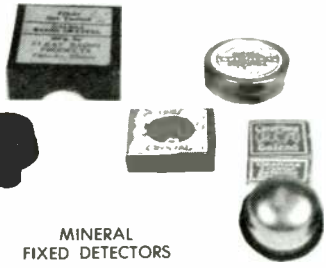


PEROXIDE OF LEAD
DRY ELECTROLYTIC
E. I. CO., 1913

THREE MINERAL DET.
JOHN A. FIRTH CO.

BABY DETECTOR
E. I. CO., 1915 $ .25

BALL SLIDERS
FOR SLIDE TUNERS
E. I. CO., 1910



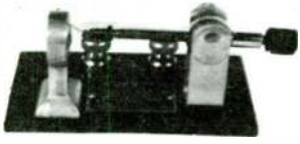
MINERAL
FIXED DETECTORS

WIRELESS DETECTORS

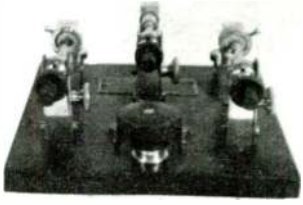
DEFOREST D-101
CRYSTAL DET.
$2.60

DEFOREST
CRYSTAL DET.

MURDOCK
324 DETECTOR
1919 $ .75



WIRELESS SPECIALTY
APPARATUS CO. 1919



WIRELESS SPECIALTY CO.
TRIPLE DETECTOR STAND
1917

DETECTOR MINERAL
CATWHISKERS

PHONE CONDENSORS
MURDOCK A. J. MORGAN PARKIN
1912 TO 1915

CRYSTAL DETECTORS IN THE 1920's

KENNEDY

KOLSTER

CARBORUNDUM
WITH BATTERY

FRESHMAN

DE FOREST
D 101

PACENT

FIXED DETECTORS

FADA

THE FLEMING VALVE

Thomas A. Edison laid the groundwork for thermonic detection of high frequency oscillations in 1883. Edison found that a black deposit formed on the inside of an electric light with use. These particles, he discovered, were part of the filament. He sealed a plate in one of his lamps and found that with it connected to the positive end of the filament, current would flow from the filament to the plate. Edison patented this as an "Electrical Indicator" and called the phenomenon, "The Edison Effect." Other pioneers became interested in the effect. Prof. Edwin J. Houston, Sir William Preece, Julius Elster and Hans Geitel of Germany all made experiments but it remained for Ambrose J. Fleming to perfect a new type of detecting device for receiving wireless oscillations.

Fleming, formerly with the Edison Co., had taken a new job with Marconi. He was hard of hearing and desired a visual indicator to use in place of audio detection. He thought of his work with Edison and decided to try one of the Edison Effect lamps. He set up the necessary circuits and found that a galvanometer gave a steady direct current reading. He then knew he had found a better rectifier for wireless oscillations.

Fleming, then, was not the inventor of, but actually the first to find an application for the Edison Effect phenomenon. On Nov. 7, 1905 he patented the "Fleming Oscillation Valve" or Glow Lamp, as he called it and it was the first thermonic wireless detector.

This valve was a diode and was made in many forms. It detected but did not have any intensifying qualities. By 1907 the Marconi Corporation was manufacturing Fleming valves for commercial use. They varied from approximately an inch to an inch and one quarter in diameter and from three and a half to four inches long. Both the Edison bayonet base and the Edison medium screw base were employed. No plate battery was used, merely a filament battery, and it was found that four volts was sufficient for wireless detection.

THE VACUUM TUBE

The vacuum tube was given its start in 1880 when Julius Elster and Hans Geitel of Germany found that adding a plate to an incandescent lamp gave a "valve" effect. Thomas Edison in 1883 found that a current would flow from a heated filament to a positively charged electrode within a lamp. John Fleming found that using the "Edison effect" rectification took place and could be used as a wireless detector.

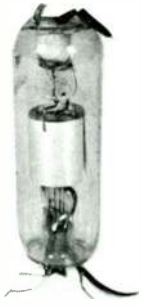
In 1900 Dr. Lee DeForest while testing his new type detector (called a "Responder") noticed that his Welsbach gas burner would dim when he operated his spark coil. In 1903 he used two platinum electrodes, one holding table salt, and detected signals by the change in the flame as current passed across the electrodes. This led DeForest to heating gas in a carbon filament lamp, and he had the H.W. McCandless Co. (makers of Xmas tree lights) make some two element tubes, which he patented. In 1906 DeForest applied for a three element tube patent, publicly announced a year later. In 1908, at the suggestion of the McCandless Co., the Audions were made spherical, and remained that way for some time. In 1909 they were made with a double grid and a double plate.

About 1910 DeForest made the RJ4 detector, sold as a unit with a DeForest Audion, the only way it could be bought. By 1915 the Audion tube was tubular and had a double filament. Next came Moorhead with Shaw bases, and diodes with a control electrode on the outside, done to bypass the DeForest patent. During the war Western Electric made the famous VT-1 and VT-2. In 1919 General Electric made their advanced UV-200 and UV-201 for R.C.A. From this date many makes appeared on the market.

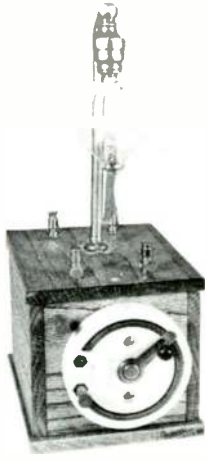
Replica of DeForest gas flame detector.

DEFOREST GAS FLAME DETECTOR
FORERUNNER OF THE VACUUM TUBE
REPLICA 1904

DEFOREST AUDION DETECTOR
TYPE RJ4
1909 $18.00 COMPLETE

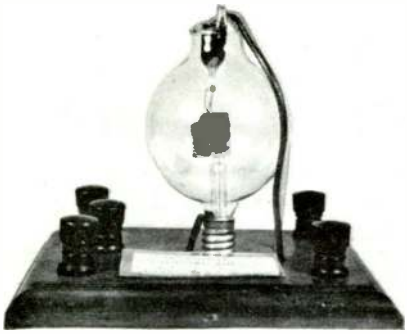


HANDMADE EXP. TUBE
1916



AUDION CONTROL BOX
FOR DEFOREST AUDION
1910

DE FOREST TUBES



DE FOREST
SPHERICAL AUDION
SINGLE GRID & PLATE
1909

TUBULAR VERSION
ALSO MADE IN 1910

DE FOREST
SPHERICAL AUDION
DOUBLE GRID & PLATE
1909

DE FOREST AUDION
PATENTED 1907

DE FOREST OSCILLION
SINGER TUBE 1917

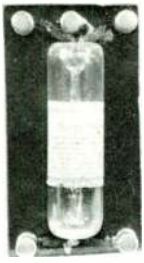
DE FOREST TUBULAR AUDION
1916

EARLY TUBES

ELECTRON RELAY
PACIFIC LABS, 1915

WEAGANT VALVE
EXTERNAL GRID
1913

MARCONI TUBE
MADE BY
H. J. ROUND
1911

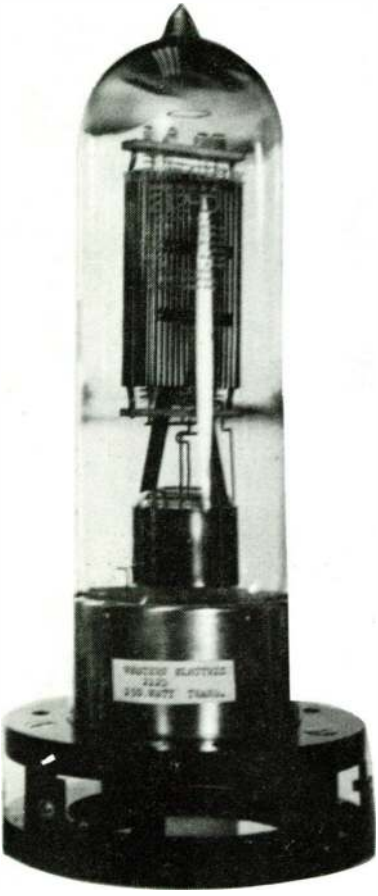


AUDIOTRON
DOUBLE FILAMENT
1915

AUDIOTRON
WITH ADAPTER

WESTERN ELECTRIC TUBES

Western Electric was one of the earliest tube manufacturers. In 1915 they worked on the transAtlantic telephone tests at Arlington, Virginia, using a bank of 550 tubes in parallel – which would be an accomplishment even today. In 1917 they started work on the repeater bulbs for telephone use, using the ladder grid construction. In 1918 W. E. made the VT-1 and VT-2 tubes for the U. S. Signal Corps; the former was a general purpose detector-amplifier and the latter a five watt oscillator-modulator. In 1919 Western Electric introduced the 50 watt type 211 transmitting tube and the "Peanut" N tube (215A) used in Western Electric receivers.



W. E. 212D
250 WATT TRANS.

W. E. VT1 1918
AND
N (215A) 1919

W. E. VT2
5 WATT TRANS.
1918

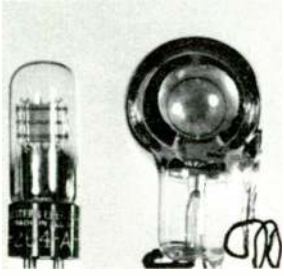
WESTERN ELECTRIC
VT1
DET. 1918 AMP.

WESTERN ELECTRIC
VT2
OSC. 1918 MOD.

WESTERN ELECTRIC
216A
SPEECH AMP.

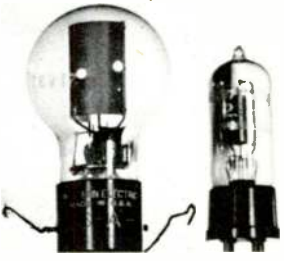
WESTERN ELECTRIC
101 F
5 WATT TUBE

WESTERN ELECTRIC
205 D
5 WATT MOD.



WESTERN ELECTRIC
264 A
DETECTOR AMPLIFIER
1923

WESTERN ELECTRIC
239 A
DETECTOR AMPLIFIER
1923



WESTERN ELECTRIC
231 D

WESTERN ELECTRIC
1 A
PHOTO CELL
EARLY TYPE

WESTERN ELECTRIC
PHOTO CELL

FOREIGN TUBES

BRITISH "R" TUBE
1917

PHILLIPS TUBE

MULLARD BRITISH
PM-22

TELEFUNKEN
TYPE EVE-193

TELEFUNKEN
TYPE ER 58

TELEFUNKEN
TYPE EVN-194

MARCONI
OSRAM VALVE

MARCONI
P-410

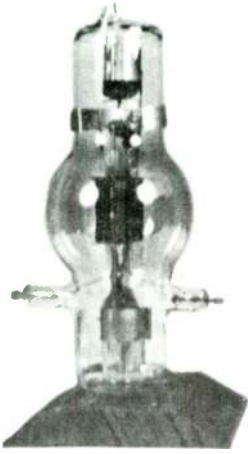
EARLY TUBES WITH SHAW BASES

A - P
TRANS. TUBE
1920

MOORHEAD
ELECTRON RELAY
1920

MOORHEAD
AMPLIFIER

MARCONI VT
1920

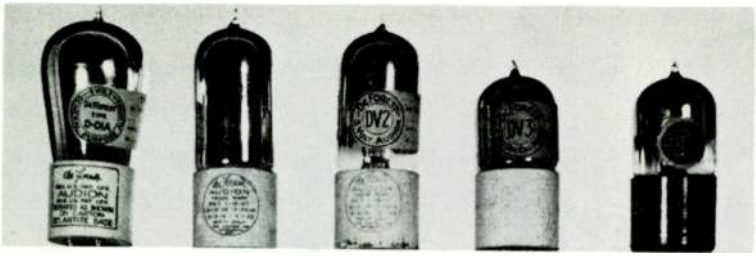


DE FOREST
TYPE H

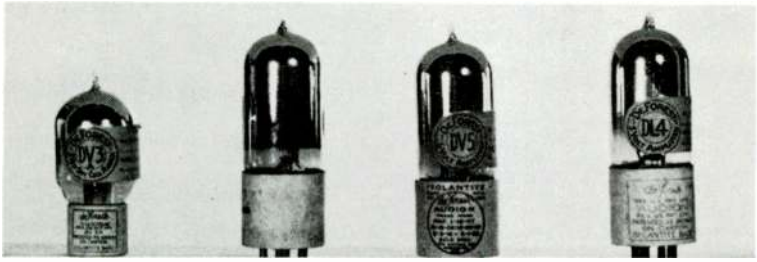
MOORHEAD
1917

VT - 14

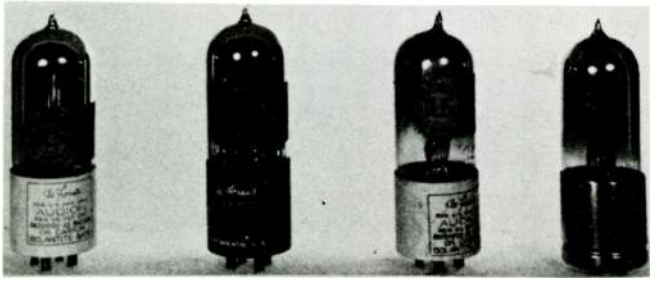
DE FOREST TUBES



DE FOREST DO1A | DE FOREST DV 1 | DE FOREST DV 2 | DE FOREST DV 3 | DE FOREST DV 3

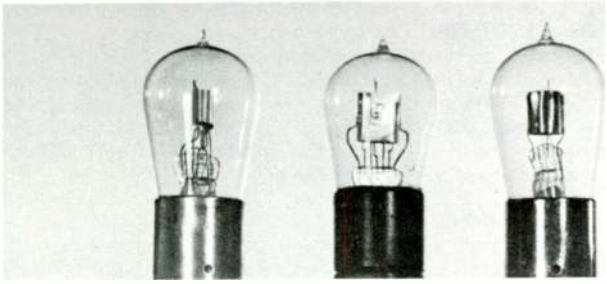


DE FOREST DV 3A | DE FOREST DV 4 | DE FOREST DV 5 | DE FOREST DL 4



DE FOREST DL 5 | DE FOREST DL 7 | DE FOREST DL 15 | DE FOREST AMP.

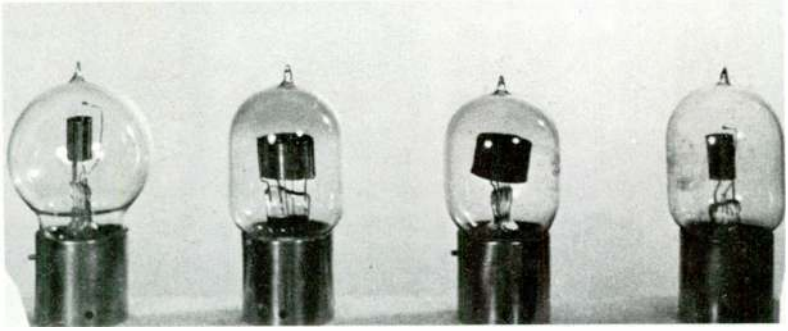
EARLY TUBES



VT 14
AUDION

DE FOREST
AUDION DET
1920

TB1
G. E. VOLTAGE
REGULATOR



MOORHEAD
ROUND TYPE AMP.
1920

MOORHEAD
ELECTRON RELAY
1920

DE FOREST AUDION
MADE BY MOORHEAD
IN S.F., 1920

ATLANTIC-PACIFIC
A-P AMPLIFIER
1920

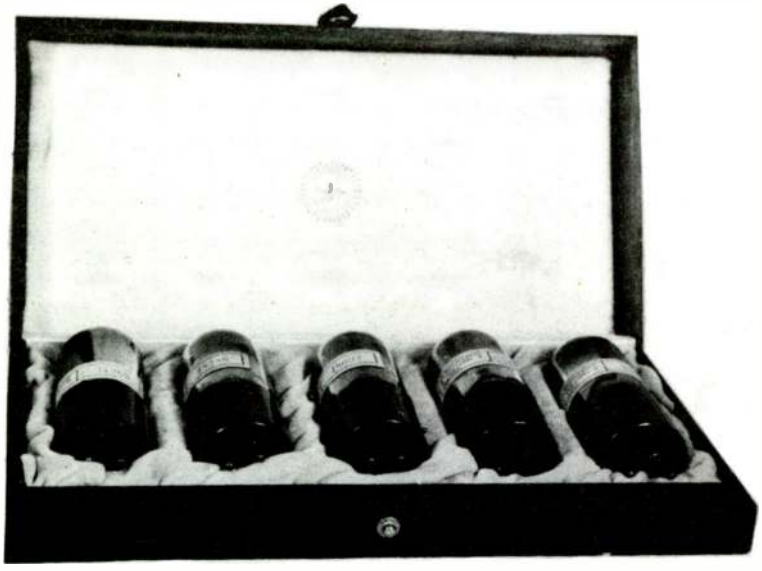
BROADCAST VACUUM TUBES

In 1919 radio was given a real boost when the Radio Corp. of America and Elmer Cunningham announced the 200 and 201 tube made by General Electric. The type 200 was a soft detector and the 201 was a hard detector-amplifier. Both were rated at five volts and one amp filament, with "A" versions at .25 amp.

Radio stations with regular broadcasts were in full swing by 1921, and the receiver business was booming. A growing business was that of rebuilding tubes due to the tube shortage; charge was usually one to two dollars. Bootleg tubes were common and sold for about $5.00; some were very good.

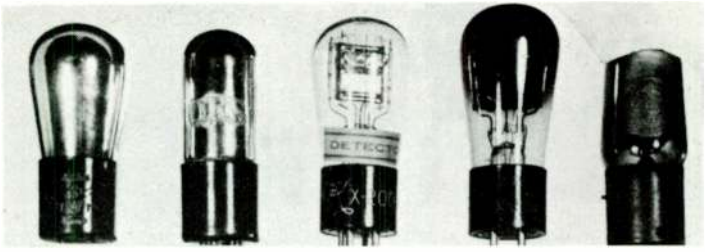
1923 saw a need for tubes that would operate on dry batteries. Westinghouse made the WD-11 and WD-12 for RCA (both 1.1 volts, .25 amp.), and G.E. made the type 199, rated at three volts, .06 amp. The next two years brought many special tubes: The DeForest DV series, the Connecticut T&T Co. double sodium vapor detector, the Electrad diode to be used in place of a crystal detector, and the Welsh peanut tube with the control element outside the tube.

1926 brought better tubes such as the 120 and 112 series. They were hard amplifiers, and with proper bias circuits improved tone quality. The Raytheon BH cold cathode rectifier for "B" battery eliminators appeared. Also the first tubes to use A.C. on the filaments: McCullough, Ardon and Kellog. The following year extremely practical A.C. tubes appeared: the 226 with a filament slow to cycle action and the 227 with a cathode unit. These made possible the era of all-electric sets. Screen grids became common in 1928.



Geo. E. Brightson's True Blue Tubes.

EARLY TUBES



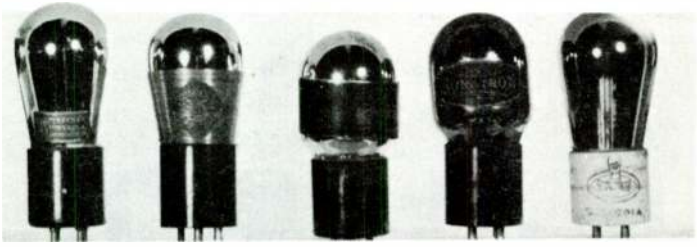
STEWART WARNER 201A TYPE AMP. 5 VOLTS

QRS 201A TYPE DET. AMP. 5 VOLTS

SUPER AIRLINE GX 201 A MONTGOMERY WARD

MAGNAVOX TYPE A AMPLIFIER

OK X 200-A SOFT DETECTOR 5 VOLTS



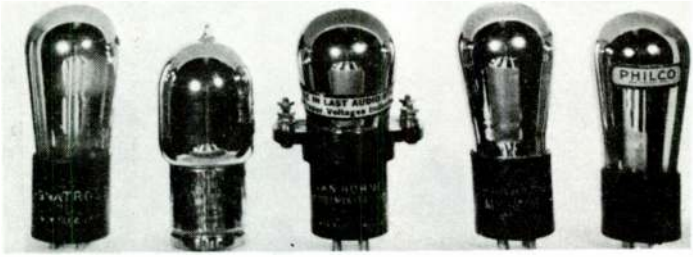
5 VOLTS PERRYMAN H 201A DET. AMP. 5 VOLTS

CONCERT MASTER FIRST TYPE TUBE SHIELDING

DAVEN MU 6 AMPLIFIER 6 VOLTS

SONATRON 201A AMPLIFIER 5 VOLTS

SUPERTRON SX 201 AMPLIFIER 5 VOLTS



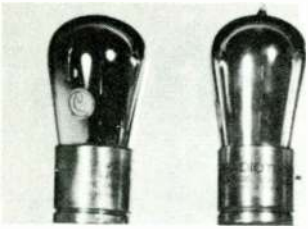
MAGNATRON DC 201A DET. AMP. CONNEWEY ELEC. LAB.

A. P. TWO IN ONE TWO SEPARATE TUBES ATLANTIC-PACIFIC

MARATHON MX 201A DET. AMP. 5 VOLTS

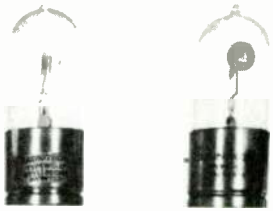
PHILCO 112A LAST AUDIO STAGE

MUSSELMAN



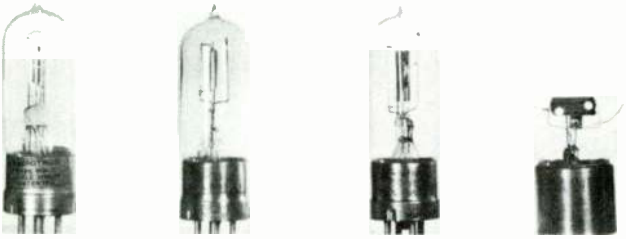
CUNNINGHAM C 301A
AMPLIFIER
1923

RADIOTRON UV 201A
AMPLIFIER
1923



RADIOTRON WD 12
DETECTOR
1923

CUNNINGHAM C 12
DETECTOR
1923

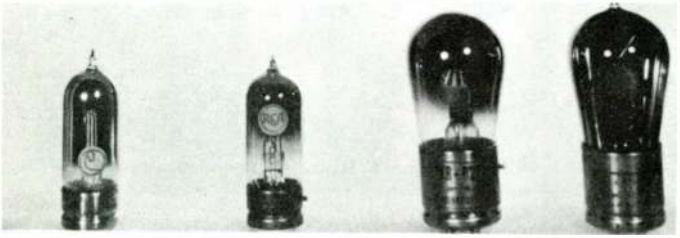


RADIOTRON WD 11
DETECTOR
1923

WESTINGHOUSE WD 11
AERIOLA
DETECTOR 1923

WESTINGHOUSE WR 21
AERIOLA DET.
1923

VACOBUB 201
DETECTOR



CUNNINGHAM C 199
DETECTOR
1923

RADIOTRON UV 199
DETECTOR
1923

KR Q201A
DETECTOR
AMPLIFIER

PANAMA 0201A
DET. AMP.
5 VOLTS

★

Get a good detector

Radiotrons WD-11 and WD-12 are the same tube but with different bases.

Radiotron WD-12 has a standard navy-type base. With it, you can change your set to dry battery operation. Ask your dealer today.

RCA

This symbol of quality is your protection

What will Radiotron WD-11 and WD-12 do as detectors? First—they are sensitive to weak signals—superlatively sensitive, as remarkable distance performances show in thousands of one-tube sets. Second, they are good "oscillators"—and that is important in regenerative circuits. And third, they are quiet in operation—add no electrical noises to the music, or speech. Radiotrons WD-11 and WD-12 are famous as audio and radio frequency amplifiers—too—and have made possible the hundreds of thousands of dry battery receivers that are in use today. They mean clear, true reception—over big distances—with dry batteries! Be sure to get a *genuine Radiotron*.

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Radiotron

REG. U. S. PAT. OFF.

★ Tested and approved by RADIO BROADCAST ★

RADIOTRON UV 199
DET. AMP.
3.3 VOLTS

RADIOTRON UX 199
DET. AMP.
3.3 VOLTS

RADIOTRON UX 120
LAST STAGE AUDIO
3.3 VOLTS

RADIOTRON WD 11
DETECTOR
1.1 VOLTS

RADIOTRON WX 12
DETECTOR
1.1 VOLTS

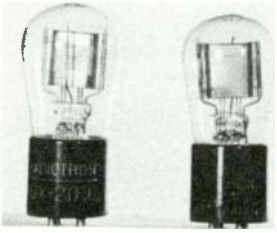
RADIOTRON UX 112
LAST
AUDIO STAGE

RADIOTRON UX 112A
LAST
AUDIO STAGE

RADIOTRON UV-877
PROTECTIVE
TUBE

RADIOTRON UX 171
LAST
AUDIO STAGE

RADIOTRON UX 171A
LAST
AUDIO STAGE



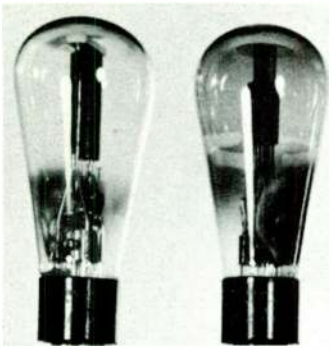
RADIOTRON UX 200
SOFT DETECTOR
5 VOLTS

RADIOTRON UX 200A
SOFT DETECTOR
5 VOLTS

RADIOTRON UV 201A
DET. AMP.
5 VOLTS

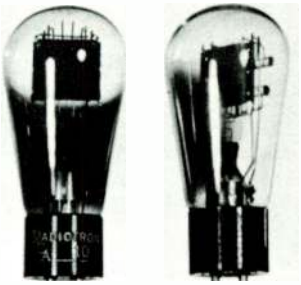
RADIOTRON UX 201A
DET. AMP.
5 VOLTS

EARLY TUBES



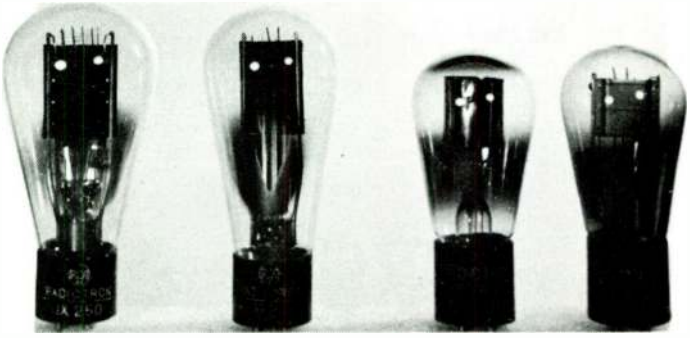
WESTERN ELECTRIC 271A

WESTERN ELECTRIC 277A



RADIOTRON CA 10 15 WATT TRANS.

RADIOTRON UX 210 15 WATT TRANS.

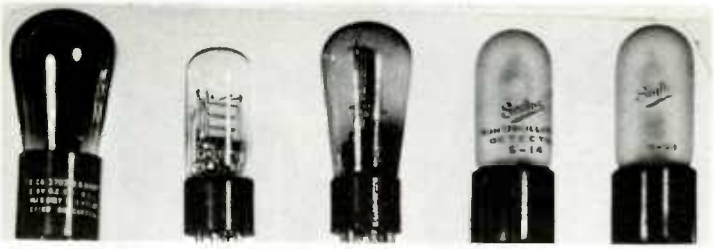


RADIOTRON UX 250 CLASS A AMP. MODULATOR

RADIOTRON UX 281 RECTIFIER

RADIOTRON UX 874 RECTIFIER

RECTRON UX 216B RECTIFIER



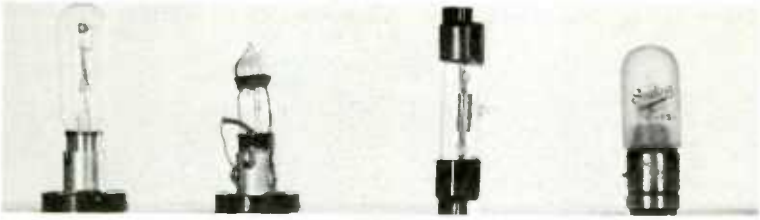
U.S. NAVY CG–1787 DET. AMP. 1923

U.S. ARMY VT 24 SIGNAL CORP. 1928

WUNDERLICH FIRST DIODE TRIODE 1932

SODION S 14 CONNECTICUT TEL & TEL CO.

SODION D 21 CONNECTICUT TEL & TEL CO.

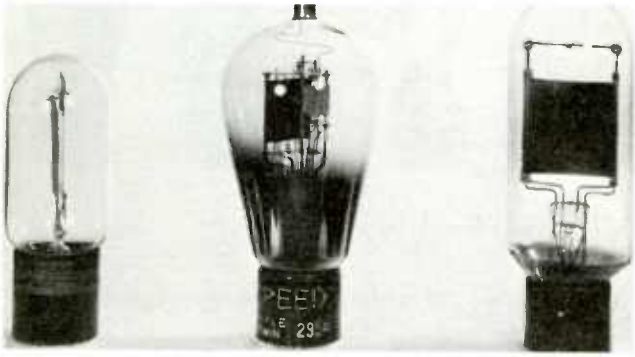


ELECTRAD DIODE 1½ VOLT 1923 $2.50

WELSH PEANUT EXTERNAL GRID 1923 $2.00

MEYERS RAC 3 DET. AMP. 1920 $5.00

SODION S13 NON OSCILLATING CONN. TEL & TEL 1923



DAVEN TELEVISION NEON LAMP 1929

SPEED TRIPLE–TWIN DIRECT COUPLED

ARCTURUS TELEVISION NEON LAMP 1929

after Painting by John Trumbull

The Golden Rule Tube

The Sodion does not oscillate.

No declaration as to sensitivity, signal strength—or quality of tone—can mean half so much to every broad-minded radio enthusiast as this simple statement of fact.

For there—in five words—you have the key to the solution of the problem of eliminating the whistles, the squeals and the howls that interfere so seriously with your enjoyment of radio today.

Don't misunderstand—

The Sodion does not protect YOUR reception against these noises from other sets.

But, because it does not oscillate—because it cannot reradiate—because it cannot whistle and howl—the Sodion DOES prevent your reception from interferring in any way with the reception of others.

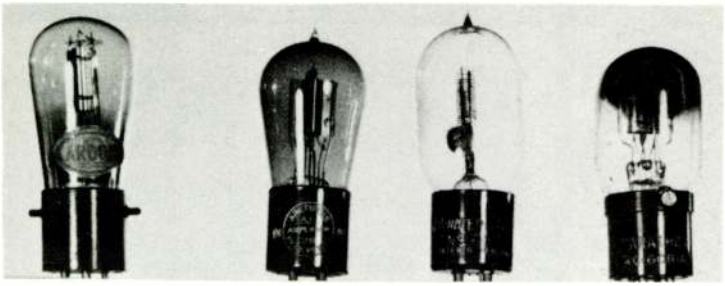
This, we believe, is the practical way of eliminating one of the greatest faults in broadcast Radio reception.

In point of efficiency the Sodion Tube is far more sensitive and produces stronger signals than any detector now on the market. Its tone is fully equal to that of the finest crystal with the added advantage of great volume.

Descriptive Bulletin upon request.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
MERIDEN Radio Division CONNECTICUT

EARLY TUBES

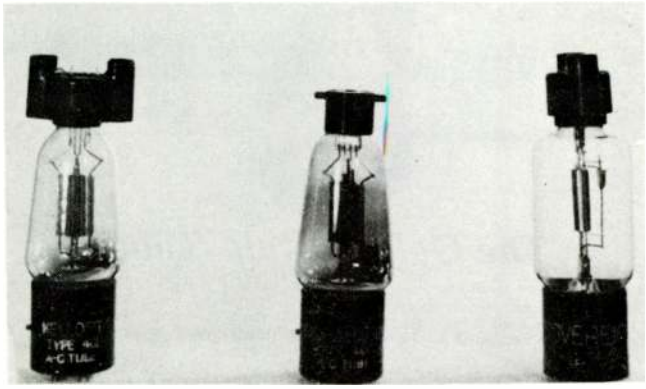


CARDON AC 373
MFG. CARDON CORP.

ARCTURUS 28
15 VOLTS AC

ATWATER KENT
AC RECTIFIER

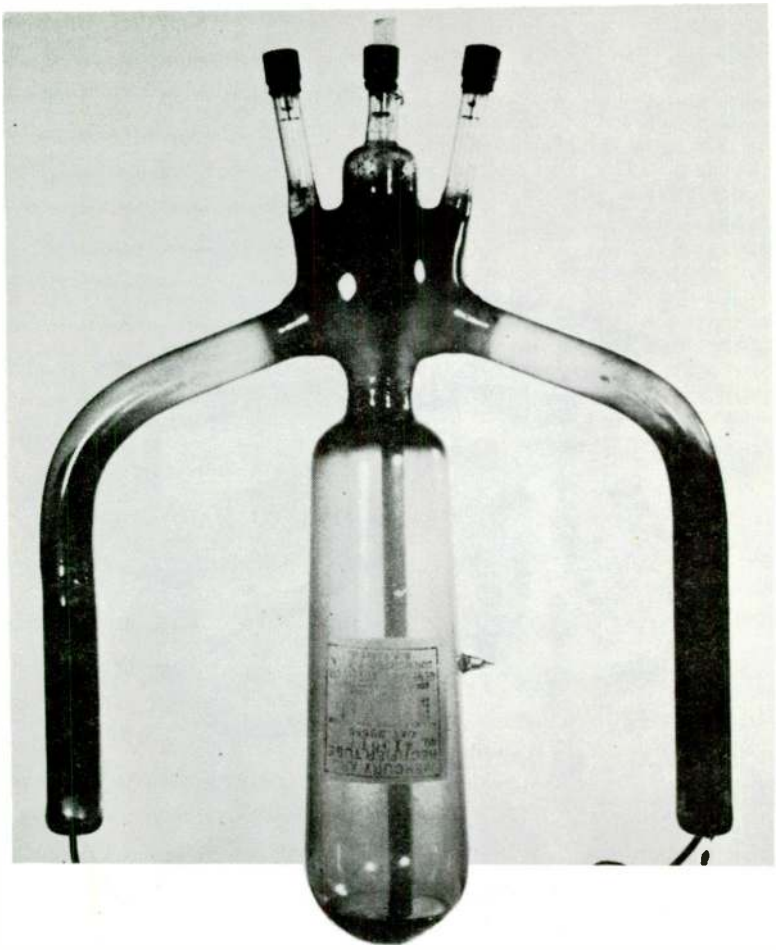
MARATHON 608 A
AC TUBE



KELLOGG 401
AC TUBE WITH
CAP

McCULLOUGH 401
FIRST AC TUBE
PAT. BY McCULLOUGH

SOVEREIGN
AC TUBE WITH
CAP



MERCURY ARC
RECTIFIER
GENERAL ELECTRIC
3,000 VOLTS 1918

HEADSETS

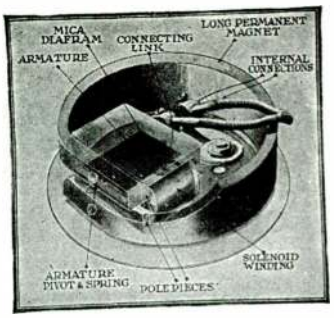
Low resistance telephone receivers were the first used with radio receivers. The coherer was usually used with a tape printer. With the coming of self-restoring detectors it was found that receivers with higher resistance ratings were needed. Early 1,000 Ohm receivers usually appeared as a single unit, soon followed by double headsets. Some of the early makes were: Holtzer-Cabot, Brownies, Mesco, Brandes, Baldwin and Western Electric.

Murdock "55" receivers were sold by the thousands at $5.00; they were a good reliable unit. Brandes were popular at $10.00. Baldwin headsets were made with mica diaphrams and gave more volume than others; the makers claimed they were equal to an extra stage of audio amplification, and sold for $16.50.

During the 1920s other common makes were Automatic Electric, Kellogg, Frost, Kennedy, Stromberg-Carlson, Federal and Red Head.

Holtzer-Cabot.

Mesco.



This illustration shows the amplifying mechanism in a Baldwin unit. Note that four pole pieces of single solenoid act on the armature, which in turn connects with the super-sensitive mica diaphragm.

Type "C" Navy standard	$16.50
Type "E" Super-sensitive	20.00
Type "F" light weight	21.00
Units for loud speakers	
Type "C"	$8.50
Type "E"	10.00

1922

Equal to two stages of radio amplification

THE experience of leading radio operators—who have found Baldy Phones "equal to two stages of radio amplification"—clearly indicates the outstanding advantages of using good phones. From a standpoint of radio efficiency, you will get "more value per dollar" from your investment in Baldwin Amplifying Phones than from any other item of your equipment.

Here are the actual (un-asked-for) letters from experienced radio men, telling of their results with Baldys. They're worth careful reading!

"Have used a pair of Type 'C' Baldys for some time, in naval communication and commercial service. Consider them the most sensitive telephone on the market." (Name on request.)

"I faithfully believe the use of Baldwin Phones will improve any receiving set at least 50%." (Name on request.)

"Have found your Baldwin Telephones equal to one and two stages of radio amplification." (Name on request.)

"In our station it is a common occurence to place the receivers (Baldys) on the table and copy in daylight the long undampt wave stations with but one V.T." (Name on request.)

"Equal to one and two stages of radio amplification": Of course Baldys cost more—but where can you get better value? Where else can you buy amplification equal to the super-sensitive Baldwin mechanism for so little?

And the more limited your investment in radio must be, that much more important becomes the use of a super-sensitive and selective Baldwin head set!

The best radio dealer in your town undoubtedly has a supply of booklets explaining the superior construction of Baldwin Phones, Eldredge Meters, and other Firth Specialties. If he does lack a supply, write, mentioning his name and address, direct to

JOHN FIRTH & CO. Inc., 18 Broadway, New York

Distributors for

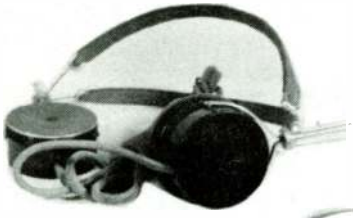
Baldwin Phones — U. S. Bureau of Standards
Eldredge Meters — Wavemeter
Kolster Decremeter — Brownie Adjustable Phones

Dealers: Write for advance information on new popular-priced loud speaker

BALDY FOR LAND SEA AND IN THE AIR PHONES

WIRELESS HEADSETS

BALDWIN RECEIVERS
PATENTED MAY 1910
FIBER DIAPHRAGMS
TYPE C $16.50



BALDWIN RECEIVERS
ALUMINUM DIAPHRAGMS
TYPE G $20.00

MURDOCK 55
1913 $4.50

WESTERN ELECTRICS
2200 OHMS 1919
$20.00

BALDWIN RECEIVERS
MICA DIAPHRAGMS
TYPE C $16.50

MURDOCK 56

THE PRICES ARE REMARKABLY LOW
THE QUALITY IS UNUSUALLY HIGH

MURDOCK No. 55

2000 OHM COMPLETE DOUBLE SET $4.50

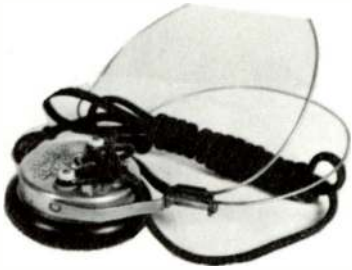
3000 OHM COMPLETE DOUBLE SET $5.50

REAL RADIO RECEIVERS

capable of record reception of signals when used with sensitive detecting apparatus. From the time of their introduction seven years ago to the present, they have earned a deserved reputation for unusual sensitiveness and long-lived dependability. The thousands of sets now in everyday service all over the world are evidences of the esteem which they have won. The unprecedented present demand for "MURDOCK 55'S" is conclusive proof that their wonderful value *cannot be duplicated* anywhere.

RADIO & WIRELESS HEADSETS

KENNEDY
$6.00



EISEMANN
$3.50

FROST
$5.00

BRANDES SUPERIOR
ABOUT 1916 $7.00

WATCH CASE RECEIVER
75 OHMS ABOUT 1914
$.60

SAMPSON WATCH CASE
RECEIVER
HAND MADE PHONE TIPS
ABOUT 1912

HEAD PHONES

MESCO HEADSET
MANHATTAN ELEC. SUPPLY
SP $6.50 1916

KILBOURNE & CLARK
HEAD SET
1919

WESTERN ELECTRIC
HEAD SET
1500 OHM. 1918

KELLOGG HEADSET 2400 OHM
SP $12.00 1921

DEFOREST LOUD SPEAKER
1922

AUTOMATIC ELECTRIC LONG RANGE RADIO HEAD SETS

"A Little Knowledge Is a Dangerous Thing"

AND that's the truth which applies to the business of making Radio equipment. It is something to think about when you buy Head Sets.

There are two kinds of manufacturers of Radio head sets—those who know little or nothing of telephone design—and concentrate their efforts in quick production regardless of quality. And then there are those who know the business through years of experience and who place *scientific design* and *quality* above everything else. So this is a plea for the good of the industry — and for your protection.

Specifically — these Automatic Electric Head Sets have been developed by telephone engineers who've devoted more than thirty years of effort to the designing of better telephone apparatus. The time spent in the perfecting of this improved receiver is shown by the remarkable results which are produced under all conditions.

This is the high grade plug that comes attached, when desired, to *Automatic Electric Head Sets*. It will take care of any kind of cord terminals, will fit any kind of jack and will accommodate two head sets. With this plug attached to our head set you can be sure the head set is properly "poled."

It has many distinctive features which prove its superior effectiveness. The powerful single pole electro-magnet and complete soft iron magnetic path—assure perfect clearness of both weak and loud signals. No distortion or foreign noises — whether used with crystal, V. T. detectors or multi-stage amplifiers.

If your dealer handles Radio equipment of the finest quality he is familiar with the Automatic Electric Head Sets. Ask him.

If your dealer cannot supply you, we will send you a complete Head Set, postpaid, for $10.00 — with plug attached $11.50.

Automatic Electric Company

ENGINEERS, DESIGNERS & MANUFACTURERS OF THE AUTOMATIC TELEPHONE IN USE THE WORLD OVER

HOME OFFICE AND FACTORY: CHICAGO, U. S. A.

LOUDSPEAKERS

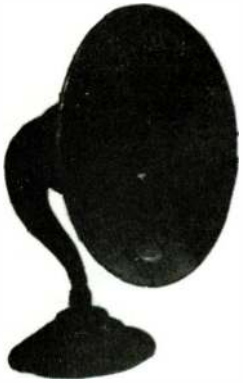
By 1921 the broadcasting stations were increasing in number and the radio receiver was entering the home everywhere; kits and parts were easily available. One tube sets and crystal sets were most common, and to allow the whole family to hear the headset was often put in a wooden bowl or cardboard box to increase the volume. The first loudspeakers were horns with arms to accept the standard headset receiver.

Magnavox brought out a speaker with a six volt field which gave much better volume, and units appeared that enabled the homeowner to use his phonograph horn as a loudspeaker. Broadcast stations were then transmitting signals that were heard as 200 to 2500 cycles/sec audio, so speakers did not need to be elaborate; when broadcast quality became better so did the loudspeakers. They were commonly made of pulp, hard rubber and wood. By 1924 wooden box and cone speakers were in use.

Western Electric came out with their cone speakers in three sizes: 18", 24" and a 36" that hung on the wall. Prices ran from $35.00 up to $60.00. The Baldwin unit was used in many of the speakers; the same firm made a unit designed to attach to the sounding bard of a piano. Baldwin also made their own horn speaker.

Magnetic speakers soon appeared, and were able to handle more audio and take higher plate voltages. 1926 brought the RCA 104 dynamic with voice coil; these were tops in their day.

LOUD SPEAKERS



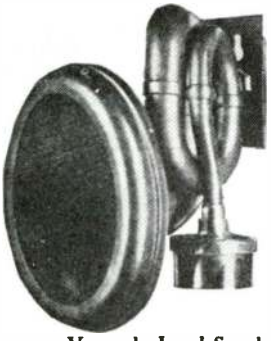
ATWATER KENT
TYPE-H
1924 $22.50

ARKAY
MADE FROM AUTO HORN
1921 $5.00

BRANDES TABLE TALKER
1924 $15.00

UTAH
1924 $18.00

THOROLA JR.
1924 $25.00



Vocarola Loud Speaker
1922 30.00

MANHATTAN
1924 $15.00

LOUD SPEAKERS

TRUTONE
1922 $15.00

MADERA
CLEAR-TONE
1923 $17.50

WESTERN ELECTRIC
1921 $30.00

SADLER
1922 $8.00

FEDERAL PLEIOPHONE
1921 $14.00

DICTOGRAND
1921

WESTERN ELECTRIC
SHAWPHONE
1922 $10.00

What matters bad weather when Radio entertains?

RADIO'S "every-hour-every-where" broadcast schedule is the most stupendous organization of the means of entertainment the world has ever witnessed.

The Magnavox Co., Oakland, California
New York: 370 Seventh Avenue

MAGNAVOX Radio
The Reproducer Supreme

MAGNAVOX LOUD SPEAKERS

MAGNAVOX R-3
1924 S.P. $35.00

MAGNAVOX TELEMEGAFONE
PUBLIC ADDRESS SET
1920 S.P. $150.00

MAGNAVOX TELEMEGAFONE
TS-2 1921 18" BELL
$93.00

MAGNAVOX 1923
14" BELL $45.00

MAGNAVOX M-4
1924 $25.00

Thrill With the Big Crowd

FOR real thrills, tense moments and dramatic situations, what can compare with a football game between two great American colleges?

A crisp fall day, stands jammed to the bursting point, bands playing, college songs and cheer, stirring the very souls of spectator and player alike—what could present a more inspiring, colorful picture?

You may not see the game, but with MUSIC MASTER attached to your radio set you can, in the comfort of your home, follow your favorite team up and down the field. The vivid word-picture of the announcer, play by play, will reach you with bell-like clarity through this wonder instrument of radio.

Until you hear the voice of MUSIC MASTER you have not heard radio at its best. Your dealer will send one to your home to prove with your own set.

Get a MUSIC MASTER and have it ready for the next game.

Dealers Everywhere

Music Master Corporation

Makers and Distributors of High-Grade Radio Apparatus

★ 10th and Cherry Streets

Chicago PHILADELPHIA *Pittsburgh*

Music Master

RADIO REPRODUCER

Connect MUSIC MASTER in place of headphones. No batteries required. No adjustments.

14-inch Model, *for* the Home..... $30

21-inch Model, for Concerts and Dancing..... $35

★ Tested and approved by RADIO BROADCAST ★

LOUD SPEAKERS

BALDWIN
1924 $30.00

ROLA
1923 $25.00

DICTOGRAND
1922 $20.00

THOMPSON
1924 $35.00

CHANSON REPRODUCER
1925 $25.00

No. 601, treasure chest type. 6-tube, totally shielded. Equipped with volt meter. Solid Mahogany. Prices, without accessories; East of Rockies, $210; Pacific Coast, $225; Canada, $290.

A New Cone Speaker—

Companion to the No. 601 Receiver

To the epic achievement of Stromberg-Carlson's No. 601 Receiver is added that of their announcement of the New Cone Speaker. Produced after exhaustive research and experimentation, this speaker embodies an idea, old to the master creators of musical instruments, but new to the radio trade—that of a soundboard.

The soundboard which functions the same on the new cone speaker as on piano or violin—accomplishes the same purposes—that of giving true pitch and modulation to notes over the *entire* musical register. Whether it is reproducing the majestic roll of the organ, or the piping of the flute, this soundboard liberates the true beauty of intonation and phrasing which the music lover desires and appreciates.

Standing unobtrusively against a wall or in a corner the Stromberg-Carlson Cone speaker so fills the entire room with music that it is difficult to tell from where the sound is coming. In addition, it is as ornamental as a Mahogany Tip-Top Table which it so closely resembles.

STROMBERG-CARLSON TELEPHONE MFG. CO.
ROCHESTER, N. Y.

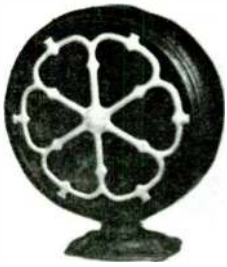
Height 34½ inches over all; diameter 22 inches. Equipped with a 20 foot cord and plug. Sound-board and pedestal finished in Mahogany. Used with any Receiver which has semi-power tubes. Prices: East of the Rockies, $35; Pacific Coast, $40; Canada, $49.

Licensed under Lektophone patents 1271-527 and 1271529. Other patents pending.

Stromberg-Carlson

Makers of voice transmission and voice reception apparatus for more than 30 years

LOUD SPEAKERS



ATWATER KENT
1926 $20.00

ATWATER KENT
1927 $25.00

CROSLEY DYNACONE
1927 $22.50

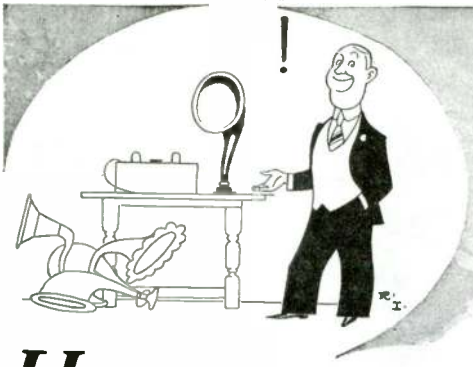
THOROLA
1927 $25.00

OVENSHIRE
1925 $32.50

THOROLA
1927 $30.00

WESTERN ELECTRIC
24" 1927

STROMBERG-CARLSON
24" FLOOR MODEL
1927 $65.00



Hear the difference.

A loudspeaker is a critical thing. Any vibration in the horn adds sounds that nature never gave to the speaker's voice. And limited range thins down the tone to flat, unreal quality. Some people think that a near-real voice is the best that radio can give . . . but not after they have heard a Radiola Loudspeaker!

The difference is the result of elaborate experiment and extended scientific study. The Radiola Loudspeaker has an extraordinary range—gets the full richness of tone. And it adds no sound of its own. To know how clear—how mellow—how *real* your music can be—ask to hear a Radiola Loudspeaker.

Radiola Loudspeaker
Type UZ-1325
Now $25.00

This symbol of quality RCA *is your protection*

Radiola
REG. U. S. PAT. OFF.
LOUD SPEAKER

RADIO CORPORATION OF AMERICA
Sales Offices:
233 Broadway, New York
10 So. La Salle St., Chicago, Ill.
28 Geary St., San Francisco, Cal.

★

★ Tested and approved by RADIO BROADCAST ★

RADIO CORPORATION OF AMERICA
LOUD SPEAKERS

RADIOLA 103
1927 $35.00

RADIOLA 100
1925 $35.00

RADIOLA UZ-1320
1923 $36.50

RADIOLA 100A
1926 $30.00

RADIOLA UZ-1325
1923 $25.00

LOUD SPEAKERS

ACME DOUBLE CONE
1926 $35.00

MAGNAVOX CM-4

LOUD SPEAKER UNITS' PHONOGRAPH ATTACHMENTS 1922 TO 1926

AMPLIFIERS

By 1921 one-tube and crystal sets were thought to be not loud enough for the whole family. Crystal sets could be amplified without tubes by use of an amplifier consising of a receiver directly coupled to a carbon mike, the output of which would operate a loudspeaker.

The audio, or tube amplifier, developed by W. H. Priess and L. L. Israel of Wireless Specialties Co. in 1917 was in use after the war. In 1919 the Federal Tel. & Tel. Co. put on the market the famous 226W transformer, the first to be offered to the amateur and experimenter. Before this time two tube amplifiers were available in complete form at about $65.00 with tubes. By 1924 there were many transformers on the market with step-up ratios of 1:2 to 1:12, all claiming to be the best. By this date the technique of biasing the amplifier tube was in use, this not only saving the "B" battery but improving the quality.

The cheapest way to build an amplifier was to use the simple Loftin-White circuit, which with proper bias worked well. Two stages of transformer-coupled audio were all that could be used unless they were cascaded by using 45 V. on the first stage and 90 V. on the second and 135 V. on the third and biasing each stage correctly. The resistance-coupled amplifier next came on the market and was a decided improvement.

Radio frequency transformers came in use about 1922; both air and iron core were made, and tuned from 200 to 600 meters. Iron core I.F. transformers came in ranges from 45 KC to 75 KC and were used for long wave R.F. and I.F. in superhetrodyne sets. The radio frequency transformer made posible the use of a loop antenna and stopped radiation from a regenerative receiver.

AMPLIFIERS

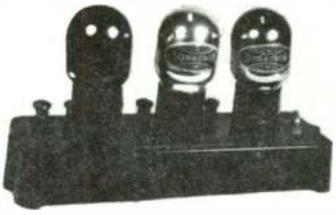
MAGNAVOX
2 STAGE AUDIO
AMPLIFIER

WESTERN ELECTRIC
7-A AMPLIFIER WITH
216-A TUBES

WESTERN ELECTRIC
25B AUDIO
AMPLIFIER

AMPLIFIERS USED IN THE 1920s

ALLEN BRADLEY
3 STAGE RES. COUP.
WITH TUBES $26.00

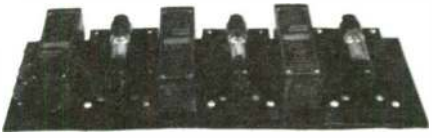


SONOTRON AUDIO AMP.
3 STAGE RES. COUP.
WITH TUBES $21.00

DAVEN AUDIO AMP.
RES. COUPLED
WITH TUBES $24.00

SAMPSON

MUTER
RES. COUP. AUDIO
AMPLIFIER
WITH TUBES $21.00



RADIO INST. CO.
R.F. AMPLIFIER
USING MEYERS TUBES

BATTERIES–BATTERY ELIMINATORS–CHARGERS

Liquid cells were used in early wireless service. The Lalande cell used caustic soda for the electrolyte, with plates of cupric oxide and zinc. The plunger battery used an acid solution and carbon plates, with a zinc electrode that was plunged into the solution to turn the cell on. Rechargeable storage batteries, mostly of the lead-acid type, were widely used in the 1920's. Dry cells came into wide use, especially in "B" and "C" batteries.

When the storage battery entered the home it had many problems; acid ate holes in the rug, corroded terminals gave noisy reception, and fumes gave the home a bad odor. Storage batteries were expensive and needed frequent recharging. Battery charging stations would pick up a battery and charge it for $1.00, or would provide rental batteries for 25¢ a day.

The "B" dry batteries were also expensive, a 90 volt set costing $10.00 and lasting about three months; a five tube set usually cost about $5.00 a month for upkeep. When "C" batteries appeared the "B" battery's life was more than doubled and the "C" lasted a year. Wet "B" batteries became available at some cost, but cut the cost of receiver operation. The Edison wet cells were best as they used a potash solution and were easy to recharge.

Those who could spend up to $125.00 for an "A" and "B" eliminator had the problem solved; all that was needed was a little water and care. The "A" eliminator was a wet storage battery with a trickle charger that operated when the battery wasn't in use. The dry "B" eliminator used a Raytheon cold cathode rectifier and produced 22½, 45 and 135 volts with no attention needed.

"A" and "B" wet cells.

BATTERIES

EDISON B BATTERIES & CHARGER
1924 $42.00

BICHROMATE BATTERY
PLUNGER TYPE
ABOUT 1900

B & C BATTERIES
1920s

WET B AND A
BAT. CELLS.
1920s

HYDROMETER

COLUMBIA BATTERY
1907

BATTERY CONDITION
TESTER

"CROWFOOT"
GRAVITY BATTERY
USED FOR TELEGRAPH
AND WIRELESS 1905

Tungar Battery Charger—keeps your battery at home. Also, with simple attachment, charges "B" storage batteries.

This is the way "B" Storage Batteries are charged with Tungar and attachment.

March, 1923

No Need of Doing This

Is yours a tube set?

Yes? Then you have a storage battery which frequently requires recharging.

Do you carry it to a charging station, wait three or four days, pay from 75 cents to a couple of dollars and then lug it home again? You don't need to.

A Tungar Battery Charger enables you to recharge your storage batteries for either radio or automobile use right at home—easily, quickly and at little expense. It operates from any a-c. lighting circuit.

Any one can operate a Tungar. Once started, it requires no attention; nor is there the slightest danger of injuring the battery.

The initial cost is low; the operating cost is little. Send for our new booklet on Tungar for radio, if your dealer cannot supply you. Address Merchandise Dept., General Electric Company, Bridgeport, Conn.

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

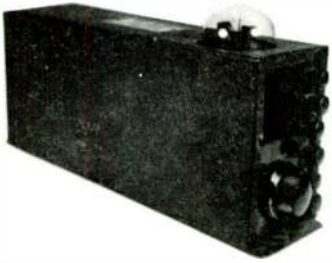
8A-79C

"A" AND "B" ELIMNIATORS
BATTERY CHARGERS

ATWATER KENT
"A" AND "B"
ELIMINATOR

MARATHON
"B"
ELIMINATOR

YAXLEY AUTOMATIC
CHARGER CONTROL



SILVER MARSHALL
"B" ELIMINATOR

TODD "B" BATTERY
CHARGER

TWIN-BULB
BATTERY CHARGER

PARTS KITS AND SERVICING

In 1905 the E. I. Company put transmitter and receiver parts on the open market. When receivers became fairly common in homes across the country many parts were offered to improve the set. Antenna eliminators designed to plug into the A.C. outlet, howl eliminators (metal caps for the tubes), variable grid leaks and condensers, phone plugs, vernier dial tuners to eliminate hand capacity effect, wave traps and lightning arrestors were all offered the home set owner.

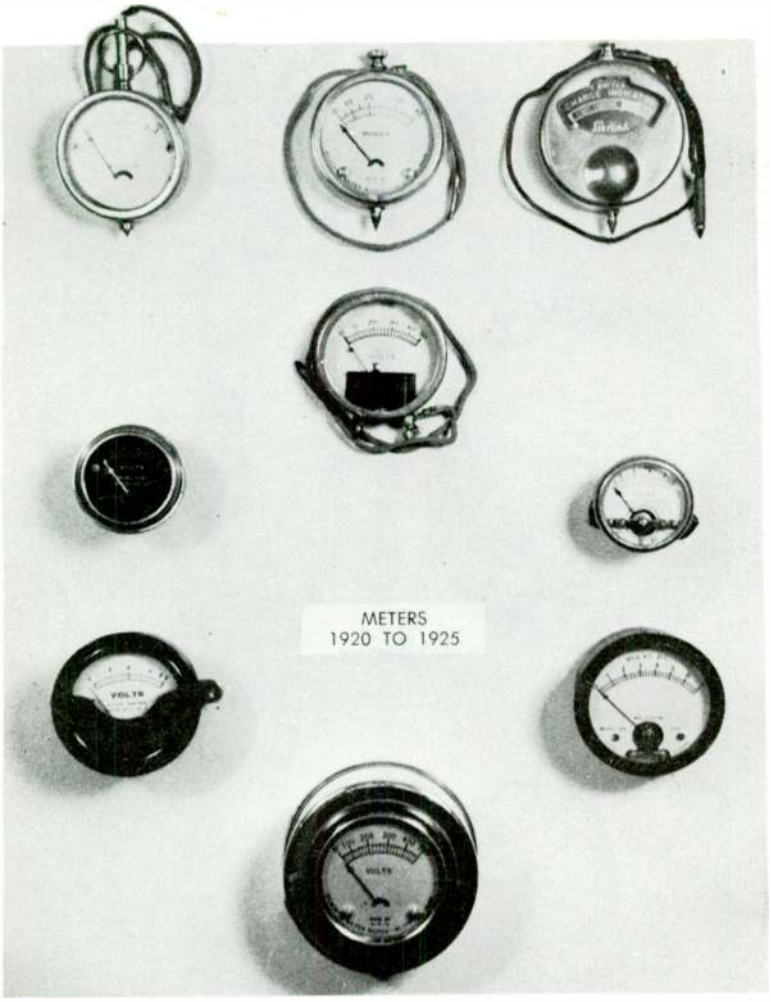
An item that sold by the thousands was the "hum eliminator" which made possible the use of A.C. on D.C. filaments; it was a center-tapped 20 ohm resistor to hook across the filaments, with the center tap grounded. Phone jacks incorporating a switch to shut off the radio's stage not in use were sold. Vibration proof sockets were offered as replacements for the original. Many varieties of outdoor antenna kits were offered at about $5.00.

When superheterodyne sets and "A" and "B" battery eliminators entered the home the occasional services of a trained repairman were needed. Storekeepers who sold the sets commonly did this up to about 1924. Among devices developed to serve the need were fast tube rejuvinators to bring back filament emission, tube testers and more accurate measuring meters. When A.C. sets came on the market in about 1928 the many receiver kits disappeared, and the role of the modern serviceman began.

Hum eliminators.

Watchcase voltmeter.

WATCH CASE BATTERY METERS
1915 TO 1920



JEWEL PANEL
MOUNT

WESTON PANEL
MOUNT

FISHER PANEL
MOUNT

JEWEL HIGH FREQUENCY METER
1919 $12.00

HUSTON BROS. CHICAGO.
TABLE MIL. METER
PAT. 1899

VOLT MIL. AND
HIGH FREQUENCY METERS

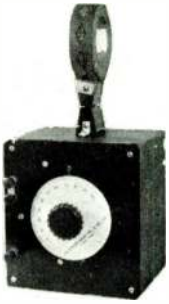
DECREMENT AND WAVE METERS

GENERAL RADIO
WAVE METER
TYPE 358 $15.00

MARCONI DECREMENT METER
1909

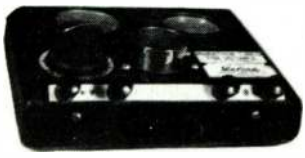
GENERAL RADIO
WAVE METER
TYPE 274 $10.00

GENERAL RADIO
WAVE METER
TYPE 174
1922 $68.00



DEFOREST WAVE
METER 1923

TUBE AND SET TESTERS USED IN THE 1920s



STERLING TUBE TESTER
$25.00

STERLING
TUBE REACTIVATOR
$5.00

HEMCO
TUBE VITALIZER
$5.00

JEFFERSON TUBE
REJUVINATOR
$5.00

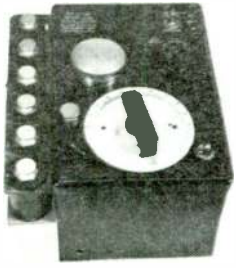
PEERLESS
KONDENSOR TEST KIT
$10.00

STERLING TUBE AND SET
TESTER $35.00

TEST EQUIPMENT USED IN THE 1920s

SYLVANIA TUBE TESTER

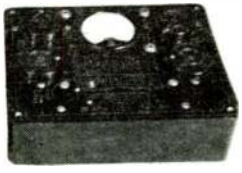
HICKOCK TUBE TESTER



WESTON MODEL 802
TEST OSCILLATOR

ELECTRON 5 INCH
ELECTRON OSCILLOGRAPH
GENERAL RADIO

VAN HORNE TUBE TESTER



BURTON TUBE TESTER

Standard on the finest

THORDARSON

Super
AMPLIFYING TRANSFORMERS

THORDARSON ELECTRIC MANUFACTURING CO. *Chicago, U.S.A.*

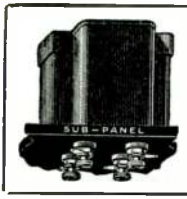
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS

Thordarsons are Absolutely Uniform!

They always "match up" perfectly

One reason that leading builders of fine sets use *more* Thordarsons than all competitive transformers combined is because Thordarsons run *absolutely alike, absolutely uniform;* always "match up" perfectly; always amplify *evenly.*

The following statement was made recently by a prominent set maker (name on request): "Any radio manufacturer who is sincerely desirous of producing an instrument of the volume necessary and of a tone superior to anything else on the market, must be absolutely forced to use Thordarson transformers sooner or later." Follow the lead of the leaders—build or replace with Thordarsons. They are unconditionally guaranteed. Any store can supply you. If dealer is sold out, order from us.



SUB-PANEL MOUNTING TYPE THORDARSONS NOW ON SALE

They permit a neater assembly, the shortening of leads and the concealing of wiring—as in factory built sets. Same ratios—same prices—as standard type Thordarsons. If dealer cannot supply order from us.

SUPER-HET BUILDERS! TAKE NOTE OF THIS GOOD ADVICE

For the "Best" 45,000 Cycle Super-Heterodyne, "RADIO" and other leading authorities recommend in highest terms the Thordarson 2:1 ratio transformers. Take no others!

Use Thordarsons for Power Amplification, Too

Thordarson Power Amplifying Transformers equal in tonal purity our justly famous audio transformers. They give best results when preceded by two stages using Thordarson 3½:1 Audio Frequency Transformers. May also be used as 4½:1 a. f. transformers by disregarding center taps—or as a coupling transformer for loud speakers. Bulletins on request.

The Thordarson INTER-STAGE Power Amplifying Transformer with a pair of Thordarson Power Amplifying Transformers provides two stages of power amplification. Although two stages of this amplification involve the use of four tubes, the quality of the reception more than compensates for the additional expense. Bulletin on request.

Thordarson Types and Prices

Thordarson Radio Transformers include: Audio Frequency (sub-panel or top mounting types) 2:1, $5; 3½:1, $4; 6:1, $4.50. Interstage Power Amplifying, $8 each. Power Amplifying, pair $13. Autoformers, $5 each. All Thordarson Products are unconditionally guaranteed. Dealers everywhere. We ship direct upon receipt of price if dealer cannot supply.

THORDARSON ELECTRIC MANUFACTURING CO.

Transformer specialists since 1895

WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS

Chicago, U.S.A.

MORGAN McMAHON AND SOME COLLECTIBLES

CHAPTER VI
COLLECTING

The collector is the strongest force in preserving the history of radio. He may have a single old radio in his den as a conversation piece. Or he may build a separate building to house his large collection. The Antique Wireless Association, a group of serious collectors, has an outstanding collection in Holcomb, New York.

There are many kinds of collectors. Some of us collect facts and interesting stories, and are the historians of the wireless-radio era. Some collect old technical publications. Some collect old radio programs, broadcast business publications and memorabelia of radio stars of the past.

Collectors of early-day wireless equipment have a very challenging job of locating and restoring the various parts that made up the wireless stations. In wireless days, (mostly pre-1920), most transmitters and receivers were assembled from separate pieces, rather than being bought as units. One problem is that it is impossible for the uninformed person to recognize that the piece of "junk" in his attic is a piece of wireless history. Wireless collectors continually prowl antique stores, swap meets, junk shops and garage sales in hopes of finding wireless components. Once the parts get into the hands of collectors, they are enthusiastically traded from hand to hand as each collector tries to enrich his own specialized collection. There is no "dollar market" in wireless parts; collectors prefer to trade rather than sell. When a collector does sell, the price is a stand-alone figure based on that transaction only. One word of caution; there are some beautiful replicas, which can be easily mistaken for the real thing.

The radio era brought complete transmitters and receivers. These items are more easily recognized, and can be more easily appreciated by the general public. Workmanship on many of the receivers is as fine as can be found on any top-grade furniture. The novice is captivated by the weird collection of knobs, dials and switches, and by the hand-crafted cabinets. Sophisticated collectors can get a tremendous thrill from seeing a rare Federal radio, or by filling in one more vacancy in a string of Atwater Kent radios.

Again, there is not a firm dollar market value in radio transmitters and receivers. A radio is worth what a collector can afford to pay for it. "Asking" prices vary widely; you may find a lovely old radio for $20, and then find someone next door asking $100 for the weathered hulk of a defunct set.

Wireless and radio add-on components make good collections. Some people collect headphones, of which hundreds of kinds were made. Others collect speakers, which have many kinds of insides and which range from weird to poetic in their styling. Vacuum tubes make perhaps the most interesting collection for the technical man. They are the key elements in the progress of radio, ranging from 1904 Fleming valves to 1929 screen grid tubes.

Most old radios do not operate after many years in storage. The paper-dielectric wound capacitors are bad, or will go bad shortly after batteries are connected. Sometimes they can be saved by starting at a low voltage and gradually increasing the voltage over a period of days. The remedy for bad capacitors (or condensers, as they were called), is not to replace them with equally old ones that will go bad just as quickly. Rather, one must replace the old foil windings with new ones. Most windings are tarred into the cans. The first thing to try is to freeze the condenser; the tar will usually shrink away from the can and the insides will slide out. Failing this the condenser can be heated and the tar poured out.

Transformers are another problem. In the old days, paper insulation contained traces of sulphur, which deteriorated the windings over the years. Old transformers may fail at any time. The old transformers can be re-wound, or a newer transformer can be put inside the old case by the non-purist.

WARNING: Do NOT attempt to hitch up voltage or repair antique wireless or radio equipment unless you know what you are doing. You can do irreparable damage to both yourself and the equipment. This is especially true of early A-C power supplies.

There are some excellent books on the radio industry and its people. Erik Barnouw's series "A Tower in Babel," "The Golden Web" and "The Image Empire" (Oxford University Press, N. Y.) is a very interesting factual history of broadcasting. Ron Lackman's "Remember Radio" (G. P. Putnam's Son's, N. Y.) and Jim Harmon's "The Great Radio Comedians" and "The Great Radio Heroes" (Doubleday & Co., Garden City, N. Y.) are entertaining and informative memory trips. Lawrence Lessing's "Man of High Fidelity" (Bantam Books, N. Y.) is the story of E. H. Armstrong's amazing career. These can be found in record shops or in the classified sections of antique periodicals.

If you are seriously interested in radio history and collecting, write to the Antique Wireless Association, Holcomb, N. Y. 14469; The Antique Radio Club of America, 516 Country Lane, Louisville, Ky. 40207; or the Canadian Vintage Wireless Association, P.O. Box 51, Station R, Toronto 352, Ontario.

Every day, valuable pieces of wireless and radio history are thrown unto the trash heap. Perhaps you, the reader, can help your relatives, friends, and neighbors dig up these modern-day antiques out of attics and basements. It's a great way to start a hobby, or to get these bits of history into the hands of true collectors.

GOOD HUNTING!

CARL SIVERTSON AND EARL ENGLAND DISCUSS EARL'S RADIOLA III

AGE GUIDE

There are useful clues to the age of early-time sets. Early wireless equipment looks like experimental scientific equipment. Radios of the early and mid-1920's were battery sets with many knobs and dials. Early A-C sets built in the mid-1920's were simply battery sets with power supplies replacing the batteries. True A-C sets, with built-in power supplies and A-C tubes were introduced in 1927.

Console models became popular in the late 1920's when radio became part of the home scene. Well-constructed consoles were the showpieces of the home in the 1930's and 1940's. Smaller A-C cabinet "cathedral" radios (also known as "midget" or "depression" models) became widely used in the early 1930's as bad times made money scarce. These evolved into the box-shaped table radios that are sold today. Small AC-DC radios with plastic cabinets made the $9.95 "cheapie" available to every room in the home in the late 1930's.

Patent numbers appear on many radios built up through the mid-1930's. They are a good clue to age, since the item must have been made later than the latest patent shown.

January	Number	January	Number
1900	660,000	1926	1,580,000
1902	720,000	1928	1,660,000
1904	770,000	1930	1,760,000
1906	830,000	1932	1,850,000
1908	890,000	1934	1,940,000
1910	950,000	1936	2,010,000
1912	1,020,000	1938	2,100,000
1914	1,080,000	1940	2,180,000
1916	1,150,000	1942	2,270,000
1918	1,240,000	1944	2,340,000
1920	1,320,000	1946	2,390,000
1922	1,410,000	1948	2,430,000
1924	1,500,000	1950	2,500,000

Tube types give another rough guide to age. Four-prong tubes, most often –00A, –01A, WD-11 and –99 were used in the 1920's. Early A-C sets from 1927 to 1929 used four and five prong A-C tubes like the 26, 27 and 71A. The 24A tube, with its grid cap connection on top, hit in 1928 and was widely used well into the 1930's. Six and seven prong tubes were introduced in many sets in 1932. "Octal" tubes with plastic-keyed bases hit in 1935. Many of these tubes were made of metal rather than glass. "Loctal" tubes with metal bases were introduced in WWII. Miniature glass tubes were used in compact and portable sets starting in 1941, and were used in many sets after 1945.

One word of caution: Model numbers don't usually follow in time sequence. It's dangerous to assume that a radio is older because it has a lower model number.

DIRECTORY OF RADIO BROADCAST RECEIVERS, 1921-1930

YEAR OF INTRODUCTION BY MODEL NUMBER

This table lists receiver manufacturers and the year in which models were introduced in national magazines. If the same model number appears more than once, it means that a modified version was brought out. As with automobiles, radios were introduced as much as eight months before their "model year". Many companies stayed very small or folded very quickly; only companies that advertised nationally for more than two years are shown. "N/A" indicates that specific information is not available. Much of the original research for this list was done by Ralph H. Langley.

MANUFACTURER	YEAR	MODEL
A. C. Dayton Co.	'23	(crystal set)
	24	Super Polydyne six
	25	XL 5 Polydyne, XL 5, XL 10, XL 15
	26	XL 20, XL 25, XL 30
	27	XL 25, XL 50, XL 60, XL 70
	28	XL 61, AC 63, AC 65, AC 66
	29	XL 71, Navigator Series: XL 72, AC 98, AC 9960 AC 9970, AC 9980, AC 9990, AC 99100
Acme Apparatus Co.	'23	Acmephone
	24	Acmephone
	25	A, S
Adams-Morgan Co.	'21	Paragon Regen., RD 5 Paragon, A-2, RA 10
	22	DA 2
	23	RD 5 Paragon, RA 10 Paragon, DA 2
	24	RA 0, RD 5, RB 2
	25	Paradyne Series: 2, 3, 4
Adroit Tool Co.	'25	N/A
	26	Adrola Series: R5P, R5B, R5C
	27	Adrola All Electric
Advance Electric Co. (Formerly Falck)	'30	77, 88, 89
Air-Way Electric Appliance Corp.	'23	F, G
	24	41, 42, 51, 52
	25	61, 62, 63, 61D, 62D, 63D
	26	61, 62, 63, 61D, 62D, 63D
Ajax Elec. Specialty Co.	'24	Crystal
	25	Marveltone, ACS Crystal, CST Junior Crystal
	26	Marveltone, Crystal
All American Mohawk Corp.	'25	Junior, Senior, R
	26	Duet, R HiBoy, Sovereign, Loraine, Forte, Sextet, 226
	27	44, 55, 80, 90, 77, Duet, 115, 66, 88, Sextet, Forte, 99, Loraine, Sovereign
	28	60, 61, 62, 65, 66, 70, 77, 80, 83, 84, 85, 88
	29	93 Lyric, 95, SG1, 94, 96
	30	D11, D19, D29, D39, D69, H19, H29, H60, Battery Model, DC Model
American Bosch Magneto Co.	'24	Amborola
	'25	16 Amborola
	26	27 Amborola, 35 Cruiser, 35 Imperial, 35 Royal

MANUFACTURER	YEAR	MODEL
American Bosch Magneto Co. (Continued)	'27	46, 57, 57AA, 57AC, 66, 66AA, 66AC, 66ACAA, 76, 76AC, 76L, 87, 96, 96DC Cruiser, 107, 107AA, 116, 116AA, 126, 126AA, 136, 146, 156, 166, 176
	28	28, 28A, 28AA, 28C, 28D3, 28-25, 28-33-B3, 28-33-B4, 27-7C, 28-7D, 28-7E, 29, 29AA, 29B, 29AS, 29W825, 29W826, 297A, 297B, 29D1, 29D2, 29-33B2, 29-33B1, 30, 38, 38A, 38C, 38-25, 38-33B4, 387D, 387E
	29	48, 48A, 48C, 48H, 48J, 48L, 48R, 48-16, 48-17, 48-18, 48-19, 49, 52 (Export), 53 (Phillips Tubes), 54AD, 56, 56AB
	30	58A, 58B, 60D, 60E, 62C
American Piano Co.		See Ware Mfg. Co.
American Specialty Co.	'24	Electrola
	25	24 Electrola, 60 Electrola, 18 Electrola, 40 Electrola, Electrola Standard, Grand
	26	30 Republic
Amrad Corp. (American Radio & Research)	'22	Short Wave
	23	35, 2771, 3366, 3380, 3500-1, 3500-2, 3670-1, 3670-2
	24	Inductrole, Neut.
	25	3500-3 Inductrole, 3500-4 Cabinette, 3500-6 Jewel, T5
	26	S522, S522C, AC5, AC5C, AC9, AC9C, S733, S733C
	27	DC6 Warwick, DC6C Berwick, DC7 Windsor, DC7C Hastings, AC6 Warwick, AC6C Berwick, AC7 Windsor, AC7C Hastings
	28	70 Nocturn, 70 Concerto, 70 Sonata, 70 Opera
	29	81 Duet, 81 Aria, 81 Serenata, 81 Symphony, 81 Minuet
	30	See Crosley Radio Corp.
Amsco Products Inc.	'23	Melco Supreme
	24	Melco Supreme
	25	MS-24 Melco Supreme, MS-25 Melco Supreme, MS-5 Melco Supreme
Andrews Radio Co. (Deresnadyne)	'24	A
	25	M, Standard, DeLuxe, AC
	26	11, DeLuxe, 111
Anylite Elect. Co. (King Cole)	'25	King Cole
	26	4, 5, 6, 7
	27	6, 7, 8
Apex Elec. Mfg. Co.	'25	Super 5, DeLuxe, Baby Grand
	26	Super 5, DeLuxe, Baby Grand, Apartment Grand
	27	Lyric, Milan, Corsair, Minstrel, Troubadour
	28	36, 136, 236, 50, 60, 70, 75
	29	N/A
Arborphone		See Consolidated Radio Corp.
Argus Radio Corp.	'25	Phono Panel, Standard URR, 235, 300
	26	Standard, 235, 300
	27	B-125, B-295, B-395, A-25, 375
Atwater Kent Mfg. Co.	'21	5
	22	None

MANUFACTURER	YEAR	MODEL
Atwater Kent Mfg. Co. (Continued)	'23	10, 11, (Kit), Radiodyne (Kit)
	24	9, 10A, 10B, 10C, 12, 19, 20, DeLuxe
	25	21, 20C, 7960 Compact, 20C, 7570 Compact, 24 DeLuxe
	26	30, 33, 32, 35
	27	33, 36, 37, 38
	28	40, 41, 42, 43, 44, 48, 49, 50, 52
	29	45, 46, 47, 53, 56, 57, 60, 61, 67
	30	66, 1055C, 1060C, 1061C, 1067C, 70, 74, 75 Comb., 76, 67
Audiola Radio Co.	'21	Audiola
	22	VT
	23	Audiola, VT, Grand
	24	Audiodyne, Super, Midget
	25	Sealed Five, Big Six
	26	527, 627, 527C, 627C
	27	6T, 8T, 6C, 8C, 6B, 8B, 6T
	28	829, 929
	29	7330, 8430
	30	60, 70, 80, 30, 889
Automatic Radio Mfg. Co.	'25	Bluebird
	26	Arc, Bluebird
	27	Hudson, Liberty Bell
	28	N/A
	29	B Tom Thumb, B DeLuxe, DC, AC
	30	C Tom Thumb, Automatic, Junior
Baldwin Inc., Nathaniel	'29	25, 35, 37
	30	40, 50 Baldwinette, 51 Baldwinette, 70 Consolette, 71 Baldwinette, 75 Hydaway, 80
Balkeit Radio Co.	'28	A3, A5, A7, B7, B9
	29	C, F
	30	Balkeit, SG8 Balkeit, Midget Balkeit
Blue Seal Mfg. Co.	'24	N/A
	25	4, Cincodyne, 5, Blue Seal
	26	Blue Seal
Bosworth Elec. Mfg. Co.	'25	B-1 Air Set
	26	B-2, B-1, B-3
	27	B-6, B-3, B-5, B-7
Brandes Inc., C.		See Kolster Radio Inc.
Brandes Products Corp.		See Kolster Radio Inc.
Branston Inc., Chas. A.	24	R310 DeLuxe, R-95 Superhet, R304, Superhet Wired, R-306, R-55, Crystal
	25	R45Hetrola, R46 Hetrola, R47 Hetrola
	26	R45, R46, R47
Bremer Tully Mfg. Co.	'26	Counterphase Series: 5, 6, 6 Power, 8
	27	Counterphase Series: 6-22, 6-35, 6-37, 8-12, 8-13, 8-13, 8-16, 8-17, 6-38
	28	6-40, 6-41, 7-70, 7-71M, 7-71D, 8-20, 8-21, 8-22
	29	80, 81, 82, 81A, S81, S82, 83
Bronx Radio Equip. Co.	'23	Breco
	24	D, 2A
	25	BSC-3 Breco
	26	BS-3 Breco, BR-5

MANUFACTURER	YEAR	MODEL
Bronx Radio Equip. Co. (Continued)	'27	12 Breco
Browning-Drake Corp.	'26	5R
	27	Official Kit, 5R, 6A, 7A
	28	34 Eight in Line, 36, 38
	29	53, 54, 56, 57, 63, 64, 66, 67, 83, 84
	30	68, 69, 70, 71, 70R, 71R, 72
Bruno Radio Corp.	'23	3, 8, 10
	24	N/A
	25	Powertone, Kit
	26	999, Diamond, Oriole, Nightingale
Brunswick-Blake-Collender Co. (Brunswick Radio Corp.–1930)	'24	Radiola III 30, Radiola 3A 35, Regenoflex 100, Superheterodyne 160, 260, 360
	25	60, 460
	26	PR148C
Brunswick:	27	PR138C, Cordova
This name was first used in 1924 or 1925 on a 5 tube 3 dial TRF receiver with RF transformers and condensers built by King Quality Products Inc. Often used chasses bought from other manufacturers.	28	PR17-8 Radiola 17, 5KR Radiola 18, 5KRO Radiola 18, 5NO, 5NC8, 3KRO Radiola 18, 3NC8, 148, 2KRO Radiola 18
	29	3NW8, 3KR6, 5KR6, 2KRO, 3KRO, 3KR8, 3NC8, R1, 14, 21, 31, S14, S21, S31, 81, 82, S81, S82
	30	15, 22, S31, 42, 32, DC14, DC21, DC31, 15B, DC15, DC22, DC32
Buckingham Radio Corp.	'25	I, II, III, IV, V, VI, VII
	26	Jr
	27	1, 2, 5 Orthophonic, 18, 20 Orthophonic
	28	N/A
	29	6950, 1, 2, 3
Bush & Lane Piano Co.	'26	N/A
	27	1, 1-C, 3-C, 4, 4-C, 6, 6-C Grand, 7
	28	2, 4B, 9C, 12C, 11C, 7C
	29	10-C, 11-C, 12-C, 20, 21, 30, 32, 34, 40, 50, 60, 70, 90
	30	9K DeLuxe, 10K DeLuxe, 11K DeLuxe, 12K, 9K, 10K, 11K
Carloyd Electric & Radio Co.	'23	N/A
	24	Malone Lemon Neut.
	25	11, Power Six, ML 400, Marine
	26	See Malone Lemon Products Inc.
Carteret Radio Lab.	'30	AC, DC, Moto Radio, AC-7, AC-8, DC-8, DC-HW
Chelsea Radio Corp.	'23	102
	24	102
	25	107 Regenodyne, Super 5, 122, Super 6, 130 Super 5
	26	Super 5, 140 Bearcat, Super 6, Truphonic Six, DeLuxe, 122
	27	Super Six
Clapp-Eastham Co.	'21	ZRF, ZRD, ZRA
	22	Radak HR, Radak HZ
	23	R23, A23, C3, C23, R4, A4, C64
	24	R4, C64
	25	DD, Gold Seal

MANUFACTURER	YEAR	MODEL
Cleartone Radio Division	'23	2 Goldcrest (20), 3 Goldcrest (30), RFAA60 Goldcrest, Goldcrest Series Nos. 31, 4, 32, 62, 42, 60
	24	61, 70 Clearodyne, 71 Clearodyne, 72 Clearodyne
	25	80 Super Clearodyne, 82, 90, 91, Console, Series 100
	26	Standard 100
	27	Standard 110, Compact 110, Standard 110T, Mayflower Compact, Standard 110C, Senator Console, Congressional
	28	Senator
	29	Senator
	30	112
Cockaday		See Silver–Marshall Inc.
Colonial Radio Corp.	'25	16, 16-5, 16-6, 17, 17-5, 20-6, 21-5, 23-5, 24-5
	26	25, 26
	27	28
	28	31
	29	32 Cavalier, 32 Picadilly, 32 Moderne,
	30	33 Princess, 33 Mayflower, 33 Windsor, 34 Lafayette
Columbia Phonograph Co.	'27	900
	28	960, C1, C2, C3, C4, C5, C6, C7
	29	950, 961, 940, C111, C11
	30	981, Telefocal Series: C20, C21, 939, 991
Consolidated Radio Corp. (Precision Products)	'25	26-5 Arborphone, Arborphone
	26	Arborphone
	27	27 Arborphone, 271, 272, 25, 252, 253, 255
	28	45, 55
Continental Radio & Mfg. Co.	'23	BR, BRA
	24	BRA, Cell, C-22, C-133
	25	Continental Five
Crosley Radio Corp. (Crosley was also Precision Equipment Company in 1922, and took over the Amrad line for 1930 production.)	'22	Harko Sr., Harko Sr.V, Model I, VI, X, XV, XX, Ace
	23	IV, VI Super, VIII, XJ Super, XII, XV, XXV, 3B Ace, 3C Ace, V Ace, V Special Ace, VC Ace, 2A Ace
	24	Ace 3C, Super VI, Super XJ, XL, 50, 50A, 50P, 51, 51A, 51P, 51S, 51SD Special DeLuxe, 52, 52P, 52S, 52SD Special DeLuxe, Trirdyn Series: 3R3 Standard, 3R3 Panel, 3R3 Special, 3R3 Newport, 3R3 Biltmore, 3R3 Super
	25	Pup
	26	4-29, 4-29P, 5-38, 5-50, 5-75, 5-90, RFL60, RFL75, RFL90
	27	6-60, 6-85, AC7, AC7C, Bandbox 601, Bandbox 602
	28	Bandbox Jr. 401, Bandbox Jr. 401A, Gembox 608, Gemchest 609, Gemchest 610, Jewelbox 704, Jewelbox 704A, Jewelbox 704B, Showbox 705, Showbox 706
	29	708 Showchest, 804 Jewelbox, 20, 21, 22, 30, 31, 32, 40, 41, 41A, 42, 60, 61, 62, 82, 83, 30S Monotrad, 31S, 33S, 34S, 40S Unitrad, 41S, 42S, 45S, 82S, 60S, 61S, 62S, 63S

MANUFACTURER	YEAR	MODEL
Crosley Radio Corp. (Continued)	'30	Chum, Playmate, Comrade, Buddy, 26H, Crony 26J, Partner 26K, Mate 53E, Pal 53F, Wood's Desk 53M, New Buddy 54G, Director 76A, Director 77A, Arbiter 77B, Rondeau 84C, Sondo 84D, Roamio 90, Buddy Boy, Classmate, Administrator
Daven Radio	'23	N/A
	24	N/A
	25	N/A
	26	N/A
	27	Bass Note
Day Fan Elec. Co. (Dayton Fan & Motor Co.)		See General Motors Radio Corp.
DeForest Radio Co.	'21	MS-1, Interpanel
	22	Radiohome, D6 Radiophone, D7 Reflex Radiophone
	23	MR 6, D4 Radiophone, D5 Radiophone, Radiophone, D10, DT600, Everyman
	24	D12, D14, F5
	25	D17, D17A, F5, F5AW, F5M, W6F Renaissance, W6T, W5F, F5
	26	N/A
	27	N/A
	28	N/A
	29	N/A
	30	Short Wave CS5
DeWitt-LaFrance Co.	'23	Superadio
	24	"
	25	" Reactodyne 5, Superadio Reactodyne 6, Superadio Superheterodyne
Diamond T. Radio Manufacturers	'25	Special S-10, DeLuxe D-15, C20
	26	S-10, Super Special, Baby Grand
	27	Super Special, Diamond Special, Baby Grand, Chief
	28	American Beauty, Baby Grand, S. D., Chief
Distantone Radios Inc.	'25	A, B
	26	A, B, E, C, F, D, Batteryless
	27	E, C
Diva Radio Corp.	'24	599, 600, 603, 604 Superdyne, 605, 606, 701, 702
	25	Kardonstrip
	26	Kardonstrip Diva 3, Diva 2, Diva DeLuxe 1, Diva, Diva 5, Diva DeLuxe
Duck Co., Wm. B.	'23	CQ, CQA, RFQ
	24	N/A
	25	A884, A884 DeLuxe Balanced
	26	A884, A885, A886
Eagle Radio Co.	'23	Eagle Neutrodyne
	24	Eagle Neutrodyne
	25	Eaglet, Eagle Bal Neut. B, C
	26	N/A
Echophone Radio Corp.	'24	F5, V3
	25	R3, R5, V4, Echophone, Echophone "3", Echophone "4"

MANUFACTURER	YEAR	MODEL
Echophone Radio Corp. (Continued)	'26	4AC, 6ACX, 27AC
	27	40AC, 41AC
	28	46
	29	56
	30	Midget
Edison, Thomas A. Inc.	'28	R1, R2, C1, C2
	29	R5, R4, C4
	30	R6, R7
Electrical Research Labs. (ERLA)	'23	Quad Six
	24	One Tube Kit, Two Tube Kit, Three Tube Kit, Duo-Reflex
	25	Angelus, Nestor 5, Pearson 5, Town & Country, Superflex, Console, Cirkit Superflex, Standard 5, DeLuxe 5, Standard Console, DeLuxe Console, Superflex Cirkit K7, Circloid Kit
	26	Monodic S5, Monodic S50, Sextet, DeLuxe Sextet
	27	Monodic C12, Monodic S51, Single Six S52 & C53, Super 7 S61, C60, Super 7 S61, C62
	28	75, 85
	29	30, 31, 32, C4F Duo Concerto, C5F Duo Concerto, R2
	30	71, 72, 73, 35, 37, 38, 39, 77
Electrical Research & Mfg. Co.	'24	Superheterodyne
	25	Superiorflex Series: S3, 419-3, PS3, P3
	26	Superiorflex S3
Elgin Radio Supply Co.	'25	Super Reinartz 2L0, "1926", Super Reinartz
Emerson Radio & Phonograph Co.	'24	"Combinations"
	25	Distributing: Amrad Neutrodyne, Federal 135 Panel, 125 Cabinet
	26	No Radio Products
	27	" " "
	28	" " "
	29	C, D, F, Series 65, C2, D2
ERLA		See Elec. Research Labs.
F. A. D. Andrea (FADA)	'22	Hazeltine Kit
	23	One Sixty
	24	175A Neutroceiver, 175/90A Neutroceiver Grand, 185 Neutrola, 185/90A Neutrola Grand, 195, 195A Neutro Jr.
	25	160A, 165A, 166A, 167A, 169A, 170A 192A Neutrolette, 192BS, 192S, 195A Neutro Jr., 196A, 197A, SF10-70 Davenport, SF20-70 Beethoven, SF30-70 Queen Anne, SF40-70
	26	175AL Neutroceiver, 460A, R60
	27	262CA or UA, 265A, 265CA or UA, 472, 475UA, 475 A, 475C, 480A, 480B, L65C, CA45/72 CA or UA, SF45/75, CA45/75CA or UA, SF50/80, SF50/80B, RP62 CA or UA, RP65 CA or UA, RP80A, SF45-75C
	28	10, 11, 12, 16, 17, 30, 50, 70, 71, 72, 50E180, 50E420, 70E180, 70E42 0, 72E180, 72E420

MANUFACTURER	YEAR	MODEL
F. A. D. Andrea (FADA) (Continued)	'29	18, 20, 22, 25, 32, 35, 35B, 36, 40, 48A, 75, 77
	30	41, 42, 44, 45, 46, 47, 48, 49, 51, 53, 57, 81 82, 84, 86
Falck (Advance Electric Co. in 1930)	'25	N/A
	27	No-Battery
	28	Climax, 9A, 9D, 11, 52, 61
	29	26 Jr., 23 Sr., 27
Federal Radio Corp.	'22	55, 56, 57, DX58, Federal Jr.
	23	59
	24	59, 61, 102, 110
	25	DX 58, 135, 200, 141, 142, 143, 144, 161, Orthosonic Series: A10, B20, B30, B35, B36, C20, C30, C34,C40
	26	D40, E40, F40, Orthosonic Series: D10, E10,F10
	27	F10-60, E45-60, F45-60, Oxford, Louvain, Mandarin, Milan, D10-60, E10-60, D40-60
	28	E40-60, E41-60, F-11, F40-60, F11-60, F41-60, F50, F50-60, F51-60, F60, F60-60, F61-60 F70, F70-60, F71-60, F80, F80-60, F81-60, G10-60, G40-60, G41-60
	29	K10, K40, K41, L36, L46, M36, M41, M46, M10
Federal Telegraph Co.		See Kolster Radio Inc.
Ferguson Co., J. B.	'24	"TRF"
	25	"TRF", TRF 3V, TRF 3
	26	10, 6, 8, 12
	27	12, 10, 18, 14
Flint Radio Co. Inc.	'28	Little Chief, AX, CX, C
	29	Chief, Standard, 79, 113, 129
	30	Dolores, San Gabriel, Del Rey, Fantasy, Spanish Mission
Freed-Eisemann Radio Corp.	'23	105 Marvel, 350, 370, NR5
	24	NR6, NR12, NR20, NR215, NR400, Aristona LaSalle
	25	NR7, NR35, NR45, NR405, FE15, FE18, FE30
	26	NR15, NR30, NR40, NR48, NR70, NR800, NR850, 10, 30, 40, 48, 50
	27	NR8, NR9, NR11, NR57, NR60, NR66, NR67, NR77, 411, 130
	28	NR50, NR80 Great Eighty, NR80W, NR80 Hand Decorated, NR80, NR85, NR85W, NR85-9 Adler Royal, NR85 Hamilton
	29	NR10, NR53, NR55, NR56, NR78, NR79, NR95, NR90
Freshman Co. Inc., Chas.	'24	Masterpiece
	25	Masterpiece, 5F2, 5F4, 5F5, 5F6, 5F7, Concert, Master Unit, Franklin
	26	6F1, 6F2, 6F3, 6F4, 6F5, 6F6, 6F7, 6F9, 6F10, 6F11, Master Unit, 6F16
	27	G1, G2, G3, G4, G5, G6, G7, G10, F1, F2, F4, F5. 7F1, 7F2, 7F3, 7F4, 7F5, 7AC2, 7AC3, 7AC4, 7AC5
	28	H9, K, L, LS, M11, N11, N12, N14, N17, Q15, Q16, QD16, 3Q15, 3Q16, 2N
	29	21, 21 Earl, 22, 22 Earl, 24, 31, 31 Earl, 31S, 32, 32S, 33 Earl, 33S Earl, 41, 41 Earl, 121 Earl
Garod Corp.	'23	RAF Neutrodyne

MANUFACTURER	YEAR	MODEL
Garod Corp. (Continued)	'24	RAF Neutrodyne, V, Georgian
	25	RAF, V, Georgian
	26	EA, EC
General Motors Radio Corp.	'24	5105 OEM 11, 5106 OEM 7, 5107 Day Radia
	25	5108 Dayola, 5109 Daycraft, 5110 Daytonia, 5111 OEM 7, 5112 Dayola, 5113 Daytonia, 5114 Dayfan 5, 5115 OEM 12, 5116 Daycraft 5, 5117 Day Royal, 5118 Day Grand, Dayphone 5
	26	5121 Dayfan 6, 5122 Daycraft 6, 5124 Dayfan 7, 5125 Daycraft 7, 5126 Day Grand 7, 5127 Day Royal 7, 5128 Dayfan 5, 5129 Daymar 7, 5131 Daycraft 5, 5133 Daytonia
	27	5140 Dayfan 6, 5142 Dayfan 6 Jr., 5057 Dayfan 6 AC, 5143 Daycee 6, 5144 Day Royal, 5145 Day Console, 5146 Dayfan 6 AC, 5147 Day Console AC, 5148 Daycraft, 5152 Day Console, 5153 Day Console, 5154 Daycraft, 5158 Daymar, Dayfan 6 Jr., 5163 Daycee, 5164 Daymar, 5165 Day Royal, 5166 Dayfan
	28	25 8AC (5069), 26 8AC (5069 & 80), 27 8AC (5069 & 80), 28, 35
	29	43, 48, 54, 66, 67, 68 A5003, 69, 72, 73, 56, 74, 80, 81, 82, 83, 90, 91, 93 A5005, 94 A5005
	30	120, 130 Sheraton, 140 Italian, 150 Queen Anne, 160 Georgia
Gilfillan Bros. Inc.	'23	R475, R550
	24	R475, R550, GN-1, GN-2
	25	GN-3
	26	GN-4, GN-5, GN-6, 10, 20, 30, 40
	27	60, 70, 80, 90, 55, 65
	28	33, 44, 66, 77
	29	100, 101, 102, 103
	30	105, 106, 107
Globe Electric Co.	'23	810
	24	770, 775 Duodyne, 815 Duodyne. 900 Duodyne, 815, 900
	25	"Panel", 770, 772, 700, 830, Duodyne Series: 775, 880, 815, 900, 902
	26	Duodyne
Golden-Leutz Corp. (later Leutz, Inc.)	'24	Super Pliodyne 9
	25	Pliodyne 6, Super Pliodyne 9, Universal Pliodyne
	26	Admiralty PL 10-6, Imperial PL 10-6, Admiralty PL 10-6 Jr., Imperial PL 10-6 Jr., Imperial PL 10-6, Admiralty PL 10-6 Sr., Admiralty Super 8, 9-SE, Imperial PL 10-6 Jr., Imperial Super 8, Imperial PL 10-6 Sr., Universal Transoceanic, Universal Super 8, Super Plio 9, Plio 6, Universal Plio 6
	27	Transoceanic Phantom, Univ. Transoceanic, Universal Plio 6, Transoceanic 7, Super Pliodyne 9
	28	P-6, AA, SA, SG, Univ. Transoceanic
	29	Seven Seas Console, Silver Ghost, Univ. Trans. Phantom
	30	Seven Seas Console, Seven Seas Egyptian, Silver Ghost, 7CS, SG
Graybar Electric Co.	'29	330, 340, 311, 500, 550, 310, 320
	30	700, 770, 900
Grebe, A. H. & Co.	'20	CR3

MANUFACTURER	YEAR	MODEL
Grebe, A. H. & Co. (Continued)	'21	KT1, CR3A, CR5
	22	CR5, CR8, CR9
	23	CR6, CR12
	24	CR14, Synchrophase
	25	MU1 Synchrophase, MU2 Synchrophase, DeLuxe
	26	Puritan, Princess, Lancaster, Andalusia, Renaissance, CR 18 (Short Wave)
	27	C7, Synchrophase Seven
	28	AC6, AC7, CR16, 2227, 2249, 2250, Power Amp Table, DeLuxe, Buckeye, 820
	29	21950A Super Synchrophase, 21950B Super Synchrophase, 270A, 270B, 270C, 285A, 285B, 450B, CR 18 Short Wave
	30	160, 18950, 225M, 225W, 265
Grigsby-Grunow Co. (Majestic)	'28	61, 62, 71, 72
	29	181, 91, 92, 101
	30	90, 91, 92, 93, 102, 103, 130, 131, 132, 233
Grimes, David Inc.	'24	N/A
	25	3XP, 4DL, Baby Grand, 5B, 5D, Empire, Renaissance, Monotube, Tritube
	26	N/A
Gulbransen Co.	'28	N/A
	29	200, 290, 290A, 291, 292, 295, 296, 297, 9950
	30	161, 53
Guthrie Co.	'24	Bob-O-Link, Nightingale, Blue Bird, Mocking Bird
	25	Goldfinch
	26	5 Nightingale, 6, 5-50, 6-60
	27	E-6-2 Nightingale, S-6-1, A-8-1
Halldorson Co., The	'23	N/A
	24	RD400
	25	RF400, RF500
	26	RF500
Haller, W. B. (Hallerio)	'23	N/A
	24	III, IV, V
	25	1½, 3½, III, IV, V
	26	Hallerio, III, IV, 5
Hallock & Watson	'23	RF12
	24	RF12, RF22, TR5-5
	25	TR-5 Halowat, TR-R Halowat
	26	TR-5 Halowat, AW-5 Halowat
Hamburg Bros. (Pennsylvania)	'24	No. 1, No. 2
	25	No. 1, No. 2
	26	No. 1 Jr., No. 2 Jr.
Hammarlund-Roberts, Inc.	'25	N/A
	26	HI-Q
	27	HI-Q
	28	HI-Q-29 Junior, HI-Q-29 Master
	29	N/A
	30	HI-Q-30
Harmon & Sons, W. H. (Harmonson)	'25	IVC, IVC Grand, IVA, IVA Grand, Unitro, IVA-R, VC Grand, Unitrol Grand, Unitrol
	26	IVA, VC
	27	5-C, Unitrol

MANUFACTURER	YEAR	MODEL
Hartman Elec. Mfg. Co.	'25	10A Adam Period, 12A Adam Period, 10A Italian Period, 12A Italian Period, 10A Queen Anne Period, 10B, 12B, 10C, 12C
	26	Compact, Jr. Upright, Sr. Upright, Sheraton
	27	Compact, Jr. Upright, Sr. Upright, Sheraton
High Frequency Labs.	'28	Isotone
	29	Special 9, Isotone, Mastertone
	30	N/A
Horn, H. H.	'30	Tiffany Tone
Howard Mfg. Co.	'24	Table, Console, Phonograph Panel
	25	D4, A5
	26	S7
	27	135, 495, S7, 445
	28	Consolette, Hepplewhite, Gothic, Florentine, High Boy, Green Diamond 8
	29	Sheraton, Louis XVI, Consolette, Hepplewhite, Gothic, Florentine, High Boy
	30	Plymouth SG A, Consolette SG A, Puritan SG A, Patrician SG A, Combination SG C, SG B
Hyatt Electric Corp.	'27	A
	28	A, C
	29	N/A
	30	AC7, M5, D, A6
Hyman & Co., Inc., Henry	'23	N/A
	24	V60
	25	V60 Imperial Bestone, V60 Aristocrat Bestone, Bestone
Imperial Radio Corp.	'26	5
	27	a-5 Michigan, 6
Indiana Mfg. & Elec. Co.	'25	Hyperdyne Series: 500, 600, 700, 502, 701, 503, 702
	26	503, 506, 500, 701, 60A, 60B, 60C, 60D, 702, 600, 606, 603, 703
	27	60A, 61A, 61C, 62B, 90A, 62C, 92A, 90C, 92C
Industrial Radio Service	'24	Ultra-Marvel, 404, 404A
	25	Ultra-Marvel
	26	Ultra-Marvel, Ultrola
Jackson Bell Co.	'28	5
	29	59, 60, 6, 8, Imperial DeLuxe
	30	62 Modern, 62 Round Top
Jones Radio Co.	'21	H, J
	23	SMJ Symphony, 502J Symphony, 503J Symphony, Port
	24	SMJ, 502J, 503J
	25	Symphony
	26	N/A
	27	29 Harmonic
Jones Radio Mfg. Co. (Joseph W., New York)	'24	Semi-Portable
	25	J-80, Portable, J-75S P, J-100B, J-175, J-100C, J-175C, J-175D, J-85, J-65, JW-90, J-195, J-75B, J-75T
	26	J-621, J-700, J-675, J-655, J-175, J-195B
	27	J-621, J-625, J-600

MANUFACTURER	YEAR	MODEL
Kellogg Switchboard & Supply Co. (Wavemaster)	'25	Wave Master
	26	504, 505, 506, 507, 508, 601, 701
	27	510, 511, 512
	28	514, 515, 516, 517, 518, 519, 520, 521, 521B
	29	523, 524, 525, 526, 527, 528
	30	533, 534
Kemper Radio Laboratories	'25	K51
	26	K52
	27	K53, Radiomobile
	28	K56
	29	K57 Kompak, K53
	30	SG7
Kennedy Co., Colin B.	'22	220/525, 110
	23	281, 110 Intermediate, Universal, 311, V, X, Jacobean, Spanish Desk
	24	VI, XV
	25	III, XI, XVI Royal, 20, 6, 30 (XXX)
	26	N/A
	27	Coronet, Imperial, Spinet
	28	60, 70, 80
	29	210, 220, 310, 320
	30	222, 224, 426, 526, 632, 726, 726A, 726B, 826, 826A, 826B, 826C, 1030
King Mfg. Co.	'24	N/A
	25	5
King Quality Prod.-1925	26	10K1, 10SK, 25, 30, 40, 61, 62, 63
King Hinners Radio Co.-1926	27	71 Commander, 80 Baronet, 80H Viking, 81 Crusader, 81H Chevalier, 82
King-Buffalo, Inc.-1926-27	28	E, FK, GK, HK, JK
	29	97 Royal, 98 Imperial, 101 Monark
King Mfg. Corp.-1927-30	30	218
Kodel Mfg. Co.	'24	C-11, C-12, C-13, C-14, P-11, P-12, S-1, Camera Radio
	25	C-1, Gold Star, Gold Star Reflex, P14, Logodyne, Big 5, STD 5 Logodyne, Big 5 Logodyne, C-13, STD 5 Logodyne, Logodyne Unitrola, Logodyne 53
Kolster Radio Inc.	'25	6A, 6B, 8B, 8C, 6C
	26	6D. 6E. 8A
Fed. Tel. Co. 1925	27	6G, 6H, 7A, 7B, 6F, 6K, 6J, 6L, 6R
Fed. Brandes, Inc. 1926-27	28	K-20, K-21, K-22, K-23, K-24, K-25, K-30, K-32, K-35, K-36, 6M, K27, K28
Kolster Radio Corp. 1928-29	29	K42, K43, K44, K45, K38, B10, B11, B12, B15, B16
Brandes Radio Corp. 1929		
Langbein Kaufman Co.	'25	4-S Elkay Super Selector 5-S Elkay Super Selector Kit
	26	5-S Elkay, 6-S Elkay
	27	Jr. 6 Elkay, Jr. 7 Elkay, Sr. 6 Elkay, Sr. 6E Elkay
Lee Electric & Mfg. Co.	'23	Lemco
	24	50 Lemco Neutroflex, 340-A, B
	25	N/A
	26	50 Lemco, 340A
Leutz, C. R. Inc.		See Golden Leutz Corp., 1924-1927
Lytton Inc., Walter	'23	(Models $45 to$545)

MANUFACTURER	YEAR	MODEL
Lytton Inc., Walter (Continued)	'24	(Models $15 to $545)
	25	103 A Compass, 103, 100, 101A Wav-O-Dyne, 99T Lytton Duplex, Port. Lytton Duplex, 103PL Masterpiece, 103A-PL, 105 Super Wav-O-Dyne, 201 Wav-O-Dyne, 100 Standard, 401A Concert, 305
McMillan Radio Corp.	'26	DeLuxe Tel-o-air, Standard Tel-o-air, Table Model Tel-o-air, Standard DeLuxe, 1 McMillan, 2 Superfine Five, 3 McMillan Five, 1 McMillan
	27	Seville, Ivanhoe, Verdi, Orleans, Oxford Six, Northfield
	28	Warwick 8, Westminster 8Y, York Comb. 185, Westchester 186
	29	N/A
	30	959, 965, 975, 999, 925A, 925B, 925D, 935, 937
Magnavox Co.	'24	TRF50, TRF-5
	25	Jr., 10, TRF-5, 25, TRF 50, 75 (7-5), Drawer
	26	Drawer, Jr., 25, 75
	27	N/A
Magnus Electric Co. (Magutrol 1925-26)	'23	872, 876, 873, 4, 55, 77, 870
	24	868 Magnadyne 84
	25	940, Sub-Panel, DeLuxe, Sloping DeLuxe, Magnus
	26	TRF, Sub-Panel, DeLuxe, Phono Panel
Majestic		See Grigsby-Grunow Co.
Malone Lemon Products, Inc.	'23	See Carloyd Elec. Co.
	24	See Carloyd Elec. Co.
	25	See Carloyd Elec. Co.
	26	SP 5, Power Six, MR-6, 8 Tube, 25, 31, 35, 52, 55
Marti Electric Radio Co., Inc.	'26	B-Power, Electric Power
	27	TA-2, TA-10, DC-2, DC-10, CS-2, CS-10
	28	N/A
	29	N/A
	30	E
Mazda Radio Mfg. Co. (Consonello)	'24	Grand
	25	Grand, Junior
	26	Concert, Premier, DeLuxe, Royal, Grand, Junior Portable, Special
Metro Elec. Co. (Metrodyne)	'25	Metrodyne
	26	Super 5, Super 6, Super 7
	27	Super 7, Super 6
	28	All Electric, Super 8
	29	N/A
Michigan Radio Corp.	'22	Senior
	23	MRC-2, MRC-3, MRC-7, Midget
	24	M-10 Midget, M-11 Midget, M-12 Midget, MRC-4, MRC-10, MRC-11, MRC-12
	25	MRC-3, MRC-14 DeLuxe
Midwest Radio Co.	'22	Miraco
	23	K, MW
	24	K, MW

MANUFACTURER	YEAR	MODEL
Midwest Radio Co. (Continued)	'25	Ultra 5, R, R3, MW
	26	Ultra 5, R, R3, Unitune
	27	Ultra 5, Unitune, 8 Tube, 7 Tube, 6 Tube
	28	8 Tube, 7 Tube, 6 Tube, DeLuxe, AC9, AC8
	29	AC8, AC7
	30	A, B, H, J, K, L, M
Minerva Radio Co.	'25	Distantia DeLuxe 5, 5M, Elite, Serenade, Grand
	26	Studio Console, DeLuxe, 1A, Library Console, Parlor Console, Consolette
	27	N/A
	28	F-26, F-27, F-28, F-29
	29	N/A
	30	1, 2, 3, 4, 13, 14, M-28, M-29, M-30
Mission Bell Radio Mfg. & Dist. Co.	'28	AC
	29	D, E,
	30	Mantle
Mohawk Corp. of Illinois	'25	A5, 110, 115, X, XL1
	26	CX, A, B
	27	Seneca, Geneva, Pontiac, Winona, Cherokee, Chippewa
	28	Navajo, Pawnee, Iroquois, Hiawatha, Cortez, Seminole
Mohawk Electric Co.		See All American Mohawk Corp.
Mohawk Radio Corp.		See All American Mohawk Corp.
Montgomery Ward Co.	'25	Airline
	26	Airline
Mu-Rad Laboratories, Inc.	'22	MA-12, MA-13
	23	MA-17, MA-12, MA-13
	24	MA-17, MA-15
	25	Triplex, MA-20, Transcontinental A, B
	26	B, Super Six
	27	Super Six T, SC, SE
Murdock Co., Wm. J.	'23	5 Tube Neutrodyne
	24	5 Tube Neutrodyne
	25	5 Tube Neutrodyne 100, 204, 200, 203, CS-32, CS-33, 101, 110
	26	M-26
	27	350, 65, 75
Music Master Corp. (See Ware)	'25	175, 400, 60, 100, 215, 300, 50 Ware, 140, 250 Ware, 460 Ware, 301
	26	N/A
Nassau Radio Corp.	'23	LR-70
	24	LR-70, LR-170 Unitune
	25	Magnadyne Series: VR-215, MR-60, VR-400
	26	C, DLP, Magnadyne Series: MR-60, VR-400, VR-215
National Airphone Corp.	23	G, GT-1 Monodyne
	24	GT-1 Monodyne
	25	4A Stratford, 5A Somerset Mars, 4B Shelbourne, 4C Somerset Standish, Monodyne, Somerset 5
National Carbon Co.	'27	1
	28	2, 3, 11, 20, 21
	29	31, 32, 33, 34, 42, 43, 44, 52, 53, 54

MANUFACTURER	YEAR	MODEL
National Co. Inc.	'29	SG4 Thrill Box, SW4 Thrill Box, MB29
National Radio Mfg. Co.	'23	70, 71, 72, 73, 77, 82, 83, 93, 99, 473, Ford Jr., Ford Sr.
	24	072, 372
	25	Country Gentleman
National Transformer Mfg. Co.		See Balkeit Radio Co.
Neutrowound Radio Mfg. Co. (Advance Auto. Access.)	'25	1926
	26	1927, 1927 Super Power
Norden-Hauck Co.	'25	C-7, C-10 Navy Model, 6 Pliodyne
	26	Universal Plio 6, C-10 Navy Model, Admiralty Super 10
	27	Super 10, Super 10 Specialty, Admiralty Super 10, Improved Super 10
	28	Improved Super 10, Shielded Super 10, Electrophonic Super
	29	Shielded Super 10, Admiralty Super 10 Screen Grid
Northwestern Radio Mfg. Co.	'22	22/2
	23	SR-25
	24	Nor-wes-co, SR-25
	25	Norco, Norco Type D, Norco DeLuxe
	26	Norco 55, Norco
Operadio Corp.	'23	N/A
	24	N/A
	25	"1925", Windsor, Empire, C
	26	C
	27	7
	28	7
Ozarka, Inc.	'24	RC200
	25	299 Junior, Senior Console, Viking (5A)
	26	Senior(5A), Junior (5A), Senior (S5), S7
	27	Senior (S5), S7, Junior (5A), S5
	28	78, 89, 90
	29	91 Viking, 91, 92
	30	93, 93A, 93B, 94AVC
Paragon		See Adams-Morgan
Pathe Phono & Radio Co.	'24	Minute Man
	25	Minute Man, B-5 Minute Man
Patterson Radio Corp.	'26	Supreme Series: C, T, K, B
	27	Supreme, K, D
	28	SD, Aristocrat, DeLuxe
	29	89, 99, 119, 169
	30	5-69, 7-69, 6-59, 6-69
Perry Radio Supply Co.	'23	Perasco Kewpie, PRD-11, Petite Grand
	24	Perasco, PRD-11, Petite Grand
	25	Perasco Kewpie, PA-111 Perasco Amp., Perasco Petit Grand, PRD-11 Perasco, PA IV Perasco Amp.
Pfanstiehl Radio Co.	'24	7 Overtone
	25	8, 8C, 8E, 10 Overtone, 10C, 10S
	26	20, 201, 202, 18, 181, 182
	27	28 Junior, 30, 32, 302, 322, 34, 50

MANUFACTURER	YEAR	MODEL
Phenix Radio Corp.	'24	Ultradyne, Ultradyne Kit
	25	Ultradyne Kit, Ultradyne L-2, Ultradyne L-3
	26	L-3 Ultradyne, L-1, L-2, L-3
Philadelphia Storage Battery Co. (Philco)	'28	551, 561, 531, 541, 511, 521, 512, 513, 514, 515, 522, 523, 524, 525
	29	86, 82, 65 DeLuxe, 65, 62 DeLuxe, 62, 87 DeLuxe, 83, 65, 76
	30	65, 62, 87, 95 DeLuxe, 95, 92 DeLuxe, 92, 76 DeLuxe, 76, 30, Baby Grand, Concert Grand, 20, 20A, 96, 77, 296A Comb., 96A, 77A, 29 Comb., 41, 296 Comb., 87 DeLuxe
Pilot Radio & Tube Corp.	'26	Universal, Wasp
	27	Super Wasp
	28	A-C Super Wasp
	29	Super Wasp K110, Super Wasp K136, Pilotone, Air Scout, Air Hound, SG 105, K106, K108, K117
Powerola Radio Co.	'25	C-3
	26	C-3,C-3 Electric Panel, C-3 DeLuxe 114, C-3 Highboy 113, C-3 Highboy 111, C-3 Highboy 110
Premier Electric Co.	'26	Ensembles
	27	6 in Line
	28	PT28-29RAC, PT28-29DC, PC28-29RAC, PC28-29DC, PC28RAC, PC28DC, PC80RAC, PC80DC, PC47RAC, PC47DC
	29	601, 771M, 745C, 845-V, 724D, PT771M, 2930 7-M, 2930 7-D, R-53, R-57, R-55, R-54, R-47
	30	2375, 824, Home-Pal
Premier Radio Co.	'25	7-A, 7-B, 6B, 8A
	26	Allen's Rectaflex, 20
	27	30, 40, 50B, 50
Priess Radio Corp.	'25	PR-3, PR-5, PR-4 Straight 8, PR-6 Straight 8
	26	PR-4 Straight 8, PR-6 Straight 8, Straight 9
Q. T. Radio Products Co., The	'24	N/A
	25	PT Little Giant, QT Little Giant, QT Evening Hour
	26	QT-3, QT-A, QT-C
	27	EH-7 Evening Hour
Radiette	'29	(Mantle)
Radiodyne		See Western Coil & Electrical Co.
Radio Corp. of America		See R. C. A. Victor Co. R. C. A. Victor Corp. of America
Radio Guild Inc., The	'22	Harkness Super-Regen.
	23	Guild Seal, "Broadcast Receiver", RG510
	24	Harkness Reflex
	25	N/A
	26	Counterflex Reflex
Radio Master Corp. of America (Simpliform)	'25	100, 275, 375, 5-T-50, 5-T-14, 5-T-15, 10, 11, 12, 5-T-1, 110, 5-T-215
	26	19-AS, 15, 10, 11, 12, 5-T-1, 5-T-14
Radio Products Mfg. Co.	'23	RPM
	24	RPMODYNE

MANUFACTURER	YEAR	MODEL
Radio Products Mfg. Co. (Continued)	'25	RPM-50, RPM-51, RPM-52, RPM-53
	26	RPMODYNE A
		" B
		" C
	27	Same as 1926 Models
	28	C, D
	29	4AC, 3AC, "RPL"
Radio Receptor Co., Inc.	'23	Home-O-Fone
	24	Receptrad Multiflex
	25	Receptrad Multiflex, Batteryless
	26	RM-2-DC, M-DC, RF-6, RM-2-AC, M-AC, P-F-6
Radio Supply House	'24	Paramount
	25	Paramount X3, Paramount 1, Paramount No.5
	26	Paramount
Randolph Radio Corp.	'25	Acme, Harkness, Reinertz, Neut., Superhet., Cockaday
	26	N/A
	27	Randolph, 7
R. C. A. Victor Co., (Victor Div.)	'26	Hyperion Electrola, Borgia I Orthophonic, Borgia II Orthophonic, Florenza Orthophonic, Alhambra II Orthophonic
	27	7-30 Orthophonic, R-20 Orthophonic, 9-15 Orthophonic, 9-25 Electrola Radiola, 9-40 Orthophonic, 9-55 Electrola Radiola
	28	7-10 Orthophonic, 7-11 Victrola Radiola, 7-25 Orthophonic, 7-26 Electrola Radiola, 9-16 Electrola Radiola, 9-54 Automatic Electrola Radiola
	29	9-18 Electrola, 9-56 Autoelectric, R-32 Electrola Radiola, RE-45 Radio Electrola
	30	R-52 Radiola, RE-75 Electrola, RE-154 Electrola, RE-156 Electrola, R-35, R-39, RE-57
R. C. A. Victor Corp. of America	'21	Aeriola Jr.
	22	Aeriola Sr., Aeriola Grand, RE, AR, RA, DA, RA 1300, AA 1400
	23	Radiola I, II, IV, V, VI, VII, IX, Radiola Sr., Radiola AC AA-1520, Radiola DA, Radiola Grand, RS, RC, Radiola Jr.
	24	III, III Amp., III, IIIA, VIII Super, X, Superheterodyne, Regenoflex
	25	20, 24, 25, 26, 28, 30
	26	28, 104
	27	16, 17, 18, 30A, 32, 51
	28	41, 60, 62, 64 DeLuxe
	29	21, 22, 33, 44, 46, 47, 66, 67
	30	48, 80, 82, Comb. 86
Reichmann Co.	'25	50 Thorola Islodyne, 55 Thorola Islodyne, Thorola Islodyne, New 51
	26	60, 57, 58 Thorola, 59 Thorola, 55, 50, 51, 52
	27	N/A
Rich, George H.	'25	2-T-12, 3-T-22, 2-T-22, 5, Special, 3, 5, Custom Built, Custom Built Dragon
	26	3, 4, 5 Special, 6
	27	6-S Custom Built, 6, 7, EP-6-S, EP-6, EP-7
Roth-Downs Mfg. Co.	'25	Orphens F
	26	Orphens Series: A, C, H

MANUFACTURER	YEAR	MODEL
Roth-Downs Mfg. Co. (Continued)	'27	Orphens H, 25, C, A, 30, 40
	28	N/A
	29	N/A
	30	82, 62, 52, Caradio
Scott Transformer Co.	'28	Super 9
	29	Super 9, AC Nine, Symphony, Taranaki, Canterbury, Milford
Sears Roebuck & Co.	'23	Armstrong Regen.
	29	1150, 1170, 1152, 1174, 1250, 1252, 1260, 1290, 1292, 1300, 1310, 1312, 1330, 1302, 1370, 1320, 1322, 1324
	30	1390, 1400, 1402, 1404, 1406, 1430
Shamrock Mfg. Co.	'25	Shamrock Harkness, Grand Console, Spec. Consolette, DeLuxe
	26	A DeLuxe Grand, B, C, D
	27	A, B, C, BL, CL
	28	Standard, Console Electric
	29	N/A
Silver-Marshall Inc.	'28	SC11 Silver Cockaday, 620 Silver Cockaday, 630, 642AC, 644SG
	29	712, 714, 716, 710, 720AC, 722, 722DC, 724, 724DC, 726, 726SW, 727SW, 730, 731, 735, 740, 740AC, 770, 782
	30	30A Princess, 30B Princess, 30C, 30D, 30E, 34, 34A, 35, 35A, 36, 36A, 37, 38, 39, 55, 60, 60B, 70, 75, 75B Concert Grand, 90B, 95B, 95
Simplex Radio Co. (Philadelphia)	'23	RJ, RFB, RF
	24	RF, RJ, RFB
	25	Travel, RX, RF, SR-8, SR-5, SR-5 DeLuxe
	26	SR-8, Compact, SR-9, SR-9 Grand
	27	SR-9, SR-10, SR-11
Simplex Radio Co. (Sandusky, Ohio)	'25	N/A
	26	6-A
	27	B Electric
	28	D
	29	S Louis XV
	30	G, H, I, J
Slagle Radio Co.	'25	Five, IV, V
	26	10, 12, 4, 5, 9, Console 4, Console 5, VII, V
	27	XX, A, B, C
	28	9, "Ten 29" Series: A, B, C, D
Sleeper Radio Corp.	'23	Monotrol
	24	Monotrol
	25	Monotrol 54, Scout 57, Serenader 58, Super Symphon 59
	26	Scout 57, Serenader, Super Symphonetic 56
	27	Scout 64, Serenader 65, Scout 66, Scout 67, Imperial 68, Monotrol 69, Electric Chassis
Sonora Phonograph Co. (See Ware)	'24	241 Ware Neut., 242 Ware Neut. Type T
	25	800 C, Plymouth, Hampden, C, Chatham
	26	D800, D820 Standard, D830 DeLuxe
	27	E300, E850, E860, E865 Standard, E870 DeLuxe, F875 DeLuxe, G880 Light, G885 Light
	28	A20, A30, A31, A32, A33, A35, A36, A40, A44, A46, A50

MANUFACTURER	YEAR	MODEL
Sonora Phonograph Co. (Continued)	29	N/A
Sparks-Withington Co. (Sparton) "The Pathfinder of the Air"	'25	5-15, 5-26
	26	AC5
	27	6-15, 6-26, AC7, AC62, AC63
	28	39, 69 Sparton, 79, 79A, 89, 89A, 99, 109
	29	101, 110, 111, 49, 301, 301DC, 930, 931, 931DC
	30	31, 103 Ensemble, 111A, 235, 410, 410DC, 420, 420DC, 564, 570, 574, 589, 591, 593, 600, 600 DC, 610, 610DC, 620, 620DC, 740, 740DC, 750, 750 DC, 870, AR19, AR50 (Police), AC55 (Headquarters)
Spielman Electric Co., Inc.	'23	Seco
	24	Seco
	25	Air Pilot
	26	Air Pilot
Splitdorf Electrical Mfg. Co.	'24	R100
	25	R102, R200, R400 Sonata, R500 Polonaise, R150 D Nocturne, R410C Rhapsody, R110D Geisha, R425C Mikado
	26	C200, C215, R560, RV580, RV695
	27	Abbey, Concerto, Virtuoso, Maestro, Intermezzo, Warwick, Lorenzo, Winthrop, Buckingfam
	28	Abbey Jr., Abbey Sr., Warwick, Avon, Lorenzo, Salem, Como, Winthrop, Devon
Steinite Lab.	'25	26-1, 25-1, 26-2, 25-2, 5
	26	27, 27C
	27	85, 100, 125, 150, 990, 991, 992, 993
	28	261, 262, 263, 264, 265, 266
	29	40, 45, 50, 60, 70, 80, 95, 100, 102, 105
	30	410, 420, 412, 450, 210, 230, 421, 425
Stewart-Warner Speedometer Corp.	'25	300, 300A, 305 Aeromaster, 310, 315, 320, 325
	26	330, 335, 340, 345, 350, 355, 360, 365, 375
	27	385, 390, 500, 520 Compact, 525, 530, 535, 700, 705 DeLuxe, 710 DeLuxe, 715, 720, 750
	28	801A, 802A, 806A, 811A, 812A, 801B, 802B, 806B, 811B, 812B
	29	900, 900AC, 901-2-3, 911-12-13, 921DC, 921-22-23. 931-32-33, 951-52, 953
	30	1 Avon, 2 Graham, 3 Raphael, 4 St. James, 5 Comb.
Stromberg-Carlson Mfg. Co.	'23	N/A
	24	1A, 2
	25	1B, 3A, 3B, 601, 602
	26	501, 501A, 501B, 502, 502A, 502B
	27	601B, 602B, 601A, 602A, 523, 524, 633, 634, 734, 744
	28	633W, 635 Treasure Chest, 636 Treasure Chest, 744B
	29	635, 638, 641, 641A, 641B, 642, 642A, 642B, 846, 846A, 846B, 848
	30	645, 652, 652A, 652B, 654, 654A, 654B, 10, 10A, 10B, 11, 11A, 11B, 12, 12A, 12B, 14, 14A, 14B
Sun Mfg. Co.	'25	50 Sun Reflex, 60 Sun Reflex, 70 Sun RP, Sun Radio Deluxe, Super Sun
	26	Sun, Sun Radio DeLuxe
	27	27-A, 27-B

MANUFACTURER	YEAR	MODEL
Super Antenna Co.	'23	Gem, Super
	24	Gem, Super
	25	Super
Telephone Maintenance Co.	'23	Telmaco
	24	Acme P-1
	25	Acme P-1, P-1
	26	P-1
Thompson Mfg. Co., R. E.	'23	N/A
	24	5B, 5-A
	25	S70 Concert Grand, S60 Parlor Grand, V50, P11, P12, 5C, 5M Minuet, K40 Lafayette, C61 Super Duo Tone, R81 Super Duo Tone, Minuet
Thorola		See Reichmann Co.
Trav-Ler Mfg. Corp.	'26	N/A
	27	N/A
	28	Standard
	29	T
	30	A, A-DC, B, No.6 Standard, No. 7 DeLuxe, No. 10 Aristocrat
Trego Radio Mfg. Co.	'23	N/A
(Did not use model nos.)	24	N/A
	25	N/A
	26	N/A
Tuska Co., C. D.	'22	RT-224
	23	RT-222, RT-225, 225
	24	225, Tuska Superdyne
	25	305 Superdyne, 301 Jr. Superdyne
United Air Cleaner Corp.	'28	N/A
(Early "Sentinel" Line)	29	440, 444, 445, 550, 555, 666, 666-C
	30	8, 9, 10, 11, 12, 15, 16
United American Bosch Corp.		See American Bosch Magneto Corp.
United Engine Co.	'25	K Radio Lark, M Lan Sing, W Lan Sing, Lan Sing Phono, Lan Sing Console
	26	United Lan Sing
	27	United Lan Sing 90-28, 160-28, 225-28, 275-28, 205-28, 340-28
	28	N/A
	29	N/A
	30	50-301, 50-302, 50-303
United Metal Stamping Co.	'24	Midget, Travellers, Diamond, L. R. D.
	25	1 Paraflex, 2 Paraflex, 3 Paraflex, 6 Flyn, 5 Flyn
	26	Paraflex, Aristocrat
United Scientific Lab.	'26	Pierce-Airo
	27	B Pierce-Airo
	28	B Pierce-Airo
U-S-L Radio Inc.	'25	RC-5
	26	Broadcast Receptor
	27	DC6, DC7, AC7
U. S. Radio & Television Corp.	'29	21, 22, 36, 37, 80, 46, 47, 48, 49, Radiotrope Neut., 50, 55, 90, 89, 60, 70, 40

MANUFACTURER	YEAR	MODEL
U. S. Radio & Television Corp. (Continued)	'30	28A, 28AX, 31B, 31BX, 31-C Comb., 31CX, 31D, 31DX, 54, 55, 27, 11, 14, 115, 140, 160, 240, R-1 Radiotrope, R-2 Radiotrope
Valley Electric Co.	'25	5, Valleytone
	26	35, 52
	27	52, 71
Vibroplex Co., Inc.	'24	VT
	25	1 Martinola, 4 Martinola, 5 Martinola
Victoreen Radio Co.	'29	Superhet
	30	345, 395, 595
Victor Talking Machine Co.		See R. C. A. Victor Co., Victor Division
Walbert Mfg. Co.	'24	R, K
	25	Isofarad Jr., Penetrola
	26	5 Isofarad, 6 Isofarad, 7 Isofarad, Penetrola, Isofarad
	27	47-T Isofarad, 26 Isofarad, 26P-T Isofarad
Ware Radio Corp.	'22	AD2
(See Sonora, Music Master, and Ware Mfg. Co.)	23	DA2, T
	24	T, TU, X, XU, W, WU, L
Ware Mfg. Co.	'29	Bantam B1 Ampico, Bantam B2 Ampico
	30	5MW, Trainon, 10, Byron
Western Air Patrol	'24	N/A
	25	N/A
	26	100
	27	AC100
	28	80, 100
	29	80, 90
Western Coil & Electrical Co.	'24	Radiodyne
	25	Radiodyne Series: WC-12, WC-5B, WC-11, WC-11B, WC-12B, WC-14A, WC-17A, WC-15, WC-14B, WC-18B, WC-12B, WC-14C, WC-12C, WC-18C; Radiodyne
	26	Radiodyne Series: WC-15 Jr., WC-19E, WC-70G Super, WC-20F Super
Wholesale Radio Service Co. (Lafayette)	'29	Preselector
	30	Duo Symphonic, AC524
Wilcox Laboratories	'23	N/A
	24	N/A
	25	10H Hexair Coil, DeLuxe Hexair Coil, Hexair Coil
	26	J Cathedral, Grand Cathedral
	27	N/A
	28	VIII
Wireless Shop, The	'23	Perflex, Detector Unit
	24	Perflex
	25	Perflex
Work Rite Mfg. Co.	'23	N/A
	24	Work Rite Neut., Neutro-Grand
	25	Chum, Air Master, Radio King, Aristocrat

MANUFACTURER	YEAR	MODEL
Work Rite Mfg. Co. (Continued)	'26	Winner Five, Air Master Six, Radio King Six, Aristocrat Six, 16, 26, 36, Air Master 5, Neut. Kit
	27	17, 26, 37
	28	18, 28, 38, 48, 58
	29	33, 35, 37, 39, 40, 24, 27
Wright Radio Mfg. Co.	'24	RF, ARF, Acme Special
	25	5A, III W, IV D, VI, VI Wright DeCoster, VIC Wright DeCoster, Acme Special, A Wright, B Wright
	27	7, 7A
Wurlitzer Co., The Rudolph	'24	N/A
	25	N/A
	26	MF5, 5C
	27	SD
	28	AC, T4
	29	7A, 9A, 7B, 9B, 7C, 9C
	30	840, 850
Zenith Radio Corp.	'23	3R, 4R
	24	Super Portable, VII, VIII, IX, X, Spanish, Italian DeLuxe
	25	Chinese, English
	26	Colonial DeLuxe, English DeLuxe, Italian DeLuxe, Chinese DeLuxe, Spanish DeLuxe
	27	11, 12, 14, 15, 16, 17, 11E, 14E, 15E, 15EP, 16E, 16EP, 17E
	28	31, 32, 33, 33X, 333, 34, 34P, 35, 35A, 35AP, 35P, 353A, 362, 36X, 35XP, 35AXP, 37A, 39, 39A, Super, Super 27
	29	40A, 41, 42, 52, 53, 54, 563, 57, 55
	30	60, 61, 613, 62, 64, 67, 71, 72, 73, 75, 77, 74

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ATWATER KENT 84
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PHILCO 90
1931

This book traces the growth of radio from 1887 to 1929, as it became a tool for reaching millions of people. The next 20 years were the heyday of radio broadcasting. Perhaps the "cathedral" radios shown above best recall those days. If you're interested in the story of radio's golden years, and in the beginnings of television, write to Vintage Radio for details of the fascinating 1930-1950 story.