

THE AUTO RADIO

A Romantic Genealogy

by Donald W. Matteson

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 **Thornridge Publishing**

THE AUTO RADIO: A ROMANTIC GENEALOGY

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To my wife Sally

with whom I shared these fleeting moments

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Preface

I have always been intrigued by automobiles, radios, and Horatio Alger, Jr. success stories. When taken together, spiced with a soupçon of romance, they provide the ingredients for—The Auto Radio: A Romantic Genealogy.

The inspiration for this book may have begun back in 1936 when I built my first two tube short wave radio set and sat in the dark one evening with headphones listening to a musical interlude, part of "The American Hour From Rome," coming over the airwaves direct from radio station 2RO Rome, Italy.

Or...perhaps it was when I carried my high school track coach's car radio home on my bicycle to repair it for him.

Or...when I spent a sunny summer Saturday afternoon with my head and shoulders under the instrument panel of my friend's 1933 Ford V-8, installing a radio, capped off by a drive around the lake country that evening listening to the big band sounds.

Or...when fresh out of high school I went to work for the old Sparks-Withington Company of Jackson, Michigan, makers of Sparton radios. There I experienced it all: the sounds; the odor of fresh-cut cabinet wood, coil wax, rosin flux from soldering; pretty girls assembling radio chassis; and the many buzz words of the radio industry. One of the highlights was installing an experimental radio in a new 1941 Ford and taking it for a test drive over a variety of roads from street car tracks to the "washboard" roads near Gillett's Lake, ending up sneaking a chocolate malted at the local drive-in while listening to Gary Moore's "Club Matinee" on the radio.

Or...it could have been some three years later, again on a beautiful Saturday afternoon while flying a twin-engine U.S. Air Force plane high over the California coastline, surreptitiously listening to Frank Dailey's "Matinee at Meadowbrook" when I should have been tuned to the control-tower frequency.

No,...my heart tells me it really began before that, on a Friday evening during a moonlight drive around Michigan's Irish Hills in my 1936 Ford Coupe with my best girl (now my wife) as we listened to the entrancing music on the radio, after leaving the little summer stock theater nestled in the hills near one of the many lakes.

After a career encompassing nearly every phase of radio communications and electronics, during which an increasing interest in collecting vintage cars and radios developed, I decided to begin research, review and gather material for this book early in 1976, the United States of America's bicentennial year.

Acknowledgments

The work began by talking with fellow "old-timers": Raymond Boyd, the late "Buff" Brown, Gordon Fulton, Elmer Jordan, Roy Purchase, George Wedemeyer, and fellow collectors and enthusiasts: Arthur Aseltine, Earl C. Buton, Jr., James Fred, Alan Douglas, Douglas Houston, Arthur F. Miller, Melvin Patterson, and L. Dale Shaeffer, M.D. Then came my quest of the Ford Archives, thanks to the late Henry E. Edmunds, director, along with David Crippen and Winthrop Sears, archivists, who were all very helpful in guiding me through the stacks.

My investigation of the auto radio collection at the Henry Ford Museum, thanks to the invitation of my good friend Randy Mason, then associate curator of transportation, led to the past ten years of service on my part as curatorial consultant of communications for the museum. During that time I spent many pleasant lunch hours discussing various issues with Kenneth M. Wilson, director of collections; Leslie R. Henry, curator of transportation; G Donald Adams, director of public affairs; Larry McCans, and Walter Simmons, curators; Don McDowell of Public Programs Division; Carl Malotka, photographer, Corporate Services Division and Ross Callaway of Media Relations; all the while subtly directing the conversation toward automobiles, radios and the "good old days." Upon Les Henry's retirement, the museum was fortunate to gain the services of John A. Conde, then recently retired from American Motors Corporation.

When Conde, a noted historian, lecturer and writer learned of my desire to write this book, he began to channel news items and photos from his personal collections to me, as well as suggest that I join the Society of Automotive Historians where I met other writers who have been of much help and inspiration to me: men like Don Butler, who during one of his weekly trips to the Detroit Public Library, generously uncovered some gems for me; and Henry Austin Clark, Jr. of Long Island Auto Museum fame, who reflected upon his early radio experiences one evening at the Dearborn Inn; also Lorin Sorensen, successful writer and publisher, who gave me some excellent advice and James Wren, manager of the patent section of Motor Vehicle Manufacturers Association and his assistant, Dan Kirchner, who were very cooperative and made their historical files available for my research.

After absorbing all of the material on radio manufacturing firms from my personal files of nearly a half century, and more recent acquisitions from swap meets far and wide, I turned to the direct approach of those firms from "A" to "Z" or their successors who were still in existence.

Formerly known as Noblitt-Sparks Industries, now Arvin Industries ,Inc., is still very much in business in Columbus, Indiana, although not making radio or television products. I am indebted to William Kendall of their public relations department for the material he generously supplied as well as his directing me to Ben Irwin, retiree, who came to Arvin as a young engineer just out of Purdue University to begin work on their first car radios. Ben vividly recalled details on these early sets as well as some marketing methods.

My thanks also to D. Doherty, director of public relations for Armatron, of Melrose, Massachusetts, formerly Automatic Radio Manufacturing Company, long-time maker of home and auto radios and parts, for sending background material on Automatic and their founder, David Housman.

Special thanks go to Robert H. Wathen, William B. Draper, Mary Kristek, and Thomas Prewitt of Delco Electronics of Kokomo, Indiana, formerly Delco Radio Division of General Motors, one of the very few survivors in the manufacture of auto radios. They supplied me with historical background on the company and product photographs. Wathen referred me to retired engineer Art Jonsson with whom I conversed extensively about the early days; his memory for details is uncanny.

It was indeed a pleasure to discuss the life of William C. Grunow of Majestic fame with his son, William C. Grunow, Jr. Grunow and his wife Melita provided me with a wealth of background on the father and the Grigsby-Grunow Company. The story of this dynamic man and the empires that he built is true Horatio Alger.

Few people realize the extent of the contributions that William P. Lear made to the auto radio field. Although I knew him casually and was aware of his accomplishments in the field of aviation, the material and leads supplied by his widow Moya Lear and her secretary Dorothy Olson filled in many of the gaps in his early brush with the car radio.

The personnel at Motorola took a great interest in my research and assisted in many ways. Charles A. Sengstock, Jr., manager of corporate relations, patiently listened to my needs and steered me to people who could help, including Faye Bergemann who supplied me with statistics and Carl Lund who provided photos. The key to the early history of the company was retired President Elmer Wavering, while Oscar P. Kusisto, former vice president and general manager, filled in the details on the cartridge tape player development. I spent long periods of time in pleasant telephone conversation with these gentlemen and am forever grateful for their cheerful cooperation.

My search for background on Philco Radio and Television Corporation history led to John F. Eisenmann, manager of consumer & technical affairs for Ford Aerospace & Communications Corporation, who sent copies of materials from his files. Retired Philco engineer, William E. Denk, and his wife Jane, now active as secretary/treasurer of Antique Radio Club of America, cheerfully dug out bits of information from their files and referred me to David Earnshaw, retiree, who was in on the beginning of Philco's long history with car radios. This was followed by a telephone conversation with William Balderston III who recalled his father's early association with Automobile Radio Corporation which culminated as president of Philco. I also had the good fortune to meet with Clark Quinn, former engineer with the Detroit office, who recalled his experiences in building prototype sets for the automotive industry.

Philco auto radio history is still being made by its successor, Ford Motor Company, who sponsored this book. It all started with a telephone call from C. W. (Clem) Rowan, manager of Electro-Mechanical Instrumentation, Electrical and Electronics Division. Shortly afterwards, I was a luncheon guest of Rowan and Carlos A. Altgelt, supervisor of Audio Components Engineering (currently resident engineer in Brazil), as we discussed car radio history. (Little did I know then that this pair would become renowned for their annual auto radio history presentations to the Society of Automotive Engineers.) This led to meetings with Lawrence A. Lopez, executive engineer, Audio Products Development, whereupon we decided the form this book would take. Knowing and working with these men has been the motivating force that made this work a reality.

J. J. Sanchez, RCA Consumer Electronics Division, was most helpful in furnishing data on the the late 1950s era RCA Victor record changer for automobiles.

As I mentioned earlier, I covered industry from "A" to "Z". The "Z" represents Zenith Electronic Corporation, formerly Zenith Radio Corporation. William A. Nail, director of corporate public relations and his secretary Carol Dystin both understood my absorption with the romance of the car radio. They kindly responded to my request by sending a history of the company and and some particulars on the Zenith auto radio (now in antiquity). W. F. Gloss of Zenith Sales Company, also generously answered my request for data on the first Zenith car radio by sending a copy of the complete service bulletin.

Thanks go to Bruce Kelley, curator of the Antique Wireless Association Museum in West Bloomfield, New York; Norman Knight, curator of the Gilmore Auto Museum in Hickory Corners, Michigan; Degna Marconi

Paresce, author of My Father Marconi and her sister Gioia Marconi Braga; Morgan E. McMahon and Gayle McMahon Rowland of Vintage Radio; Dan Post, publisher of Post Era Books; Ron Grantz, curator of the National Automobile History Collection of the Detroit Public Library; Carla Rosenbusch of the Chrysler Historical Collection; Steven Hamp, chairman of the Collections Division of Henry Ford Museum, The Edison Institute; and the libraries of the University of Michigan.

My appreciation to the following members of various antique radio and automobile organizations who unselfishly gleaned reference material from their files and other sources: Arthur J. Balfour, William Biche, William Borntraeger, Joseph Butterfield, Tom Deptulski, Jeff Fisher, Marshal Lee, Vaughn Oswalt, Lloyd Riggs and Marvin Rynard. Collectively, these fellows and especially Alan Douglas, James Fred and Jay Ketelle kept the U.S. Post Office and UPS busy.

Finally to my family: my wife Sally, who not only wrote the social commentaries for chapter five but took on the endless task of editing all of the manuscripts as well as putting up with my moods and giving me encouragement during my periods of the all too real "writer's block." Our son Robert Wayne Matteson, Ph.D., of Ann Arbor, provided the tutoring for our word processors, converted the disks from one system to another and assisted with the photography and the computer programmed format of the book. Our son William Hillary Matteson, Ph.D., of Durham, North Carolina, gave inspiration and drew from his "journalism days" to advise on the dummy layout.

To any contributors I may have inadvertently omitted, please accept my sincere apologies.

D.W.M
September, 1987

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Introduction

The dozen or so years preceding the United States entry into World War II saw the unfolding of one of the most remarkable success stories ever witnessed: the evolution of the automobile radio. Conceived at the turn of the century, it evolved from an unwieldy novelty to a fully perfected, vital accessory for the motor car. Publicly launched on the heels of the stock market crash of 1929, it spawned an industry employing tens of thousands of people in supplying millions of units until halted early in 1942 to retool for war production. Automobile manufacturing helped to lead the country out of the depression and a good radio made the car more desirable. The auto receiver was a prime profit maker for the radio industry during the period when sales of expensive cabinet sets had slowed to a trickle and low cost table models were emerging.

The production facilities and knowledge gained during this period in the radio industry made it possible to supply highly reliable communications equipment to our armed forces and contributed immeasurably to victory.

The story of those intervening years is one filled with challenge and excitement for many of us maturing during that era. The tale is interwoven with the golden years of radio broadcasting, the refinement of the automobile, the birth of the electronics industry and unfortunately the dark days of the depression and the war clouds over Europe and Asia. What did this all mean to the lives of the average person?

To the romantic, this meant an experience without parallel. Think of the thrills of a young couple driving in their open car along a moon-splashed road on a balmy summer evening, listening to the sounds of Benny Goodman or Guy Lombardo being broadcast from some exotic-sounding place like the Cocoanut Grove or the Palomar Ballroom.

To the traveling man who had to cover many otherwise dreary miles for his next appointment, it meant entertainment, weather information and companionship. Perhaps he would choose the afternoon ball game or for a Friday evening on his way home, Billy Jones and Ernie Hare, the Interwoven Pair, "could keep him in stitches." A radio in the company car was a highly desirable accessory.

To the worker in a radio plant, it meant an opportunity for a career or a summer job among the aromas of beeswax, rosin, lacquers, and plating baths. Girls sat on the assembly lines busily attaching parts to radio chassis as they moved along the conveyor. To break the monotony they would flirt with the fellows working on the test and trouble shooting benches near-

by. Others were busy packing the sets for shipment to the auto companies or the distributor. Those were the days!

To the design engineer, it was the challenge to improve the product and restyle the case and controls for the new model year. As the number of firms involved in the manufacturing of car radios increased, the business became highly competitive and it took the teamwork of all involved, including the sales department, to make a success of it. The tough job was to win an Original Equipment Manufacturer (OEM) contract with a car company. One had to be good and keep a sharp pencil.

To the radio dealer or distributor, these momentous years brought frustration as he struggled to stock and market the most desirable and profitable lines, but the thrill of attending the trade shows, viewing the new products, discussing sales promotional deals and being part of the sweeping tide of progress was most rewarding.

To the radio technician/installer in the field, this was a world filled with tubes, vibrators and test equipment. Between sessions of standing on his head underneath the dashboard removing or installing the radio in the car, he attended service clinics and seminars sponsored by the manufacturers to keep informed of the latest circuitry.

Some of the more fortunate or unfortunate as the case may be, experienced many if not all of the foregoing feelings. but those were memories that helped carry us through the war years.

Following World War II, the nation's industries scrambled to convert their plants to supply a market hungry for goods, and the electronics or radio industry was no exception. It seemed that everyone was in the business of making and marketing home radios, phonographs and car radios. There were new faces, many fresh from experience with highly sophisticated military equipment, eager to get involved. As a result of this new infusion of knowledge, the end product was generally more compact, lighter weight, easier to tune and in time more reliable.

For a while the great days of radio broadcasting continued. A new audience and some of the old crowd thrilled to the sounds of drama and music, but soon television pretty well replaced the home radio, and with that, many of the entertainers crossed over to the new medium. Gone from radio were the mysteries, soap operas, dramas and the live bands. The car radio audience did help keep radio alive, however, and much of the news was and still is targeted to that segment such as the traffic and highway conditions reports.

With the invention and perfection of the transistor, the radio in the car became still smaller, lighter and drew less current from the battery, but

for a while the radio was just taken for granted, sort of ho hum. Then came such new features as frequency modulation, tape players and stereo sound. Now there is a whole new generation of listeners intent on keeping things alive. There also seems to be a resurgence of the old programming as well as recorded big band sounds and "beautiful" music. The interest in automobile sound systems is now greater than ever, so perhaps we are on the crest of a whole new wave of even greater heights with electronic tuning and memory, the compact laser disc players and scientifically designed speaker installations.

But what has happened to the radio industry as we knew it? Where are the present radios and tape players made? Where are the workers and production lines that formerly made those products in this country? Three major firms still supply original equipment to the car makers, but many of the parts and major assemblies are made outside of the USA. We, however, have to face the fact that products and markets change. Our biggest businesses now evolve from products unimaginable a few years ago. It is an international market today and anyone or any number can "play." That said, it is still great fun to reminisce. Following in footsteps of the past may help show us the way ahead.

In this book we trace the history of the car radio, tell of the problems that were encountered upon installing it in a moving machine, pass along some of the technical details and tell something about the industry that arose from these humble beginnings. One section covers the early history of broadcasting so that we can show how the medium and the industry are interrelated. In the chronology we offer a time line of the refinement of the car radio as it kept pace with the fast-moving automobile industry. The model years are prefaced by some of the social events that occurred in these times as well as the lighter moments that hopefully recapture some of the romance that permeated the air waves during the embryonic period. We hope to tell it like it was and the historian, the hobbyist, the dreamer and the "just curious" will each experience his/her own moments of magic.

One

PRELUDE: TRANSPORTATION AND COMMUNICATION

The story of the automobile radio is more than a review of a belatedly hung-on accessory, novelty or luxury item. Among other things it includes parts of the history of the automobile branch of transportation and the radio branch of communication. This shows us how closely entwined these fields of endeavor are, how they essentially came out of the same crucible and developed side by side even though they didn't join in matrimony as a pleasurable team until many years later.

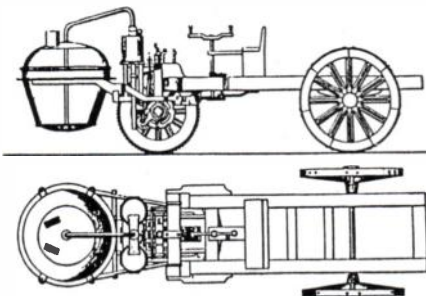
To help us focus on the parts of transportation and communications histories that relate to our quest, let us consider Webster's definition of an automobile as follows: "automobile, n. [auto and movable], a car, usually four wheeled, propelled by an engine or motor that is part of it, and meant for traveling on streets or roads: a motorcar." Likewise for radio we find: "radio, n. [short for radiotelegraphy], the wireless transmission and reception of electric impulses or signals by means of electric waves." This gives us rather broad interpretations in both cases and challenges us to go back to the origins of these particular disciplines in order to have a more complete story.

Throughout history there has been a gradual increase in the knowledge of science and technology because of the efforts of many great men and women. To them we are deeply indebted, for they were the ones, each in his or her own time, who laid the foundations of the work that followed.

At the dawn of the nineteenth century, what we will call our transportation/communication Parade of Progress, began an accelerated march. Among the marchers were men of many countries and unique talents. There were the geniuses, the ambitious, the greedy and the unsung heros, but taken together their forward momentum would one day contribute toward the culmination of a sophisticated automobile radio. First, let us examine developments in some early forms of transportation.

As historical background, recall that in 1769 what was recorded as the first mechanically propelled vehicle, a three-wheeled steam tractor, was designed and built by Nicolas Cugnot of France to haul artillery. This unit and an improved version were both extremely unwieldy and unbalanced. After an accident in which the vehicle overturned, the military decided against further financing of the project.

In 1801 England's Richard Trevithick, a mining engineer, developed the steam coach and became the



Nicholas Cugnot's first self-propelled vehicle which was designed for road travel. It took the form of a three-wheeled steam tractor, circa 1769.

first British motorist. His vehicle, however, caught fire and was lost, yet in spite of this, he later built an improved version but could find no sponsors. A few years later others took up where Trevithick left off and during the 1830s several steam-coach companies operated passenger-carrying routes in England.

The steamboat and the locomotive do not precisely fulfill the definition of an automobile, but are mentioned here because they were people movers and milestone events which were responsible for causing many inventors and promoters to think in terms of individual transportation. There are no records to indicate that the vehicles mentioned had any form of electrical communications aboard; nevertheless, they were part of our Parade of Progress.

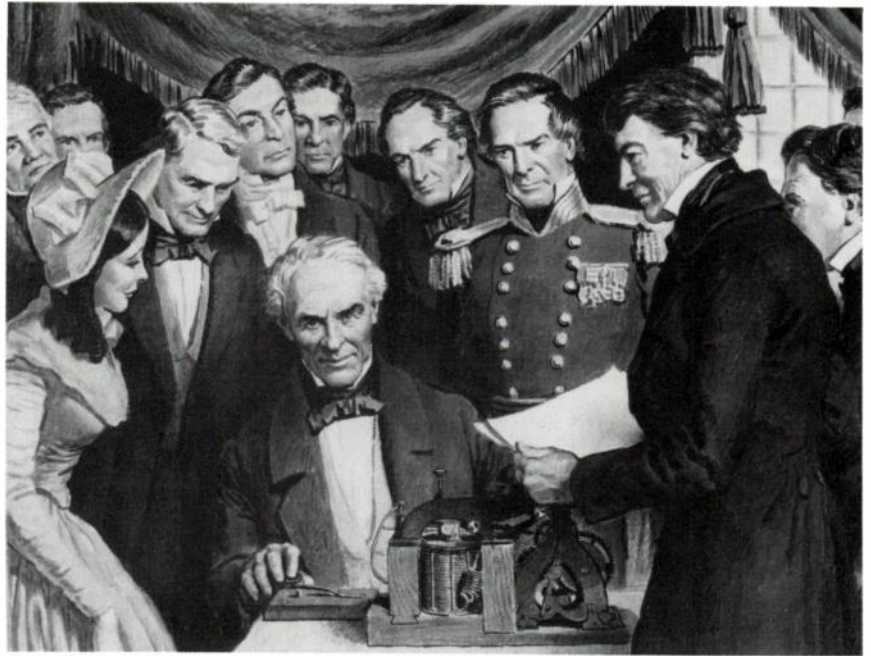
By 1807 America's Robert Fulton, following years of interest in machinery and engineering, constructed the steamboat Clermont. She had a British steam engine with side paddle wheels and on August 17, 1807, completed her maiden voyage from New York City to Albany and return in sixty-two hours, with a top speed of five miles per hour.

In 1825 George Stephenson built the first practical steam railroad locomotive; later in 1829 he and his son Robert built the British Rocket locomotive which demonstrated the the first really successful use of steam power in the famous locomotive trials at Rainhill, England. An authentic replica, built 100 years later by the same locomotive family, rests in the Henry Ford Museum at Dearborn, Michigan.

Meanwhile, Joseph Henry, a great American scientist, was conducting advanced experiments in electromagnetism which formed the basis for the development of the telegraph, telephone and wireless. Henry, working independently, paralleled Faraday's research in mutual-induction and self-induction. Faraday is credited with discovering mutual-induction, the property that exists between two current-carrying conductors when their magnetic lines of force link, as in a transformer. Henry is credited with discovering self-induction, the property whereby a varying current will produce a voltage in a circuit, as in a choke coil. Without these phenomena or the knowledge thereof, radio receivers or transmitters could not exist. For his work in this field, the term "henry" was adopted for the unit of inductance. Henry was well aware of and demonstrated the principles of the telegraph to his students but his concern was pure research and not the practical applications of science. He was also lax about publishing his work.

Another important member of our Parade of Progress was Samuel F.B. Morse, a graduate of Yale University. He was a visionary and a talented artist who painted portraits and other subjects to maintain a

Samuel F.B. Morse, inventor of the first practical electro-magnetic telegraph, is shown sending the first public telegram on May 24, 1844. The message, "WHAT HATH GOD WROUGHT!" was sent from the Supreme Court Chamber in the Capitol at Washington over a forty mile wire to Baltimore, Maryland.



meager living while dreaming about a telegraph system. When in 1843 Congress appropriated \$30,000 for Morse to erect a telegraph line between Washington and Baltimore, he obtained the services of a sturdy young man named Ezra Cornell (who later founded Cornell University) to assist in laying lines. In collaboration with Alfred N. Vail, he devised the Morse code and on May 24, 1844, the telegraph line was opened with the words "What hath God wrought!" The system was completed just in time to report the results of the Democratic Convention being held in Baltimore.

Further expanding the scope of the telegraph: Cyrus Field, American businessman, after a long struggle, obtained financial backing and facilities for the laying of the transatlantic telegraph cable. In 1858 after two previous unsuccessful attempts, success was achieved with an exchange of greetings between President Buchanan and Queen Victoria. The cable subsequently failed, however, when sea water penetrated the insulation and was abandoned. Having secured additional funds, Field tried again in 1865 but this cable parted at sea. Finally, in 1866 the goal was achieved, and on Friday July 27, at 8:00 A.M., Field jubilantly sent a message to President Andrew Johnson advising him of the triumphant mission. For the first time in history, a permanent communication line was established between the United States and England, another step in our Parade of Progress.

Even before the automobile and the wireless telegraph, there were attempts made and patents awarded for systems to communicate with moving vehicles (e.g. railroad trains and ships) by such

(No Model.)

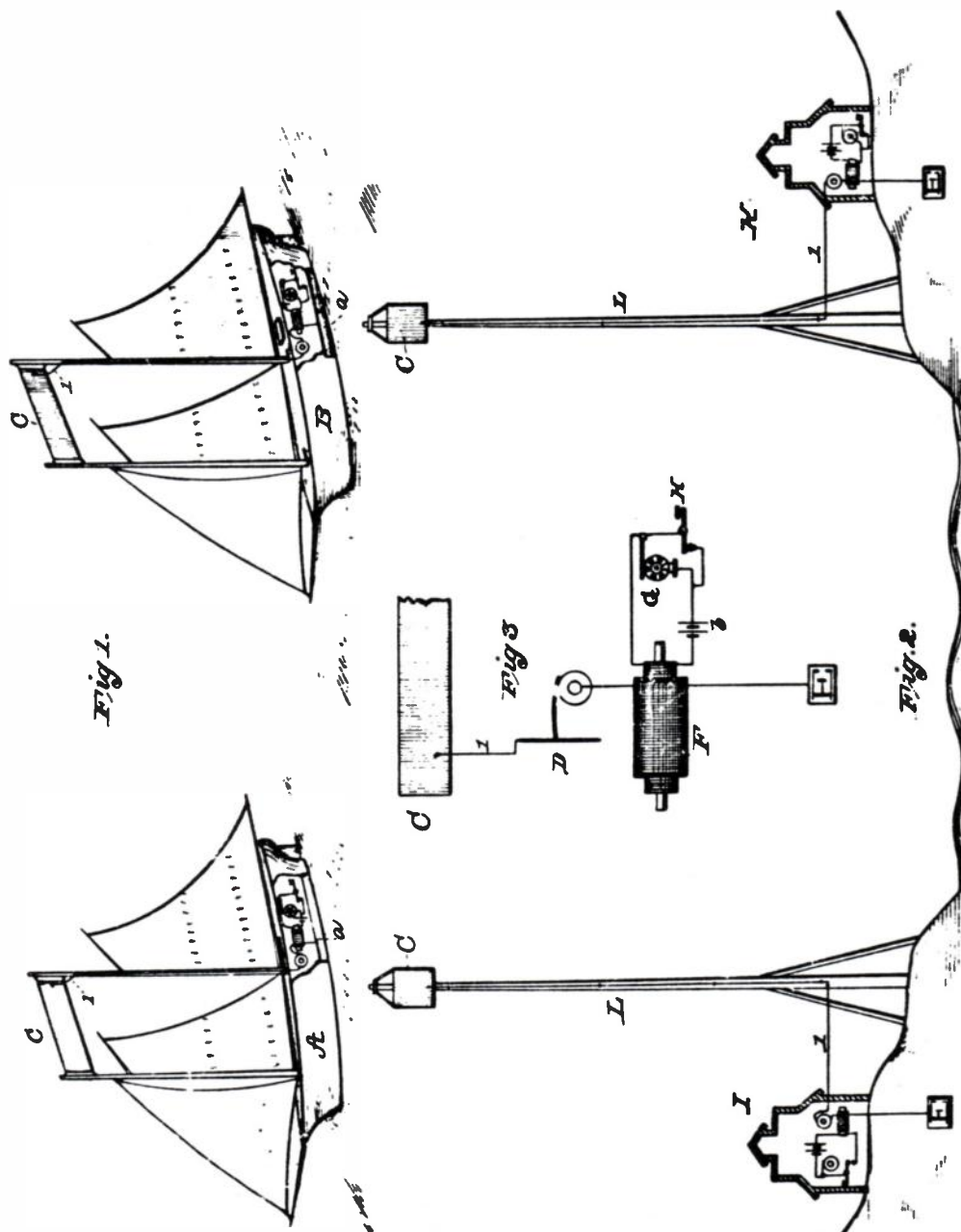
2 Sheets—Sheet 1.

T. A. EDISON.

MEANS FOR TRANSMITTING SIGNALS ELECTRICALLY.

No. 465,971.

Patented Dec. 29, 1891.



ATTEST:

Ed. Rowland
- H. F. Fiddle.

Wm. F. Felt

INVENTOR:

INVENTOR:
Thomas A. Edison
By *John W. Wells*
Attorney

Ben S. Jones & Schell
Agents

Kenji

means as electrical conduction, electrostatic induction, and magnetic induction. Thomas Edison, on May 23, 1885, filed a patent application for a new and useful improvement in "Means of Transmitting Signals Electrically." This patent (No. 465,971) dated December 29, 1891, with a few changes in the circuit and a more sensitive receiver, could have earned laurels for Edison as the inventor of the wireless telegraph. His elevated antenna masts and the associated ground system anticipated others by as much as ten years. (This patent was later sold to Marconi in 1904.)

A New Form of Energy



Oil was discovered near Titusville, Pennsylvania, by Edwin L. Drake on August 27, 1859. Drake built the first of a multitude of wells that brought kerosene for light, and subsequently gasoline for motor vehicles.

In 1850 when a Scotsman named James Young patented a method of getting liquid hydrocarbons from coal and shale. Just before the Civil War more than thirty plants in the United States were using adaptations of Young's process, making "coal oil" (kerosene) to burn in lamps. On August 27, 1859, Edwin L. Drake struck oil in Titusville, Pennsylvania. Within a few years American oil was lighting lamps as far away as Palestine.

The gasoline, naphtha and benzine which were tapped off in the refining process found use not only for stoves but for removing lanolin from wool, for the manufacture of varnishes, oilcloth and patent leather, and for thinning paints. It was generally available in chemist shops in small quantities. If the supply exceeded the demand, the gasoline was thrown out; that is, until enterprising mechanics and engineers began to think in terms of the hidden potential of that relatively inexpensive fluid.

Belgian born, French engineer and inventor, Jean Joseph Etienne Lenoir, developed the first practical internal-combustion engine. He was a man with wide ranging interests but his most important work was the Lenoir gas engine which he developed in 1859-1860. This modified double-acting steam engine was fueled by illuminating gas which was injected into the combustion chamber and ignited. It was only about 4% efficient but Lenoir built and sold several hundred. It is said that he later installed one of his engines in a car of sorts which was terribly slow; nevertheless, he used it to drive from his home to his factory works in Paris. Among Lenoir's other accomplishments was an autographic telegraph.

Siegfried Marcus of Malchin, Mecklenburg, (a region in Germany), was a versatile inventor who had a background in machining and telegraph work. Around 1850 he invented a telegraph relay system and subsequently moved to Vienna, where he was employed by several scientific organizations. In 1860 he established his own engineering laboratory. It was there that he reportedly built four of the world's earliest gasoline powered automobiles, the first in

1864. One of these cars is said to be in a museum in Vienna. In Mecklenburg, he is considered the inventor of the automobile. It appears that it will be as difficult to locate the true inventor of the automobile as it will be to find the inventor of the automobile radio.

Nikolaus August Otto of Germany became interested in internal combustion engines and in the early 1860's, began experimenting to find ways of overcoming the noise and inefficiency of the Lenoir engine. He completed work on his compression fueled, four stroke cycle engine in 1876 which was marketed by the firm that Otto founded with Eugene Langer. The principles incorporated in this engine form the basis of most internal combustion, reciprocating engines in use today.

Commentary



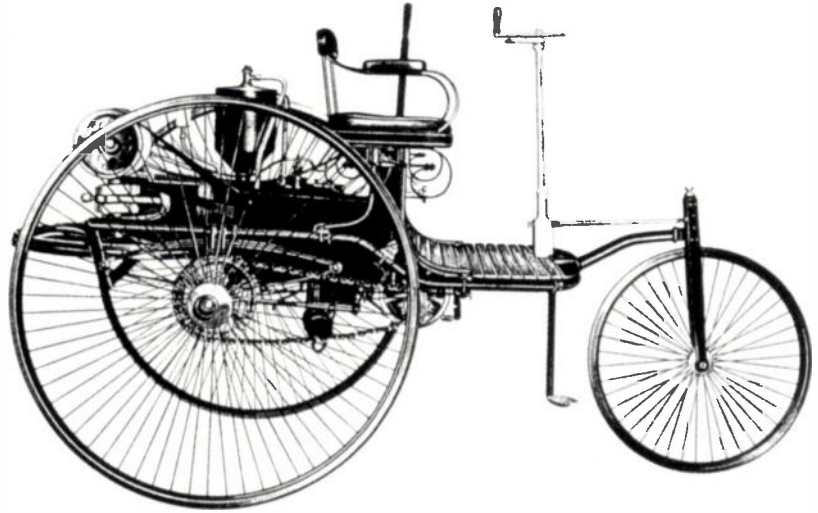
Alexander Graham Bell and his assistant Thomas Watson on the occasion of the first successful telephone message, "Mr. Watson, come here I want you."

To help put the following events in the proper perspective, consider what the world was like in the latter part of the nineteenth century. There was relative peace, the war between the states in America was over, and the Franco-Prussian War had ended. This was the age of music boxes, parlor organs and lantern slides. The bicycle and the horse drawn vehicles were the accepted forms of transportation.

This was also the age of the inventor. Alexander Graham Bell, who developed the telephone in 1876 and demonstrated at the great Centennial Exposition in Philadelphia. Thomas A. Edison's carbon button transmitter of 1877 made the telephone more practical, and his invention of the phonograph in 1877 paved the way for the improved wax cylinder phonograph of 1886 soon to be ready for its "Morning Glory" horn and its place in the parlor. Edison's electric light of 1879 and the first central power generating station in New York City in 1882 were creating a stir. The kerosene lamp and the gaslights were still the dominant form of lighting, however. Mechanized gadgets were finding their way into the home but they were still usually powered by hand or foot.

It Started With a Spark

When Karl Benz' two cycle internal combustion engine roared into life late in 1885 at Mannheim, Germany, the petrol-air mixture was ignited by an electric spark. Several other means of ignition had been used by early experimenters, including open flame and a hot tube but the internal spark seemed to be the answer. That simple spark created in the plug by an ignition system consisting of battery, induction coil with vibrator, timer and associated wiring, heralded a new era in transportation and soon would do the same for world wide communication.



Karl Benz' first car was propelled by a spark ignited gas engine.



Heinrich Rudolph Hertz, the great scientific investigator, who proved the electromagnetic wave theory of James Clerk Maxwell.

The public was hardly aware of the work of another Scotsman, James Clerk Maxwell, who back in 1867 had laid down theories on the electromagnetic waveform nature of light and other sources of energy. They were equally unaware when Edison in 1875 noted a mysterious spark while experimenting with his telegraph equipment. He called this spark "Ethereic Force" and after further investigation, made a report to Scientific American and sent his "black-box" experimental device to his assistant, Charles Batchelor, who conducted a demonstration for some scientists in Paris.

In 1886 Professor Heinrich Hertz of the Carlsruhe Polytechnic, successfully demonstrated the transmission of electromagnetic energy from a spark and showed that it could be reflected and refracted by using a simple open ring, (hereafter known as the "Hertzian Ring"), for a receiving device. This accomplishment earned Hertz his rightful place in the annals of science. Although the term was not used at the time, this was radio, short for radiated energy. How ironic that within a short period of time two men, Karl Benz and Heinrich Hertz, living in Germany, only a few miles apart, came up with the basic ingredients of what was to become a revolution in transportation and communication, and that a humble spark was at the heart of it all.

Karl Benz went on to form the basis of the firm which still bears his name, along with that of another pioneer, Gottlieb Daimler, who was hard on Benz' heels

pioneer, Gottlieb Daimler, who was hard on Benz' heels in putting together the first motor car. From that time forward, a never ending stream of automotive geniuses have marched in their footsteps. The electrical investigators who learned of Hertz' work were quick to develop means of creating, radiating and detecting this newly defined form of energy, some, with the hope of putting it to commercial use. Professor Edouard Branly in 1890 invented the coherer, the first detector of wireless waves. Branly's device consisted of a glass tube filled with loose iron filings. When placed in series with a galvanometer and a battery in a closed circuit, it became a sensitive detector. Sir Oliver Lodge had the idea of using this amazing instrument to detect electromagnetic waves in place of the much less sensitive Hertzian ring, and introduced it to the British Royal Institution in 1894. This was an important discovery along the Parade of Progress.

In 1893 the World's Columbian Exposition was held in Chicago on the shores of Lake Michigan. Some of the many spectacular sights were: Machinery Hall, the Palace of Mechanical Arts, the transportation Building, the Palace of Fine Arts, the Building of Electricity and Electrical Appliances, the Woman's Building and a 265-foot high Ferris Wheel. Among the exhibits were the latest in electrical generating and lighting, a few automobiles and an electrified kitchen. One of the attendees at the fair was a young man named Lee de Forest doubling as a chair pusher to help earn money for Yale, and an engineer for the Edison Illuminating Company of Detroit, named Henry Ford. Thomas A. Edison's planned demonstration for a coin operated peep show device, the Kinetoscope, harbinger of the motion picture projector, was not quite ready for the fair.



Highlights of the "World's Columbian Exposition" at Chicago, Illinois. Above is the Transportation Building, below is the Building of Electricity and Electrical Appliances.



The stage setting for 1895 was indeed colorful. In America, men had a new "Pin-Up Queen," the "Gibson Girl," drawn by Dana Gibson for major magazines. This was the Gay Nineties and the age of ragtime. Alfred Bernhard Nobel, a shy Swedish bachelor, invented dynamite and became one of the richest men in the world. To ease his conscience after inventing the deadly explosive, he founded the Nobel Prizes on November 27th.

Late in September near Bologna, Italy, Guglielmo Marconi, a bright young man with an Irish mother and Italian father, sent spark derived wireless signals to his brother, stationed beyond the rim of a hill on his father's villa. This was a spectacular pioneering achievement, yet when Marconi took his ideas to the Italian government they showed no immediate interest. The young genius then took his invention to England where he, not only found interest, but financial backing as well. He formed the Marconi Wireless Co. Ltd. and soon gained international recognition. He had taken the lead over many well qualified men who had been working on a similar idea for years. In 1901 Marconi sent feeble signals to St. Johns, Newfoundland, 2,000 miles from Poldhu, England. World communications were freed from the bondage of the wires.

As we move toward a more sophisticated application of the electric spark in our discussion of wireless telegraphy, it will be helpful to further investigate the term, spark. Spark is defined as: "A luminous disruptive electrical discharge of very short duration between two conductors separated by air or some other gas." Not included in this definition is something that cannot be seen with the naked eye. With proper equipment we find that this exotic phenomenon is an oscillatory discharge, characterized by a train of waves that are attenuated by time. The frequency of these waves is dependent upon the values of the inductance and capacitance of the circuit, but because the bandwidth (frequency spectrum) is so broad, the radiation from a spark is quite easy to detect. An automobile spark plug is a good transmitter and the radio an excellent detector. Without the spark suppressors on the engine or some other means of damping or canceling the electromagnetic waves, the modern driver would mostly hear ignition noise on his car radio.

A typical early wireless or radio telegraph transmitter consisted of a spark gap in series with an induction coil and an energy source. It had a telegraph key or switch to close the circuit and was connected to an aerial and ground with some means of tuning. This was one half of a wireless system. At the receiving end was some form of detector. The first detector used was the coherer as mentioned

filings operated on the principle that when a radio frequency current passed through the tube, the filings would cohere or cling together, thereupon, pass current and close a separate circuit which included a battery and a telephone receiver, or other such indicator. A vital component was the decoherer to shake the filings loose between each signal impulse so that the instrument would be ready to receive the next burst. This was a very delicate and temperamental arrangement.

To complete the installation, there was an earth ground such as a buried copper plate and an elevated antenna. This was essentially the system that Marconi introduced to the world. The concept was amazingly similar to that described in Edison's 1891 patent discussed earlier, which Marconi later purchased just for added protection.



Guglielmo Marconi in England with the mysterious black box which he brought from Italy in 1896. His wireless system consisted of a spark gap transmitter and a coherer receiver.

While the wireless embryo was being nurtured across the Atlantic the automobile was being brought to the attention of the American people. One bit of publicity was the Thanksgiving Day 1895 race sponsored by the Chicago Times Herald. It was to be a round-trip race from Jackson Park to Evanston under the most difficult conditions. Of all the cars to enter, the only viable contestants were two Benz cars and the American Duryea driven by J. Frank Duryea of Springfield, Massachusetts. The winner was the Duryea, a spark ignited, gasoline engine propelled machine.

This brings us to the Twentieth Century and the beginning of a new era.

Two

PUTTING VOICE AND MUSIC ON THE AIR



The De Forest wireless telegraph transmitter tower, built for the 1904 St. Louis World's Fair.



Music cover for the song made popular during the fair and recreated for the movie by the same name in 1944.

While Marconi was basking in the limelight there were two men in America who were becoming extremely interested in wireless development: Lee de Forest and Reginald Aubrey Fessenden. Both had recognized the limitations of the spark gap as a source of electromagnetic energy because of the difficulty in controlling the frequency and the associated noise level.

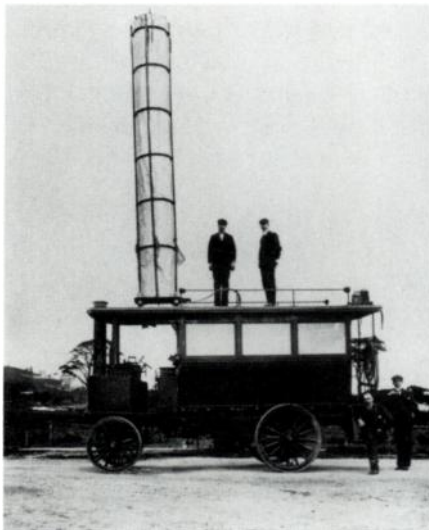
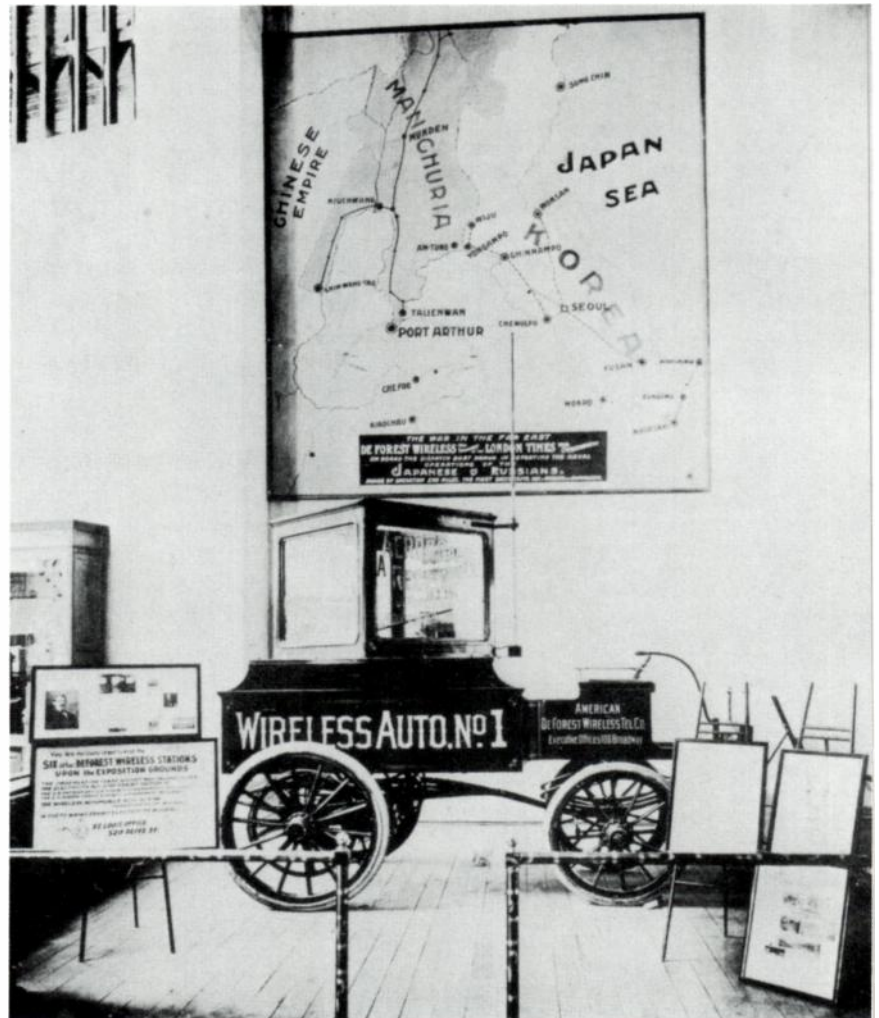
Lee de Forest received his Ph.D. from Yale University in 1899 and immediately began a series of employment periods and business ventures directed toward developing and building improved wireless apparatus. In 1902 he invented an improved detector which he called a responder. That same year he met Abraham White and together they founded the American De Forest Wireless Telegraph Co. and obtained an important equipment order from the War Department. The firm took space at the Louisiana Purchase Exposition at St. Louis, Missouri, in 1904 and set up six wireless stations on the grounds. On display in the transportation building at the De Forest booth was what may have been the first automobile radio in America. It was called Auto Wireless No. 1. This radio received only wireless telegraph signals or Morse code but it was in the form of electromagnetic radiation or radio waves. Spark plug interference was no problem since it appears to have been an electric car.

As an aside, it was during the aforementioned event that the famous song, "Meet Me In St. Louis, Louis" was written. The words were by Andrew B. Sterling with music by Kerry Mills. The song was later popularized and appeared in a movie by the same name in 1944.

Our story continues with Reginald Fessenden who was a native of Canada. He received his education at colleges in Ontario and Quebec. After serving as principal of Whitney College in Bermuda, he decided to try for a job with his hero, Thomas A. Edison; and he was successful in obtaining employment with the Edison Machine Works in New York City. Later, after making a good impression on Edison, he was assigned to the West Orange, New Jersey, Laboratory to do chemical research. In 1889 Fessenden left Edison to continue his studies in the wireless communication field. By 1892 he was Professor of Electrical Engineering at Purdue and later lectured on Hertzian waves at Western University in Pennsylvania. In 1899 he addressed the American Institute of Electrical Engineers.

When interviewed in 1915, Fessenden said that his earliest experimental transmission of speech by wireless was in 1900. He was apparently talking about

One of the most novel displays at the fair was this early automobile fitted with wireless equipment. Note the vertical antenna attached to the windshield.



British Marconi personnel pose with this steam powered vehicle sporting a complete wireless transmitting station sometime around the turn of the century.

the experiments at Rock Point, Maryland, where he managed to communicate over distances up to one mile. (At that date he probably would have still been using the spark gap.) Fessenden in 1901 filed a patent application on improvements in wireless, particularly audible sounds; and Patent No. 706,747 was awarded in 1902. This appears to be the earliest registered invention in the United States for a radiotelephone system employing electromagnetic waves. He subsequently secured a position with the U.S. Weather Bureau during which time he continued with his tests at Roanoke Island, North Carolina. In 1902 Fessenden and some financial backers formed the National Electric Signalling Company (NESCO). Although Fessenden realized that the conventional spark systems were too noisy for practical transmission of speech, they did represent the state of the art at the time. Based on this principle and incorporating his latest refinements, he marketed some commercial radiotelephone sets for experimental purposes.

In the meantime, work was going on in other circles which would provide one more step in the evolu-

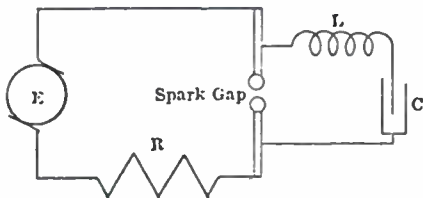
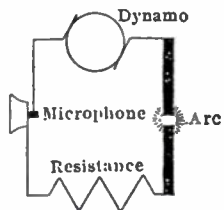
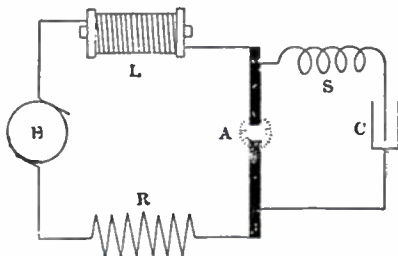


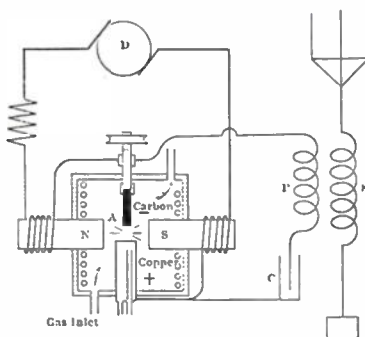
Diagram of Elihu Thomson's direct current spark generator.



Professor Simon's talking arc.



Duddell's singing arc.



Valdemar Poulsen's singing arc generator of electric waves, an important improvement.

tionary process of radio: the high frequency arc. The arc is defined as: "A sustained luminous discharge of electricity across a gap between electrodes." The key word here is sustained. Again Webster makes no mention of the fact that this, like the spark, is a source of electromagnetic energy. The arc differs from the spark in that it produces a continuous oscillation. Sir Humphry Davy discovered the carbon arc in 1800 but it is doubtful that he or the many people later involved in arc lighting, realized its future application.

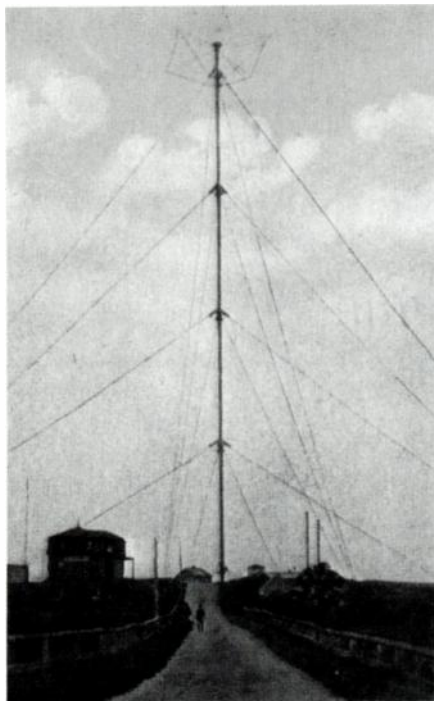
Investigating in 1889, Elihu Thomson found that oscillations could be produced from a 500 volt direct current source by connecting it in series with a resistance and a spark gap which was shunted by capacitance and inductance. For this arrangement he was awarded U.S. Patent No. 500,630 July 4, 1892. In 1898 Professor H. Th. Simon of Gottingen, Germany, found that the vapor path of an ordinary arc lamp could be set into mechanical vibration by varying the current with a telephone transmitter: the effect would be a talking arc. The next development was William Duddell's singing arc which substituted the spark gap of Thomson's patent with an arc. This provided a continuous source of electromagnetic waves that could be adjusted in frequency by changing the value of the inductance or capacitance.

Valdemar Poulsen of Copenhagen, Denmark, in 1903, made an important improvement in the arc by placing it in an atmosphere of coal gas or hydrogen, watercooling the copper anode, and inserting a powerful electromagnet to enhance the strength and the frequency of oscillations. This was inductively coupled to an aerial and ground system. With some means of varying the signal strength or modulating in accordance to speech or music, it was a complete radio transmitter. This was a great improvement over the spark gap and proved popular with some experimenters. Poulsen was awarded British patent No. 15,599, July 14, 1903.

Our narrative returns to Fessenden who was not satisfied with the arc transmitter because of its noise and instability, so he asked Charles Steinmetz of General Electric Company to build a 10,000 cycle alternator for him that could be modulated by voice and music. This would be his transmitter. The alternator was in essence a high speed electric motor coupled to an alternating current generator. Initial tests in 1905 proved the concept so a larger higher frequency machine was designed by a team headed by Dr. E.F.W. Alexanderson of GE. This alternator was installed in NESCO's Brant Rock, Massachusetts, test facility.

After preliminary tests, the stage was set for what was to be a milestone in radiotelephony. On

THE AUTO RADIO



The Wireless Station, Brant Rock, Massachusetts, where Reginald Fessenden conducted his famous tests.

Christmas eve 1906 Fessenden and his crew put on a program of music and speech, including a violin solo and song by Fessenden, entitled "Oh, Holy Night": a truly memorable event. They received reports of reception by ships as far away as Norfolk and the West Indies. Activities continued for a time but the company had economic and administrative problems, so in 1911 Fessenden went on to other work. The alternator, which had proved to be rather unwieldy for radiotelephone applications, found extensive use in the radiotelegraph field until replaced by the vacuum tube transmitters.

It is not known what Lee de Forest had to say about all of this, but it is interesting to note that also in December 1906 he had succeeded in transmitting voice across the room of his laboratory in the Parker Building in downtown Manhattan. For this, he used the small high frequency arc transmitter. At the receiving end he employed a vacuum tube detector, his latest invention! Perhaps not all of what we have said on these pages will be familiar to all who read them, but there are few who have not heard of the radio tube, in spite of the fact that so much of the communication equipment in use today enjoys exclusive use of solid state devices.

De Forest's vacuum tube, in its earliest form, was an adaptation of the Fleming valve (diode), a refined version of the Edison effect lamp of 1883; however, De Forest did not stop there but inserted a third element in the glass envelope. This acted as a control, a means of regulating the flow of electrons from the filament (cathode) to the plate (anode), thus allowing the device to be used as an amplifier as well as a detector. It is upon this invention that he applied for a patent on January 29, 1907, and the patent was awarded on February 18, 1908. De Forest called his triode the Audion; the world called it one of the most important inventions in human history.

To promote this new product, the De Forest Radio Telephone Company was formed. The potential of voice transmission as a tactical communication tool intrigued the Navy Department, and they ordered a number of units to be installed on board their ships. By January 1908 radiotelephone broadcasts conducted aboard the U.S.S. Ohio were received by the U.S. and Brazilian fleets. Later, while the fleet was anchored at Long Beach, California, the radio crew requisitioned a phonograph and proceeded to entertain the local radio operators. When on April 23rd, the De Forest firm gave a banquet in Los Angeles for the fleet wireless crew, it is understood that one of De Forest's assistants made the following announcement: "This is the first meeting of the radio broadcasters."

No. 879,532.

PATENTED FEB. 18, 1908.

L. DE FOREST.
SPACE TELEGRAPHY.
APPLICATION FILED JAN. 29, 1907.

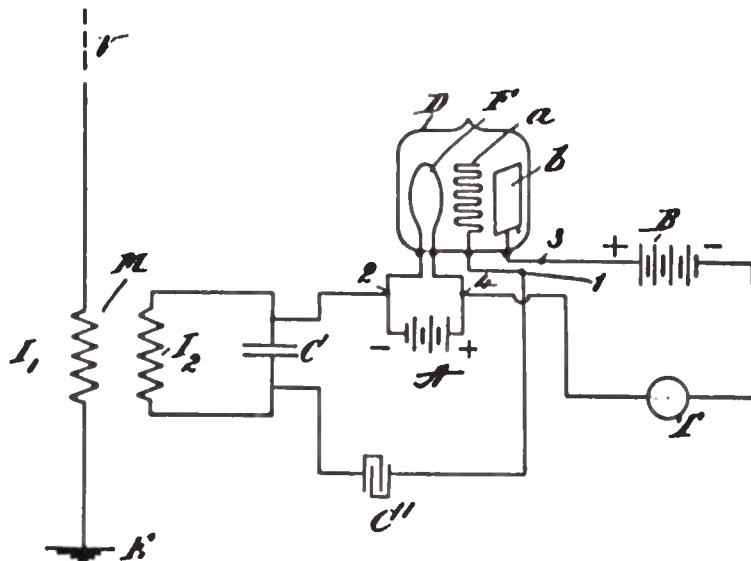


Fig. 1.

Dr. Lee de Forest's milestone invention of a three element vacuum tube.

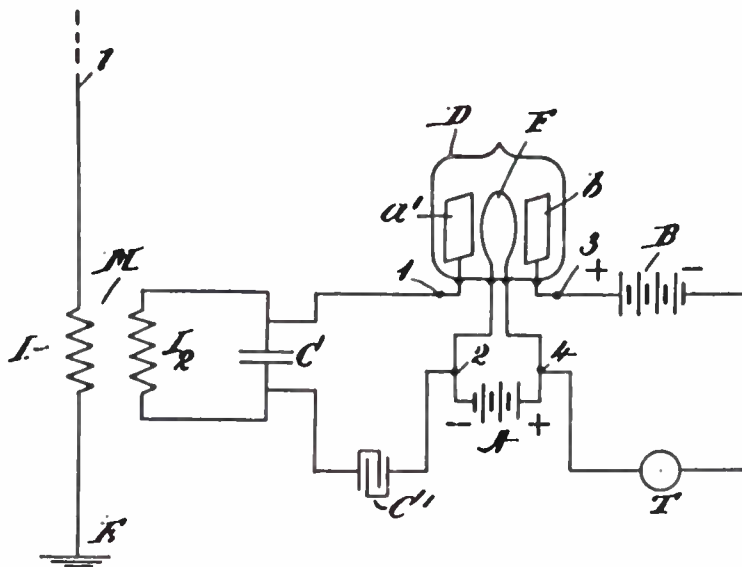


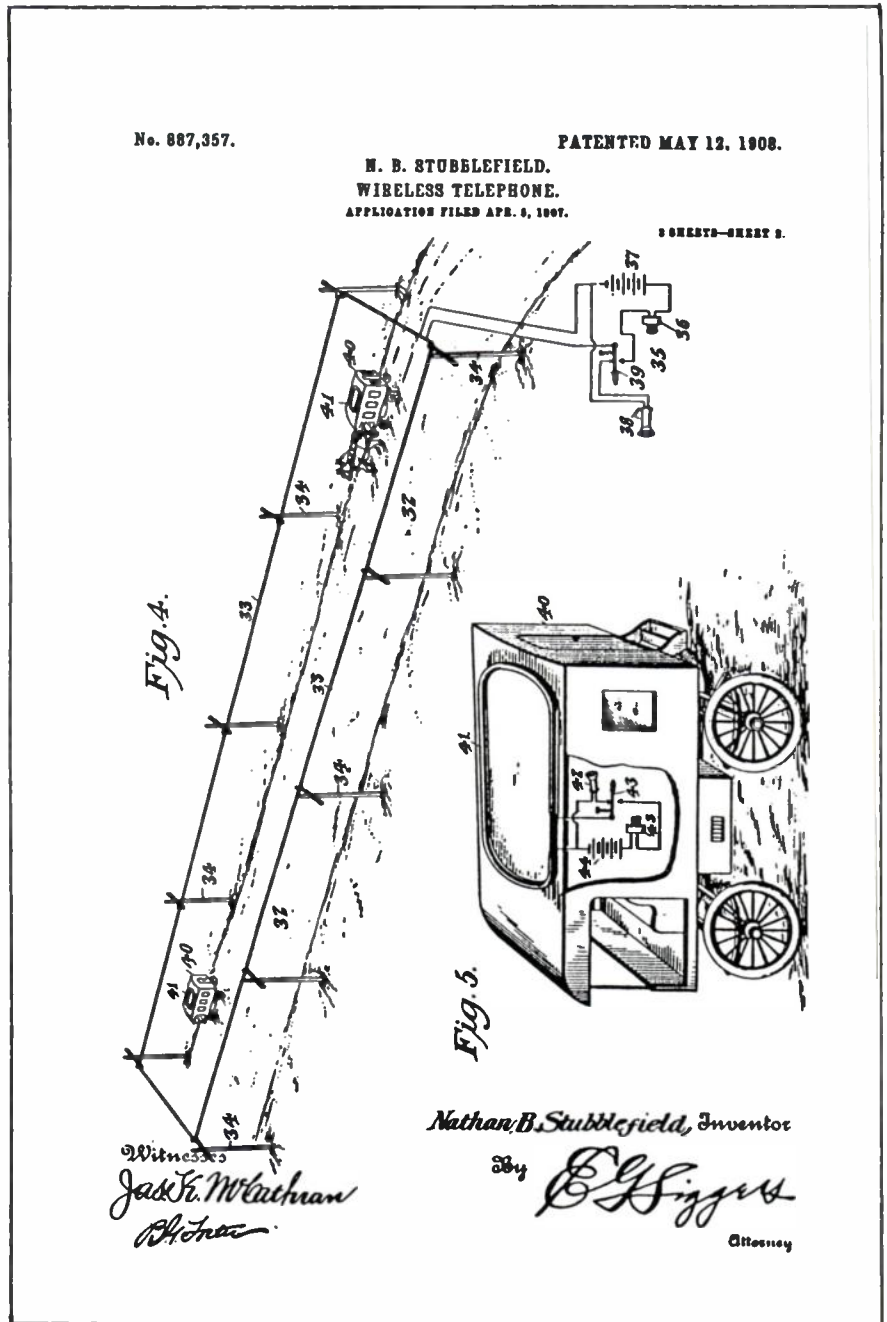
Fig. 2.

WITNESSES-
E. B. Thompson
Patrick J. Conroy

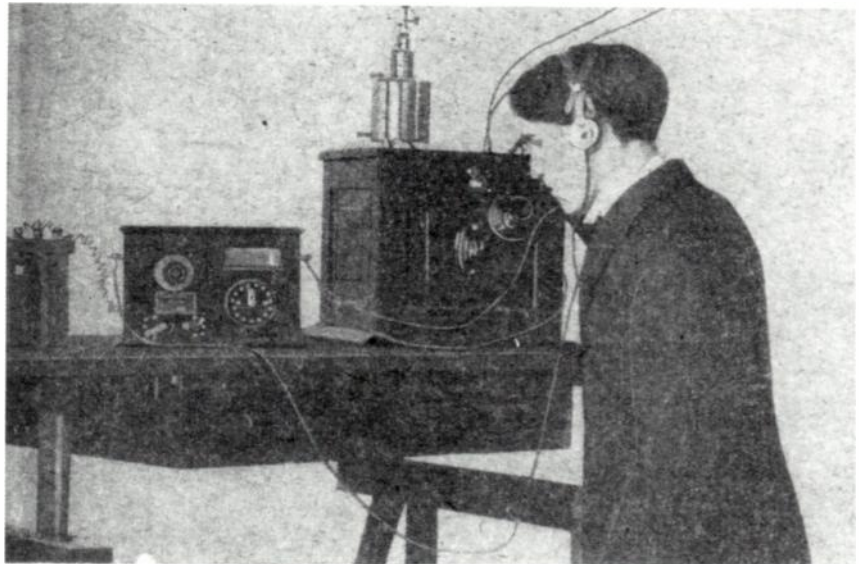
INVENTOR:
Lee de Forest
by Geo. H. Woodworth
Atty.

In this same year, Nathan Stubblefield obtained a patent on what may be the world's first documented example of a car radiotelephone; however, the vehicle appears to be a horsecar and the system doesn't look workable.

Nathan B. Stubblefield's patent for a wireless telephone.



We pick up the story of De Forest following the Navy tests mentioned earlier. He and his assistant, Frank Butler, continued to make many other broadcasting tests: among them, a demonstration from the Eiffel Tower in Paris. In 1910, the year that Irving Berlin composed "Alexander's Ragtime Band" and the U.S. automobile production exceeded two million units, the most memorable broadcast took place. It was on January 13th and the scene was the stage of the Metropolitan Opera House. During the airing of Cavalleria Rusticana and I Pagliacci several famous soloists were heard, among them, Ricardo Martin and Enrico Caruso. This was a full ten years before regular commercial broadcasting began. Throughout this period, De Forest was still using a modified version of the Poulsen arc for the wireless telephone transmissions.



De Forest's assistant Frank Butler operating their pioneer radio broadcasting equipment.

(It is interesting to note that on March 10, 1910, Chalmers-Detroit Motor Car Company successfully demonstrated the transmission of radiotelegraph signals from a moving vehicle, using a spark gap rig.)

Lee de Forest had left his alma mater too soon to be caught up in the raccoon coat, plaid cap and the Stutz Bearcat craze that swept the campuses of Harvard, Princeton and Yale, nor would he have had the temperament for that sort of thing, even if he had had the funds, as he was too busy working on projects that would pave the way for the auto radio to become part of that picture. In 1911 the De Forest Radio Telephone Company was experiencing more outgo than income and soon went bankrupt. De Forest then transferred his activities to the West Coast where he subsequently joined the Federal Telegraph Co. In the meantime, his patents were beginning to succeed.

Shortly after arriving in San Francisco, De Forest was hired to head a team to concentrate on development of an audion amplifier circuit. This work proved fruitful enough to interest AT&T in obtaining rights to De Forest's patent on the Audion for use as a telephone repeater. For this, they paid a sum of \$50,000 on July 26, 1913. A year later they paid \$90,000 for a non-exclusive license for use in the field of wireless telegraphy. Having some money in his pockets from the first sale and a good deal of encouragement from the tests with the audion amplifier, De Forest went back to New York and to High Bridge in the Bronx and formed a new company: De Forest Radio Telephone and Telegraph Company. There, he picked up his broadcasting activities again and began the manufacture of Oscillion transmitting tubes and other products.

De Forest and Fessenden were not the only ones who were deeply involved in pioneer radiotelephone work. There were many engineers and amateurs carrying on experimental broadcasts during these years. To name a few: William Dubilier of Seattle, Washington; Frederick Collins of Philadelphia, Pennsylvania; and Alfred Goldsmith, Professor of Electrical Engineering at CCNY, who operated a broadcasting station at the college in the 1912-1914 period. For the most part, they were using arc or spark transmission which was destined to a short life for voice work and music work. A more serious contender was the American Marconi station in New York's Wanamaker store building in 1914. This was a low power vacuum tube transmitter for experimental radiotelephone broadcasting.

It had been at this same Wanamaker store in 1912 that a young wireless operator, David Sarnoff, had received a message from the Olympic, 1300 miles out at sea, that the Titanic had gone down. He stayed at his station for endless hours receiving reports on the sad fate of many of the passengers and afterward received much recognition for his tireless efforts. The Titanic disaster placed the Marconi Company in undisputed leadership of the wireless field. Wireless had saved seven hundred lives, but had the California not closed down their wireless room for the night, all might have been saved. This disaster shocked the world into realizing the importance of wireless. As we shall learn later, the successor to this company became one of the all time giants of the industry.

During the period 1912 to 1915 many advances in receiver technology were taking place. De Forest and Armstrong developed regenerative amplifier and oscillator circuits, and Bell Laboratories and General Electric improved high vacuum radio tubes.

NOTE: Things were happening so fast as we entered the World War I era that it will be

advantageous to look at one year at a time in order to get a better perspective.

Nineteen Fifteen

Closed bodies on cars made them more acceptable and useful and more women began to drive. Somehow, the open car always seemed more romantic but in inclement weather it was another story. When the convertible came in vogue, however, it proved the best of both worlds.

January first was the meeting of the Hartford Radio Club; Hiram Percy Maxim presided, Clarence Tuska served as the secretary. In February, Maxim, a pioneer in the automotive radio field, and Tuska, an early manufacturer of radios, incorporated the American Radio Relay League. In December the league published the first issue of QST magazine.

David Sarnoff, by then assistant traffic manager for American Marconi, wrote the famous memo to his superiors about his dream of "radio music boxes" and the great potential which lay ahead for home radio. He would live to see that dream realized.



Early experiments with the De Forest portable wireless telephone at Newark, New Jersey.

Lee de Forest had a special interest in expositions. In 1915 he attended the Panama-Pacific Exposition, where the De Forest Radio Telephone and Telegraph Company of New York exhibited their radio telephone for use on railroad trains. This equipment, in addition to the first portable radiotelephone which he had demonstrated using a horse for the vehicle, indicated the trend toward mobile radio. These pioneering efforts must be among the earliest known examples of lightweight, portable equipment being used for

wireless voice transmission and reception. Some enterprising individual probably installed one of these units in an automobile at that time. We, however, have no confirmation of this, but will continue our search. For his efforts in advancing wireless communication, De Forest was awarded a gold medal from the Panama-Pacific Exposition committee.

An event that had a profound effect on the establishment of the practicality of radiotelephony was the July 28, 1915, broadcast by AT&T and Western Electric Co. engineers from Arlington, Virginia, to Paris, France, 3700 miles; and to Hawaii, 5000 miles. The system used high power transmitting tubes which resulted from development work in the years 1912 to 1915. De Forest's vacuum tube was here to stay.

Nineteen Sixteen

New York City Police Department established station KUVS for telegraph communications with police boats - another example of mobile communications.

De Forest broadcasted election returns by radio-
phone from High Bridge, N.Y., and bulletins were heard by wireless amateurs within a radius of 200 miles. Also in 1916 De Forest built the first American Radio-
phone for aircraft communications.

Station ZEK New Rochelle, New York, operated by Cannon and Logwood, broadcasted between the hours of 9:00 and 10:00 PM daily except Sunday.

Patent infringement suits between De Forest and the Marconi Company and AT&T vs. General Electric Company tied up domestic manufacturing until after World War I.

Nineteen Seventeen

AT&T purchased the remaining rights to De Forest's Audion patent for \$250,000. Under the contract, De Forest retained personal, non-transferable rights for his own use.

April 6th the United States declared that a state of war existed with Germany. All amateur wireless stations in the United States were closed. On April 7th President Wilson directed the Navy to take over all wireless stations not already being operated by the Army. Manufacturing firms agreed to waive patent problems in order to build materials for the war effort.

With the entry of the United States into World War I, all non-governmental radiotelephone or radiotelegraph activity was prohibited. This meant that all of the private transmissions, including industry, commerce and amateur, would cease.

Nineteen Eighteen

The radiotelegraph and radiotelephone proved their importance during the war. Aircraft carried wireless telegraph sets for tactical reconnaissance missions and later radiotelephone was employed on a limited basis.

November 11th, Armistice; fighting stops in Europe.

Nineteen Nineteen

By January 16th the necessary thirty-six states had ratified the eighteenth amendment - Prohibition became a reality. This would have a profound effect upon post war society.

On February 8th Major Edwin H. Armstrong filed for a patent on the superheterodyne radio circuit which he had developed while on duty as a signal officer in the Army during the war. The patent was awarded June 8, 1920.

De Forest set up operations again at the High Bridge location with call letters 2XG. Phonograph records this time were supplied by Brunswick-Balke-Collender Company, who acted as a sponsor. In December concert singer Vaughn de Leath appeared as soloist and made several broadcasts. De Forest moved to the World Tower Building at Broadway and 46th but did not get a permit. The operation was closed by Government order; whereupon, De Forest again moved to San Francisco in the California Theater Building and made daily broadcasts featuring, among others, Herman Heller's Orchestra. At this point, the company made arrangements with the Radio News and Music Company to handle sales of the Radiophone transmitter.

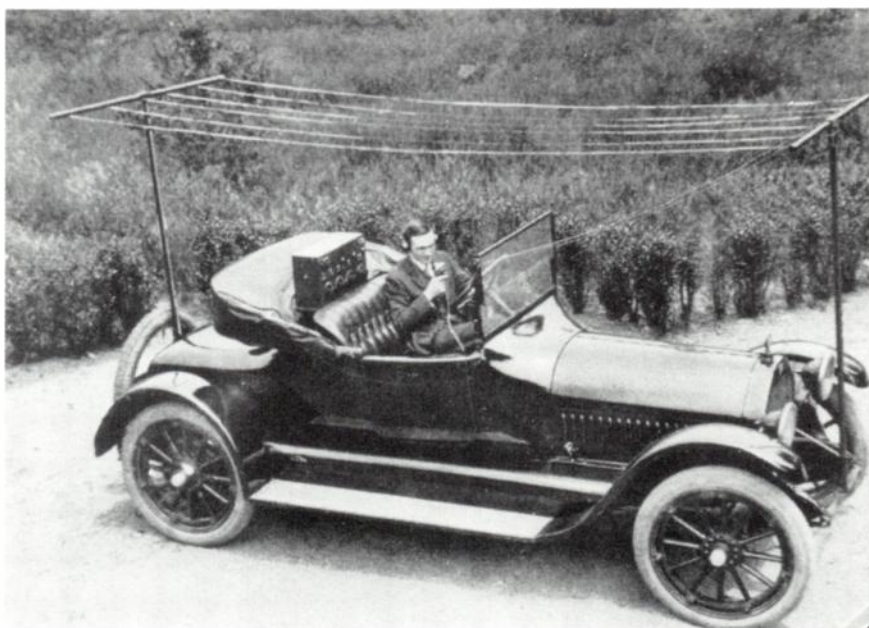
Post WWI prosperity put more cars on the road. Lieutenant Dwight D. Eisenhower led the first coast-to-coast army truck convoy on the newly opened Lincoln Highway. Improved motor cars and new highways such as this helped to change America's living habits.

Now we have another opportunity to decide whether we have found the first auto radio. The August issue of Radio Amateur News described Alfred H. Grebe's radio-outfitted roadster. Grebe was no newcomer to the wireless field as he had been in it since 1907 when he was twelve years old. He became the manufacturer of high quality amateur and broadcast receivers. This two way car radio described by Mr. Grebe did not require "B" batteries. It was powered by a dynamotor which in turn was powered by an extra storage battery. This was unique, even into the early 1930's. The author indicated that he had experienced some trouble with ignition noise and that it was not entirely overcome by shielding.

On October 17th the Radio Corporation of America was formed. A charter was granted under the corporation laws of Delaware. Owen D. Young, then vice president of General Electric, was elected chairman of the board of directors; and Edward J. Nally, President. On November 20th the business and property of Marconi Wireless Telegraph Company of America were acquired by



The famed wireless pioneer is shown with Marconi Company Managing Director, Godfrey Isaacs (with lorgnette phone). They were happily listening to the "wireless" which was installed aboard the limousine.



Alfred H. Grebe operating his Auto Radio-Phone in 1919, a year before regular broadcasting began.

Radio Corporation of America. This new firm became a marketing group for the products of Westinghouse Electric and Manufacturing Company, General Electric Company and Wireless Specialty Company. RCA became the largest distributor of radio receiving sets in the world.

In November amateur radio station 8XK, Wilkensburg, (part of Pittsburgh) operated by Frank Conrad, started private broadcasting. Joseph Horne Company of Pittsburgh advertised wireless sets that would pick up Conrad's broadcasts. This would be just the beginning.

Thus we lead into the 1920s.

Three

THE EARLY DAYS OF BROADCASTING

The war was over and hundreds of thousands of young men returned home - more than a few disillusioned, restless, and infected with eat-drink-and-be-merry-for-tomorrow-we-die philosophy. These feelings emotionally stimulated a whole generation and were mirrored in the so-called frenetic Jazz Age of the Roaring Twenties chronicled by F. Scott Fitzgerald's daring novels.

There was a revolution in manners and morals - the flapper was born as many "nice" girls bobbed their hair, rolled their stockings below their knees, hiked their skirts, and smoked cigarettes. Their boy friends wore ground length raccoon coats, drove racy cars, and furtively shared the contents of their hip flasks now that Prohibition was in effect; and boys and girls necked and petted in the freedom of the automobile. It seems that the only thing missing was the musical accompaniment for those romantic moonlight drives. Perhaps there were those who brought along their phonographs, but alas they needed frequent winding. Fortunately, people were working on this problem - people with vision, ambition, determination and technical knowledge.

The time was right to present a new media to the American public, and perhaps this is what was needed to temper feelings and bring some unity to those times. The stage had been set by the pioneers in radiotelephone work: Reginald Fessenden, Lee de Forest, Alfred Grebe, Frank Conrad and others. Then came men, who like David Sarnoff, saw the enormous potential and envisioned a vast communications network that would reshape our whole entertainment and information patterns. It was time to raise the curtain.

On the warm summer evening of August 20, 1920, about thirty Detroiters who owned "home brew" radio receivers heard: "This is 8MK calling." This was followed by a program of phonograph music including that popular song "Roses of Picardy." The program was produced by a small band of men in a makeshift "radio room" on the second floor of the Detroit News building. The model OT-10 De Forest Radiophone transmitter was purchased from Radio News And Music Company, the representative for De Forest Radio Telephone and Telegraph Co.. This transmitter operated on a wavelength of 200 meters (or in other terms a frequency of 1500 kilohertz) with a power of 20 watts.

Although the license was not yet issued, Detroit News operated 8MK as a commercial station and has been broadcasting regular daily programs since its inception. 8MK then became WBL when the commercial license

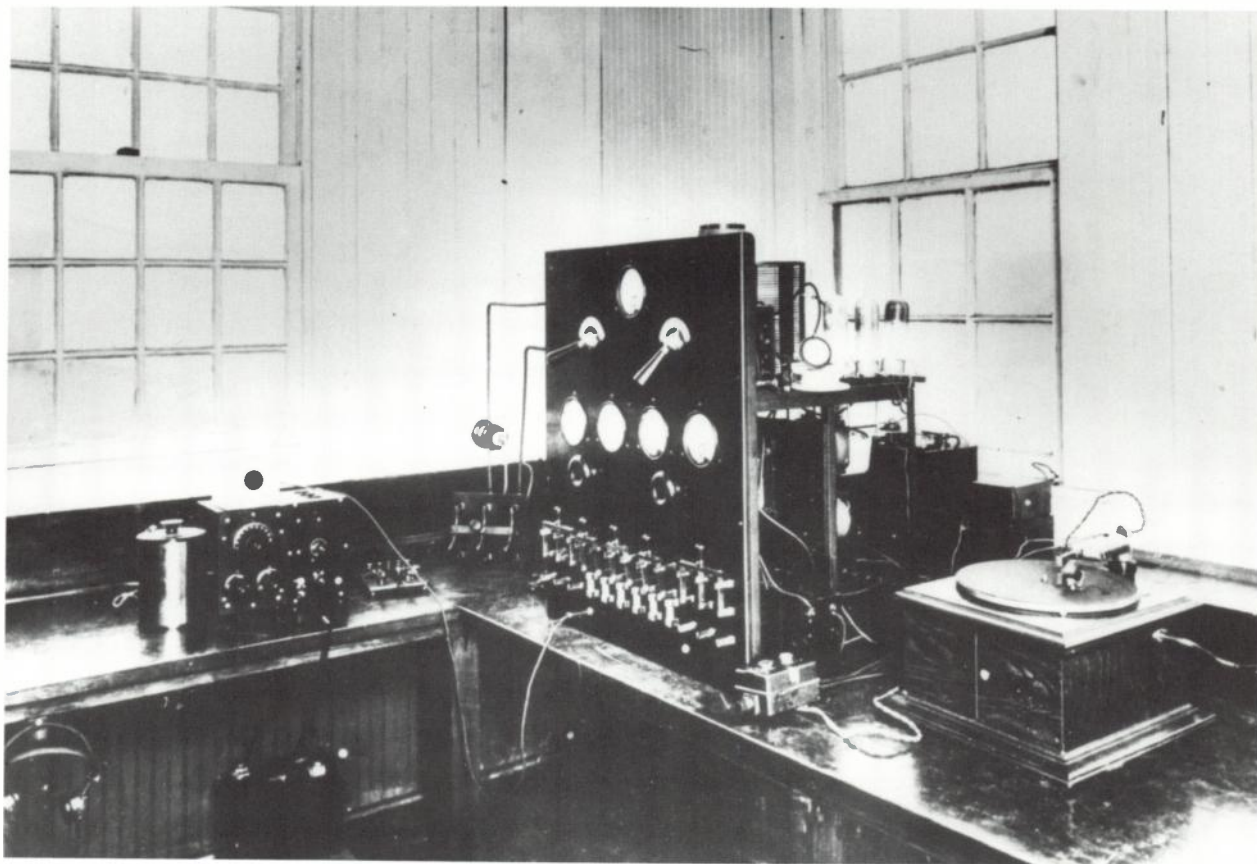
THE AUTO RADIO

was issued October 13, 1921, with its call letters changed again to WWJ on July 7, 1922. WWJ had the distinction of being the Pioneer Newspaper Broadcasting Station of the World. There were also reports that WWJ featured the first dance band, that of Paul Specht, to broadcast over the air waves on September 14, 1920.

The Detroit News radio station 8MK as it looked when it began operation August 20, 1920.



Pictured below is Westinghouse station KDKA, Pittsburgh. The first broadcast on November 2, 1920, featured the Harding-Cox presidential election returns.



On November 2, 1920, a date that will be long remembered in radio history, Westinghouse radio station KDKA came on the air with the Harding-Cox presidential election returns. This was the successor to Dr. Frank Conrad's amateur experimental station 8XK, a commercial license being granted October 27, 1920. The audience was made up of radio amateurs: a few people who had purchased some of the first sets available and officers of the company who had been given receivers. KDKA's first studio was a wooden structure perched on the roof of one of the taller buildings.

Although many firms were already engaged in the production of wireless and radiotelephone transmitters and receivers for amateur and commercial use, the consumer markets were not well established. When the broadcast era began there was a virtual explosion of activity, and thousands of small shops began offering radio receivers. The first radio receivers were generally one or two tube sets that left a lot to be desired, so here was the opportunity of a lifetime for engineers, technicians and entrepreneurs to get in on the ground floor of this rapidly expanding market. In those early days, the rush to have a receiver was so acute that there was a revival of the simple crystal set that had been popular as a detector of radio waves before the vacuum tube was perfected for wireless telegraph receivers.

The crystal detector with cat whisker, oatmeal box coil, and a pair of headphones (lovingly referred to as "cans") continues in concept to this day. This type of receiver was ideal for bedside and private listening; no batteries were required so there was no switch to shut off. To operate, one probed the galena crystal with the tip of the fine cat whisker wire to locate a sensitive spot. Imagine the excitement when one found the right spot and began to receive radio signals! No matter the type of set available, it was necessary to be within a few miles of a transmitter, have a long aerial wire (antenna), and a ground connection such as a water pipe or a long steel rod driven into the ground. After being fortunate enough to obtain a suitable receiver and connect all of the paraphernalia, one was ready to cast his lot, barring atmospheric phenomena like static, squeals, howls and fading.

The first broadcasting stations were generally adjuncts to other business activities. For the Detroit News station 8MK, later WWJ, the station represented a way to report the breaking news that was too late for the press and, in the long run, this would sell more papers. Westinghouse in Pittsburgh, owner of KDKA, was involved in the manufacture of electrical products, including radiotelephone equipment. Radio station WJZ, which came "on the air" in October 1921 from Newark, New Jersey, was acquired by RCA and moved

Special Crystal Radio Sets

Study Commercial Radio—Enjoy Daily Programs.

The tuned crystal receiver was the first practical apparatus used for amateur and commercial reception and is still in great demand on account of its simplicity in design and sturdy construction. These sets are accurate in long wave spark reception and clearly reproduce music and voice transmissions. No batteries are required for their operation. The outfits offer a real opportunity to the amateur student because they are well adapted for the study of code reception and are a great source of knowledge to the experimenter, as the parts can be arranged to test out many different hook ups. The sets govern a wide band of wave lengths. Signals can be tuned in from 150 to 2,000 meters. The exact radius of these sets depends largely upon the location and atmospheric conditions but radiophone broadcasting may be heard under favorable conditions from 20 to 30 miles.

Receiving Radius From 20 to 30 Miles.

Complete Set \$13.80

Loose Coupler Crystal Outfit.

This is certainly a dandy outfit for the beginner in radio as well as those who wish to hear local broadcasting programs. The control is so simple that a child can make the adjustments and get excellent results. The outfit consists of a crystal detector and a pair of sensitive 3,000-ohm phones. Also, a fixed condenser, loose coupler and complete aerial and ground outfit. In other words, it is complete in every way and ready for use. The coupler has a tuning capacity of 2,000 meters, which provides for long wave reception, such as naval stations and Government time signals, as well as amateur code and radiophone broadcasting of music, market reports, etc. For best results we recommend that the instruments be connected as shown in the illustration. This hook up has been tried out and has given very good results. Of course, you understand, that there are many other ways of connecting up receiving instruments. Shipping weight, 27 pounds.

\$7A9306—Loose Coupler Crystal Outfit, complete. \$13.80
We recommend the above wiring connections, which is Hook Up No. 3, page 42.

Complete Aerial and Ground Set, \$7A9438, furnished with this Crystal Outfit.

Complete Set \$11.00

Tuning Coil Crystal Outfit.

Here, too, is also a very fine crystal receiving set, but the tuning coil used is not quite as selective as the loose coupler above. The tuning coil will respond to wave lengths up to 1,000 meters. This set is composed of all high grade apparatus of the best workmanship and constructed so as to give most sensitive results. It consists of one tuning coil with fine slider adjustments and polished bakelite rods, a car whistle detector, one fixed condenser and a pair of 3,000-ohm phones. Also, a complete antenna and ground outfit, with all the necessary parts for erecting a good aerial and wiring the set. Connect instrument as shown in illustration. You'll have lots of fun listening in and experimenting with this outfit. Shipping wt. 16 lbs.

\$7A9307—Tuning Coil Crystal Outfit, complete. \$11.00
We recommend the wiring connections shown in the above illustration, which is Hook Up No. 1, page 44.

Complete Aerial and Ground Set, \$7A9438, furnished with this Crystal Outfit.

429

SEARS, ROEBUCK AND CO.

Page 23

A page from Sears, Roebuck and Co. radio and parts catalog.

to New York City. Since RCA sold transmitting and receiving sets made by General Electric, Westinghouse and Wireless Specialty Apparatus Company, it made good sense to be in the broadcasting business. Of course, RCA already owned a wireless telegraph station in New Brunswick, New Jersey. A.T. & T., the nation's telephone moguls who founded WEAf in New York City, were very much involved in commercial radio telephone apparatus in cooperation with their equipment arm Western Electric Co.

It was well that these pioneer radio broadcast stations had other means of financial support because there was not immediately enough revenue to enable them to be self-sufficient. Paid advertising had not yet been invented, and who ever thought that it would reach the enormous proportions of thousands of dollars per minute a few years hence? Early programming con-

sisted of news, reporting of major events, and talent presentations that the announcers would go out and recruit for little or nothing. Performers were willing to do this just on the chance of becoming known. Responsibility for putting the program together often fell to the announcer who had to improvise and fill the time with chatter in the event the talent was late or did not appear at all. Harold W. Arlin of KDKA, one of the pioneer announcers of the world, had those special qualifications that made him a valuable asset: a resonate voice, clear enunciation, tact in handling people, and a wide knowledge of music, sports, and other topics of general interest.

In telling their story many years later, Billy Jones and Ernie Hare, otherwise known variously as the Happiness Boys, Flit Soldiers, and Interwoven Pair, told how they got started in radio. They met in a phonograph recording studio in 1920 and recognizing each other's talents, teamed for some combination recordings. They received word from the program director of WJZ in Newark asking them to take part in some radiophone experiments. The studio was temporarily located in a tent and the boys made their debut with only a handful of experimenter-listeners.

When Guy Lombardo and his fellow Canadians left their London, Ontario, home in 1923 for Cleveland, Ohio, to make their mark upon the entertainment world, they found it tough going. The following year Lombardo was able to make arrangements with radio station WTAM for the band to make regular performances in the broadcast studio free of charge, just for the exposure. It was a daring move but it paid off handsomely.

In the same vein, Freeman F. Gosden and Charles J. Correll got their first radio job with WEWB at the renowned Edgewater Beach Hotel doing a "Songs and Chatter" bit gratis, one night a week. The feeling was that any kind of product advertising was in poor taste and would not be tolerated on a well managed broadcasting station. The point was not to burden the radio audience with a commercial while some legitimate entertainers were waiting in the wings. However good these intentions, it couldn't go on forever. The first sponsored program, the Eveready Hour, went on the air December 4th, 1923. Broadcasting was on the move.

To the public, radio was magic. The idea of this new media reaching into their homes from across vast spaces carried with it an almost extra-sensory experience or dimension. It was different from anything that had gone before. The radio announcer was the ticket to a whole new vista. When he introduced the program, the listener was transported right to the scene: temporarily lifted out of personal thoughts and worries; and caught up in whatever the program was of-

Freeman F. Gosden and Charles J. Correll as they looked before they gained fame as the comedy team of Amos and Andy.



fering, whether it was drama, opera, dance music, sports event, news, church service, political convention or inauguration of a president. For many, this was a kind of therapy. The radio was a companion, especially when one was doing some monotonous task such as household chores; it never seemed to detract from the quality of the work and it made life a lot more pleasant.

Later, when radios were first beginning to be practical for cars, there was much controversy about safety considerations. In several states, members of the legislature including Connecticut and Massachusetts, attempted to pass bills to ban car radios, using the argument that the radio would distract the attention of the driver. After much discussion, it became the consensus of opinion that if anything, the radio helped to keep one awake, ward off boredom, and generally make the trip more enjoyable.

Nineteen twenty one was an eventful year for radio broadcasting. It started off with a religious service from the Calvary Episcopal Church January 2nd over KDKA. For the prize fight fans (and even for many who had never cared for boxing) there was the Dempsey-Carpentier heavyweight championship bout on July 2nd with Major J. Andrew White, famed sports announcer at ringside. For the baseball follower, station WJZ in Newark broadcast the play by play action of the first World Series game ever to be presented on radio. The first broadcasting program for radio station KYW was the Chicago Civic Opera on November 11th.

It was December 15th and well known vaudeville comedian, Frank Tinney, thought he was being "put on." He believed that no one but the crew could hear him when he made his radio debut on WWJ Detroit, but phone calls from appreciative listeners convinced him otherwise. On December 19th the famous comedy team of Van and Schenk also made their initial appearance on radio on WWJ and two days later on the same station, Fannie Brice, world famous "funny girl," debuted.

Nineteen twenty one was also the year that the Detroit Police Department put the first radio equipped cars into service for test purposes. An experimental license 8XAB was issued on August 16th. The automobiles were provided with a small antenna fitted over the top which connected to a receiver placed in the seat. This was not the only example of car radios in 1921. In Seattle, Mr. Charles E. Williams designed a radio receiver for the back shelf of his 1921 Ford Coupe. He rigged a loop antenna on the car and installed the batteries in the trunk. The project was completed in August of 1921 and put into use originally to help locate sources of interference from local power systems and industrial plants. This was particularly troublesome because of the low power of



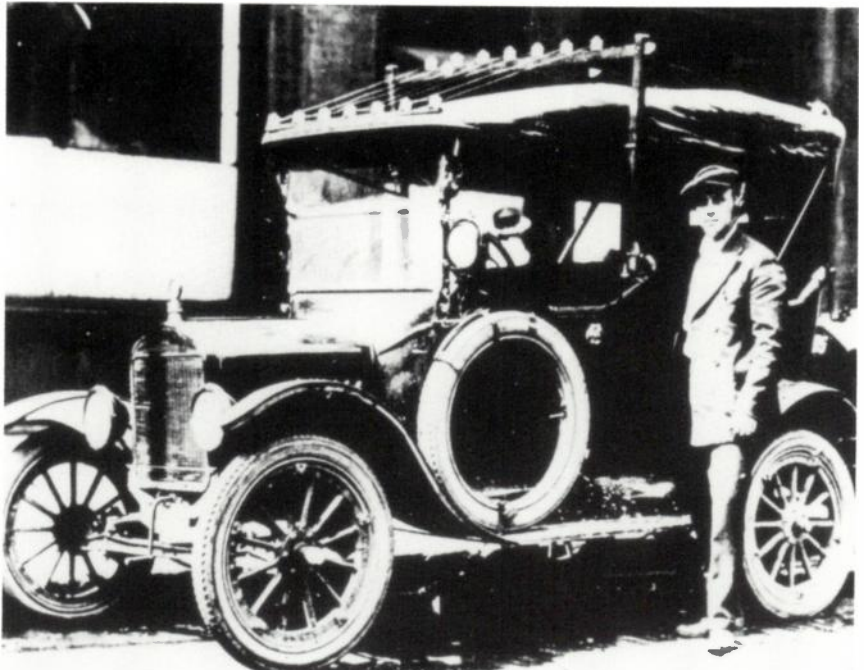
March 1922 Seattle Newspaper clipping showing "Radio Liz." The car has a loop antenna running from roof to radiator, under the floor and up over the rear deck.

transmitters in use by amateur experimental stations. By the following March, the first commercial broadcasting stations came on in the Seattle area. Mr. Williams attracted a lot of attention with his mobile radio which acquired the title of "Radio Liz."

In 1922 the radio broadcasting business really got into high gear. The greatest period of growth in the radio industry occurred in the years 1922 and 1923 when the number of licensed broadcasting stations jumped from a total of 60 to 573, an increase of 513 stations in one year's time. A survey completed April 10, 1922, showed that the roster of stations' licenses had grown to 167 up to that time. It seemed the desire of everyone was to be in on the ground floor. A cross section of the station owners revealed the following: automobile dealers and distributors, department stores, electrical and radio manufacturers, parts suppliers and service dealers, newspaper publishers, religious organizations, municipalities, police and fire departments, utilities, universities, and weather stations.

Among the new licensees for 1922 were some familiar names: WLW, Crosley Mfg. Co., Cincinnati, Ohio; WJX, De Forest Radio Telephone & Telegraph, New York City; WHU, William B. Duck Co., pioneer mail order dealers in radio and electrical supplies in Toledo, Ohio; WWI, Ford Motor Company, Dearborn, Michigan; WGY, General Electric Co., Schenectady, New York; WCJ, A.C. Gilbert Co., famous makers of electric trains, erector sets, and radio kits, New Haven, Connecticut; WWL, Loyola University, New Orleans, Louisiana; and KLS, Warner Brothers, Oakland, California.

From an original photo of the first Detroit Police Radio "Cruiser", In May 1921.



Overleaf: This news item from Motor World points up station owner and car dealer Earle C. Anthony's Motoradio car radio. No existing examples of this product have been located.

Also discussed is the Reo Auto-Bungalow shown with a radio installation.

Other call letters worthy of noting are KOP, the Detroit Police Department whose station was officially opened by Police Commissioner, Dr. James W. Inches, at 10 PM on December 18th.

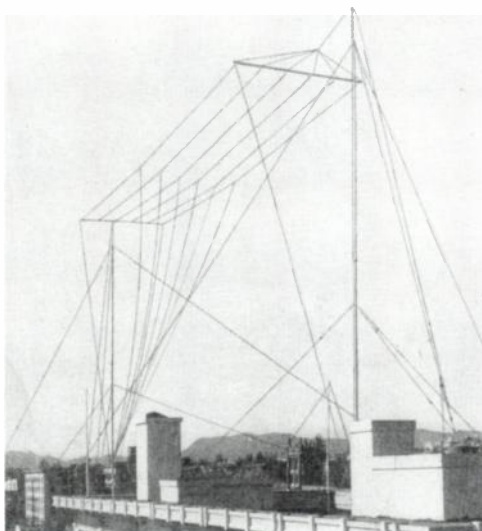
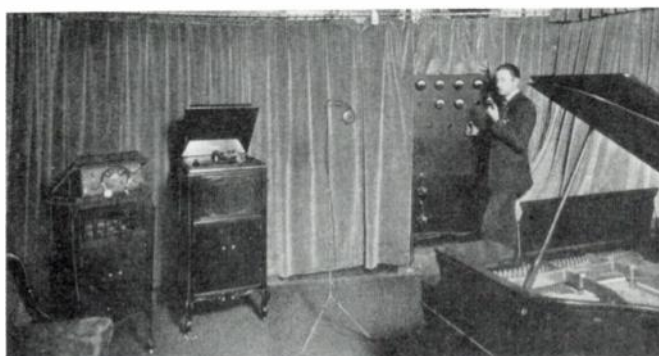
September 6, 1922

MOTOR WORLD

Caught by the Camera

Dealer a Radio Broadcaster

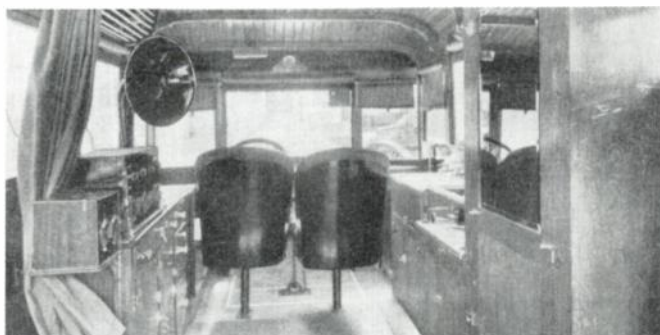
The pictures at the right and below show the interior and exterior equipment of the radio broadcasting station maintained by Earle C. Anthony, California distributor of Packard and Durant, with headquarters in Los Angeles. Anthony uses the radio for entertainments in co-operation with a local newspaper. Incidentally it advertises his automobile business and also the Motoradio, which he is manufacturing and selling.



The Motoradio, mentioned above is designed particularly for use on automobiles. All that is necessary is to set up an aerial on the top of the car or string it from the car to a tree or anything convenient, then plug into the dash socket on the car for current from the regular car battery. Thousands of automobiles in use for touring and camping in California, the occupants of which at times become detached entirely from news events and entertainment, led Anthony to believe a compact portable receiving set would have a very wide market. He obtained the best available talent he could to design and build such a set and having been successful in his initial efforts, now is opening a national market for his equipment under the name of Motoradio. The device can be used in the home as well as in the car.

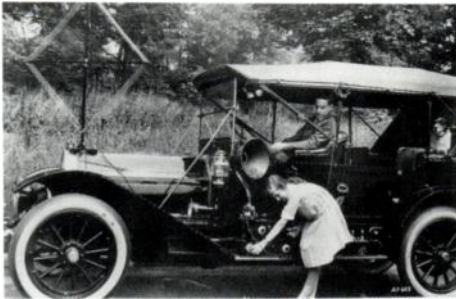
Auto-Bungalow

The Auto-Bungalow developed by the Reo Motor Car Co. of California is a home on wheels. This model is fitted to the Speedwagon and has a road speed of 30 to 35 m. p. h. The interior equipment includes writing desk, combination buffet and ice chest, Ottoman bed of Pullman type, clothes closet, gas stove, white enameled sink with closet for cooking utensils, hot and cold circulating water, toilet, two revolving portable leather covered chairs, portable collapsible dining table, clock, rear view mirror, two dome lights, and opaque curtains and portieres (insuring privacy).



The Roaring Twenties

Also included in the roster of new stations for 1922 were call letters KFI, owned by Earle C. Anthony, Inc., 10th and Hope Streets, Los Angeles, California. Mr. Anthony, Packard and Durant distributor/dealer for California, was noted for his palatial showrooms. His San Francisco location on Van Ness Avenue in the exclusive Nob Hill District with the magnificent Packards on display, was the epitome of the Roaring Twenties. The radio station was used for entertainment in cooperation with a local newspaper. It also served to advertise his automobile business and his new product the Motoradio, which he reportedly was manufacturing and selling. The Motoradio, as the name suggests, was designed particularly for use on automobiles. A person had a choice of setting up an aerial on the top of the car or stringing a wire from the car to a tree or anything convenient. The sales were aimed at the thousands of automobiles that were in use for touring and camping. Many times the occupants of these cars would be without news and entertainment for days, the Motoradio was the solution. It is not known how many of these sets were sold.



A 1924 temporary radio installation in a 1911 Pierce Arrow, boasts a Kennedy receiver with Magnavox amplifier and speaker.

Several 1922 periodicals published photos along with newsworthy comments of a radio-equipped Chevrolet sedan. Four upright insulators mounted on the roof supported a five-strand loop aerial around the entire top of the car. A radio set with a small horn speaker on top, anchored to a support behind the front seat, completed the installation. One writer reported that this installation was a result of an experiment by Chevrolet Motor Company, proving that radio equipment operates satisfactorily in an automobile. Another author indicated a cost of \$200 for the setup.



A successful radio installation experiment by the Chevrolet Motor Company in 1922.

It looked as though nothing could hold the radio back. There was enthusiasm to install a radio in anything that would move on land sea, or in the air. The business man saw the commercial potential in having two-way radios in pick up and delivery trucks so they could keep in touch with the home base; and railroad and ship owners saw the entertainment value as well as the safety and communications aspects..

The foregoing activities undoubtedly furthered the public's interest in the "magic box." During 1922 the number of radio sets in the U.S. increased to 1,500,000. The response of the people to this new medium continued to be overwhelming; it seemed miraculous to hear such a vast array of programming with the mere click of a switch. To think that this was gratis (except for the initial cost of the receiver and the upkeep) was almost beyond comprehension. It was one of the most exciting periods of communications history. Many people were instantly attracted to the radio and became avid fans. As people recognized the announcers or the performers, they felt as if they knew them and were anxious to correspond. Many old timers tell of receiving bushels of such fan mail. Some radio stations, WJZ for one, did not want the announcers to give their names; instead, for identification purposes they used initials only.

When Norman Brokenshire joined WJZ at 33 West 42nd Street in 1924, he took the initials AON, "A" for announcer, "N" for New York and "O" because it sounded good. Milton J. Cross was AJN; J. Lewis Reid was ALN;

Famed radio announcer Graham McNamee covering the "Opening Game" for station WEAF, New York. Assisting is George McElrath.



Herbert B. Glover, ATN. Management apparently believed that the announcer should remain anonymous. By the time Ted Husing, famous sports reporter, joined the same station in 1925, the announcers were allowed to use their own names.

The announcing game was one of sudden ups and downs depending upon popularity, personality clashes, the breaks, and the ability to handle success. An all important factor was the speech quality: the man or woman "on the air" needed a well modulated voice because of the electrical limitations of the carbon button microphone. Some of the more successful announcers of the time, (and by no means a complete list), in the New York area, in addition to those already mentioned, were: Major J. Andrew White; Graham McNamee, WEA;F; Alois Havrilla; and Nils Thor Granlund known as "N.T.G." of station WHN, New York. Granlund was the one that had phony feuds with Harry Richman. Everyone will no doubt remember their favorite.

As some people who carried the radio fan cult one step further, a new craze or hobby came on the scene. It was called DXing, long distance radio reception. With stations popping up all over the United States, Canada, and many foreign countries, one could purchase a radio log book which gave the station name, call letters, location, and sometimes the wavelength in meters to aid in locating something interesting. The fact that the log book was probably obsolete by the time it hit the newsstand made it all the more challenging. It was soon learned that reception distance (not reliability) increased during the hours of darkness, so some folks would stay up until the wee hours of the morning amid the squeals, howls, and whistles of the radio set trying to out distance themselves or their fellow DX fans and then tell "fish stories" next day over coffee. To make it all honest, one could jot down all of the information on the station, confirming it by giving the name of the performing artist or program heard, mail it off to the station and receive a stamp bearing the station's call letters. These stamps became valuable collector's items. Of course the station was glad to have people do this as it gave them an idea of the range of their transmitter.

DXing was a sentimental experience. Listening to the music coming from far away places quickened a romantic's heart. Maybe it was Abe Lyman's Coconut Grove dance orchestra at the Ambassador Hotel, "coming to you" from radio station KNX, Hollywood, California, or Vincent Lopez and his Hotel Pennsylvania Orchestra "coming to you" from WEA;F across the continent in New York City. DXing was also adventure, or perhaps a lesson in geography. Radio thereby encouraged travel and the widening of one's horizons; travel demanded swift and comfortable automobiles with good roads, and

Abe Lyman, popular radio broadcasting dance orchestra leader.



A predecessor of the chronic television sports watcher and his "widow."

The cover of the famous Duck Company 1921-1922 wireless catalog which featured many parts for the radio experimenter.

THE
WILLIAM B. DUCK COMPANY
ANYTHING ELECTRICAL

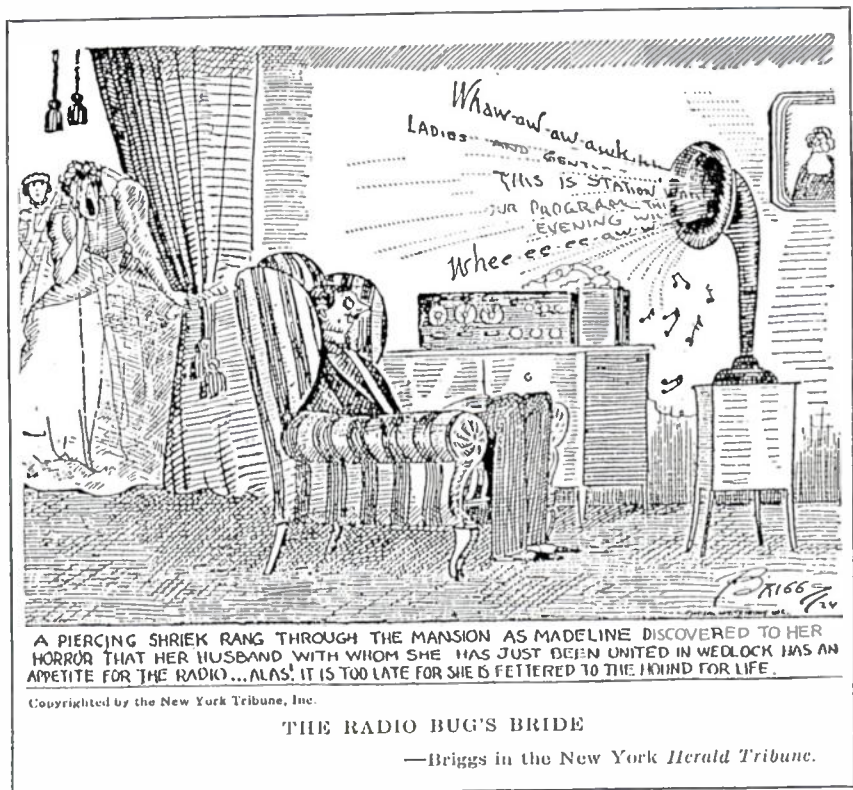
WIRELESS INSTRUMENTS



15,000 of our catalogs ready for delivery to eager electrical and wireless enthusiasts in all parts of the world. This was one of our most successful shipments during the early part of November, 1918.

224-226 SUPERIOR STREET

TOLEDO, OHIO



radio was the cosmic force that brought it all together.

Partly to save money and partly out of desire, still another development appeared on the horizon. This was radio set construction. The original enthusiasts were the amateur radio telegraph and telephone operators who were often members of the American radio relay league. They had a strong interest in building, operating, and experimenting with radio transmitters and other equipment, as well as conversing with amateurs around the world. When radio broadcasting came in, a growing number of hobbyists appeared, ranging from those who had casual interest to those who had to learn all there was about radio. These hobbyists wanted to start by building their own receivers, and clubs and organizations sprang up across the country. In newly established correspondence schools, hobbyists could get both theory and hands-on practice. These were fun times, the sky was the limit, but where to obtain the necessary supplies?

Wireless and electrical mail order houses which had been catering to the earlier group for years, recognized a growing market in these do-it-yourselfers. Among these were: The William B. Duck Co. of Toledo, Ohio, and The Electro Importing Co. of New York City. They were joined by such greats as: Montgomery Ward & Co., Sears Roebuck and Co. and Kresge. Many radio parts specialty houses such as: Wholesale Radio Service Co. (LaFayette) of New York, Chicago, and Atlanta; and Allied Radio Corporation of Chicago, did a

Overleaf: This advertisement from September 27, 1924, shows some of the many radio uses for Bakelite phenol resin.

A Saturday Evening Post advertisement for radio tools from September 27, 1924.



"YANKEE" RADIO TOOLS

These special tools make radio jobs easy. Slip the right attachment into chuck of "Yankee" Ratchet Tool Holder, and you can do any radio work. Do it quicker, too, and better.

The tool counterdrums, reams, runs up nuts, drives screws. A touch on Ratchet Shifter gives you right- or left-hand ratchet; or rigid adjustment.

For drilling, you'll find the "Yankee" Radio Drill No. 1431 the exact tool you need. Capacity 1/2 inch.

For changing hook-ups; for repairs; for building new sets; "Yankee" Radio Tools are time- and trouble-savers. They're mighty convenient also for many jobs about the house.

"Yankee" Radio Tool Set No. 100, Ratchet Holder and 9 attachments. Price \$3.95
"Yankee" Radio Drill No. 1431—Special Handle. Capacity 1/2 inch. Price \$3.95

Your dealer can supply you
Write us for FREE "Yankee" Tool Book

NORTH BRON Mfg. Co., Philadelphia, U. S. A.

"YANKEE" TOOLS
Make Better Mechanics



large volume of business. In addition, many apparatus and component manufacturers sold mail order products ranging from assembly kits and parts to complete sets. Of course, in the large cities, there were many local outlets where individuals could shop in person.

This was the thrill: to survey the catalog, or better yet, to see the shiny black bakelite panels, Kurz Kasch knobs, bright brass condensers, rheostats, tubes in brightly colored boxes, resistors, bright nickel finished hardware, and the coils of bare and cotton-covered copper wire. Those were the days when one could look at a part and tell what it was. The set builder was only limited by his or her budget. Both "Millers Falls" and "Yankee" brands offered radio tools for drilling, countersinking, reaming, and wire forming, in addition to a wide range of nut and screw drivers. Who wouldn't thrill over a set of new tools, or want to build his/her own radio receiver?

Some of the above mentioned tools were useful in preparing the Bakelite panels for the mounting of parts. Bakelite is a rather hard substance and requires sharp tools. That marvelous phenol-formaldehyde base material used widely in radio for all kinds of panels, sockets, tube bases, knobs and many other components was developed in 1907 by Dr. Leo Baekeland, and perfected in time for application in the radio industry. Prior to Dr. Baekeland's first patent in 1907, the only materials available for molding were natural products as shellac, rubber; bituminous materials such as asphalt and gilsonite; and some artificially produced materials like ebonite, vulcanite and celluloid. The inherent defect of these earlier materials was that they were subject to deformation when they were heated (thermoplastic). Bakelite, on the other hand, is thermosetting, meaning that once formed and cooled, it remains stable and the re-application of heat does not readily deform it. This was an excellent example of science and technology growing together to provide basic building blocks.

To keep the budding technician informed of new developments in the field of radio, there were literally dozens of publications, either on the newsstands or available by subscription. They dealt with a host of subjects ranging from the elementary building projects to the intensely technical articles, something for everybody. It was especially informative merely to scan the advertisements. Occasionally, some daring contributing editors would present feature articles on radio installation in diverse modes of transportation. Sometimes the article would include circuit diagrams, a bill of materials and construction details. Out of these do-it-yourselfers often came the future technicians, engineers and scientists who would make great contributions in future years. In the meantime, some were so bitten by the fever that they found an immedi-

THE SATURDAY EVENING POST

One man's gift to millions

—a material of a thousand uses



WESTON WATTMETER
—Molded Bakelite Case



BALDWIN HEADSET
—Molded of Bakelite



REMIER TUBE SOCKET
—Molded of Bakelite



EVEREADY FLASHLIGHT
—Bakelite Insulated



TERRI VANITY CASE
—Molded of Bakelite

ONLY a few years ago a new material was created in a Chemist's laboratory.

It was Bakelite, known chemically as phenol resin.

Today, this remarkable product serves hundreds of manufacturers, in thousands of different ways, for millions of people. And wherever it is used, Bakelite has been the means of improving quality, giving greater utility or reducing costs.

Bakelite combines high dielectric and mechanical strength with heat resistance. It is not affected by oils, moisture or common solvents, nor will it deteriorate with age.

There are still many new ways in which Bakelite—as a molding material, in sheets, rods, tubes, or in transparent form; as a varnish, cement, lacquer or enamel—can serve manufacturers.

Our Research Laboratories are at your disposal. Perhaps, in your product, there is a use for Bakelite.

May we send our illustrated booklet,
"The Material of a Thousand Uses"?

BAKELITE CORPORATION

247 Park Avenue, New York, N. Y.
Chicago Office: 636 West 22nd Street



BOYCE MOTO-METER
—Molded Bakelite Cap



SAAL LOUD SPEAKER
—Molded Bakelite Horn



KLAXON HORN
—Bakelite Insulated



FOSS-SET BRUSH
—Set in Bakelite Cement



"BRAW LADDIE"
—GOLF CLUB HEAD
Bakelite Molded



Preformed Bakelite "biscuit"
placed in steam-heated mold.



Molded Bakelite product
completed in one operation.



BAKELITE

THE MATERIAL OF A THOUSAND USES

ate challenge in joining the growing number of firms making sets for a profit.

The ever increasing competition from new firms entering the manufacturing arena, brought about rapid progress in engineering and refinement of product. Some of the choices, in addition to the crystal detectors and the one tube reflex sets, were: the detector and two step audio amplifier; the detector and two stage regenerative set (this was a real squealer until one learned to tune it); the tuned radio frequency receiver; and the Hazeltine Neutrodyne receiving set. By the mid twenties, most of the quality radios on the market were of this latter design or variations thereof. The circuit was designed by Dr. L.A. Hazeltine as an adaptation of the tuned radio frequency receiver, which was becoming popular, but was subject to oscillation (squealing and howling) because of its sensitivity. Dr. Hazeltine found a way to neutralize the inherent instability and obtained a patent. Anyone using this arrangement had to secure a license and show the Neutrodyne label. What was to become the most popular circuit design of all, was the superheterodyne, developed by Edwin Howard Armstrong.

Armstrong's name is closely entwined with the early development of radio. He discovered the principle of regeneration, super-regeneration, and later, frequency modulation. Perhaps his most important contribution was the superheterodyne, which he designed while on duty with the Army Signal Corps in 1918. He filed for a patent on February 8th, 1919, and described his circuit to the Radio Club of America on December 12th. The patent was awarded on June 8th, 1920. Technically, the superheterodyne is a means of converting any of a broad band of radio frequency signals to a specific intermediate frequency (IF). The signals are then amplified by precisely tuned high gain IF circuits, detected, and then amplified at audio frequencies.

In 1920 Major Armstrong assigned his patents to the RCA interests. RCA brought out the first mass produced superheterodyne in 1924 and continued to expand their line of sets using this principle. They kept control of the patents until 1931 when they issued licenses to other manufacturers. This circuit became universally accepted and is in use today in practically all radio and television receivers.

As we shall see later, the ability of the superheterodyne to utilize high gain, narrow band pass IF circuit elements, is one of the major factors in making the automobile radio practical. For the present, we will return to 1925 and see what great things were in store for the mid 1920s, halfway through the Roaring Twenties.

Four

EMERGING RADIO INDUSTRY

Overleaf: Supplying batteries for home and auto radios was big business until the battery eliminators were developed.

A Case radio advertisement from Literary Digest showing the selection of models available. Indiana Mfg. & Electric Co. was the forerunner of the United States Radio & Television Corporation which later became involved in auto radio manufacturing.

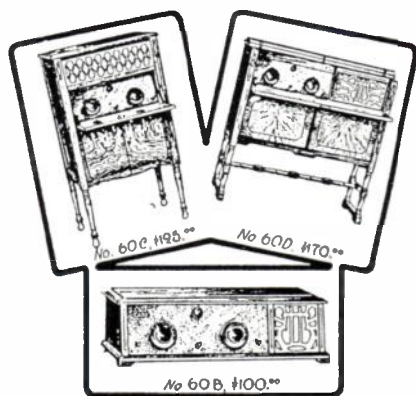


Table or console models, priced \$65 to \$190—with dial or vernier control, mahogany or walnut cabinets. Every set made for beauty as well as a life-time of satisfactory service.

CASE
RADIO PRODUCTS
"Satisfaction In Every CASE"

Insist on CASE Radio Receivers at your local dealer's—or write direct for interesting, 5-color booklet which describes and illustrates the complete CASE line of 10 numbers.

Indiana Mfg. & Electric Co.
Marion, Indiana

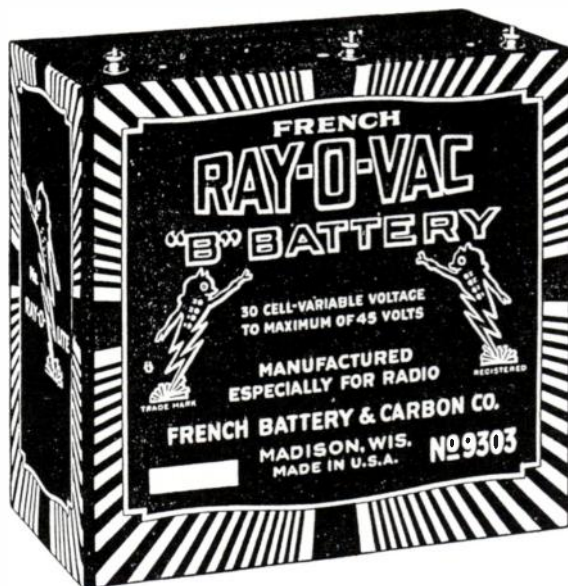
The electrifying effect of radio was changing the World and nowhere was it more evident than in the United States. Radio was bringing everything into focus and the true spirit of the Roaring Twenties or the Jazz Age was being felt on all fronts by 1925.

The pioneers of 1920, who endured the unknown, now had valuable property in the form of successful radio broadcasting stations. As sponsorship became acceptable, there was money to spend on better programming, resulting in a wider audience. If the listeners bought the sponsor's service or product, the sponsor was generally willing to purchase more "air" time which, in turn, perpetuated the cycle. When the success story became apparent, more sponsors jumped on the bandwagon and a record breaking chain reaction resulted.

Some radio receiver makers were growing and expanding their facilities and by the mid-twenties there were about 325 companies each seeking their niche in the market. This was a period of adjustment and, as always, in industry, it was the survival of the fittest. Evidence suggested that at least some segments of the set buying public wanted more powerful, more sensitive, more selective, higher sound quality in their receivers. Many families owned two or three radios, buying a new model as new features were introduced. Styling still left much to be desired, however, now that console or floor models were beginning to appear. If the radio was going to be here to stay, why not make it look like a piece of furniture?

Despite the demand for elaborate sets, there were still approximately seventy-three makers of crystal sets and thirty-two suppliers of unmounted crystals, indicating that there was still a market for the low cost sets. The crystal set was for the young and the young at heart. (It still had one advantage in that it did not use any batteries.) For the hobbyist and do-it-yourselfers, there were around 112 providers of knockdown sets or kits.

A big market opened up for batteries, battery chargers and battery eliminators. In terms of supplying power to a radio set, the "A" battery was that which powered the filaments of the tubes. Since the current requirement was on the order of two or three amperes at 5 volts, a 6 Volt storage battery was generally used. (The set had a rheostat for adjusting the voltage.) This high current drain meant frequent charging of the storage battery. The owner had a choice of sending the battery out, or purchasing a charger. The function of the "B" batteries was to



French Ray-O-Vac No. 231R
This 4 1/2 volt "C" battery is also adjustable to 1 1/2 and 3 volts.
Size 4" x 1 1/4" x 2 3/4".



French Ray-O-Vac No. 1153
Recommended only when larger size cannot be used.
Size 4 5/8" x 2 3/8" x 2 1/8".



French Ray-O-Vac No. 1153
Vertical type "B" for use where space is limited but where current needed is greater than smaller size can supply economically. Size 5 1/2" x 3 3/8" x 2 5/8".



French Ray-O-Vac No. 2151
Adjustable voltage 16 1/2, 18, 19 1/2, 21, and 22 1/2 and will give long dependable service on sets using up to 15 milliamperes current. Size 6 5/8" x 4 1/8" x 3 1/4".



French Ray-O-Vac No. 4151
A small size 22 1/2 volt "B" for very light use only.
Size 3 1/8" x 2 1/8" x 2 1/8".



French Ray-O-Vac No. 1211
For "A" Circuits 1 1/2 volt single cell Alkaline 2 and 3 cell units



Advertising Department
French Battery Company
Madison, Wisconsin

Please send me your free book—Radio Trouble finder and up-to-the-minute list of Broadcasting Stations, logging record, etc.

Name.....
Address.....
Town..... State.....



French Ray-O-Vac No. 2303
For vertical type sets requiring a large battery in small space, this battery is recommended. Size 8" x 7 1/2" x 3 1/2". 45 volt with 22 1/2 volt tap.



French Ray-O-Vac No. 2303
On sets using not over 15 milliamperes, this 45 volt battery will give satisfactory service for a great many hours. Voltage adjustment 16 1/2, 18, 19 1/2, 21, 22 1/2 and 45. Size 8 3/8" x 6 5/8" x 3 3/8".



French Ray-O-Vac No. 2153
Vertical type with same capacity and service as 2151, but 22 1/2 volts only. Size 7 3/8" x 4 3/8" x 3 3/8".

Ten Radio Batteries

for big sets, home-built sets, one-tube sets and super-sets

BE sure your batteries fit the demands your set makes on them. The correct type of batteries make a great difference in your enjoyment of radio—the quality of tone, the distance you get, in the life of the battery, and in satisfactory service.

Whatever the size and type of your set, there's one certain French Ray-O-Vac Battery that best conforms to your service. Nearby stores carry the assortment shown here, and it's easy to select the correct type of battery. Once you have it, you'll experience a new satisfaction, a new economy in radio. Send the coupon for an interesting book on radio batteries, radio trouble finder and log record.

FRENCH BATTERY COMPANY, Madison, Wisconsin
ATLANTA DALLAS KANSAS CITY CHICAGO NEW YORK MINNEAPOLIS

FRENCH RAY-O-VAC

Radio's Best Batteries

supply the plate voltage to the tubes. Typically, ten to twenty milliamperes of current were drawn from a 90 to 180 volt "B" battery pack, depending on the number and types of tubes in the set. These "B" batteries (also called dry batteries) would last anywhere from a few weeks to a few months before replacement was necessary. A wide selection of "B" eliminators, which operated from the lamp socket, were available. "A" eliminators were also available, but they were not as prevalent. By 1925 some manufacturers were marketing their more expensive radios, complete with "A" and "B" eliminators built-in.

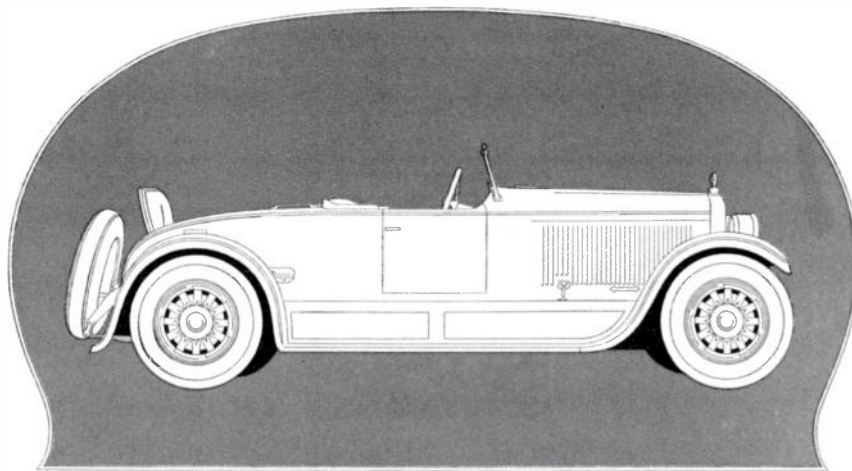
The above discussion also applies to the early automobile radios, except that the "A" battery current was generally supplied by the automobile battery. The "B" eliminator terminology was also used for a few years, and in the case of the car radio, it was in the form of a motor generator, or later, the vibrator power pack. This will be described more fully in a later section.

The tube and component parts manufacturers were realizing a greater demand for a growing range of products. There were about sixty manufacturers of radio tubes and hundreds of hardware and parts suppliers. These parts, including transformers, condensers, rheostats, tuners, resistors and major assemblies were carefully packed in distinctive individual boxes. When the set builder or repairman made a trip to the local parts house and saw those attractive cartons arranged neatly on the shelves, it created a psychological urge to buy more than one really needed, just to stock the shelves at home. The increase in sales due to this technique was phenomenal; what we would now refer to as "impulse" buying. This all contributed to the business climate.

The momentum of the business climate also had its effect upon the automobile industry. Of the thousands of automobile companies which had come and gone there were still a few dozen left who were offering some thrilling models with intriguing features and attractive body styles. Some of these makes are still music to the ears: Auburn, Hupmobile, Kissel, Marmon, Packard, Peerless and Stutz, just to name a few. Names such as Jordan and Columbia, belonged to the so called assembled cars. These were often fine cars made up of major components purchased from independent suppliers, for instance: Timken axles and bearings; Borg & Beck clutches; Durston transmissions; Ross steering gears; Hayes wheels; Continental engines; Stromberg carburetors; Autolite electrical equipment; and Murray bodies.

The goal of these firms was to offer an attractive, dependable car with quality parts and catch a little piece of the market by selling to people who wanted something with unique features. Ned Jordan,

Overleaf: The Jordan Playboy was more than an automobile. It was a legend which remains to this day.



And Now the Playboy at \$1695

Everybody knows that the Jordan Playboy started the roadster craze all over again in this country.

It was built for red blooded Americans who never grow old.

It dominated its field—and of course was imitated.

But there has always been something distinctive about the Playboy—something in its lines—something in its charm—something in the way it carries itself along the road which makes it

the leader among the style sport cars in America.

Now it is lighter—with more power—and lower in price.

A little smaller. A little more compact. Easier to handle. Easier to park. Turn around on a dime.

Of course there's all the speed you dare to use—the Playboy will always have that.

And now the price is \$1695.

Of course there won't be nearly enough of them to go 'round.

JORDAN MOTOR CAR COMPANY, Inc., CLEVELAND, OHIO

JORDAN



Something about September sets the gypsy blood astir. It's the growing scarlet in the hills—crisp nights in the great outdoors—a longing to be somewhere else—a friendly pilot—and a night we hope may never end.

THE SATURDAY EVENING POST

CONVENIENCE-UTILITY

for BEAUTY

Chassis has been lowered; bodies have also been lowered and lengthened. This stream-line effect is further emphasized by the raising of radiator and head lamps.

Closed bodies in color are unusually pleasing; the Fordor Sedan comes in a rich Windsor Maroon, while the Coupe and Tudor Sedan are finished in deep Channel Green; new and finer upholstery gives an artistic harmony to the whole car.

Bright nickeled radiator and head lamp rims feature closed cars. On open cars, head lamp rims are also nickeled.

Fenders are larger, longer and more attractive, conforming to stream-line treatment. The hood also is longer; louvres on sides are redesigned and increased in number.

Rear deck of both the Coupe and Runabout has a full sweep of line which greatly improves these cars' appearance.

for COMFORT

Seats are set further back, lowered and redesigned to permit easy relaxation.

Lowering of the car's center of gravity tends to give greater sense of security and to increase roadability.

Improvement in both the transmission and rear wheel brakes, with wider drums and bands, makes braking smoother and more positive.

One-piece ventilating windshields in the Tudor Sedan and Coupe give greater visibility.

Running boards are wider and nearer the ground; doors are designed for easier entrance and exit.

for CONVENIENCE

In the Tudor Sedan, Coupe and open cars, gasoline tank is under the cowl and may be filled from the outside.

Brake and clutch pedals are wider and more conveniently spaced. Steering wheel is larger and lower.

Coil box and gasoline sediment bulb are placed under hood, where they may be more conveniently reached. Improved fan bracket simplifies adjustment of fan belt.

for UTILITY

Bodies of all-steel construction mean longer wear and lower upkeep.

The Touring Car and Runabout have removable storm-curtains opening with all doors.

Compartment space under the rear deck of the Coupe and Runabout has been greatly increased.

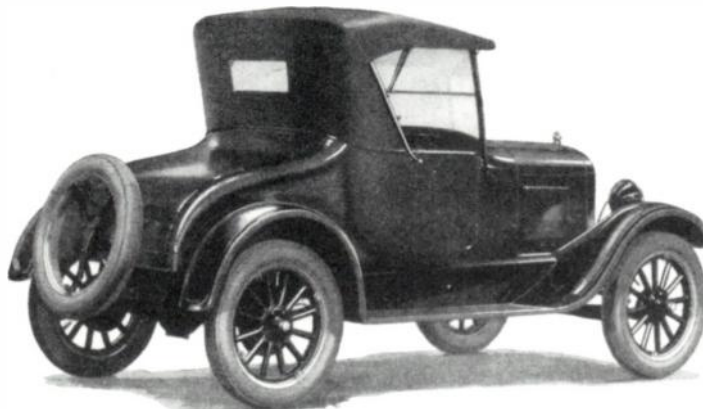
There is added capacity in the gasoline tank of the Tudor Sedan, Coupe and open cars.

No increase in prices

THE TUDOR SEDAN

Channel Green. All-steel body. Nickeled radiator and head lamp rims. Starter, demountable rims, four cord tires, windshield wiper, rear view mirror and dash lamp. Balloon tires \$25 extra. Price f. o. b. Detroit

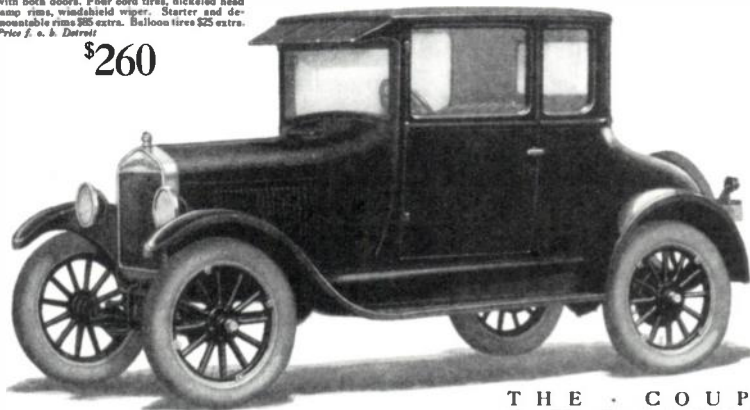
\$580



THE RUNABOUT

Black. All-steel body. Large compartment under rear deck. Weatherproof side curtains opening with both doors. Four cord tires, nickeled head lamp rims, windshield wiper. Starter and demountable rims \$25 extra. Balloon tires \$25 extra. Price f. o. b. Detroit

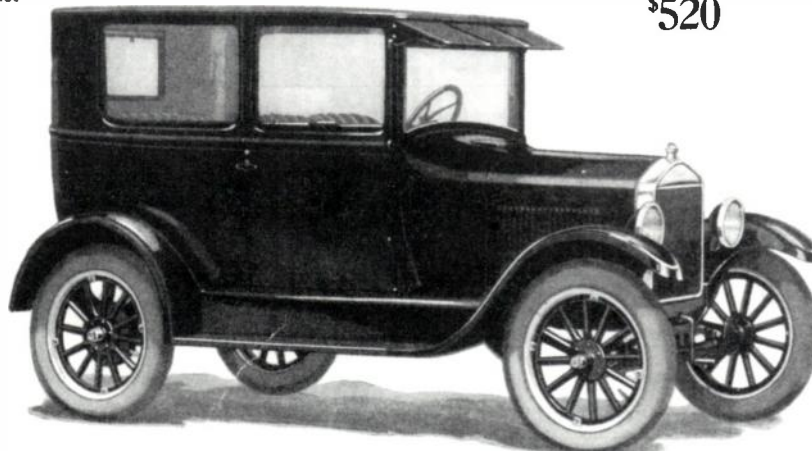
\$260



THE COUPE

Channel Green. All-steel body. Nickeled radiator and head lamp rims. Large compartment under rear deck. Starter, four cord tires, demountable rims, windshield wiper, rear view mirror and dash lamp. Balloon tires \$25 extra. Price f. o. b. Detroit

\$520



Overleaf: The Model T Ford. \$260 for the Runabout put it in a class by itself, becoming incorporated into nearly everyone's vocabulary.

supercharged founder of the Jordan Motor Car Company, went a step further with his romantic advertisements designed to stimulate the hidden emotions in men and women. His ads, "Somewhere West of Laramie" and "Port of Missing Men," were classics, gaining favorable results in the showrooms.

In spite of this rosy picture, it was tough going, with the independents against the giants, and many more car companies disappeared in the next few years. (The parallels between the radio manufacturers and the automobile manufacturers in this regard were very evident.) The large firms built as many of the parts as practical within their own plants, while the many smaller firms purchased most of the major parts for assembly in their own plants. Here again, the ranks would thin out considerably.

The Model T Ford was beginning to look a little dated in comparison with some of its competitors' offerings. To add some excitement to the market, the 1925 Model T Runabout was offered for an all time low price of \$260.00. The Ford open cars still came only in black, but bowing to pressure, Ford offered an option of Channel Green on the Tudor and Coupe, or a rich Windsor Maroon for the Fordor. The customer could buy a fleet of these cars for the price of a Packard, Pierce Arrow, or Peerless.

In the meantime, an event was taking place that would, at first thought, seem completely unrelated to the American radio or automobile industry. This was L'Exposition des Arts Decoratifs et Industriels Modernes, held at Paris, France. The United States of America did not exhibit here for reasons not fully understood, but it seems to have been because of the interpretation of a qualification for attending. The organizing authorities decided that the exhibition should cover a wide field of contemporary, industrial and decorative art; the limiting conditions being such that reproductions or mere copies were excluded and that all exhibits should display genuine originality, fulfill a practical need and express a modern inspiration. Some felt that this was an encouragement for "that hopelessly superannuated thing, 'modern style.'"

Although receiving some criticism from both sides of the Atlantic, a styling trend known as Art Deco, seemed to prevail at the show. Art Deco designs, composed of severe lines with emphasis on vertical arrangements, exerted a profound influence on industrial design. Within a few years, product styling began to reflect some of the influence of this art. The American automobile almost universally adopted the clean swept body sides, with a higher radiator shell as exemplified by the 1928 Hupmobile. Introduced in October of 1927, it was said to be a truly beautiful car.

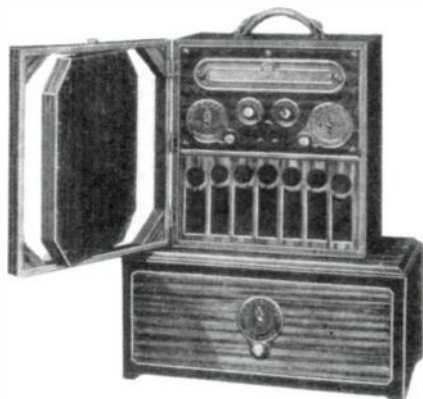
A strange development was taking place with the automobile dealers. They were being urged by editorials appearing in their trade publications to supplement their business by handling radio receivers: no mention made of auto radios, only home radios. It was felt that this was a natural arrangement since the radio business seemed to be developing along the same lines as that of the automobile, and the fact that the heavy season for selling radios was generally the slower time for automobiles. Radio was destined to become one of the greatest industries in America for exactly the same reason that the automotive industry was one of the greatest industries at the time. Both the automobile and radio erase distance and expand the horizon. The automobile made it possible for people who lived in cities to travel the highways and the back roads of the country. Radio made it possible for people who lived in isolated farms and small villages all over the United States to tune in the great cities and listen to world-famous artists, orchestras, statesmen, musicians, and educators.

The radio manufacturers also did considerable advertising in the automobile magazines like Motor and Automotive Merchandising to coincide with the above mentioned editorials. This encouraged courtship between the automobile and the radio and is very interesting, since some radio makers, (Operadio, De forest, Trav-ler and RCA, to name a few), offered innovative portable receivers about this time. With self-contained batteries and built-in loop antennas, it wouldn't have taken too much imagination to rig one of these sets for use in the car.

Although not intended for the purpose, the Atwater Kent Model 35 battery set in a compact inverted metal case with a single tuning dial, made an ideal set for a permanent installation in a car. With this set of course it was necessary to make provision for the "B" batteries; the "A" lead cable for the tube filaments would have been connected to the car battery. The metal housing of the set would have been grounded to the chassis of the car and a connection made from the radio to a suitable antenna on the roof of the vehicle.

There were a number of examples in the mid twenties of car radio installations. One involves previously mentioned Alfred H. Grebe and his Richmond Hill, New York facility. Mr. Grebe had not only been one of the first suppliers of radio receivers, but had also operated his own radio station on the premises. WAHG featured the royalty of stage, screen and radio stars on special appearances and, even more surprising, was his continuing interest in automobile radio equipment. One car was maintained as a mobile broadcasting station for relaying special events such as the horse races at fashionable Belmont Park or the boat races on

The Atwater Kent Model 35, a compact set in a metal case was an ideal candidate for an automobile installation.



Radiola Model 26 portable shown with auxiliary home battery box.

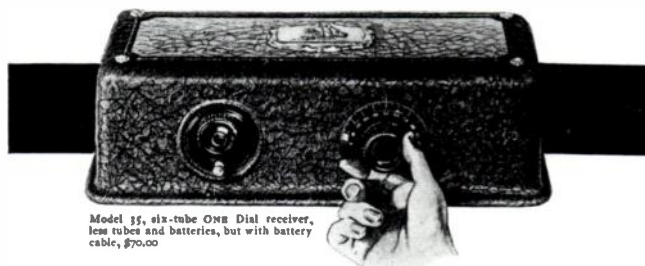
An attractive self-contained portable radio by Operadio Corporation.



Opposite: This illustrated feature on Alfred H. Grebe's radio station confirms his continued interest in automobile installations.

AUTOMOBILE TRADE JOURNAL

ATWATER KENT RADIO



Model 35, six-tube ONN Dial receiver, less tubes and batteries, but with battery cable, \$70.00

1926-1927

Policy, line, prices, advertising—are *right*

NO WONDER Atwater Kent dealers are jubilant over the Fall and Winter sales outlook. See what *they* see!

The sales policy—So satisfactory last year that it stands pat for 1926-1927, without the change of a comma.

The line—Four Receiving Sets. Five, six or seven tubes. Genuine ONN Dial operation, without auxiliary tuning devices; or three dials for those who prefer. Tone, selectivity and range of all models again improved by Atwater Kent engineering.

Three Radio Speaker models. One of them offers a new decorative note—duo-tone color.

The prices—Receivers from \$60 to \$140, including battery cable attached to each set. Radio Speakers, designed to bring out the best in Atwater Kent Receivers, from \$16 to \$23. A price for every customer.

The advertising—Radio's greatest campaign. Fifty-one consumer magazines with 20,347,533 circulation. *All*

kinds of magazines—general, women's, boys', farmers'—monthlies and weeklies. Many back covers, many pages in color. A list of newspapers with 13,000,000 circulation. Posters on 4,358 billboards in and around 199 cities with a population of nearly 40,000,000. A profusion of new dealer helps—new window and counter displays, stuffers, and a mail campaign going direct to prospects from the dealers' stores, bearing the dealers' own names.

And the Atwater Kent Radio Hour—

A powerful goodwill builder for dealers—Radio's finest program, broadcast weekly over a far-flung network, with special concerts outside the WEA chain.

That's the lineup. No wonder Atwater Kent dealers are jubilant. Who wouldn't be?

Write for illustrated booklet telling the complete story of Atwater Kent Radio

Prices slightly higher west of the Rockies and in Canada



Model 32, seven-tube ONN Dial receiver. Less tubes and batteries, but with battery cable, \$140.00



Model H Speaker, dark brown crystal-line finish, \$21.00



Model 20 Compact, five-tube Three Dial receiver. Less tubes and batteries, but with battery cable, \$60.00

ATWATER KENT MFG. COMPANY, A. Atwater Kent, Pres. 4801 Wimsickon Ave., Philadelphia, Pa.

June 13, 1925

RADIO DIGEST—Illustrated

The Famous Richmond Hill Station—WAHG

To the right is Marie Dressler, famous comedienne, who acts as announcer at WAHG when she's in town. Below is Evan Davies, Scotch comedian, and one of the most popular men at the station. His voice always brings a load of mail from bonnie Scotland.

Below is "Ole Bill" Diehl, the Radio question box man at WAHG. But Bill does not devote all his time to answering fan mail on how to do it. He's one of the country's best known engineers and is responsible for the designing of Grebe receivers.



By "Bishop" Heber MacDonald

EIGHT years ago, when Mayor Hylan of New York was just entering the lists for the mayoralty, a young experimenter invited him out to his station on Richmond Hill. There the first political speech was broadcast. The experimenter was A. H. Grebe. So you see Grebe and broadcasting seem synonymous. And this proves that Kipling was right when he said:

*The wisest thing, we suppose,
That a man can do for his land
Is the work that lies under his nose,
With the tools that lie under his hands.*



Above is Pat Mooney, chief operator. It is said he is not so sad as he looks. Below is the A. H. Grebe plant and the WAHG towers.

Eight years has brought many changes in broadcasting. Today the studios and transmitter occupy the entire top floor of the big Grebe plant. The mechanical equipment of the station is in the able hands of Pat Rooney and Alfred Hiller. Walter Neff is the station announcer.

Evan Davies, Scotch comedian, is one of the regular features of WAHG and many letters from across the briny deep attest the excellent reach of the station and the immense popularity of Davies, who is a personal friend of Sir Harry Lauder.

Madelyn Marshall Simon, wife of Robert Simon, the novelist, is the studio accompanist. Prior to her engagement at WAHG, Mrs. Simon was accompanist on the tours of Sigrid Onegin, the Swedish contralto of the Metropolitan Opera company.

Burr McIntosh, the Cheerful Philosopher, known as the man with 10,000,000 friends, has the 8:00 to 8:30 period every Friday night. Last September and October the Cheerful Philosopher was the daily noon hour feature, but motion picture engagements changed this time to the once-a-week appearance.

Thornton Fisher, the well-known sports announcer, was formerly at WPAF. He touches every phase of the world of sports and graces everything he touches. The mobile broadcaster WGMU and the marine broadcaster WRMU are also in the keeping of Mr. Fisher. No matter whether it is horse races at Belmont Park or boat races on the Hudson, Thornton Fisher is on the job for WAHG. Incidentally it might be mentioned that Thornton Fisher is one of the leading newspaper cartoonists when he is not handling the mike for the Grebe station.

John Finnegan, tenor of Saint Patrick's cathedral, Fifth avenue and Fifty-fifth street, New York city, is another regular Friday feature at WAHG. Granting that John McCormack is the first Irish tenor, John Finnegan is easily the second.

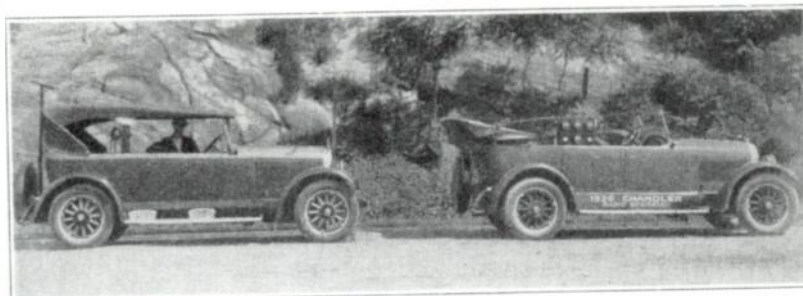
Mikail Lamberti, cellist, was long a member of the New York Symphony orchestra under Walter Damrosch. Mr. Lamberti is on every Friday night and his concert tours are so arranged that the itinerary never interferes with WAHG time.

A deep niche has been (Continued on page 6)

Walter J. Neff, chief announcer at WAHG. Not only is Neff the announcer, but (sotto voice) it is said he can sing a mean song.



The Synchronphase Buick which calls for the artists and takes them home. Looks Synchronphase, doesn't it?



N. R. I. Man To Take "Driverless Auto" on Round-the-World Tour

Leo Paul Handles Transmitter for "Wonder Car"

from National Radio Institute's December 1925 newspaper to students and graduates. Early remote control.



LEO PAUL

The American Wonder? A Radio-equipped Chalmers auto that starts, stops, turns, circles, shift gears, does everything a chauffeur could make it accomplish, without the touch of a human hand!

The explanation of this seeming mystery is Graduate Paul, who, following behind in another Chalmers car, operates the Radio transmitter, which causes an ingenious Radio-controlled mechanism in the "Wonder Car" to put the automobile through all its paces. Never at any time during the performance does a hand touch the leading car, nor is any person se- creted in or near this car. It is absolutely controlled by Radio impulses sent from Leo's transmitter following behind.

A picture of the mechanism, shown below, gives you an idea of just how clever is this new and astounding application of Radio science.

Graduate Paul's tour, under the direc- tion of Francis P. Houdina, started from New York City during the late summer, and is now progressing through the south- ern states, stopping in every large city along the route to give a demonstration of the car and its miraculous perform- ance. Many of you will have an oppor- tunity to see it in action as it crosses the country.

Before the tour began, Leo gave the sophisticated New Yorkers an exhibition that made them sit up and take notice. when he piloted his driveless Chalmers down Fifth Avenue, before the awe- struck stares of the noon-day crowds.

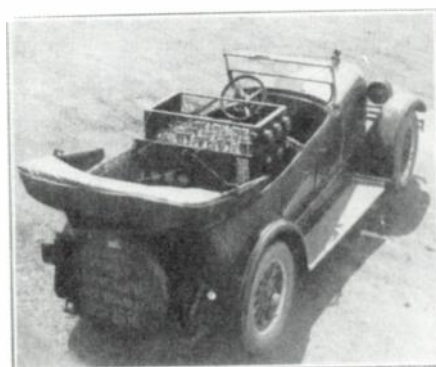
The large picture at the top gives an idea how the "Won- der" and the pilot

car, carrying the transmitter, look when in action.

Leaving New York, the American Won- der tour visited the leading cities of the Atlantic seaboard, and now is heading westward. After a year of demonstrations across the country it will find itself in San Francisco, Calif.

From that point the "Wonder" will turn across the ocean and enter the far lands of the earth, taking two more years to circle the globe.

"A wonderful experience, Mr. Smith," writes Leo. "Made possible for me by the Radio knowledge I received from you. I can never thank you enough for what you have done for me."



TER DEMOCRAT AND CHRONICLE, SUNDAY, OCTOBER 25, 1925.

OTHER FEATURES ON RADIO

Navy Has Contributed Much to Radio Development

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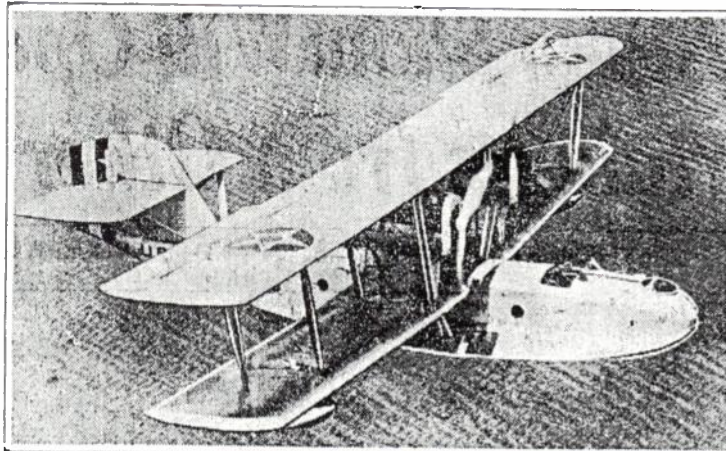
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Became Interested in Invention in 1902; Has 135 Stations.

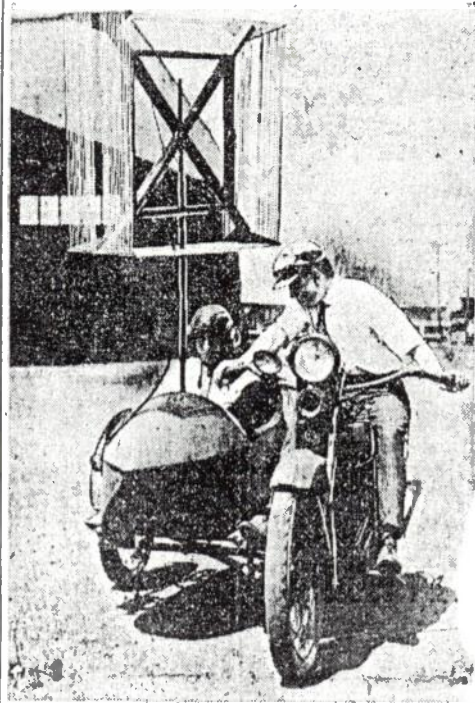
By LIEUT.-COM. T. A. M. CRAVEN,
Radio Section, U. S. N.
(Radio News Service.)

Washington—Through its chain of forty high-powered and ninety-five intermediate shore radio stations, the Navy is always in direct touch with the whole world and its war craft at home and abroad. This radio station investment cost the government approximately \$22,000,000, but in view of its constant official use, and, in emergency, commercial and humanitarian service, it is regarded as worth far more.

Governmental dispatches, most of them secret, naval orders, and in many instances, important messages pertaining to aid, relief and the safety of life are flashed instantly to whatever point it is necessary.

The Navy was on the job in radio early, watching every move. In 1902, the New York Herald arranged with Mr. Marconi for the installation of radio apparatus on certain private vessels, so that newspaper reporters could telegraph to their papers the results of the International boat races off Sandy Hook. The Navy sent a representative to witness this experimental communication. This representative immediately saw the military value of radio communications and recommended that the Navy investigate the matter as rapidly as possible. This was done and many United States vessels were soon fitted out with the new invention. The apparatus was crude and was useful for communications at short distances only.

Early Experiments.
In 1907, or 1908, the Navy conducted what was then considered long distance radio communication tests with the U. S. S. Salem and U. S. S. Birmingham. These ships



Commander Roger's Pacific plane, the "P.N.-3" which was equipped complete radio transmitting and receiving equipment, and a portable motorcycle radio receiving set used for experimental purpose at the Navy Station, Anacostia.

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By 1925, radio installations in military aircraft were becoming commonplace while motorcycle receiving sets were still a rarity.

the Hudson River. Another car radio was installed in a Buick which called for the performing artists and took them back to the hotel after their appearances before the microphone; the car was appropriately named the "Synchrophase Buick."

Another exciting story appeared in the December 1925 National Radio News, published in the interests of students and graduates of the National Radio Institute. A graduate of N.R.I. was chosen to take a "Driverless Auto" on a Round-the-World-Tour. This radio-equipped Chalmers was designed to start, stop, turn, and shift gears by radio impulses from a similar car following behind. This indicated the state of the radio art which existed in 1925 and must have been a challenge to the imagination of any budding radio person of the time.

As if any more proof of the value of radio was needed, there was the report from the skipper of the airship Shenandoah, Lieutenant Commander Zachary Lansdowne of the U.S. Navy, made a statement to the effect that communications is no longer dependent upon transportation. This was in reference to a lighter-than-air ship that he commanded and the margin of safety provided by the on-board communications equipment.

There was no doubt that radio was popular with the Navy. Commander Roger's Pacific flying boat was equipped with complete radio receiving and transmitting gear, and while on the Naval Base he used his motorcycle and sidecar with a radio receiver on board.

This then is the way that it was in the mid-twenties, the years when the best dressed man at the football games wore a raccoon coat, carried a megaphone, waved his college pennant and munched on an Eskimo Pie. All the while, however, there were forces propelling him headlong into a date with destiny.

1926 A Year of More New Developments

One more step toward insuring a future for the automobile radio, although not made with that in mind, were the super-power radio stations. In the spring of 1926 radio station WJZ with transmitter in Bound Brook, New Jersey, and studios in New York City, went on super-power. The transmitter power was increased from 1000 to 50,000 watts. Others would follow suit as permission was granted. The rabid DX fan, with the misfortune to live near one of these powerful stations, was hopelessly lost as the strong signals blanked everything else out. However, for the average listeners, it meant clear, interference free reception.

The next step was the joining of two great competitors. Radio Corporation of America purchased Station WEAJ in New York City from the American Telephone and Telegraph Company. This launched the National Broadcasting Company. The stated goal: "to provide the best programs available for broadcasting in the

The Formative Years

United States." Merlin Hall Aylesworth became the first NBC President.

On November 15th NBC's first network broadcast went out over WEAf, the "Key Station," and a group of over twenty-one scattered affiliated stations, which utilized approximately 3,600 circuit miles of special telephone lines. Those fortunate radio set owners who were "tuned in" were treated to the media's finest. The extravaganza from New York included: Walter Damrosch and the New York Symphony Orchestra, Will Rogers, the comedy team Weber and Fields, and Mary Garden. But that was not all, there was Titta Ruffo and the New York Oratorio Society with Albert Stoessel. More music was provided by the Edwin Franko Goldman Band, and the orchestras of: Vincent Lopez, the "Old Maestro" Ben Bernie, B. A. Rolfe and George Olsen. This was truly entertainment for everybody.

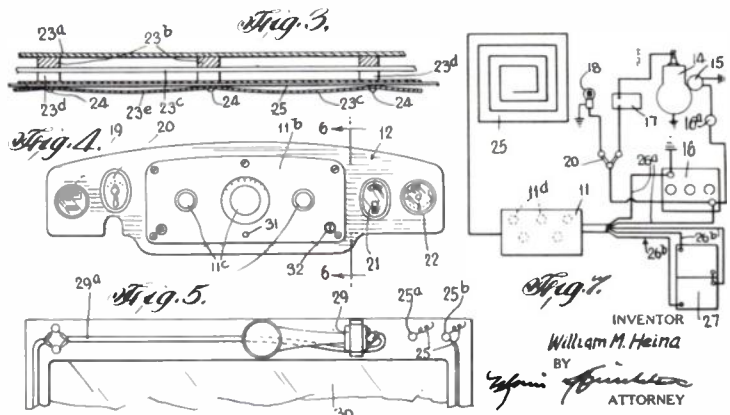
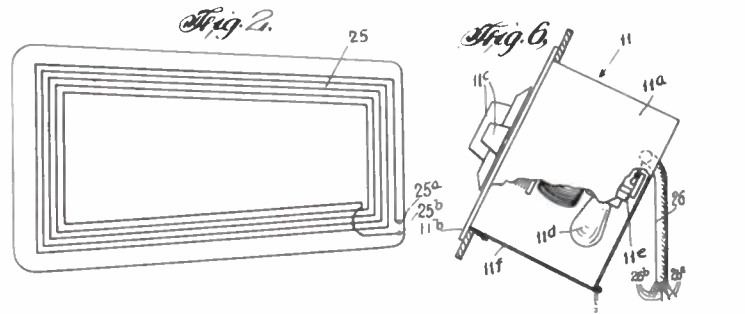
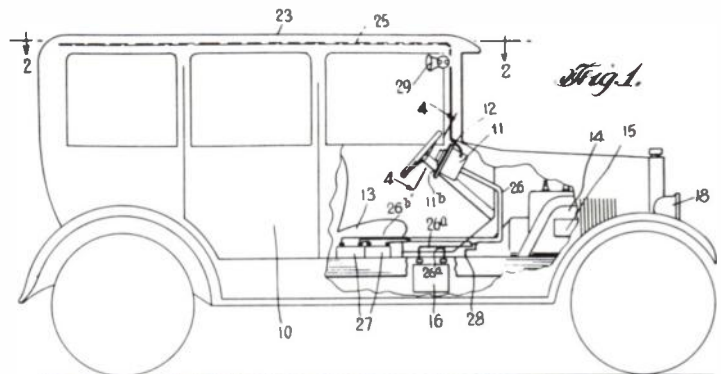
Networking provided top-flight programs and facilities that no single station could afford. It furnished excellent talent, big names and good coverage to the outlying member stations. This was a great moment for radio set owners. It brought programs such as Cities Service Concert hosted by Graham McNamee, and The A & P Gypsies concert orchestra of twenty-two pieces directed by Harry Horlick with Milton Cross as announcer. If one liked popular music, Cliquot Club sponsored Cliquot Club Eskimos with an orchestra under the direction of Harry Reser, banjoist. On the light side, were the famous pioneers Roxy and His Gang, a program of semi and popular music featuring the members of the Roxy Theater personnel. Among the new arrivals making their first appearances on radio for 1926, were Jessica Dragonette and Eddie Cantor. That was a year to remember.

Perhaps encouraged by the higher power stations and network wide programming, 1926 was a big year for the automobile radio, even if all of its problems were not solved. On September 16, 1926, William M. Heina filed for a patent on a portable radio apparatus, i.e. an automobile radio. His claims dealt primarily with the physical arrangement of the radio chassis in combination with the dashboard and the ease of operation. The system drawings depicted an orderly installation which served as a guide for future auto radios. According to several sources, Heina began installing his product, known as the Heinaphone, in the New York City area and worked up quite a following of customers. The radio itself was a four stage, tuned radio frequency amplifier with two stages of audio amplification. The tubes used were the conventional UX201A and UX112 battery set triodes. The batteries were mounted in a weatherproof box under the floor of the car. The antenna was either a screen in the roof or an endless wire threaded back and forth across the top of the car between the composition roof

April 26, 1927.

W. M. HEINA
PORTABLE RADIO APPARATUS
Filed Sept. 16, 1926

1,626,464



William M. Heina's patent for a car radio made no revolutionary claims, but it served as a guide for future installations.

An interesting auto installation for use in locating radio interference, supplied by a newspaper of Rochester, New York in 1926.



and the interior headlining. The radio mounted directly behind the reworked instrument board with holes cut for the two tuning dials and control knobs. To cap it off, an abbreviated magnetic horn speaker mounted on the headliner above the windshield. This was an extensive installation consuming several days of time. The final product was well planned, however, and apparently performed successfully in the New York City area. One could only hope that the received signal drowned out the ignition interference.

Mr. Heina was not the only one in the auto radio business but he certainly seemed to be the most ambitious at that time. There were reports that both Radio Auto Distributors and All American Mohawk offered automobile radios in 1926; however, no further information is available.

The home radio also received its share of attention. As mentioned earlier, with all the battery eliminators and paraphernalia, it was possible to have a set that was operable from alternating current available from the lamp socket. This, however, was not the right way to proceed. A tube with a filament or heater that would operate from the AC line was badly needed; such a tube would make the "A" battery eliminator unnecessary. A man named Frederick S. McCullough who had worked for Westinghouse on indirectly heated cathode tubes devised his own tube in 1925, but it was January 1926 before arrangements were made with Kellogg Switchboard and Supply Co. to produce these tubes. A few manufacturers adapted their sets to accommodate the McCullough tubes, added a "B" power supply and presto an AC set! Sparton was one of these, but since they already owned a tube plant they soon decided to build their version of the heater type tube. Thus Sparton became one of the first to offer the "all Electric" set; in fact, they claimed to be the first. This was only the beginning.

1927 A Crucial Year for the Auto Radio

1927 opened with the broadcast of the Rose Bowl game in Pasadena, California. This was the first coast-to-coast radio program using a hookup of 4,000 miles.

The NBC-Blue Radio Network, established by RCA-NBC with WJZ as the key station, began operation as an adjunct to NBC-Red (the original network of which WEAJ was the key).

1927 was a vintage year; it was the year in which Charles A. Lindbergh, the "Lone Eagle," flew his little Ryan monoplane 3600 miles, non-stop, from Roosevelt Field, Long Island, New York, to Le Bourget airfield in Paris, France. Lindbergh landed there on May 21st after 33 hours and 29 minutes of flight time. Reports of his historic flight were broadcast on a coast-to-coast radio network.

The Westinghouse and General Electric receiving tube engineers may have been listening to the Rose Bowl game and reports of Lindbergh's flight, but they were not oblivious to the challenges of their own world. In the last few years of the decade they added considerably to the RCA tube line. The UX226 AC filament tube and the UY227 AC heater, detector tube were brought out in 1927 in time for the famous Radiola 17, the first compact self-contained AC line cord set from RCA. The AC powered sets began to make the earlier battery sets obsolete in locations where 110 volt 60 cycle electrical power was available. This was another boost for the radio set business as there were thousands of families who had been waiting until such a radio was available before making an investment. No more "B" batteries to buy, no more storage batteries to keep charged. In October of 1927 another tube was introduced by RCA, one that would influence the pioneering efforts of the auto radio.

Engineered by General Electric and produced at the Nela Park facilities for RCA, the type UX222 was a four element screen grid tube for D.C. filament operation. The screen grid was inserted to reduce the interelectrode capacitance between the anode and grid of a three element tube. This capacitance caused feedback of energy, resulting in instability or oscillation. The inclusion of the screen grid also greatly increased the plate resistance and usable amplification factor of the three electrode tube. A three element tube such as the UX201A had an amplification factor of 8, the UX222 had a maximum amplification factor of 270. The UX224 screen grid tube for AC or DC heater voltage, introduced in April 1929, had a an amplification factor in excess of 400. This meant an incredible increase in radio set sensitivity if used in a carefully designed circuit. Unfortunately, RCA was keeping the superheterodyne circuit for themselves. In the meantime, the auto radio developers were not waiting.

On April 26, 1927 William M. Heina was awarded U.S. patent No. 1,626,464. It was assigned to the Heina Radio Corporation of New York. As mentioned previously Mr. Heina had been marketing his product under the name of Heinaphone. In the same year, a Mr. Russell C. Feldman, originated the Automobile Radio Corporation, apparently located in Long Island City, New York. It is assumed that this was a successor to the Heina organization. The arrangement that was made with Mr. Heina is not known, but the work of the Automobile Radio Corporation closely resembled Mr. Heina's patent drawings. The trade name of the new firm's receivers was Transitone.

An engineer with the Automobile Radio Corporation, Mr. A.A. Leonard, made a breakthrough in developing the automobile spark plug suppressor to help

eliminate the ignition interference. This was a carbon resistor molded into a bakelite or ceramic adapter which was placed between the spark plug wire and the plug. This resistance in the order of 20,000 ohms was sufficient to dampen the electromagnetic radiation to a tolerable level. The previous method of dealing with this objectionable radio frequency "noise" was a total shielding of the system (as in aircraft ignition systems) which was laborious and expensive. The development of the automobile spark plug suppressor was certainly a milestone in the history of the car radio.

One of the most respected names in the field of radio, John F. Rider, instructor, writer, and publisher, made his contribution to the automobile radio by designing and building a seven tube superheterodyne set which he installed in his two door automobile. Mr. Rider stated that he found in traveling the Eastern part of the United States he was always able to get good reception from a number of stations, wherever the car was brought to a standstill. This last remark indicated that he did not have the set sufficiently shielded, or did not use spark plug suppressors. He did indicate, however, that he had installed a loop "aerial" in the roof. Mr. Rider felt that "soon every car will carry its own radio equipment, if only for the purpose of listening to broadcast programs just as one does at home."

Earlier, Radio World magazine for April 16, 1927, published a report from Wellington, New Zealand, that radio sets in taxicabs helped business boom. It seems that the country from down under was attempting to equip all of the taxicabs with a radio receiving outfit. There is reference made to the Daimler Company and the fact that they had equipped their cabs in London with radios. This would indicate that they had a head start on the cabs in the United States. Like everyone else, they seemed to have had a problem with ignition noise. They said that on cars with magnetos they could solve the problem with a small choke coil, but where a Delco system was in operation the engineers had not been able to satisfactorily overcome the noise unless a separate "A" battery was used.

In Boston, Massachusetts, David Housman, President of Automatic Radio Mfg. Co. Inc., was busy working on his version of an auto radio. He developed special mountings and flexible connections to spare the delicate tubes and components from the road vibrations. In 1930 Automatic would be one of the pioneer manufacturers with a compact auto radio.

Just so these recently installed car radios and the people at home would have a well rounded selection of programming, on September the 18th the newly formed Columbia Phonograph Broadcasting System went on the air with a basic network of sixteen stations. On November 19th the name was changed to Columbia Broad-

Overleaf: John F. Rider, well known publisher, describes his superheterodyne automobile receiver installation in 1927.

SIXTH YEAR

RADIO WORLD

Vol XI
No. 18
Whole No. 278
July 23, 1927
15c Per Copy. \$6.00 Per Year

A Weekly Paper Published by Hen-
nessy Radio Publications Corporation
from Publication Office, 145 W. 45th
Street, New York, N. Y.

Phones: BRyant 0558 and 0559

[Entered as second-class matter, March, 1922, at the post office at New York, N. Y., under Act of March, 1879]

A Super on Wheels How to Build a Receiver Into An Auto

By John F. Rider

Member, Institute of Radio Engineers

PART I

IT is said that truth is stranger than fiction. The significance of this statement, however, cannot be appreciated unless one has undergone some peculiar experience which will bring forth the realization that the human mind cannot conceive all the intriguing situations within the powers of Dame Fate.

A short time ago I visited a small resort in the foothills of the Catskills. Though at the off season, this establishment had several guests. An outstanding individual was a somewhat corpulent chap, with a strong penchant for all forms of gambling. One of his pet diversions was the stock market, and his favorite group the oils.

One bright morning at about 10:15 this gentleman received a telephone call advising him that a telegram awaited him at the village telegraph office, and that personal service was not rendered; but, if he so desired, the contents of the telegram would be read to him over the phone. He assented and a message was delivered.

Not So Good

Upon his exit from the booth it was obvious that the message, whatever it was, was unfavorable; as a matter of fact, very unfavorable; so much so, that the coat of tan acquired during his expensive stay was useless. The man appeared as if he had seen a ghost. Questioning brought forth the information that some of his pet stocks had apparently suffered a relapse. To make matters worse, the quotations given over the wire were incoherent. If he had deciphered the figures correctly, according to what he took down over the wire, they indicated sharp decline in the oils. The quotations were so low that the man could not believe them. He forthwith placed a long distance call for his brokers in New York City, to check up on the devastating figures and give his orders to save as much of his investment as possible. If the figures were correct his margin would last but a short time.

After a few minutes he was advised that the call could not be put through, because of a recent fire in one of the conduits carrying the telephone cables through the Harlem section of New York City. He was further informed that it would be necessary to wait at least one hour before the connection could be completed. . . . The man was frantic. With an appreciable amount of money at stake, he was helpless to make a decision. The burnt cable in the city explained the brokers' recourse to the telegram. The fat man had received a phone call every morning, advising him of the opening prices on the Stock Exchange.

Out of Luck

He dispatched a wire to the brokers,

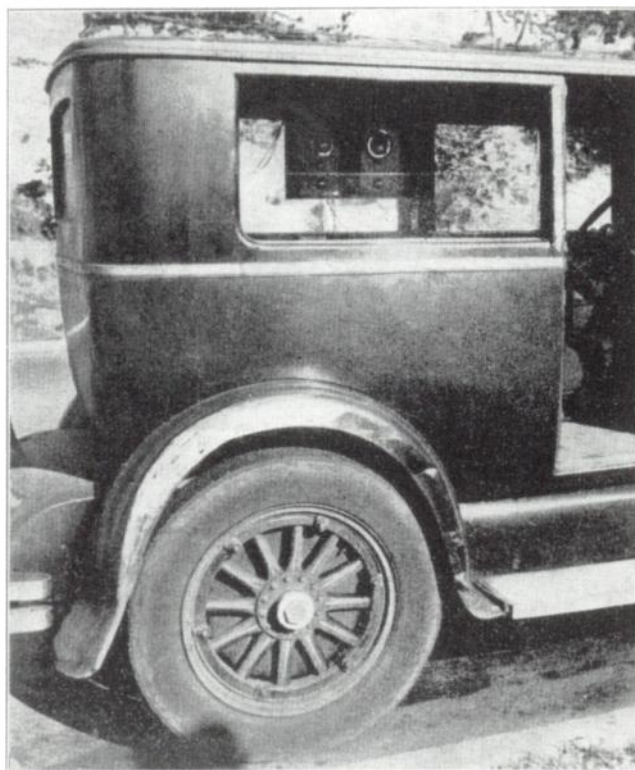


FIG. 3

The set is secured to the automobile just under the top. Stations usually are tuned in when the car is at a standstill. The loop is wound on the top of the car but can barely be seen.

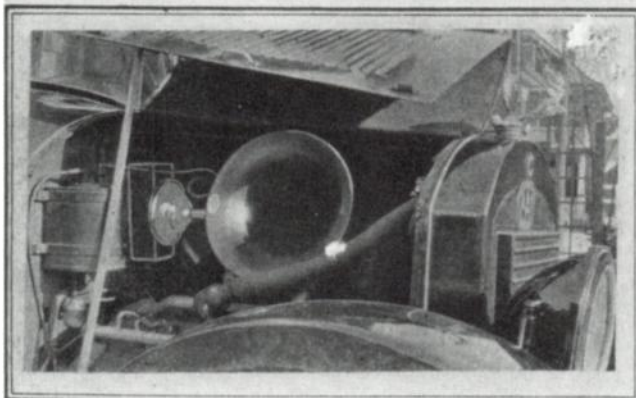
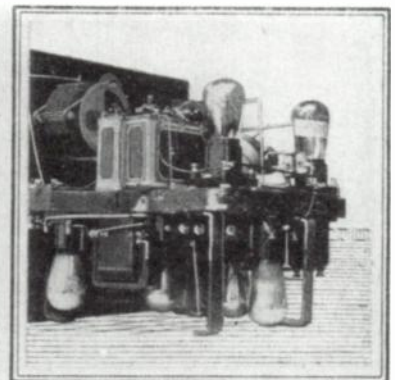
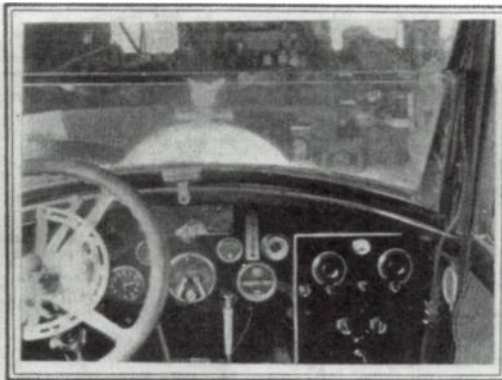
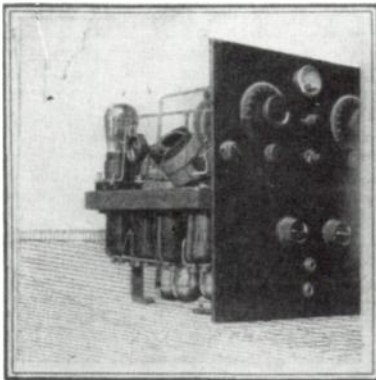
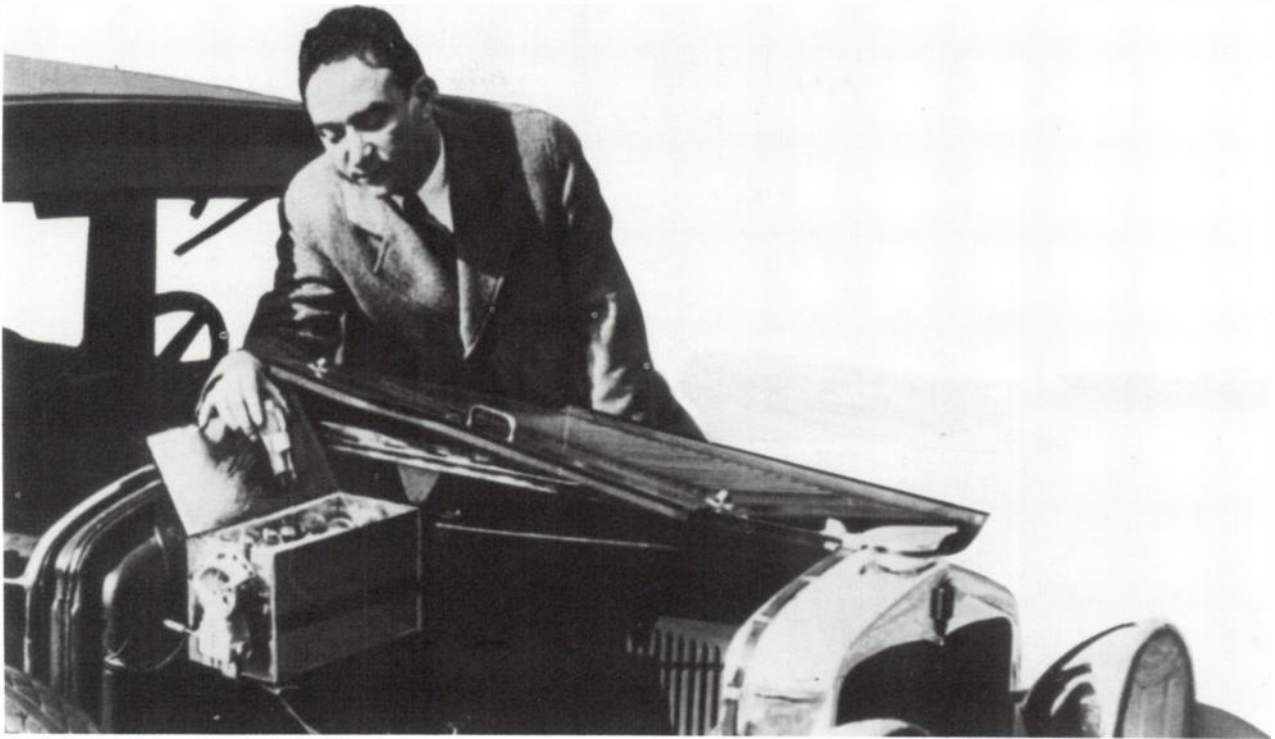
requesting additional information, and explaining that the first wire was incoherent. He then called another number in a different part of New York City, hoping to make connection with his brokers through the switchboard in this office. He located the number, but was again advised that connection with the lower part of the city was impossible. Only immediate exchange calls were being made, the upper part of the city being isolated from the lower portion. About ten minutes elapsed. It was now 10:25. Nothing had been accomplished to help the situation. The man's apprehensions were mounting each moment. . . . As a last effort he called the

telegraph office and asked a check-up on the previous wire. He was told that the check-up would be made, but that it would take some time.

Just then it occurred to me that WMCA, in New York City, broadcast the stock quotations at 10:30 A. M. A receiver had been installed in our family "chariot" to provide entertainment while on the move and when away from the city. WMCA was within the range of this receiver, and if the stock quotations broadcast could be received, fine and dandy! The service of the receiver was offered and very gratefully accepted.

All Set to Tune In

The man approached the car and seated



casting System, and on January 3rd of the following year William S. Paley was elected President.

The year 1927 would not be complete without a reminder that on September 22nd at Soldier Field in Chicago, more than 150,000 fans saw Gene Tunney successfully defend his heavyweight title against ex-Champion Jack Dempsey. The prizefight was broadcast from Chicago over sixty-nine NBC radio stations, largest network of stations ever to carry a program up to that time. Veteran announcer Graham McNamee was at ringside and gave the blow-by-blow description.

Another item of interest was the October 6th premier of a very special motion picture: The Jazz Singer, a musical featuring Al Jolson. The film was produced by Warner Brothers utilizing the Vitaphone sound-on-disc system. This was essentially the same system, (although somewhat refined), as Edison's ill-fated Kinetophone of 1913-14. By 1930 the modern system of synchronized sound-on-film was inaugurated. This technological advancement was welcomed by theater audiences, particularly since the radio had made them so conscious of the quality of sound reproduction.

To complete our calendar year, we come to the unveiling of the all new Model A Ford. On December 2nd at the unveiling, one million people, (according to the Herald-Tribune), tried to get into the Ford Headquarters in New York to catch a glimpse of it.

1928 The Economy Climbing Toward the Zenith

What follows is one of the most remarkable periods in the history of industrialization within the American free enterprise system. By now, the world was already familiar with the precarious course of events in the growth of the automobile industry. This "bumpy road" was paved with stories of failures and successes involving thousands of entrepreneurs, and the world had never before seen anything to compare with it. By 1928, however, it was becoming apparent who the future leaders would be.

By comparison, the radio receiver business was still new and undergoing drastic changes. One might have thought that the Radio Corporation of America with its licensing position and corner on the superheterodyne circuit would be way out in front and stay there, but others had different ideas and the race was far from over. It is the unfolding of this saga that is so memorable. We have singled out the following manufacturers for discussion, not only for their mercurial rise to dizzying heights, but because they all became important producers of automobile radios in the early thirties. This is not intended in any way to overshadow other important and capable producers.

This was the year that most of the industry was swinging over to alternating current (AC) supply sets. The public, (those who had 110 Volt, 50 or 60 cycle power available), was eager to buy the new sets and

Overleaf: David Housman inspects his installation in a 1928 Hupmobile.

Mr. Seymour Sager of Hamilton, Ontario, shows off the 1927-28 superheterodyne radio installation in his car. He stated that sparking could be heard when the vehicle was in operation.

get rid of the batteries and/or the extra paraphernalia. Also, prosperity was in the air, so sales of new radios continued at a lively pace. The people whose business was dependent upon the manufacture of batteries, battery chargers and battery eliminators were worried. There would be sales of this merchandise for years to come but not in the quantity that was being produced at that time. What to do about it, was the question! It wasn't the first time that technical obsolescence had driven someone out of business.

THE SATURDAY EVENING POST

October 3, 1925

Both A and B

radio power from your house current



Philco "A" and "B" Socket Powers are plugged right into a lamp or wall socket. They transform your alternating current into smooth, hum-free, direct current necessary for your radio.

One switch controls everything—"A" power, "B" power, even the radio set itself. Snap it "ON" and you get a strong, uniform flow of both "A" and "B" power. Snap it "OFF" and your power is shut off—your radio is silent—and current begins gently feeding back into Socket Power "A" from your light wires.

No more recharging to think about—no more bother of disconnecting worn out dry cells and replacing them with new.

Equally important—there are no tubes to burn out—no high voltage transformers—no moving parts—no hum—no distortion—no falling off in reception. As dependable as your electric current and turned on exactly like an electric light.

Once you connect Philco Socket Power to your radio you never need change a single wire. You forget all about getting wires mixed and burning out tubes. You forget that radio is mysterious and technical. You just enjoy it.

Sold and demonstrated by leading radio and music stores and by Philco Diamond Grid Battery Dealers.

Philadelphia Storage Battery Company
Philadelphia

For dry cell (3 volt) tubes

Buy Philco Socket Power Type "A" and "B" in individual cases. Either "A" or "B" may be used alone, but for the greatest possible convenience use both together. Plug Socket Power "B" into the hole in receptacle on Socket Power "A". Plug "A" into a light, wall or base socket. Turn the "B" switch and the radio switch "ON" and have them on permanently. The switch on the "A" then controls everything. To use the radio, snap the "A" switch "OFF". When through using the radio snap it "OFF". A touch of your finger does everything. Nothing to think about but the use of "A" switch.

For storage battery (6 volt) tubes

Buy Philco Socket Power Type "A" and "B" in individual cases. Either "A" or "B" may be used alone, but for the greatest possible convenience use both together. Plug Socket Power "B" into the hole in receptacle on Socket Power "A". Plug "A" into a light, wall or base socket. Turn the "B" switch and the radio switch "ON" and have them on permanently. The switch on the "A" then controls everything. To use the radio, snap the "A" switch "OFF". When through using the radio snap it "OFF". A touch of your finger does everything. Nothing to think about but the use of "A" switch.

PHILCO RADIO A AND B SOCKET POWERS

Philadelphia Storage Battery Company got started in the radio business by manufacturing batteries and battery eliminators.

Philco also builds rechargeable batteries, and because they may be conveniently connected to your radio and safely charged in your home from different charging dry cells. Better than the portable recharging and recharging of dry cells.

Philco Standard "B" Battery—a complete Adams-Brown maintenance Radio replacement for 60 volts of dry cells. Only \$19.95!

Philco "A" Batteries in solid tight glass cases—for dry cell tubes, 30, 6 volt tubes, 115. Built in charge indicators.

Is rubber cover, rubber making any rubber, \$14.95 and up.

Philco Radio Batteries are built Dynamos—DRY but CHARGE! Their life doesn't start until the dialer goes to the electrolyte. You can't get a stale Dynamo Philco.

May, 1926

Majestic Super-B



Winner In Performance!

ON the racetrack there is always a winner! One whose stamina is greatest of all contestants—so it is with Radio. Your set when equipped with the new Majestic Super-B will literally outperform at *all* times, the records made previously by your receiver in its best temperamental moods.

The Majestic Super-B not only improves the volume and quality of tone, but spares you the constant annoyance of depreciating B batteries. Also, it reduces the cost of operating your set to less than one-eighth cent an hour!

Two chokes of 41 Henrys each and 20 micro-farads of capacity are used in the Majestic Super-B filter circuit. Winding the chokes and transformer with 30 gauge wire of low resistance also allows voltage regulation of better control. The unusually large condenser bank smoothes out every trace of ripple with a wide safety factor to spare.

Majestic Super-B Current Supply, complete with Raytheon Tube, capacity 1 to 12 tubes, including the use of new 135-150 volt power tubes.

110 volt, 60 cycle. Price\$39.50

The Majestic Standard-B is a smaller B current supply unit, designed for sets having not more than 6 201A-type of tubes or 5 201A, plus one 112 type of 135-volt power tube.

Majestic Standard-B Current Supply, complete with Raytheon Tube.

110 volt, 60 cycle. Price ..\$32.50

GRIGSBY-GRUNOW-HINDS CO.
4550 Armitage Avenue Chicago, Illinois

The roots of the famous Majestic radio. From an advertisement in Automotive Merchandising magazine.

Philadelphia Storage Battery Co. was one of those firms producing batteries, chargers and eliminators for radios, to the tune of some fifteen millions dollars worth in 1927. They had been making batteries of one type or another since their founding in 1906, but they were never a leader in the automobile battery field so they didn't have that much to fall back on. The man responsible for Philco being in the battery eliminator business and the man with the faith and enthusiasm to see them through this trying period was James M. Skinner. In the spring of 1928 Philco was in the radio business, starting right out with a line of AC sets, just in time to hopefully cash in on the boom. Obviously, it cost millions to set up production and they were in debt for the first time in the history of the firm. They borrowed heavily and had some precarious times, but they were making radios the way that Henry Ford was making cars. Philco built and sold over 400,000 sets in 1929, not a record yet, but they had become one of the top firms in the business. In the thirties they would become the largest radio manufacturer in the field.

The Grigsby Grunow Co. (formerly Grigsby-Grunow-Hinds) of Chicago, which, like The Philadelphia Storage Battery Co. had been making "B" eliminators. The firm had been established in 1921 with a determination to manufacture something when they hit upon an automobile sun-visor which they made for the after market until the automobile makers began installing them at the factory. With the inventory of celluloid-like Du Pont Pyralin, left over from sun-visor manufacturing, they decided to make radio loudspeaker horns until they became obsolete. Grigsby-Grunow then tried the battery eliminator business, a successful venture for a time but that too became out-dated as we have seen. In the meantime, Orville Quincy Hinds and Grigsby's younger brother sold their interest out. That left Bertram James Grigsby and William Carl Grunow to steer what was left. Grigsby and the financial backers put their fate in the explosive (he had been known to bang his fist on the table to emphasize a point) Mr. Grunow's hands, who advised building radios. He said in essence, that they would build a receiver around their power supplies, install them in attractive console cabinets, and outsell everybody else in the business.

Grunow flung the Majestic radio at the world. It was a good low priced radio that performed with the best of them and it had a dynamic loudspeaker that shook the room, if one so desired. He inaugurated the Majestic Theatre of the Air over CBS in the fall of 1928 and spent thousands on programming and advertising. Ring Lardner wrote a play exclusively for radio production and Edgar A. Guest wrote and read poems to the radio program listeners. Mr. Grunow signed on the

Extravagant Majestic radio display in a corner of the lobby, Hotel Stevens, Chicago, during the 1929 Radio Manufacturer's Association Trade Show June 1929.





Lavish Majestic Day & Night Club, held for the benefit of dealers and distributors in the Hotel Stevens, Chicago, during the R.M.A. Trade Show June 1929.

comedy team, Moran and Mack; they and Majestic climbed to fame together. All this pushed Majestic sales into thousands per day and in 1929 the industry leadership passed to Grigsby-Grunow.

Another name, not yet in neon lights, was Paul V. Galvin who also got his start in the battery eliminator business. In fact, since 1921 he and his friend Edward Stewart had been in and out of business several times. More recently, they were out again when they had experienced a technical problem which delayed production and cash flow to the point that their creditors forced them to close the business.

With encouragement from Sears, Roebuck and Co. (possibly an order) and \$1,000 he had scraped together, Galvin bought back the eliminator portion of the former business at public auction. On September 25, 1928, the Galvin Manufacturing Corporation was born in a small section of a rented building on Harrison Street in Chicago. There, Galvin and five employees invaded the home radio field by manufacturing nine tube AC sets with assorted name plates for private-label use and sale. Business was doing quite well until the stock market crash, but we had not heard the last from Paul Galvin. You may remember him as the founder of Motorola!

In 1928 the industry sales leader was the Atwater Kent Manufacturing Co. who had popularized the AC tube that RCA had introduced. Arthur Atwater Kent started business in Philadelphia in 1902. At that time the firm manufactured chiefly intercommunicating telephones and small electrical-indicating instruments. In 1905 with the growth of the automobile they started production of ignition systems. In 1921 with the increased interest in radio, Mr. Kent directed his firm into the production of radio receiver parts of remarkably high quality which they marketed as home assembly kits. In late 1922 production was started on completed assembled radio; this was the famous line of "breadboard" sets. In 1923 the working force had increased to 5,000 employees and the new plant covered fifteen acres of floor space. By 1929 the facilities were increased to thirty-two acres of floor space with a capacity of 12,000 receiving sets per day. This was the best year ever for the company; they sold close to a million sets and grossed an estimated \$60,000,000.

A very early industry sales leader, and still a major contender, was the Crosley Radio Corporation. Powel Crosley, Jr. was a man of many interests and occupations, reportedly holding more than fifty jobs before he was twenty five. First and foremost, he was an innovator; he was a leader not a follower, nor was he interested in working for anyone else. After his nine year old son asked for a radio receiver, he became so enthusiastic that he went into the business,

becoming one of the largest manufacturers of radios by 1922.

His motto: "you give the customer the greatest possible amount of merchandise for the money," no doubt contributed to his success. His famous line of radios: "Pup," "Jewelbox," "Gembox," "Bandbox," and many others were a good value. He began experimenting with radio broadcasting in 1921 by operating Amateur Radio Station 8CR from his home. As an outgrowth of that interest and to make sure that his customers had good reception, he founded radio station WLW Cincinnati, the "Nation's Station." Often called the "Cradle of the Stars," WLW introduced the world to quiz shows, "soap operas" and many famous personalities.

These people and their companies were the "high shooters," somewhat different personalities, ranging from the merely cautious to the outright daring. Some gambling with stockholders' money; some gambling with their own. All were gambling with their employees and their own futures. At the end of 1928 business was good, and there was no cause to worry. Radios sales for the year were \$650,550,000.

1929 The Sweet and Bitter
Year

The outlook for the coming year looked bright. Herbert Clark Hoover, the man who as Secretary of Commerce had brought order out of chaos in the radio broadcasting industry, was sworn in as President of the United States on March 4th.

In the radio broadcasting world, the air waves were alive with entertainment. Maurice Chevalier made his radio debut for Coty Perfume over WABC, Willie and Eugene Howard appeared on the NBC Majestic Hour and Pepsodent signed on Amos and Andy. This was the year that Guy Lombardo and his Royal Canadians opened at the Roosevelt Grill on October 3rd. In attendance was William Paley, President of CBS, making sure that the broadcast over WABC was going smoothly.

On October 21st the great and the near great, gathered on the grounds of Henry Ford's Greenfield Village. Here he had moved, restored and recreated, Thomas A. Edison's Menlo Park, New Jersey, complex of buildings. It was there, in his famous laboratory, that the phonograph, the carbon button telephone transmitter, the electric light and other important inventions were born. The occasion was the Golden Jubilee of Edison's creation of the first successful electric light bulb, and the dedication of The Edison Institute which Mr. Ford named in honor of his old friend. Presiding over the microphones, were Graham McNamee of NBC and Ted Husing of CBS.

THE AUTO RADIO

Re-creating the first successful incandescent electric lamp at the old Menlo Park laboratory which had been moved from New Jersey to Greenfield Village, Michigan. Left to right is Francis Jehl, Edison's assistant, President Herbert Hoover, Henry Ford and Thomas A. Edison.



The Automobile Radio Makes News

The May 4th issue of Automobile Topics reported on the Automobile Radio Corporation. They called their product "Transitone," an excellent name. This set was designed to fit in back of the instrument board of any make of car, with the exception of the Model A Ford (The instrument cluster on the Model A was at the back of the gas tank, drilling holes would have been disastrous.) The article went on to describe about the same layout as had appeared on William M. Heina's patent drawing. The batteries were under the floor; the loudspeaker horn was above the windshield, except on open cars, where it was mounted under the dash. The one addition not on the patent was the "filters" for the spark plugs.

The sets were custom installed on an assembly line at the firm's Long Island City plant or at a facility in Detroit; however, the company had plans to locate additional facilities in key cities as soon as possible. The Long Island City plant was said to be capable of building about 1000 sets per day.

It is interesting to note that the Stutz motor car people had been arranging for some of the sets to be installed as extra equipment in its 1929 line of cars. A car like the Stutz just had to have radio! Transitone prices ranged from \$150 to \$250 for the set and installation, depending upon the difficulty encountered. The Transitone was still using the old battery set tubes rather than the new screen grid type such as the UX222 which had greater performance. In April of 1929 RCA had announced a new screen grid radio tube, type UY224, which had an even higher ampli-



Transitone

AUTO RADIO

This is a six tube radio set permanently installed in any make or model automobile. Exclusive, patented features overcome all interference created by the running motor. Gives perfect, clear reception

anywhere at any speed. The set is under dashboard. The aerial is concealed in the top; whether it is up or down makes no difference. Loud speaker inconspicuously attached above windshield or under dash. There is an extra plug for an extension cord by which a loud speaker may be taken any distance from the car.

Tubes required—4-201A—1-200A—1-112A.

TUBES NOT INCLUDED

LIST

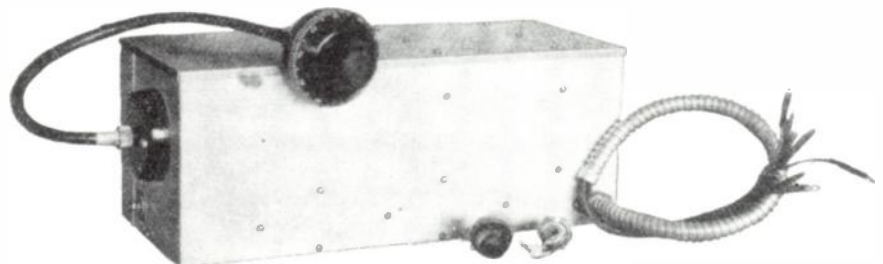
PRICE \$150.00

This advertisement from a mail order catalog shows a typical Transitone installation. It gives a good description of the set along with the tube line-up.

fication factor. This tube, designed for AC or DC use, started another revolution in the home radio market and found application for a short time in automobile radios until tubes were specifically designed for the purpose.

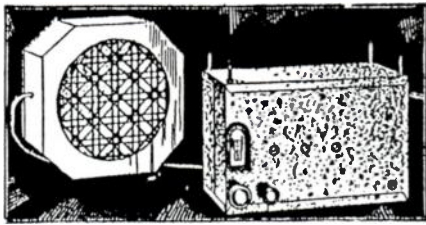
In late September the Automobile Radio Corporation made arrangements with the Dodge Brothers Distributors, Bishop, McCormick and Bishop for a 30 day demonstration at Madison Square Garden, concurrent with the New York radio show. During this period the distributor offered to install a radio free of charge to anyone purchasing a Dodge Senior Six car. The radio firm claimed at that time to have fourteen installation stations operating under franchise.

Late in 1929 other firms offered car radios. Although a specific date is not available, early in 1930 Alfred P. Sloan announced that Cadillac and LaSalle had been installing radios in their cars and that thousands had been contracted for by their deal-



Chassis view of the Delco-Remy automobile radio. Complete installation requires A and B batteries and a loudspeaker.

THE AUTO RADIO



The Silver-Marshall Auto Radio boasted three screen-grid tubes and was claimed to be the most compact and efficient receiver of its kind.

ers. He added that Cadillac Division was installing roof antennas in all of their cars. The radios were made by Delco Remy Division of General Motors Corporation and they incorporated the new screen grid tubes.

Also late in the year, was a screen grid auto radio from Silver-Marshall Inc. of Chicago. S-M was said to have been the largest manufacturer of radio assembly kits in the field and McMurdo Silver was a brilliant engineer, well respected in the industry. They had been in the business since 1924 and had recently decided to obtain a patent license from RCA for manufacturing a line of assembled sets under their own label, as well as a private label brand. Apparently included in this line was the car radio.

We now come to the bad news. On October 24th, after record highs and a series of breaks and recoveries in the stock market, the final crash came. It was financial chaos and panic. What happened to the radio business is another chapter.

1930

The decade starts with a new song, "Happy Days Are Here Again," but this fantasy belies the words. The Depression brings 6,000 apple peddlers to the streets of New York and someone comes up with the slogan, "Buy an apple a day and eat the Depression away."

Father Coughlin in his deep impassioned voice mesmerizes a nationwide radio audience with his bitter attacks on communism, internationalism and President Hoover.

People are avidly following the exploits of the gangsters: Legs Diamond, Dutch Schultz and Al Capone. But as always, many are forgetting their troubles as they see and hear the Athletics beat the St. Louis Cardinals in the World Series pennant race.

Bobby Jones gets his Grand Slam by battling his way to victory in the amateur and open golf championships in England and America. In thoroughbred horse racing, Gallant Fox with Earl Sande up captures the Triple Crown.

Ethel Merman is singing Gershwin's hit, "I've Got Rhythm," and Tin Pan Alley is offering, "The Waltz You Saved For Me" (which was to become Wayne King's theme song). Nineteen thirty marks a year of dramatic events as the cause of women's freedom advances. Job opportunities expand with more women finding their way into the radio industry.

Five

RADIO'S GOLDEN YEARS

Another decade - a new era begins. Following the stock market crash of October 1929, there was universal belt tightening; hardly anyone escaped. The effect on sales had been immediate and the automobile and radio industries did not escape the syndrome. Those firms who had built a strong marketing organization and were in a healthy financial position had a little time to do some planning. Those who were overextended and had no cash reserves were in immediate trouble as the sales volume fell dramatically.

Even for those individuals who still had jobs and had wisely avoided speculative stocks during the wild market of the late twenties, there was fear to make major purchases. Those who had the money to invest in new enterprises had lost faith in the economic system. The only solution was to try to pick up the pieces and make the best of it.

In general, automobile manufacturers sought to offer more product for less money. In such cases the fresh styling changes or dressed up carryover models, along with incentives in the forms of price, special features, and accessories were enough to entice customers to part with their money, but the competition was fierce with the small independent auto makers suffering most of all.

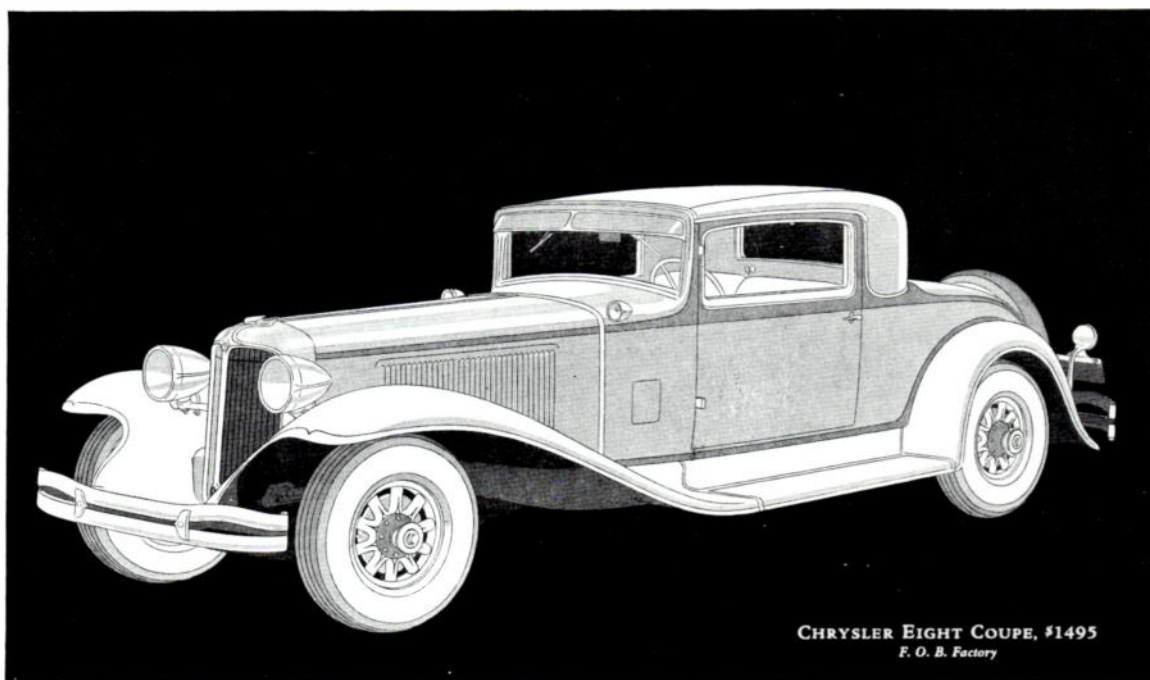
The large expensive luxury car market was one of the hardest hit. These sales had begun to slow even before the crash. The fine car makers, desperate for their share of the premium market, countered by offering more modest, semi-custom bodies, and engines with lots of cylinders. Cadillac took an early lead in the cylinder race by introducing early in 1930 its mammoth V-16 Series. Soon to follow in the multi-cylinder contest were: Packard, Pierce-Arrow, Franklin, Lincoln, and Marmon with new eights, twelves, and briefly, some sixteens.

Chrysler sought to capture some of the prestige market by introducing, in July of 1930, its totally new Imperial Eight with the daring L-29 Cord-like, V-type radiator, long hood, broad sweeping fenders and slanting split windshield. Another forward step was the news that the new Chrysler Eight and Imperial Eight closed cars were factory wired for immediate installation of Transitone, the pioneer automobile radio.

In the radio field new ideas were coming fast. Screen grid tubes, a series of 2 volt low current drain tubes for portable battery sets, and RCA's decision, in mid year, to license other radio manufacturers to use the Superheterodyne circuit, opened up a

Overleaf: The daring new Chrysler Imperial Eight. Note the reference to Transitone automobile radio.

CHRYSLER STRAIGHT EIGHTS



DARINGLY DIFFERENT IN DESIGN; TRIUMPHANT IN SMOOTH PERFORMANCE



CHRYSLER EIGHT—Standard Models—Roadster \$1495; Coupe \$1495; Sedan \$1525—Special Coupe \$1535; Special Sedan \$1565; Special Convertible Coupe \$1665; Sport Roadster (six wire wheels and trunk rack) \$1595. All prices f. o. b. factory. CHRYSLER IMPERIAL EIGHT—Five-Passenger Sedan \$2495; Close-Coupled Sedan \$2595; Seven-Passenger Sedan \$2695; Sedan-Limousine \$2895. All prices f. o. b. factory. All Imperial prices include choice of six wire or demountable wood wheels, trunk rack and bumpers.

Chrysler Eight and Chrysler Imperial Eight closed cars are factory-wired for immediate installation of Transitone, the pioneer automobile radio. Other models will be equipped on order.

EVEN CHRYSLER, with all its long record of great accomplishment, has never before been the center of such admiration as has greeted the new Chrysler Straight Eights.

The public, ever ready to reward outstanding achievement, has applauded their marvelous swiftness and smoothness of performance. It has pronounced them as refreshingly stylish as the newest mode from the Rue de la Paix.

These new Eights have an extremely low center of gravity, which not only enhances their beauty but also contributes greatly to riding steadiness and safety, making it possible

to round sharp turns safely at high speeds. And there is, further, the assured security of weatherproof internal hydraulic brakes.

The Chrysler Multi-Range 4-speed transmission gives you a quick, quiet gear shift and dual high gears—one gear for city traffic or hill climbing; the other for the open road.

Never has Chrysler leadership in style and performance been more dominant than in these new Eights . . . Eights superbly engineered and built, yet at prices that are surprisingly moderate. Your nearest Chrysler dealer is eager to have you drive them.

new market potential as older sets became obsolete. As in the automobile game, however, the market for the high ticket merchandise all but evaporated.

The large expensive ornate console radios of the late twenties didn't move, and since that is where the profit had been, something would have to take up that void. H. B. Richmond, president of the Radio Manufacturers Association, told fellow members about manufacturers' troubles in the present market and was frank in his statements about the condition of the industry. He looked forward confidently to a resumption of more prosperous operations, and said that reports received by him encouraged that expectation.

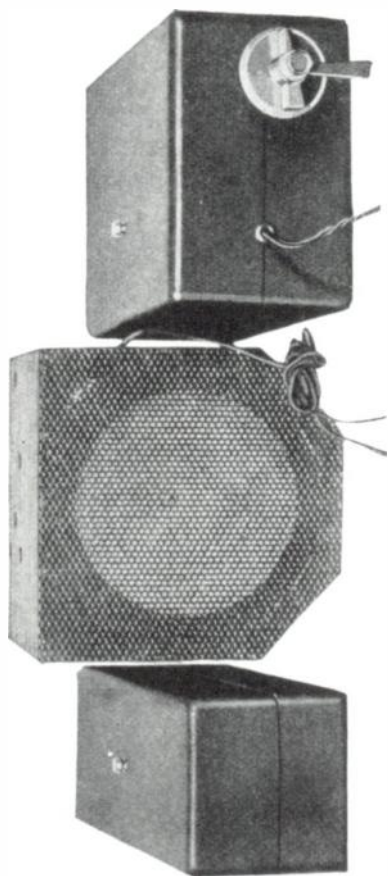
Meanwhile, Gilfillan Bros. Inc. and other West Coast radio manufacturing firms were instrumental in bringing midget radios to the market in early 1930. These so called midgets were bigger than a breadbox. Also known as mantel radios, this classification included sets later called "Cathedral Radios." This form of competition caused quite a stir with the set makers East of the Rockies, but Philco soon entered the market with a high quality, but scaled down set, which they named the "Baby Grand" and sold for under fifty dollars. Then, Philco's competitors pinned the label of price cutter on them. The sets were so successful that soon nearly everyone jumped on the bandwagon. This, however, was just one of the schemes to keep the radio plants humming.

Several radio firms had been watching the automobile radio carefully. At first, the whole idea seemed to be a little discouraging. The idea of having to tear the car half apart and spend up to twenty five percent of the price of the car for a radio installation seemed absurd, especially during a depression. Things began to change, however, and a few well placed remarks gave the whole situation a different flavor.

The National Federation of Radio Associations met in Cleveland and heard president, Michael Ert, of Milwaukee, extol the sales possibilities of radio receivers for automobile installation. "Receivers will become stock equipment in automobiles," he predicted, "and in the same way that bumpers and headlights are now." He had supervised the installation of radios in numerous cars and in every instance the result was highly successful. This freedom from trouble, he explained, refuted assertions some had made that ignition and road noises would hamper the progress of radio installations in automobiles.

"Radios make the long summer trips all the more enjoyable," Ert said, "by providing excellent entertainment." "It has been proven that no risk whatsoever attaches to the installation of a radio in an automobile; this fact was well recognized by automobile

The major components of the second generation of transitone units from top to bottom: Radio-frequency tuner, loud speaker, and audio-frequency amplifier.



Opposite: A study of this full page advertisement which appeared in one of the nation's leading weekly publications reveals considerable information.

manufacturers who decided to bring out radio equipped models."

In this same vein, the Radio Manufacturers Association argued successfully against opposition to the installation of radio sets in automobiles by some municipalities. The RMA claimed that the tuning of the radio in the automobile by the driver while that vehicle was in motion was no more distracting than turning on the windshield wiper. Under these favorable indicators, industry moved ahead.

In the following discussion of automobile radio manufacturers and their products, one thing is immediately obvious. There was a great deal of imagination and innovative thinking involved in these products - perhaps more than in any other time in the history of the car radio. Few of these pioneers were mere "copycats." So far as is known, however, all of the commercially manufactured motor car radios at this time, required "B" batteries in addition to the automobile storage battery requirement for the "A" supply (tube filaments and heaters). "B" batteries were generally housed in waterproof metal containers which were installed flush with the floor of the car.

Automobile Radio Corporation was on the move. They restyled their late 1920s era set to incorporate a single tuning dial, (their early two dial system could have been considered a distraction for the driver) and an easier mounting behind the instrument panel. It was no longer necessary to remove and relocate the instrument cluster. A separate amplifier box could be mounted up out of the way over the steering column. A cone speaker replaced the horn type. What wasn't changed was the basic circuit. It still used the old 201A triode tubes instead of the new screen grid tetrodes. The firm had realized some success as a pioneer in the field but they needed a greater distribution network.

William Balderston (later to become president of Philco) had left a position with the French Battery Co. (makers of Ray-O-Vac) to join Automobile Radio Corporation. He soon was appointed to manage a distribution and installation center near Chicago. As it turned out, 1930 was a busy year for the organization. Early in the year they made arrangements with the national network of Willard Battery Service Stations to install and service Transitone (ARC's product trademark) auto radios.

In June, arrangements were made with Philco to handle the national sales. One of ARC's greatest achievements was to place a full page advertisement in the Saturday Evening Post and list the names of the cars that were wired to Transitone specifications. They managed to list some prestigious marques. It gave notice to the world that they meant business.

Transitone

THE PIONEER AUTOMOBILE RADIO

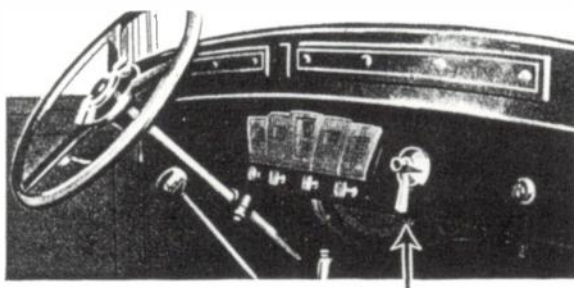
51,000

places to find out about automobile radio

~~PHILCO~~ Radio Dealers —Automobile Dealers and Transitone Service Stations

The newest thrill of this thrilling age is a radio set installed in your automobile—and the radio set for automobiles is Transitone. It is recognized by motor car manufacturers and public alike as the greatest contribution to motoring pleasure in recent years. **Q**, Transitone is the leader with a five-year start over all late-comers. **Q**, You can tell how good it is by the fact that ten leading motor car manufacturers have already wired their cars to Transitone specifications. **Q**, You can tell how good it is by the character and tremendous scope of its representation in the field. **Q**, No radio product ever before had such resources and facilities as a part of its distribution plan: Philco, one of the greatest names in home radio—

ten leading motor car manufacturers' dealer organizations—and a nationwide network of Transitone Service Stations. **Q**, Transitone is built by Philco. 13,000 Philco radio dealers are authorized to sell it. There's a Philco dealer right near you, ready to tell you all about it. **Q**, 33,000 retail automobile dealers also sell Transitone. **Q**, 5,000 Transitone Service Stations are likewise authorized to sell, install and service Transitone—and there's a Transitone Station just around the corner. **Q**, Here is the automobile radio set that has the backing, the background and the greatest of all service facilities—a set that gives you radio in your car on a par with the best radio reception to be had in the home. **Q**, Find out about it. Learn the thrill of having music with your mileage—the charm of riding to entertainment—getting everything that's going on—missing nothing. **Q**, Transitone is quickly installed under the car's dash—a natural part of the car, entirely out of the way and out of sight. Just a single control dial on the instrument panel—one touch there and you are in touch with all the magic of the air. Ask the nearest Philco or Transitone man about prices and our easy payment plan.



Note simplicity and refinement of beautiful chromium plated single dial control, performing all functions.



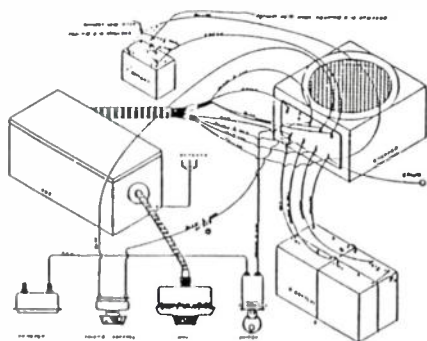
WIRED TO
TRANSITONE
SPECIFICATIONS
CHRYSLER
DE SOTO
DODGE
FRANKLIN
HUPMOBILE
JORDAN
PACKARD
PEERLESS
PIERCE-ARROW
STUDEBAKER

AUTOMOBILE RADIO CORPORATION
Executive Offices, Chrysler Building, New York City

YOU'RE NEVER ALONE WITH A TRANSITONE

THE AUTO RADIO

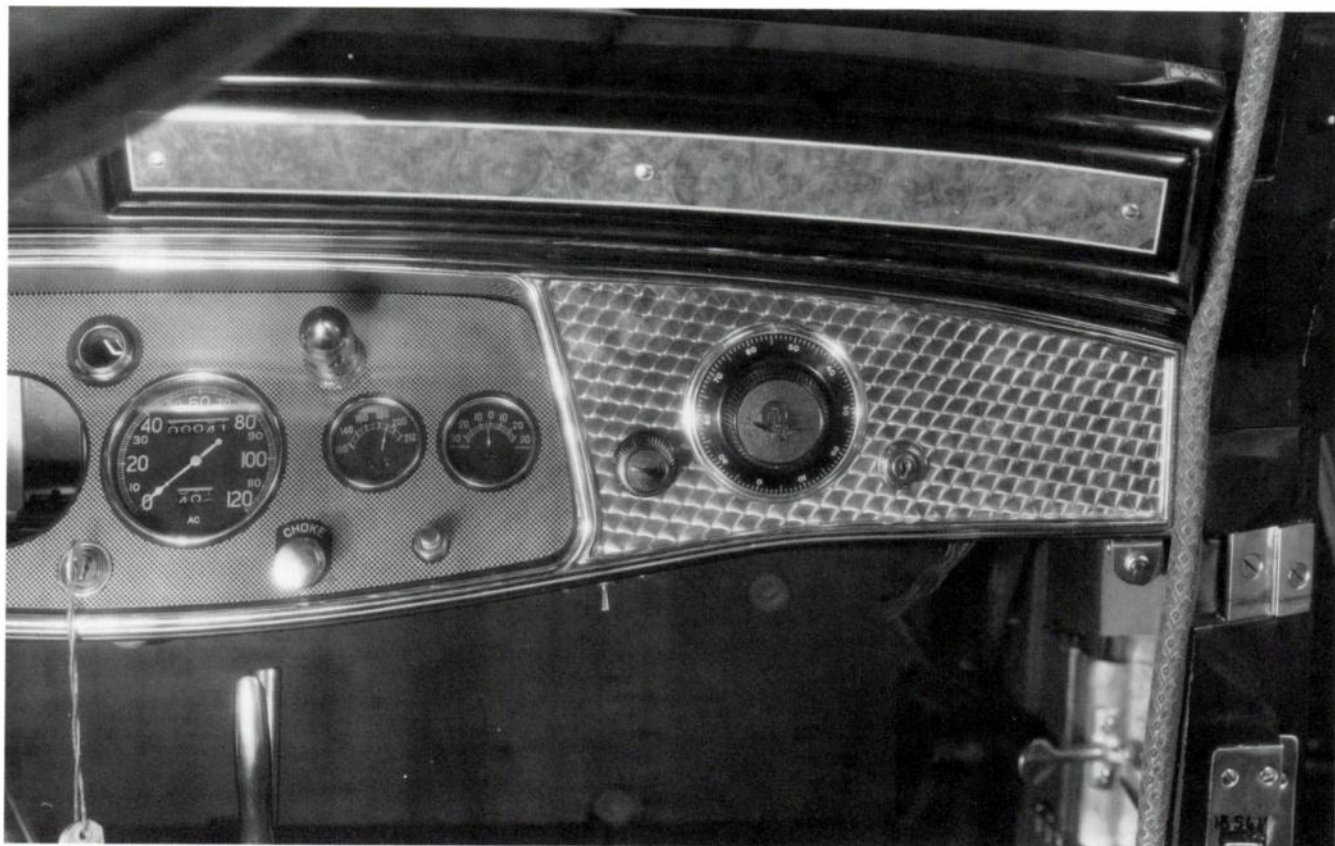
A diagrammatic view of the Delco-Remy/General Motors Radio Corporation model 3002 system.



The model 3002 components as installed in a 1930 Cadillac V-16.

Then on November 15th, Transitone Radio Corporation was chartered in the state of Delaware. Transitone immediately became a part of Philco Radio & Television Corporation. William Balderston, A.A. Leonard, and Ray Gratzner went with the new firm which proved to be a successful venture; although they were not without competition.

The production of the receiving set for automobiles introduced late in 1929 by Delco Remy and first used on the Cadillac and LaSalle cars, was moved to the newly formed General Motors Radio Corporation in Dayton, Ohio. Roger Emmert of Delco Remy Division was selected as General Manager. The entire manufacturing and engineering work was transferred from Anderson, Indiana, along with Dean Perkins, the young engineer who had designed the radio. The unit was a bulky affair measuring approximately 7in. x 7in. x 15in. The unique feature was the use of three variometers instead of variable condensers which by then had become standard practice. The shafts were ganged together and extended to the front of the box for access in tuning. It was a rather awkward affair to install but it worked. Sales of the auto radios became the responsibility of Ray Ellis. Apparently the group introduced one new model and built a few thousand before closing the doors early in 1932.



After this development, Mr. Ellis put together a group to function as liaison engineers and specifiers with outside vendors that would serve General Motors Car Divisions through United Motors Service. In this group were Charles Greene, Sam W. Archer, Art N. Jonsson and Andy Tynan, an experienced engineer, who came in from Pilot Radio & Tube Corporation.

Among the firms making their debut in the manufacturing of automobile radios this year were: Automatic Radio Manufacturing Company, United American Bosch Corporation, Carteret Radio Laboratories, Inc., Crosley Radio Corporation, Charles Hoodwin Co., Galvin Mfg. Corporation (Motorola), National Company, Pilot Radio & Tube Corporation, Sparks-Withington Company and United States Radio & Television Corporation.

After two years of refinement, Automatic Radio Manufacturing Company Boston, Massachusetts, announced two models for 1930. Both were six tube tuned radio frequency circuits, incorporating three screen grid tubes. The Junior Model with self-contained controls was priced at \$49.50 less accessories, and the Senior

AUTOMatic
MOTOR CAR
RADIO
(Junior Model)
features

**THREE TUNED CIR-
CUITS**
2 SCREEN GRID
POWER DETECTOR
THREE AUDIO
SIX TUBES

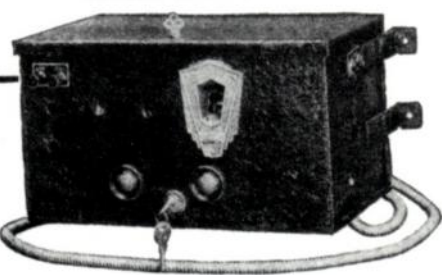
List price
\$49.50
less accessories

*Amazingly
clear recep-
tion under
extreme con-
ditions.*

**This is the Set
That's Going to Get
the Motor Radio Business**

There's no question now about motor radio coming. The question is what set to sell. Here's the cheapest and the best little performer now made. Get the dope on it today and you'll get the jump on competition.

JUNIOR MODEL



WRITE OR WIRE FOR COMPLETE DETAILS

AUTOMATIC RADIO MANUFACTURING COMPANY
112-118 Canal Street, Department R, Boston, Mass.

**SENIOR
MODEL**

complete with all necessary equipment—Speaker—Battery Box—Spark Plug and Distributor Suppressors—Antenna—Remote control for operation from instrument panel.

\$95
less tubes and batteries

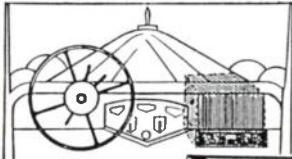
This advertisement which appeared in Radio News for September 1930, proved that the car radio need not be prohibitively expensive.

THE AUTO RADIO

Carteret offered an easy-to-install auto unit for the radio enthusiast and a business opportunity for dealers and servicemen.



CARTERET MOTORADIO

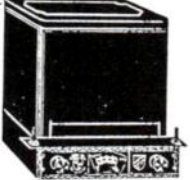


The Most Practical of All Auto Radios

Because It's COMPACT
 Radio set is only approximately 6" cube and fits snugly behind the dashboard. No separate tuner or flexible shafts. Direct tuning control.

Easy to Install
 No cutting or marking of dashboard. Anyone can install. Suspended by springs. Shockproof. Battery box and speaker can be placed in any convenient place.

EFFICIENT
 Two 224 screen grid and two power tubes give clear rich tone and plenty of volume. Needs only small aerial. Direct tuning control with clear vision illuminated dial.



\$67.50

This five-tube Carteret Motoradio uses two screen grid tubes 12V224, detector tube 12V227, amplifying tube 12V112A, power tube 12V112A, and operates power speaker. List price, less accessories and freight.

Descriptive Folder mailed on request

Dealers and Service men: Write for wholesale trade discount

Radio Bargain News

Dealers and Service Men \$100,000 WORTH OF RADIO

REPLACEMENTS SUCH AS REPLACEMENT CONDENSER BLOCKS, TRANSFORMERS, SETS, SPEAKERS, AND TUBES SOLD AT 75% OFF THE LIST PRICE.

SEND FOR FREE COPY OF THIS BIG CATALOG JUST ISSUED

SERVICE MEN now is the time to BUY PARTS

Here Are a Few Typical Values

RCA No. 1120 Power Transformer for No. 11, 12, 13 and 14 sets	\$3.95
RCA No. 1121 Filter Condenser Block for same sets	1.50
RCA No. 1122 Double Filter Choke for same sets	1.70
RCA No. 1123 Filter Condenser Block for Radiola 17	2.00
RCA No. 1124 Filter Condenser Block for Radiola 18	2.00
RCA No. 1125 Power Transformer for Radiola 11	4.00
RCA No. 1126 Audio Transformer for Radiola 11	.50

We are Headquarters for RCA, Zenith, Edison, Victor, Philco and Kolster Replacement Parts

Federated Purchaser 29 HUDSON STREET, NEW YORK CITY

The Bosch radio, ready for installation.

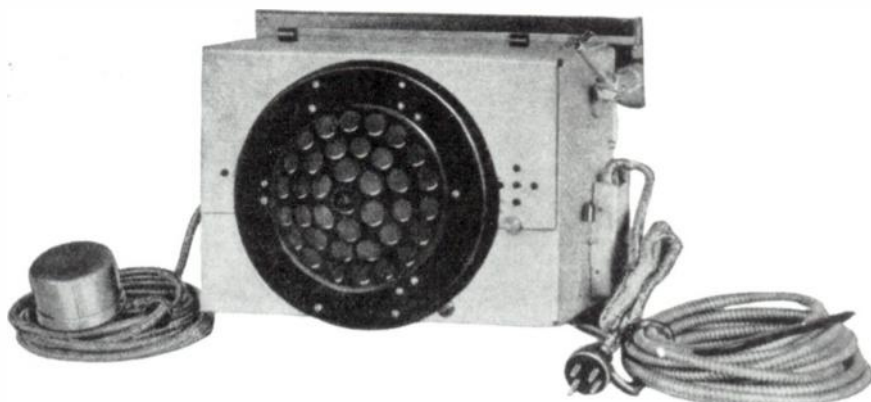
Opposite: The earliest known full page advertisement for an automobile radio to appear in Saturday Evening Post.

Model complete with speaker, remote controls and all necessary equipment for installation could be purchased for \$95.00. Charles R. Wexler, the firm's Chief Engineer, authored an article for the September issue of Radio News entitled "Practical Problems of Auto-Radio Systems."

Another leading corporation, United American Bosch Corporation (American Bosch Magneto Corporation) of Springfield, Massachusetts developed a production receiver based on earlier laboratory tests and a working model submitted to them by Radio Frequency Laboratories, Inc. This receiver reflected a high degree of engineering when considering the state of art at the time. It was a five tube set incorporating three type 224 screen grid tubes, radio frequency amplifier stages, a type 224 screen grid detector and a type 112 audio amplifier. This set featured an armature type magnetic free-edge cone speaker which was mounted on the front of the case or could be removed to an alternative location within the car. The speaker cone was treated with waterproofing to resist exposure to moisture.

The Bosch receiver was designed to be used with a capacitor plate "sub - car" antenna instead of the usual roof antenna. This was a metal plate measuring 8in. x 30in. mounted on insulated brackets suspended below the frame. The manufacturer claimed several advantages for this type of antenna. First, it eliminated the need to remove the headlining of the car to install the customary roof antenna. Also, the metal plate was said to be below the strongest field of the ignition interference. Lastly, it solved the problem of where to mount an antenna on open cars. It seems as though Bosch had done their homework. This set was the subject of an article which appeared in Radio Broadcast for April 1930 written by radio consultant, Robert S. Kruse.

Carteret Radio Laboratories, Inc. of New York City, appear to have been new on the radio scene in 1930. Among their products was an uniquely designed auto radio, called the "Motoradio." The exterior



Now! Crosley puts Radio on Wheels

See It ▲▲▲▲
Hear It ▲▲▲▲
Drive with It!

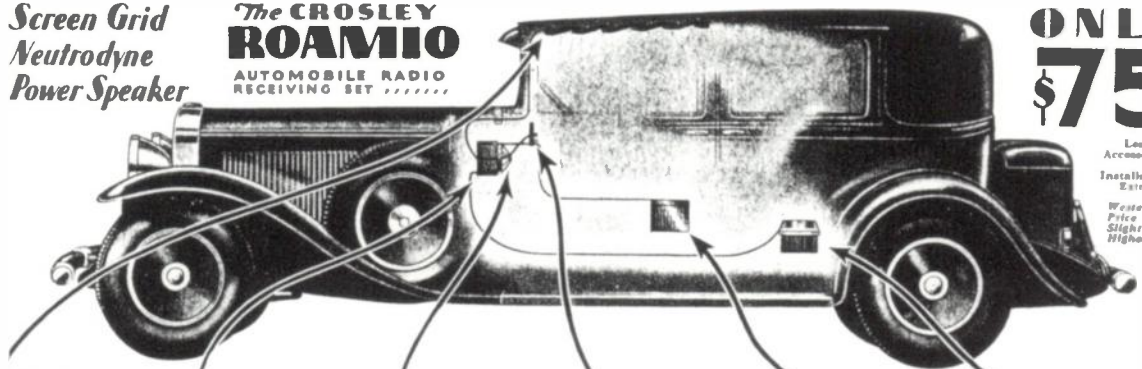
An Amazing Automobile Radio Receiving Set ▲▲▲▲ at a price that everyone can afford!

Screen Grid
Neutrodyne
Power Speaker

The CROSLY
ROAMIO
AUTOMOBILE RADIO
RECEIVING SET

**ONLY
\$75**

Less
Accessories
Installation
Extra
Western
Price
Slightly
Higher

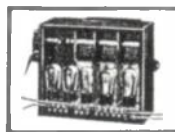


The ANTENNA



"Was surprised at how quickly and easily the ROAMIO was installed in my car."

The RECEIVER



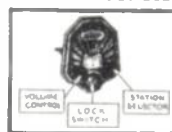
"Driving through town could easily tune out powerful local stations and get DX."

The SPEAKER



"First evening we received 30 stations with good volume, selectivity and tone."

The CONTROL PANEL



"There is no noticeable variation in signal strength in any part of the city."

CAR STORAGE (A) BATTERY



"The ROAMIO performs as well at higher speeds as when the car is driven slowly."

"B" "C" and "D" BATTERIES



"It works perfectly gives exceptional volume with wonderful tone quality."

Take your favorite radio entertainment with you wherever and whenever you drive with a ROAMIO

Think of the untold hours of pleasure, diversion, entertainment and amusement you derive from a radio receiving set in your home. Imagine how lost you would feel without it! Every time you fail to hear one of your favorite radio features you feel a sense of personal disappointment. Oftentimes this is due to some necessary trip in your automobile which keeps you away from home at a particular hour.

Now radio has been put on wheels—you can take your favorite radio entertainment with you wherever and whenever you drive your car. No longer need you remain at home to hear a particular program if your car is equipped with a CROSLY ROAMIO Automobile Radio receiving set, as are thousands of cars in daily use everywhere. Men who drive to their homes after a busy day in office, factory or store find diversion and relief from business cares and arrive home in a pleasant and happy frame of mind. Women who drive children to and from school find amusement and entertainment for themselves and children. Salesmen who travel by

automobile find a friendly relief from the monotony of driving. No matter where you are—driving in the city, touring in the country, parked awaiting family or friends—the CROSLY ROAMIO will bring you your choice of radio broadcasts exactly the same as would the receiving set in your home were you comfortably seated at your fireside.

The CROSLY ROAMIO is extremely selective and sensitive and has extraordinary distance getting ability. The automatic volume control maintains a practically uniform volume even on distant stations. It also maintains the volume in shielded areas, and eliminates the necessity of constantly changing the volume. The special lock in the control panel makes it impossible to operate the set when it has been locked by the owner. Uses five tubes, two of which are Screen Grid.

The CROSLY ROAMIO is easily and quickly installed in practically any automobile. It fits snugly and conveniently

under the dash, entirely out of the way yet in a position to render full volume for the entertainment of all in the car. The control panel is attached to the dash, handy to the fingertips. The set is moisture and dust proof. It is enclosed in a metal case, one side of which is conveniently removable when necessary. The installation of a CROSLY ROAMIO in your car can be made quickly and conveniently, whether or not the car has an in-built antenna. The cost is little. The entertainment and delight it provides for your family and friends are great.

Go to the nearest Crosley dealer today—see the ROAMIO! hear it—drive with it.

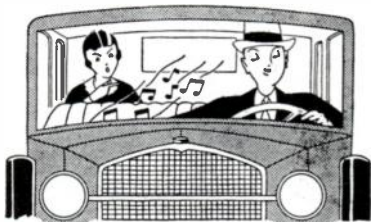
The Crosley Radio Corporation

Powell Crosley, Jr., President
CINCINNATI, OHIO

Home of WLW—"The Nation's Station"

The CROSLY ROAMIO is recommended for use in motor boats and cruisers.

YOU'RE THERE WITH A CROSLY
CROSLY RADIO



When back seat driving interferes—start the Crosley ROAMIO

"Look out!" "Be careful!" "Ooh! We're coming to a hill!" No longer need you grit your teeth and suffer such well-meant but irritating exclamations. Instead—just turn on your CROSELY ROAMIO Automobile Radio Receiving Set. All fear and irritability are forgotten as you spin along the smooth road enjoying concerts, symphonies, the latest dance hits, or the wit of world-famous humorists.

The CROSELY ROAMIO is extremely selective and sensitive. You'll easily get your favorite programs. The automatic volume control maintains a practically uniform volume, even on distant stations. You lock the CROSELY ROAMIO just as you do your automobile. It uses Screen Grid tubes, Neutrodyne circuit, and employs the latest type Crosley dynamic-power speaker. Thousands are now in use.

The CROSELY ROAMIO can quickly and easily be installed in your car no matter what its make. It fits snugly and conveniently under the dash, entirely out of the way. It will give you hours of satisfying pleasure and delightful relaxation. Consider too, that the price of this marvelous set is amazingly low—only \$75.00, less accessories—installation extra. Go to your nearest Crosley dealer today—see the CROSELY ROAMIO—hear it—drive with it. Or write for circular and name of nearest Crosley distributor who will arrange for installation. The CROSELY ROAMIO is recommended for use in motor boats and cruisers.

The CROSELY RADIO CORPORATION
1310-B Arlington St. CINCINNATI
Home of "the Nation's Station"—WLW

Also manufacturers of Crosley A. C., D. C. and Battery Radio Receivers and the famous AMRAD RADIO



Saturday Evening Post advertisement from the September 27, 1930 issue, illustrates how to "drown out" the backseat driver.

metal box was first designed with the physical limitations of the motor car in mind. The receiver was then designed to fit the box. The result was one of the earliest under-dash radios. The circuit consisted of the typical two stage screen-grid, tuned radio frequency amplifier, a detector and a two stage audio frequency amplifier. The system incorporated a metal plate antenna which mounted underneath one of the running boards. This must have been one of the easiest of installations.

The Crosley Radio Corporation, Powel Crosley Jr. President, ran an advertisement in Saturday Evening Post, showing a cut-away of a modern automobile, which illustrated the complexities of a car radio installation. This was typical, but Crosley dared to show it. On the plus side, everything was neat and out of the way of the occupant's feet. The five tube receiver was the first of a long line of Crosley Roamios. The screen grid neutrodyne circuit featured automatic volume control which is particularly desirable in a radio receiver that is traveling. The remote control panel boasted a key lock switch to prevent unauthorized use.

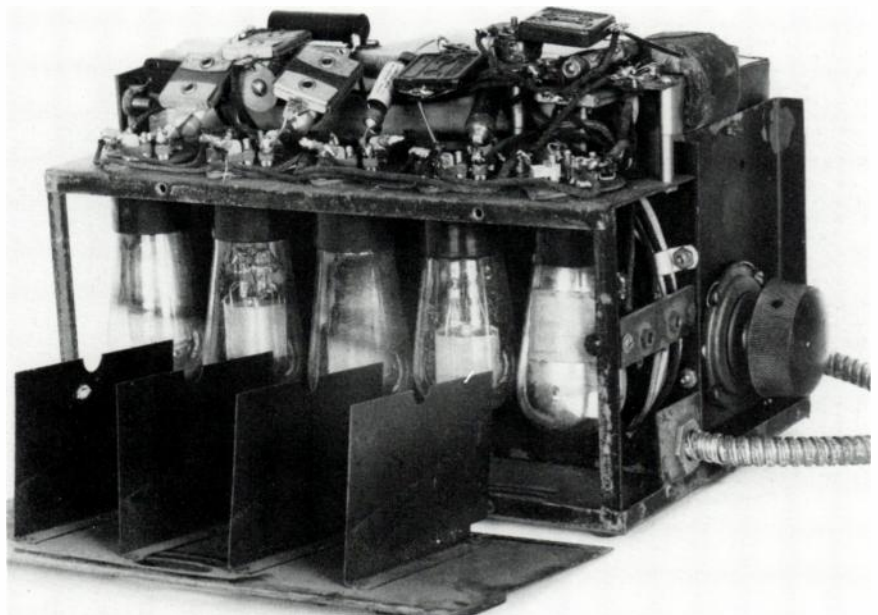
Chas. Hoodwin Co., of 4240 Lincoln Avenue, Chicago, Illinois, put together radio sets and parts kits for a few years and advertised through radio trade publications. The firm had enough of a following to at least gain the notice of the major radio service manual publishers. This, in itself, was a quite an achievement in those days, and carried some acclaim even though it was not an automatic sign of success. For 1930 Chas. Hoodwin Co. marketed a six tube, tuned radio frequency set boasting six screen grid tubes and three triodes with a magnetic speaker.

National Company Inc. of Malden, Massachusetts, a firm well known for high quality amateur and professional short-wave radio equipment, took a flyer at the automobile radio business. This was a compact unit which could be mounted under the dash in a manner enabling it to be tuned by either the driver or passenger as the controls and key switch were mounted directly on the front of the case. The five tube circuit incorporated three screen-grid radio frequency amplifiers, a screen-grid detector and one stage of audio output. This set was available in kit form or ready wired; however, it was on the market for only a short time and did not enjoy wide distribution.

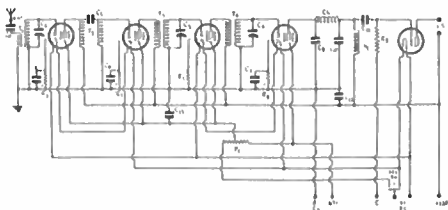
One of the most unusual radio receivers was made by a firm well known to old time radio buffs as the makers of the famous "Super Wasp" short wave set. This was none other than Pilot Radio & Tube Corp. of Lawrence, Massachusetts. Their new automotive product was called "Auto-Pilot." This firm certainly had a way with names! The people at Pilot believed that automobile receivers should be used only when the car was parked. They felt that the set should not be



Two views of the National type
ARR, six volt auto receiver.



Below: Schematic Circuit dia-
gram for the National.





Running board mounting of the "Auto-Pilot" made it convenient for outings.

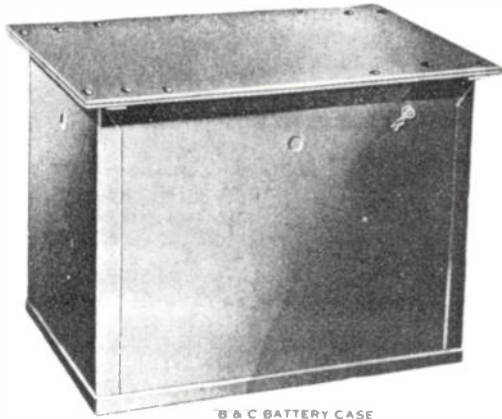
turned on to distract the operator of the vehicle. The set, which was available only in kit form, was designed for mounting on the running board with the controls secured to the car's instrument panel. This arrangement was said to offer the least inconvenience to the car's occupants.

The "Auto-Pilot" case looked a good deal like a tool box which was often mounted on the running boards in those days. Inside, the six tube radio chassis was of a simple, yet highly sensitive circuit, consisting of three screen-grid stages of tuned radio frequency amplification, a screen-grid detector and two stages of audio frequency amplification. The control assembly connected to the main case by means of a thick flexible cable. Inside of this cable, along with the necessary wiring, were two flexible metal tubes which carried lengths of brass bead chain which transmitted motion of the tuning dial to the variable condenser tuning shaft.

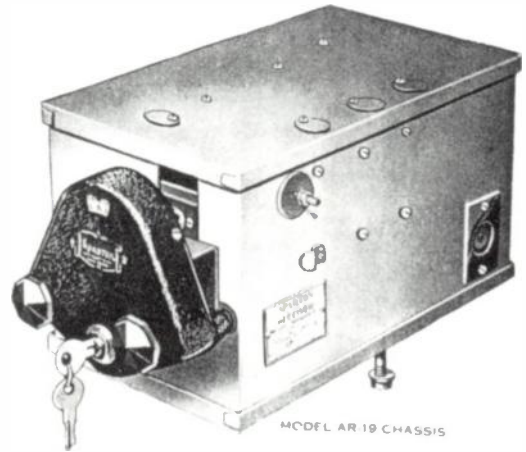
A special cone type magnetic speaker only 8-7/8 inches in diameter was supplied as a separate accessory. Furnished with the kit, however, were wire and insulators for an under-car aerial. The wire was simply strung from the insulators between the front and rear axles of the car. This avoided removing the upholstery and tacking copper screens in the top in the event the car was not already fitted with an antenna. Here again, was an auto radio that was not to gain wide usage.

Another pioneer automobile radio manufacturer was the Sparks-Withington Company of Jackson, Michigan. Founded at the turn of the century, the company became a major manufacturer of automobile parts and accessories. Under the leadership of the indomitable industrialist, philanthropist and civic leader, Captain William Sparks, the company furnished Sparton signal equipment, primarily horns, for such motor car manufacturers as Packard, Pierce-Arrow and Ford. In 1925, the company entered the radio business and eventually took over most of the buildings formerly occupied by both the Briscoe Motor Corporation and the Jackson Automobile Company. Sparton always enjoyed the reputation of making quality products. Because of their involvement with both the automotive and radio trade, it was only natural that Sparton should pursue the car radio field.

The Sparton Models AR-19 and AR-50 were designed for passenger cars and police cruisers, respectively. The AR-19 was a five tube, featuring four type 224 screen-grid tubes (three radio frequency amplifier stages and a detector) plus a type 112-A audio amplifier. The police radio was similar except for the fact that the tuning was pre-set to one frequency and the detector was a type 427 tube. The AR-19 was mounted on the fire wall in its carrier bracket in



B & C BATTERY CASE



MODEL AR 19 CHASSIS



MOUNTING BRACKET



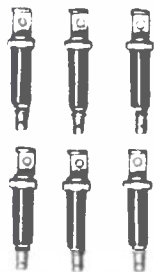
IGNITION COIL
BY PASS CONDENSER



GENERATOR CUTOUT
BY PASS CONDENSER



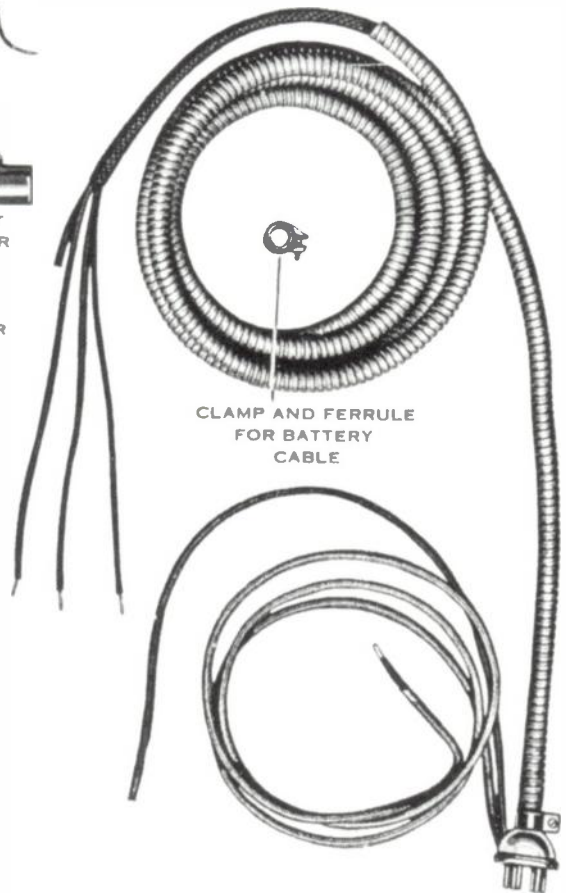
DISTRIBUTOR INTER-
FERENCE SUPPRESSOR



SPARK PLUG INTER-
FERENCE SUPPRESSOR



AERIAL LEAD-IN WIRE



CLAMP AND FERRULE
FOR BATTERY
CABLE



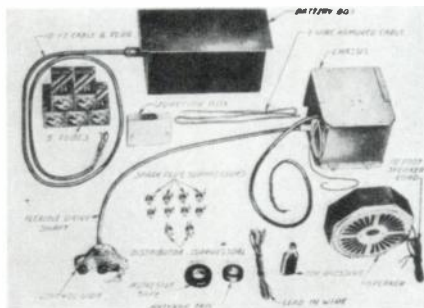
SPEAKER

'B' AND 'C' BATTERY CABLE

—SPARTON Model A. R. 19 Automobile Radio Receiving Set Equipment.

such a way as to allow the tuning head to be in front of the dashboard, making a neat appearance. The speaker was likewise mounted on the fire wall on the opposite side of the car. The company recommended using a screen or wire-mesh roof antenna whenever possible.

"Back Home Again in Indiana," United States Radio & Television Corporation of 3301 S. Adams, in Marion, Indiana, decided to throw their hat in the ring with an auto radio and installation kit complete with adhesive tape and top dressing. (see illustration) The radio chassis was a fully shielded five tube circuit with three tuned radio frequency stages and two stages of audio amplification. The attractive remote control unit with flexible cable drive was intended for mounting on the instrument panel. The installation kit included an electro-magnetic cone speaker in a trim octagonal metal and wood case that could be mounted in a variety of locations within the car, a "B" battery box, junction box, antenna lead-in wire, spark plug and distributor suppressors and a set of five tubes.



Complete installation kit from United States Radio & Television Corporation.

It is interesting to trace the heritage of the company. It began as Indiana Manufacturing & Electric Company of 510 Case Block, Marion, Indiana. In 1925, the firm began manufacturing Case radio apparatus under the leadership of Arthur Case. Later, the name was changed to Case Electric Corporation. They built radios until 1927 when they became United States Radio & Television Corporation. This is not the end of the story as we shall learn later.

One might wonder why the above mentioned firm would incorporate the term television into its name before television, as we now know it, became a viable product. Shortly after radio broadcasting began, pioneers like Baird, Jenkins and RCA's Alexanderson began experimenting with television broadcasting using the Nipkow mechanical scanning disk system. As the system became more perfected and it looked as though it might sell in spite of its shortcomings, many firms jumped onto the bandwagon with the name association. In 1939 when the present electronic scanning system began in earnest, some found that there was more to producing television sets than having the name on the door. World War II, however, cut everyone's hopes short.

We now come to one of the most colorful stories of all. We pick up the scenario of Paul V. Galvin and his manufacturing company, smarting over the immediate loss of business due to the stock market crash in 1929. What does one do with a plant full of radio parts inventory, a pile of accounts payable and a dearth of orders?

As the narrative goes, Galvin was on a business trip to the East Coast when he learned that a Long Island firm was building radios and installing them in

cars on a more or less custom basis. He was no doubt describing Automobile Radio Corporation. (This may have been a fair assessment since in spite of the advertising and publicity given to that firm we have no record of the number of sets that were actually produced and sold.) Galvin's group was oriented to volume production of radio sets. On the trip back, Galvin was toying with the idea of applying his technique to automobile radios.

One of the tenants in the building at 847 Harrison Street in which Galvin rented space, was a young self-styled engineer named William Powell Lear. He operated the Radio Coil & Wire Company. His specialty was the spinning of Litz wire, a fine multi-stranded wire used in radio coils. Lear often designed coils and even radio sets for potential customers just so that he could get the wire business.

A few years prior to 1930, Lear and his good friend from Quincy, Illinois, Elmer Wavering, had experimented with installing radios in cars. They had used the Atwater Kent Model 35 as the receiver since it was mounted in a metal box (it looked like a large upside down loaf pan) making it an ideal candidate for a motor car radio. They had experimented with ignition noise suppression using fixed resistors of different values. The problem seemed to be reduced to the fact that if the resistance was increased to the value required to adequately dampen the spark plug noise, the engine would not perform to accepted standards.

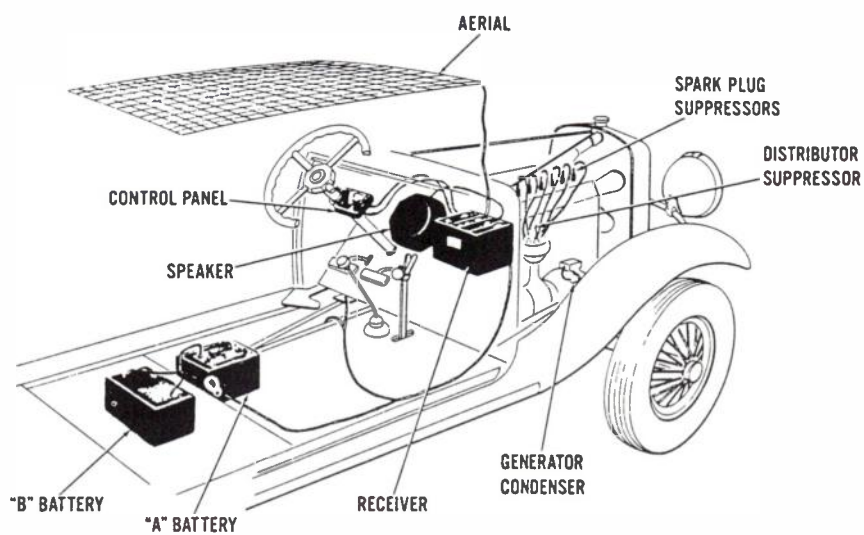
Galvin and Lear got on the subject of the car radio and Galvin hired Bill Lear and Elmer Wavering to perfect a prototype for him. They assisted in the installation of it in Galvin's Studebaker in time for him to drive with his wife and son to the Radio Manufacturers' Association fourth annual convention and trade show, June 2nd through the 6th in Atlantic City, New Jersey. The show was held in the new, mammoth \$15,000,000 civic auditorium on the boardwalk. It was at this same time and place incidentally, that the Grigsby-Grunow Company, soon to be a manufacturer of car radios, put on the long remembered extravaganza to promote their Majestic radios. Galvin, however, had no booth, no appointments and no convention space allotted to him for demonstration purposes, so he parked his car nearby and caught prospective dealers as they entered and exited the building, in hopes of giving rolling demonstrations of his new product.

Galvin came home with a few orders, enough to be encouraged, considering the relative novelty of the motor car radio. The hard work had just begun but Motorola was born. Fortunately, Galvin and his small staff had gained experience in planning and scheduling for the production of new radio products. The firm built and sold nearly a thousand sets in the second

THE AUTO RADIO



A replica of the first Motorola.



A typical 1930 installation in a closed sedan.

half of 1930. Elmer Wavering was kept busy on the road, visiting the dealers and instructing them on installation and servicing.

The total number of motor car radios produced for the year was 34,000 units. This was not high enough volume to save the industry single-handedly, but it was just the beginning.

In addition to the firms described above, there were throughout the year, references to various firms being involved with the car radio, for which no further information is available. These are names like Hyatt Electric Corp., Roth-Downs Manufacturing Co., Scott Transformer Co. (Makers of the famous Scott Radios), and Fred W. Stein Co.. There were also trade names advertised in supply catalogs. Many of these sets were made under private label by either one or more of the manufacturers already discussed or by job shops unknown. Some firm names appeared briefly, never to surface again.

There were also many sets made by both amateur and professional assemblers for hobby and profit. Some of these were the subject of feature articles in trade publications. There was the case of the "Voice of the Road," an assembly kit designed by the Wireless Egert Engineering, Inc., for the Continental Wireless Supply Corp. The six tube auto radio kit for builders was described in detail by Citizens Radio Call Book and Technical Review in their March 1930 issue. Other radio publications such as Radio News, Radio Craft, Radio Broadcast and Radio World featured articles on the design and construction of automobile receivers. It is quite likely that some of the receivers discussed in these publications became the basis for new entries in the field for 1931.



The "Voice of the Road" receiver installed on the firewall of an automobile. The instrument panel controls operate the set by means of the shielded cable.

1931

Rudy Vallee in George White's Scandals is crooning "Life Is Just a Bowl of Cherries"; let's not get serious. But it's still the Depression and vast numbers of Americans are spending less money by enjoying home recreation activities. By 1931, over 12 million radio sets are owned; jigsaw puzzles and bridge are the rage.

Eastern Air Transport initiates flying hostesses on their large planes between New York and Washington.

Fashion advertisements promote more alluring, feminine clothes, and long skirts and white gloves are "in."

With his family at his bedside, Thomas Alva Edison, the world's great inventor, passes quietly away.

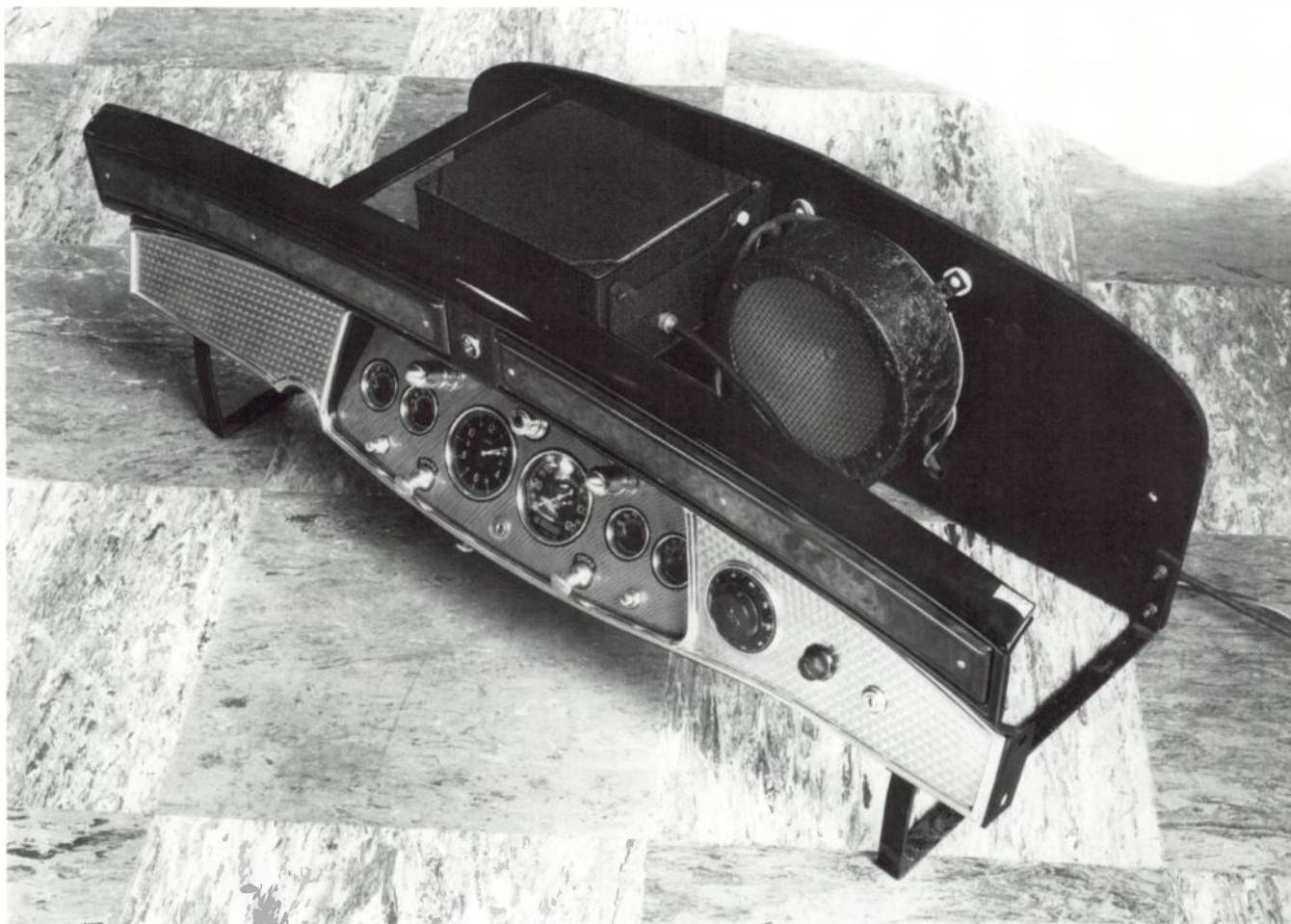
Some carefree Ivy League students are dancing to Glen Gray and his Casa Loma Band's rendition of, "In the Still of the Night," and we hear the sentimental strains of "As Time Goes By."

RADIO'S GOLDEN YEARS

Nineteen hundred thirty one was an unusual year for both the automobile and the radio industries. The first half of the year was a continuation of 1930 with some face lifting and refinements of product. In the automobile styling and mechanical features race, several makers introduced new models in mid-year. Among these firms were Nash, Packard and Reo. They were adopting the new front-end treatment and featuring improved transmissions and a smoother, quieter ride. To match its luxurious coachcraft, the Cadillac Radio was unusually appropriate auxiliary equipment.

The big news for the radio world was the announcement of the plans for "Radio City." It was reported that the quarter-billion dollar home of broadcasting and entertainment would cover three square blocks in the heart of New York City. The gigantic undertaking was sponsored by NBC, RCA, R-K-O, RCA

Factory photograph of Cadillac instrument panel and bulkhead mock-up showing a redesigned radio for 1931.



Saturday Evening Post advertisement for October 17, 1931. The market for auto radio batteries looked promising but their days were numbered.

Put BURGESS Black & White Striped BATTERIES



in Your Auto Radio

WHAT is it that you want most in an automobile radio battery? You want a battery that will withstand constant vibration. The resistance of Burgess Batteries to vibration has been responsible for their adoption by practically every police force in America, which is using auto radio.

Will it resist moisture? All Burgess Batteries are permeated with paraffin... which enables them to keep out moisture for their period of usefulness.

Will it withstand heat and cold... extremes in temperature? Burgess Batteries have proved their ability to deliver dependable service in every climatic condition on earth. They have been used at the North Pole and at the South Pole—over the Atlantic and across the Pacific—in the tropics and in the jungles—in airplanes and in submarines—in steamship service and in police car service.

Is it low price that you want? Burgess Batteries have always been conceded... by those who measured service against price... to be a bargain at any price. They are an amazing bargain at the new reduced prices!

If automobile radio batteries could be candied, like eggs, you'd insist upon getting Burgess. Make no mistake about that! Demand Burgess Batteries and insist upon getting them. You'll recognize them by their black and white stripes.



BURGESS BATTERY COMPANY

Engineers and Manufacturers of Electric and Acoustic Products

General Sales Office: CHICAGO

New York Boston Chicago
Albany Kansas City Minneapolis
San Francisco Los Angeles
In Canada:
Windsor Falls and Winnipeg

BURGESS BATTERIES

Victor and RCA Photophone, Inc. Work was to begin in June and when completed would be one of the greatest things to happen to radio broadcasting in this century.

For the automobile radio, the past year had served as a shake-down test. The incidence of troubles had been considerable in number; every conceivable problem had presented itself, but the engineers and technicians were equal to the task. Much was learned and problems were solved relative to installation, types of antennas, electrical difficulties, "high-tension" and "low-tension" noise suppression, effects of vibration and innumerable minor difficulties.

In spite of the notice that had been given to the automobile radio in some circles, this enjoyable new dimension of listening-while-driving, had not yet reached the average motorist, perhaps for several reasons. For one, after years of silence there was a lot of inertia to overcome. Although the selling prices were becoming more realistic due to competition, the initial cost plus installation could be a sizable investment, especially during the depression. A good system could easily cost 10% of a medium priced car. Other factors involved the "B" and "C" batteries. They generally required that a separate box be installed somewhere in the floor of the vehicle. The initial expense, plus periodic replacements added a further burden. After about one third of the life of the batteries was consumed, they suffered a gradual decrease in energy output causing the set to lose efficiency.

Then too, there were a lot of people who still remembered the "B" batteries attached to the family radio in the parlor. When the all-electric radio came in, they thought that they were rid of "B" batteries! In addition, after all of the bugs were out, there was still the problem of fading as the automobile was being driven through the city or across the country. During 1931 developments were underway which would soon change these factors for the following year. Meanwhile, the solution to another technical difficulty was at hand.

For the first time, three new tubes were designed expressly for car radio application. These were: type 236 screen grid radio frequency amplifier, type 237 triode detector-amplifier and type 238 pentode power amplifier. They were available about mid-year. The significance of these tubes was that they were designed for a nominal heater voltage of 6.3 volts, meaning that they could be connected in parallel to the automobile storage battery without any voltage-dropping resistors or series-parallel circuits. One might say that the car radio no longer needed to accept hand-me-downs from the domestic home

radio. The new tubes would allow the engineers greater latitude and ultimately to design a car radio incorporating the features that had been in home radios for a number of years. In the meantime, the number of players in this great game of free enterprise continued to increase.

From the dozen or so car radio makers that emerged during 1930, the field grew to nearly twice that number in 1931. There is nothing like good strong competition for solving problems and bringing out new products.

During the year, some of the manufacturers, particularly Galvin Manufacturing Corporation (Motorola) and Philco-Transitone, made changes in their sets even before the new tubes were implemented. A most popular feature was the automatic volume control circuit (AVC). In over simplification, this was accomplished by using a portion of the received signal taken at the detector, rectifying it and applying it as a negative bias to the radio frequency amplifiers, thereby reducing the gain of the set on the stronger signals in proportion to the received signal strength, but making no change on weak signals. This would help with the fading but not eliminate it completely, since there were, and still are, limitations to this feature.

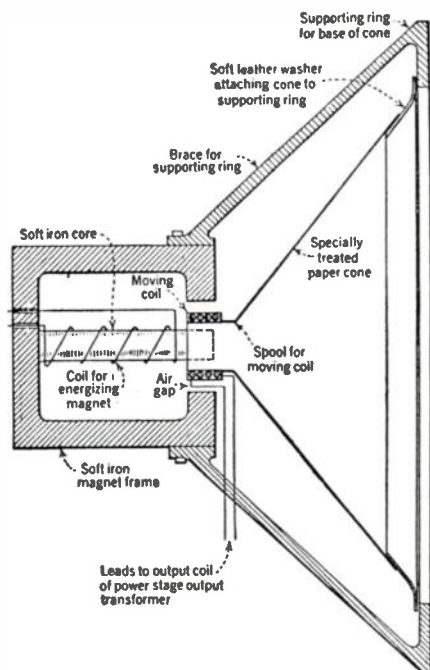
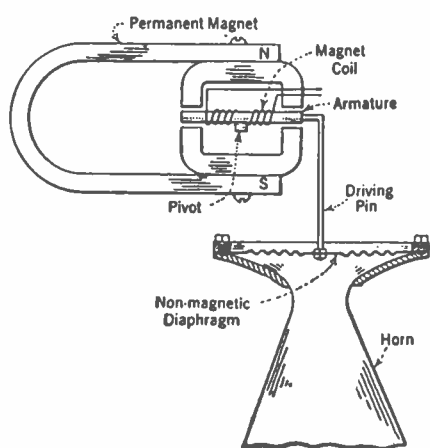
Another desirable feature soon to be universally accepted was the dynamic speaker as pioneered by Magnavox. This had been widely used in home radios since about 1928 but was not immediately available in car radios because of power considerations.

In order of historical significance, some of the first car radios used a horn type speaker borrowed from the early home radios. Designed by Alexander Graham Bell, this device used an element similar to a telephone receiver attached to a long horn. The next step in the evolution of the loud speaker was the so called magnetic speaker which incorporated a soft iron bar or armature loosely mounted within a stationary coil and a horseshoe shaped magnet. The armature was anchored to a paper or composition cone that vibrated under the influence of the coil connected to the radio output. This type of loudspeaker was also in popular use on early home radios.

The dynamic speaker operates on the principle of a moving coil (voice coil) which is cemented to the apex of the paper cone. In this case, the cone is anchored at the outside edge with a ring of soft leather or other compliant material. The signal is fed to the voice coil and the whole assembly moves in and out of the magnetic field created by a field coil thus operating like an air pump.

This type of speaker requires a substantial amount of magnetic flux. In AC powered home radios the magnetic field was generally supplied by an

Cross sections of two types of radio loudspeakers. The armature or magnetic speaker (upper) and the electrodynamic floating coil speaker (lower).



THE SATURDAY EVENING POST

This summer! Be "at home" on wheels ...with PHILCO radio in your car!

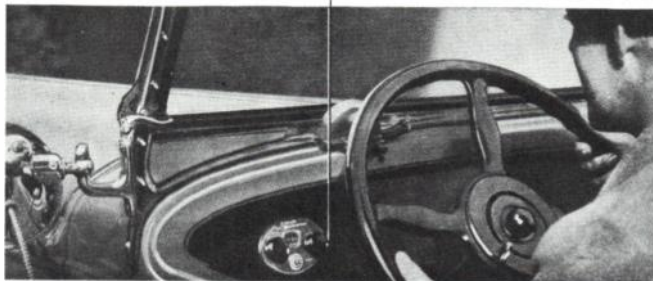


You see only this small, lighted single dial and lock on dashboard or steering column. Chassis and speaker are built in, out of the way, yet accessible. Aerial is concealed. "B" batteries fit in metal box mounted under floor. Car battery supplies the slight amount of "A" current required. Complete Philco-Transitone Radio, with 7 Philco Balanced Tubes, less "B" batteries and installation: **\$65**

Slightly higher in Canada, Denver and West



NOW YOU CAN ENJOY PHILCO RADIO PERFORMANCE WHEREVER YOU RIDE OR STOP



TAKE your favorite radio programs with you, wherever you travel or stop. A Philco-Transitone in your car (or motorboat) means radio reception as true and clear as with a Philco at home.

If scenery grows monotonous, if children become restless, if drowsiness creeps upon you at the wheel — tune in a good radio program. You do not have to speed to reach any destination in time to hear favorite evening features. Stop anywhere for the night without feeling cut off from the world . . . there is no portability problem with Philco-Transitone—it is built in, always ready to perform.

Select programs from a wide choice of stations without cross-talk; the distance range is amazing; the tone is gorgeous, true and clear because of Philco Balanced Units and a genuine electro-dynamic speaker.

Though you may stop, start, vary speed, change direction and cover many miles, you need not touch the dial! Philco's famously successful Automatic Volume Control counteracts fading and holds a program at the degree of volume you prefer.

For outdoor travel, here is the really big-performing radio with triple screen grid, full seven-tube power and Philco quality —inexpensive to buy because Philco is the world's largest selling radio. Expertly installed by an Authorized Service Station the day you want it.

Make doubly enjoyable your outings, picnics, week-end trips and vacation visits to resorts. Accept your nearby Philco-Transitone dealer's invitation to take a demonstration radio-ride! Philco-Transitone, Ontario and C Streets, Philadelphia, Pa.

Partial list of cars factory-equipped with Radio-Aerial (standard or optional): Chrysler, De Soto, Dodge, Franklin, Jordan, Lincoln, Marmon, Nash, Peerless, Pierce-Arrow, Plymouth, Reo, Studebaker, Stutz. Aerials are easily installed in any make of car, closed or open models; also buses and motorboats.

PHILCO

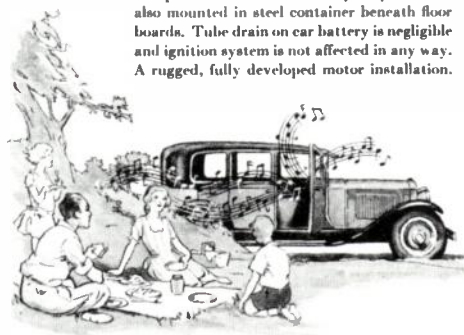
Transitone

AUTOMOBILE RADIO

Whatever You Want Wherever You Are! with **MOTOR** *Majestic* **AUTO RADIO**



Motor Majestic employs 7 tubes in a tuned radio frequency circuit . . . three type "36", two type "37" and two type "38" pentodes. "B" power obtained from heavy duty batteries also mounted in steel container beneath floor boards. Tube drain on car battery is negligible and ignition system is not affected in any way. A rugged, fully developed motor installation.



THOSE LONG DRIVES on business you've so disliked, now become hours of pleasure that pass only too quickly. The picnics that so many times would have been perfect "if we'd only had music", can now be happy gatherings long to be remembered. For Majestic engineers have solved the final problems in adapting radio to the automobile . . . in bringing you clear, clean-cut, play-by-play reports of ball games and full, ringing dance music . . . *while driving or parked!*

Motor Majestic is compact, rugged and contained in a heavy, water-tight steel case that mounts out of sight beneath the floor boards of your car, operated from an unobtrusive small control-block that clamps to the steering column just below the wheel. Single knob tuning with illuminated dial . . . a volume knob that gives smooth, accurate control from a soft background to conversation up to entertainment for a beach party. The dynamic speaker can be mounted practically anywhere, but most motorists prefer it up behind the dash.

Completely installed, ready to operate, \$87.50 (slightly higher on the West coast) . . . antenna, if necessary, at slightly additional cost.

GRIGSBY-GRUNOW COMPANY, CHICAGO, ILLINOIS
World's Largest Manufacturers of Complete Radio Receivers

M I G H T Y M O N A R C H O F T H E R O A D

electromagnet, powered by direct current from the set's rectified power supply. As this was not too practical when using "B" batteries, the only answer was to modify the field coil for use with the car battery. This was fine except the current drain was about one ampere in addition to the other power requirements of the system. This, the engineers had to live with, until a good permanent magnet dynamic speaker was developed.

Toward the end of the year, most of the pioneer auto radio makers and many recent entries were intently working on new models incorporating the recently released six volt heater type tubes. In most cases the new sets would feature automatic volume control and the dynamic speaker. The type 238 tube, the new pentode output, particularly when used in push-pull pairs, gave good response with a dynamic speaker. The shift toward the superheterodyne had also begun. This offered an advantage over the TRF (Tuned Radio Frequency) in maintaining accurate tuning and tracking. All told, these improvements would literally "put the radio on the road."

As mentioned earlier, 1931 saw some price adjustments. Philco was advertising their seven tube model 3 at a price of \$65.00 or \$99.80 completely installed. Motorola had reached the catalog house of Radio Circular Co. in which it was advertised at \$59.70.

An early mail order catalog listing for Motorola. Later, Galvin established authorized distributor and dealer networks.



"AT YOUR FINGER TIPS"

The single illuminated dial of the MOTOROLA is right at your Finger-Tips—on the Steering Wheel, as shown to the right. No need to reach or look for it—it's always in view and at hand, yet not cumbersome or unsightly—the safest and most convenient arrangement of any Automobile Radio on the Market.

You Can't Buy A Better Audio-Radio at Any Price

Consider these MOTOROLA features: The safest and most convenient dial arrangement, "At Your Finger Tips", on the steering wheel-post as shown—Quickly installed without marring your car in any way—Perfect auto-radio performance—Lowest auto-radio price.

SUPER DYNAMIC

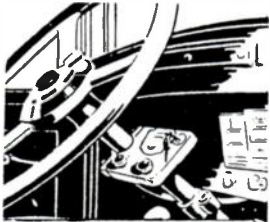
TRIPLE SCREEN GRID

AUTO RADIO

Easy to Install

OUR NET PRICE	\$59⁷⁰	LIST PRICE \$99.50
---------------------	--------------------------	---------------------------------

COMPLETE—Includes radio set, speaker, tubes, B batteries, aerial suppressors, all accessories, nothing else to buy — Less Installation.



At Your Finger Tips!

THE RECEIVER—Chassis fully protected against all electrical disturbances, three tuned stages, two stages Audio, 3 No. 224 Screen-grid Tubes, 1 No. 221-A Power Amplifier and 1 No. 201-A Audio Amplifier, in sturdy housing—dust, water and oil proof. Compact and neatly built so can be placed under motor hood of any motor car. Housing mounted on convenient brackets, easy to install.

THE SPEAKER—Equipped with the famous UTAH Dynamic Speaker. Motor noise eliminators, resistors and condensers are supplied for eliminating motor car noises.

"B" Batteries are single unit cased in steel container thoroughly protected against dirt and moisture, mounted beneath floor boards. Convenient arrangement facilitates replacement of "B" Batteries.

Complete matched and balanced set of RCA licensed tubes.

AERIAL—If your car is not factory equipped with Aerial Installation, a simple arrangement of Aerial Wires can be made beneath the body of the car.

Previous pages:

Philco's writers made listening to their car radio an irresistible pleasure.

Grigsby-Grunow's admen were no less enthusiastic in singing the praises of Motor Majestic.

If a potential customer really wanted to go price shopping, he could purchase a five tube "Roamer" through a mail order house for the amazing price of \$47.45 or the Hoodwin six tube kit for \$20.00 or fully assembled and ready to install for \$39.50. If that was still too much money, the radio periodicals at the

AUTO RADIO

Long Distance Receiver



Amazing Low Price!
Quality Performance
Six tube triple screen-grid using 8-224, 2-227, and 1-245 power tube. Easy to install. Will fit any car. Single dial control. We guarantee that this set will pull in stations within a radius of 1,000 miles and that it will deliver the volume and tone qualities of an electric set, or your money refunded.

PRICE OF SET ONLY \$20.00

Price Complete, including tubes, batteries, dynamic speaker and suppressors, all ready to install and use, \$39.50. Send \$5.00 deposit with order, balance C.O.D. On foreign orders remittance in full required. **ORDER TODAY.**

CHAS. HOODWIN CO.
4240 Lincoln Avenue, Dept. F. 30 Chicago, Illinois

A classified ad from Radio News directed toward those desiring to assemble and install their own sets.

time such as Radio News, Radio Craft and Radio World were frequently featuring construction details and parts lists for constructing auto radios encompassing the latest circuitry.

The do-it-yourself route was not a recommended choice unless one was daring and willing to go through the often laborious assembly (in the case of the kit or magazine plans), the installation, the headaches of chasing electrical interference and the prospect of trouble-shooting the radio if and when things went wrong.

If, on the other hand, a budding entrepreneur desired a new career and the prospects of a future in automobile radio sales and/or service seemed appealing, there was no better time to get started. To

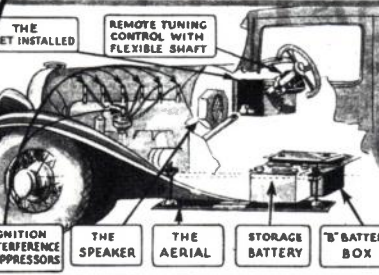
ROAMER AUTO RADIO

WITH REMOTE CONTROL!

For Automobiles, Motor Boats and Airplanes



THE SET INSTALLED



REMOTE TUNING CONTROL WITH FLEXIBLE SHAFT

Radio As You Ride!
Don't Miss Your Favorite Program
Sports—Markets—Music

ENJOY your radio in your automobile with a complete collection of programs just the same as you have at home. The really up-to-date cars are now radio equipped. It makes hours on the open road doubly enjoyable and adds "fun" into the driving. You need to miss your favorite programs while you drive. Listen in on the game—get latest market flashes or entertaining news with a Roamer.

5 Tube Circuit
Triple Screen Grid

Built by a prominent radio manufacturer with a background of over six years of radio set design and manufacture, the ROAMER auto radio is first of all a GOOD RADIO RECEIVER. The chassis is completely shielded to prevent against crosstalk pick-up and regularly constructed to withstand hard usage. Contains three 224 screen grid tubes and two 112A tubes. Licensed by R.C.A.

Life-Like Tone Quality

Superbness with the same fidelity and life-like tone quality that you would expect from a receiver in your home.

EASY TO INSTALL—DOES NOT DEFACE CAR

Simple and complete directions are furnished for installing Roamer auto radio. It is generally recommended that the installation be made by someone experienced in this type of work. However, with the instructions as furnished by us, anyone accustomed to working on its automobile should have no difficulty in making a perfect installation. No defacing of the instrument panel is necessary. Set can easily be removed for installation in another car without incurring the trade-in value of the first car.

Triple Screen Grid
Shock-Proof Chassis With Illuminated Remote Control

The remote tuning control is mounted on the steering column beneath the wheel. The tuning dial is illuminated by a neon lamp which is a part of the chassis. A directional light switch is turned on. The powerful 8-tube screen grid receiver is provided with cover and heavy brackets to facilitate mounting in several positions, adapting it to practically any car. Universal. Heavy rubber cushions hold each tube firmly in place and absorb motor vibration.

Concealed Installation

This ingeniously designed auto radio receiver fits away out of sight and is operated by a remote control tuning device clamped to the steering post. Set mounts on oval dash either under-the hood or immediately behind, concealed by the instrument panel. Antenna clamps to frame of car. Container for "B" and "C" batteries fits under floor boards. Only the remote tuning control is visible to occupants of car.

Remote Control Tuning

The remote tuning control mounts on steering column beneath wheel and is connected to receiver by flexible cable. Also wears gear drive for tuning and leads for volume control. A genuine Briggs & Stratton lock switch turns set off and on and prevents tampering with the set when the car is turned on.

Very Economical Operation

The Roamer Auto Radio uses three 45 volt dry cell "B" batteries and two 4 1/2 volt "C" batteries. Current drain is extremely low and batteries will last a surprisingly long time. "A" current is supplied by the storage battery with which the ignition and lighting system of your car is equipped. Cabled leads for connecting "A", "B" and "C" batteries to the receiver are furnished.

Complete—Less Tubes and Batteries

We furnish everything necessary for its installation—receiver with shielding case, remote control, speaker, aerial, battery box, mounting brackets with bolts and ignition resistors for eliminating ignition interference. Less tubes and batteries.

NOW CUT TO

45

COMPLETE READY TO INSTALL LESS TUBES BATTERIES

Auto Type Speaker

Special design 7 1/2" speaker in rectangular grille box with beautiful grille for mounting. Gives perfect life-like reproduction.

Non-Directional Aerial

Attaches to frame of car. No need to be held in line. Fitted with insulated clamp for mounting. The length is adjustable. One of the best auto aerials ever devised.

Box for "B" and "C" Batteries

Mounts under the floor boards. Designed to hold three 45 volt "B" batteries, and two 4 1/2 volt "C" batteries. Airtight dust-proof protection for the batteries.

Ignition Interference Suppressors

For suppressing spark plug and ignition interference on four, six or eight cylinder cars. Complete set includes 10 resistors and two condensers.

Ingenuously Designed AERIAL



Complete With All Accessories

Complete ROAMER auto radio with all tubes and batteries necessary for its operation. Nothing else to buy. Includes three 224 screen grid tubes, and two 112A tubes. Batteries furnished include three 45 volt "B" batteries and two 4 1/2 volt "C" batteries.

Complete Assembly

Includes kit of parts as listed on left with mounting brackets, remote control, speaker, battery box, aerial and ignition suppressor kit with complete instructions. No. C8127. Date Radio Kit. List Price \$68.00. YOUR PRICE **\$44.95**

ACCESSORY KIT

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Includes kit of parts as listed on left with mounting brackets, remote control, speaker, battery box, aerial and ignition suppressor kit with complete instructions. No. C8127. Date Radio Kit. List Price \$68.00. YOUR PRICE **\$44.95**

ACCESSORY KIT

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An example of featured articles which appeared in a number of periodicals containing detailed instructions for building one's own set.

purchase an assembly kit and experience all of the thrills and chills of the learning process was a way to test a person's interest. The sleeping giant was awakening: the host of both new and established firms coming into the business needed live wire people to handle their car radios in all phases of the marketing and support chain. As everyone involved would soon find out, even though the products were similar in function, the auto radio and home radio required different techniques in both sales and service.

One newcomer to the automobile radio market that would bear watching was Grigsby-Grunow Company with their Majestic line. The firm was then the largest radio manufacturer in the country. Early in 1931, William C. Grunow, the dynamic president, severed all ties with the company but they continued to be an active contender in the market. Their first car radio was the Model 110, seven tube, TRF set with AVC named the "Motor Majestic."

RCA Victor Co., Inc. brought out the Model M-30 late in 1931 for the 1932 model year. This was a car radio to end all car radios, a nine tube superheterodyne receiver with AVC, push-pull pentode output and permanent magnet dynamic speaker to minimize the battery drain. The accessories included: a heavy steel "B" battery box, a plate type antenna for use when a roof antenna was not already installed in the car, six spark plug suppressors, one distributor suppressor and two .75 mfd. capacitors for ignition interference. Tuning and volume control were accomplished by means of a remote box mounted on the steering post. The installation and service manual consisted of eighteen full pages. Let no one say that RCA didn't do things well.

Some of the other firms who reached for the brass ring in 1931 were as follows: Advance Radio Corporation, Allied Radio Corporation, Commonwealth Radio Mfg. Co. and World Battery Co., all of Chicago; Grand Rapids Radio Mfg. Co. of Grand Rapids, Michigan; Service Electrical Co., Indianapolis; Brown and Manhart, Los Angeles; and Pioneer Radio Mfg. Co., San Francisco.

As far as is known, all of the commercially available auto radios at this time required cumbersome "B" batteries, but even in the face of that, the sales for the year were 108,000 units. Not many when you divide by the number of makers but still a considerable number, since some of these may never have gone beyond the prototype stage.

Thus, 1931 was unusual in that so much of the time and energy went into designing, implementing new ideas, testing, adjusting, getting to know the products, marketing and establishing distribution channels, rather than creating a lot of publicity.

1932

Songs reflecting the disparate moods of Americans in 1932 are: "Brother, Can You Spare a Dime?" and Duke Ellington's composition, "It Don't Mean a Thing (If It Ain't Got That Swing)."

General Mills on the NBC Blue Network, sponsors the soap "Betty and Bob" in which the boss marries his secretary and as the romantic bloom fades, they encounter marital problems.

The tragic kidnapping of the Lindberghs' infant son, later found dead, arouses the sympathy of the entire world.

Babe Ruth, with two strikes on him in the third game of the World Series between the New York Yankees and the Chicago Cubs, smashes a home run into the bleachers at Wrigley Field. In the 1932 Olympic Games at Los Angeles, the nineteen-year old Mildred "Babe" Didrikson wins two gold medals as she hurls her javelin 143'4" and sweeps over the hurdles in 11.7 to establish new Olympic and world records.

In a landslide election, Roosevelt defeats Hoover. Can our new President lead America out of the deepening crisis that defies solution?

RADIO'S GOLDEN YEARS

Automobile historians and design critics are still talking about 1932. That was the year that Graham-Paige Motors Corporation introduced their bold new Graham Blue Streak Eight. A sensational car designed by Amos Northrup, it featured sweeping full skirted fenders and a wide, slanting V- shaped radiator grille. The fender treatment set a styling trend that was echoed throughout the industry.

Nineteen thirty-two was also the year that Henry Ford introduced his low cost V-8 to the world. This was an engineering and styling sensation that is savored to this day. Nearly all major auto makers offered restyled models for the 1932 model year. Many adopted the slanting V-type radiator shell or grille which came earlier on the Cord and Chrysler Eights. Many of the famous old marques were still around: Franklin Hupmobile, Marmon, Reo, Auburn, Cord and others, but the names were slipping away fast. In the meantime, some of the most prized classics were being built during this period.

Much in evidence were the special features that were offered for 1932: features such as Floating Power, Ride Control, Automatic Chassis Lubricating Systems, Electric Clutch, Four Speed Transmissions and more.

What has all of this to do with the car radio? Well, the new cars were softer riding, smoother shifting and quieter. They also had restyled interiors and driving compartments including handsome instrumentation. These cars deserved a radio to add to the comforts of the occupants. But what a shame to install: a square old box on the firewall with an ugly control head wherever space provided, an octagonal speaker case in front of the passengers feet and finally a "B" battery box hole cut in the floor. This was a challenge to the radio people. Meanwhile, the car radio manufacturers were touting special features: Superheterodyne, Automatic Volume Control, Dynamic Speaker, Push-pull Audio Output, new, efficient tubes, and other electrical and mechanical improvements.

The aforementioned features were great, but to the average prospective car radio buyer, they had nowhere near the impact as the news that two forms of practical "B" battery eliminators had arrived in time for some of the 1932 automobiles. This would be a turning point in the rise of the auto radio to the status of a practical accessory. The "B" batteries were on their way out. In the days that followed, some radio technicians would lament their passing because they had no moving parts and had not added any

electrical interference to the multitudinous noises already present from other sources. For now, however, most everyone was enthusiastic.

The battery eliminators came in two forms. Let us first consider the dynamotor or motor-generator type of power supply. The basic principle of this machine had been known since the days of Michael Faraday. Given a need for upwards of 180 volts DC as in the case of the car radio, the engineer designs a generator that will deliver the voltage at the required current. The next step is to spin the generator at the given speed. The automobile engine is not well suited for this because of the widely varying rates of RPMs, so the obvious solution is to turn the generator with a nearly constant speed motor operating from the car battery. This does seem a little involved since the battery has to be charged with the car's electrical system generator, but it works. To complete the job, this rotating machine has to be properly shielded from the radio interference generated by the brushes, and the electrical output has to be well filtered.

This approach had been previously passed up because of the cost, weight, noise and inefficiency; however, necessity demanded a solution to these problems. A number of firms who were familiar with rotating electrical devices such as motors and generators began to design and market some reliable units at a reasonable price. Some of the more familiar product names were: Janette "Auto-B-Power" unit, Emerson "B" Power unit, Pines "B" battery eliminator, Bosch Magmotor, Esco "Dyna-B," Carter Genemotor, Pioneer, U.S. Electric Works type T Genemotor and another unit manufactured by a firm known simply as EA. These dynamotors were available through local dealers and catalog houses for replacing the "B" batteries in existing sets or could be furnished with new installations. Relays were installed that "fired up" the rotating machinery when the radio switch was turned on. When properly installed, only a faint whirring was heard which was a rather pleasant sound, at least to an engineer's ears.

The typical product in supplying the "B" requirements of an average auto radio set turned out to be approximately 40% efficient when supplying 180 volts at about 35 milliamperes. At six volts input, the current drain on the car's electrical system was about three amperes. This, of course, is in addition to battery current requirements of the radio set.

It should be mentioned, however, that when the set was first turned on, the input current rose momentarily to about three times normal rate. The tube heater current was also at a high rate until the tubes began to warm up and the resistance increased. This had negligible effect on the battery but the

EMERSON
"B" POWER UNIT

Puts new PEP in
AUTO RADIOS
Improves Tone Quality
Volume, Distance

Supplies constant, uniform "B" power like electric light power used for home radios. Never weakens. Pays for itself by eliminating "B" batteries. No attention—oil once a year. Operates from auto battery. Uses same current as small parking lamp. Fits same space as "B" batteries. Ask your radio dealer or write for literature. Price, \$29.75. Dealers and Jobbers, write for discounts.

The Emerson Electric Mfg. Company
2024 Washington Avenue, Saint Louis

**Made and guaranteed by makers
of EMERSON FANS and MOTORS**

Emerson was one of the manufacturers of electric motors who entered the auto radio power unit field.

The first vibrator power supplies were separate units for universal application. P. R. Mallory Company were pioneers with their Elkon "B" eliminators.

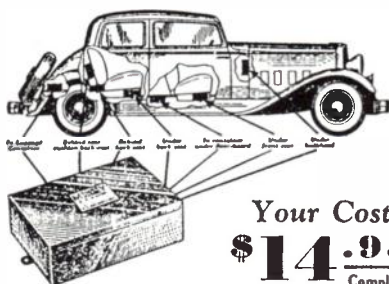


"B" ELIMINATOR

For Automobile Radio

Nearly 50,000 Mallory-Elkon "B" Eliminators are giving satisfactory service on automobile radio sets. This tried and proven unit is a result of two years' research work and development by one of America's greatest electric, radio and automotive engineering organizations. It will provide an unvarying source of power which insures uniform and dependable radio reception.

Slips easily into any of these small spaces



Your Cost
\$14.95
 Complete
 Including Relay
 Nothing else to buy.

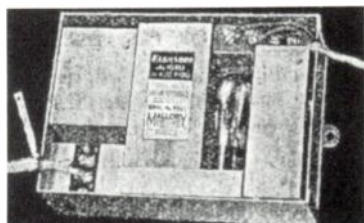
The Mallory-Elkon unit is dry. Contains no rotary parts, requires no oiling, nothing to fix and doesn't set up interference. It is easily installed and can be placed in any position. The size is 10" x 7" x 3 3/4". Guaranteed under R. M. A. standards.

Correct Type Elkonode and Mallory-Elkon "B" Eliminator for Leading Auto Radio Sets

Atwater Kent 81.....Type 4	Majestic.....Type 6
Auto-Lite 82.....Type 5	Milwaukee Police Type 2
Bosch 9:20.....Type 5P	Motorola 5-T-71.....Type 6
Bosch Police.....Type 1	Motorola 6.....Type 6
Colonial 53.....Type 5	Motorola 7-T-38.....Type 6
Colonial 54.....Type 4	Motorola 7-T-47.....Type 6
*Crosley 90.....Type 4	*Philco 3.....Type 6
*Crosley 91.....Type 3	Philco 7
*Crosley 92.....Type 6	Type 5P (180 volts)
Delco 3010.....Type 5	Philco 7
Gilfilin.....Type 2	Type 3P (135 volts)
Indianapolis Police	Universal 70.....Type 6
Type 1	Spartan 40.....Type 6

*Requires Mallory "A" Choke, \$3.50 List Price

Your Cost, \$2.06



By merely removing six screws and lifting the top, all parts of the Mallory-Elkon "B" Eliminator are immediately visible.

system had to be fused to allow for the immediate inrush of current. All told, the average steady operating current of the typical auto radio with a dynamic speaker was between six and seven amperes. At this rate of discharge, operating the radio while romancing in the moonlight with the car parked, was not recommended. There is the oft repeated legend of the distraught father who was waiting up for his daughter, not knowing that she and her beau were stranded on lover's lane with a dead battery.

About the same time that the new dynamotor units were being made available, another type of "B" eliminator was being developed. The program, spearheaded by the P. R. Mallory Company and their Elkon division, was based on another long known piece of equipment. This was the vibrating reed rectifier also used as a chopper to convert DC to AC. At this point, the name of Bill Lear comes up again. Lear was still on the payroll of Galvin Manufacturing Corporation, but had set up a part time business, Lear Developments, to build aircraft radios at the Glenview Airport near Chicago. According to Lear's biographers, P.R. Mallory, knowing of Lear's talents, approached him with an assignment to perfect the vibrator power supply for auto radios. Raymond Yoder was hired as project engineer while John Wehner, an expert tool and die maker, crafted the necessary steel reeds.

Under the pressure of an immediate commercial market, this small group and Mallory's engineers soon produced a small lightweight "B" battery eliminator to compete with the dynamotor. The principle involved was one of "chopping" or interrupting the car battery voltage at a controlled rate so that it could be fed alternately to the two halves of a transformer primary. The alternating voltage was then stepped up to the required level in the transformer and impressed upon the plates of a full-wave rectifier where it became pulsating direct current with a potential of about 180 volts. From there it went through a filter network and on to supply "life" to the tubes. That small singing reed, beating at 115 cycles or so per second became the "heart" of the radio. Compared with the dynamotor, the vibrator power supply was more efficient at about 65%.

Motorola immediately adopted the vibrator type "B" eliminator. In fact, they were apparently P.R. Mallory's first customer for the device, then known as the "Elkonode," their trade name. This incorporated a non-synchronous vibrator and rectifier tube. It was first marketed as a separate power supply for existing radios but was later built-in as an integral part of the receiver. Mallory and others then marketed the replacement vibrators as separate components.

Motorola all electric

The Supreme Achievement in Auto-Radio

MOTOROLA
Super-Buzzer
 All-Electric
 Super-High Voltage
 7 Tubes
 Automatic Volume
 Control

"It is the only all-electric auto radio on the market today. It is the only one that can be used in any car. It is the only one that can be used in any car. It is the only one that can be used in any car."
(July) **\$107**

MOTOROLA
Beltone
 All-Electric
 Tuned Radio
 Frequency
 7 Tubes
 Automatic Volume
 Control

"It is the only all-electric auto radio on the market today. It is the only one that can be used in any car. It is the only one that can be used in any car. It is the only one that can be used in any car."
(July) **\$113.50**

MOTOROLA
Super-Buzzer
 All-Electric
 Super-High Voltage
 7 Tubes
 Automatic Volume
 Control

"It is the only all-electric auto radio on the market today. It is the only one that can be used in any car. It is the only one that can be used in any car. It is the only one that can be used in any car."
(July) **\$107**

As Modelled, with "B" Batteries and
 set of 1887-1930 **\$79.50**
Only
 See Dealer

WINSTON MANUFACTURING CORPORATION
 247-531 W. Harrison St., Chicago
 WEST TOWN AUTO RADIO CO.
 606 West Washington Blvd.
 Washington, D. C. 20005



Van Sicklen

A NEW
and BETTER
**MOTOR
RADIO**

With Automatic Volume Control

A selection of auto radio literature picked up at the 1932 Chicago Automobile Show.

At the Chicago Auto Show, January 30th to February 6th, 1932, Motorola introduced three new radios: five, six and seven tube models, something for every pocketbook. The Model 7T-38 was available as a battery set, the Model 7T-47A came with a "B" eliminator.

Among the other auto radio set makers at the show, was the Van Sicklen Corporation of Elgin, Illinois, with two models, a six tube and a seven tube. These were both "B" battery sets. Another new name was Universal Auto Radio Corp. of Chicago with seven models ranging in price from \$49.50 to \$79.50. Universals were advertised as being able to mate with standard "B" eliminators. Sadly, these firms and many others that announced their products in 1932 soon disappeared from the scene.

Atwater Kent Manufacturing Co. announced their Models 91 and 91-B to supplement their earlier model 81 series. These were nine tube superheterodyne sets with AVC and dynamic speakers, priced with tubes but less "B" batteries and installation at \$69.80.

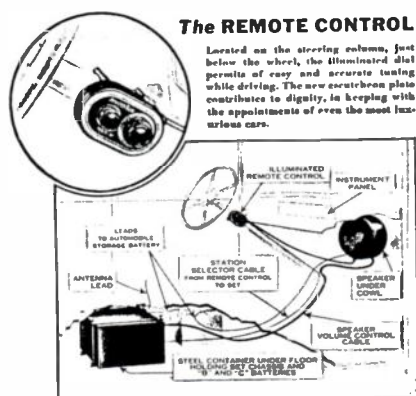
Crosley advertised their model 96 six tube superheterodyne battery set at the low price of \$39.50. Later in the year they came out with the Model 98, five tube superheterodyne featuring their Crosley Synchronode "B" eliminator.

The famous Philco Transitone Model 7, a five tube superheterodyne, was available in 1932 as a battery set, or at extra cost the buyer could purchase the EA dynamotor. The model 8 was a six tube set with two type 41 tubes in push-pull for greater output. A dynamotor was standard with this set. For motor boat owners and those with automobiles using 12 volt ignition systems, there was the model 12 with tube heaters wired in series parallel, and dynamotor designed to operate on 12 volts.

The United American Bosch Model "9:20" was an

[illegible]

NEW ATWATER KENT RADIO for MOTOR CARS



The REMOTE CONTROL

Located on the steering column, just below the wheel, the illuminated dial permits of easy and accurate tuning while driving. The new excutcheon plate contributes to dignity, in keeping with the appointments of even the most luxurious cars.

Now 3 Methods of Installation

Model 91—As illustrated above.

Model 91-B—Cowl installation.

Model 91-C—Separate set container mounted under floor and accessible from above.

The new Atwater Kent Motor Car Radio is a powerful nine-tube superheterodyne of greatly increased selectivity, with automatic volume control and full electro-dynamic speaker. Tone quality compares favorably with the best home reception... Completely shielded against interference... Rugged—built to stand up under hard usage... Placing and arrangement of units assure easy installation in any make of car. See your Atwater Kent distributor.

Price, as illustrated, complete with tubes \$69⁸⁰
less batteries and installation cost

ATWATER KENT MANUFACTURING COMPANY
4700 Wissahickon Ave. A. Atwater Kent, Pres. Philadelphia, Pa.

One of many entries into the auto radio field was the famous firm of Atwater Kent.

Overleaf: Advertised in Motor for January 1932 were Philco and Auto-Lite. Both were still promoting sets which required "B" batteries, unless fitted with one of the new "B" eliminators.

impressive piece of equipment. It was a "state of the art" auto radio, equipped with seven tubes, two of which were wired as push-pull audio amplifiers. It was designed to be used with batteries or with the "Magmotor" dynamotor which was available for \$25.00 additional charge. The controls were contained in a unit which was mounted on the steering column of the car. A lock-type "on-off" switch prevented unauthorized use. The speaker was mounted in a wooden box to prevent mechanical transmission of sound. All openings were covered with a fine mesh fabric to prevent the entry of dirt; the front opening was provided with wire screening to prevent damage to the pressed paper cone. It seemed that no detail was left unattended.

Two more sets that were announced in 1932 but did not gain prominence are mentioned here because their advertisements were so impressive. The Auto-Lite seemed to have a good name and was backed by none other than The Electric Auto-Lite Co. of Toledo, Ohio. It was a seven tube set with an electro-dynamic speaker and a convenient, illuminated remote control with locking switch. There is no further information available on this set.

The other radio in about the same category was the Motomaster made by the Motomaster Radio Co. of 536 N. Michigan Blvd., Chicago. This was another seven tube superheterodyne unit that had a price tag of \$79.50. The advertisement was impressive, gaining a news release in Citizens Radio Call Book Magazine and Technical Review and the business address was prestigious, but apparently there had to be something more to survival in the highly competitive market during the depths of the depression.

The Delco Model 3026 was marketed by United Motors Service in a black box as a universal radio for General Motors and other cars. This was an eight tube superheterodyne with AVC and push-pull pentode output. It was a flexible cable controlled by an attractive drum dial tuning unit with provisions for mounting under the lower lip of the instrument panel. The same radio was also reportedly painted maroon, given a Cadillac Motor Car Company name plate and installed in Cadillacs. Also Wells-Gardner made the Model 2722 (072A) for the 1932 Cadillac. This set was available with a "B" eliminator.

Toward the end of the year, U.M.S Model 2035 was introduced: a six tube superheterodyne designed for "B" batteries or the model B-101 vibrator type eliminator. This set was believed to have been made in Marion, Indiana, by the United States Radio & Television Corporation. Two similar receivers were made for General Motors cars: the Model 364441 Chevrolet and the Model 980393 B-O-P (Buick, Olds, Pontiac) radios. These were seven tube units with the

The
sales surface
is hardly
scratched
yet!

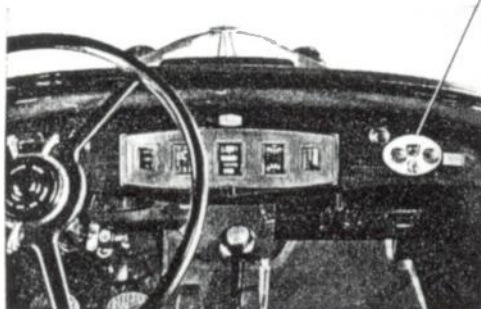


\$79.80

Including 7 Philco Balanced Tubes and Philco "B" Batteries

● Philco Steering Column Control \$5 extra.

Prices slightly higher in Canada, Denver and West.



What other accessory combines
so much buyer-appeal with such
good dealer-profit?



• PHILCO

TRANSITONE
AUTOMOBILE
RADIO

FOR PASSENGER CARS • BUSES • MOTOR BOATS

Why not line up with the enormous public prestige of PHILCO Radio? Equip your cars with PHILCO Transitone Automobile Radio—the accessory that talks for itself. Here is a real radio—seven tubes—Philco-made with the enormous force of Philco engineering, public approval and Philco national advertising behind it, selected, approved and recommended by leading car makers. And just write this down: what other

accessory can you name that combines so much desirability and buyer-appeal, which sells so readily and gives such real value, with so long a profit to you?

The surface hasn't been scratched yet. 1932 is one big opportunity for dealers who take hold of Philco Transitone to make it pay them. For details write or wire Philco-Transitone, Tioga and C Streets, Philadelphia, Pa.

OPTIONAL STANDARD EQUIPMENT—PHILCO-Transitone is optional standard equipment at the factory on Chrysler, De Soto, Dodge, Pierce-Arrow, Plymouth and Studebaker automobiles.

FACTORY EQUIPPED WITH AERIALS—Cadillac, Chrysler, De Soto, Dodge, Franklin, Jordan, La Salle, Lincoln, Marmon, Nash, Peerless, Pierce-Arrow, Plymouth, Reo, Studebaker and Stutz automobiles are available factory-equipped with aerials suitable for PHILCO-Transitone. Aerials are easily installed in any make and model of automobile, also buses and motorboats.

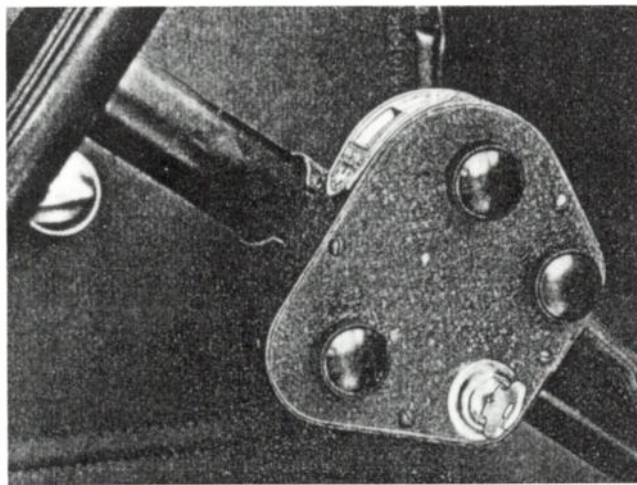
PHILCO-Transitone is manufactured and sold under patents of Transitone Automobile Radio Corporation.

PHILCO • PHILADELPHIA • TORONTO • LONDON

•

*The most conveniently located dial
control—therefore the SAFEST*

AUTO-LITE AUTO RADIO



PLUS..

- 1 Smallness of set
- 2 Ease of installation
- 3 Highly efficient and effective performance
- 4 Low price when completely installed
- 5 Ease of operation
- 6 Minimum A and B battery consumption

After five years of research and development, Auto-Lite now offers a radio that gives home reception under any conditions of driving, weather or locality—a radio set whose compactness, extreme efficiency and attractive low price make it unique among automobile radio receiving sets now in existence. 26,000,000 motorists are the market for this new Auto-Lite Auto-Radio.

Full control of the Auto-Lite Auto-Radio is within easy reach of the

driver. The control unit, the only visible part of the set, is mounted on the steering column. Thus the controls are manipulated without changing the position of the body, or removing the eyes from the road. This is the *safest* automobile radio installation yet developed. Illuminated dial, full-range volume control, 7-tube, electrodynamic speaker and extremely low battery drain are potent sales points. The Electric Auto-Lite Co., Toledo, O.

Auto-Lite



An Industry Is Reborn...offering.. BRAND NEW PROFITS TO DEALERS

The American Bosch Motor Car Radio is conveniently controlled from the steering post. The dial is illuminated with Line-a-tune tuning.

American Opoch uses a full dynamic loud speaker which is installed under the instrument panel.

The engineering of the American Bosch Motor Car Radio reflects the corporation's unique combination of radio and automotive electrical experience.

The American Bosch Magmotor forever eliminates "B" batteries and noiselessly supplies constant 160 volt "B" current . . . \$25.00 extra.

MOTOR CAR RADIO has been treated like a Cinderella stepchild, waiting for some prince of a manufacturer to come along and take a genuine interest in it.

Some time ago we concluded that there was a big opportunity in motor car radio. Early last year we put it up to American Bosch engineers . . . men who had pioneered not only in radio for the home but in automotive electrical work as well.

Towards the first of 1932 they were ready—with the new American Bosch 9:20 Motor Car Radio. Into it they built 20 major developments . . . nine of them combined for the first time in any motor car receiver. After hearing this set, dealers have cast aside their prejudices; have revised all their ideas; have realized that this is going to be a big money maker for the dealers.

The American Bosch 9:20 rivals the performance of the finest home set. 500% more sensitive. Gets distant stations with an ease that many a home radio would like to boast. Acknowledges no handicaps . . . but brings in clear, uninterrupted, *perfected* radio reception regardless of changes in road surfaces . . . in conditions of reception . . . in distance from the broadcasting station.

In a year when most dealers are looking for new sources of reliable, honest profits, the American Bosch 9:20 offers you a timely opportunity. Ask your jobber or write us direct.

UNITED AMERICAN BOSCH CORP.
Springfield Massachusetts
Branches: New York Chicago Detroit San Francisco

20

MAJOR DEVELOPMENTS

**9 of them combined for the first time in any motor car radio set.*

- *1. Over 500% greater sensitivity
- *2. Full automatic elimination of fading and overloading
- *3. Magmotor which forever eliminates "B" batteries
- *4. Double-detection superbattery
- *5. Knife edge selectivity
- *6. Power-saving tubes save 16% battery drain
- *7. Home-like reception
- *8. Improved dynamic speaker
- *9. Diode-Triode tube
- *10. 3 Pentode Power tubes
- *11. Completely armored against ignition interference
- *12. Internal filtering of extraneous noises
- *13. Under-car plate antenna with matching coil
- *14. Double-quick-heating tubes
- *15. Removable or replaceable in 30 seconds
- *16. Plug-type connections
- *17. Rugged construction
- *18. Illuminated dial
- *19. Steering post station selector
- *20. Low cost

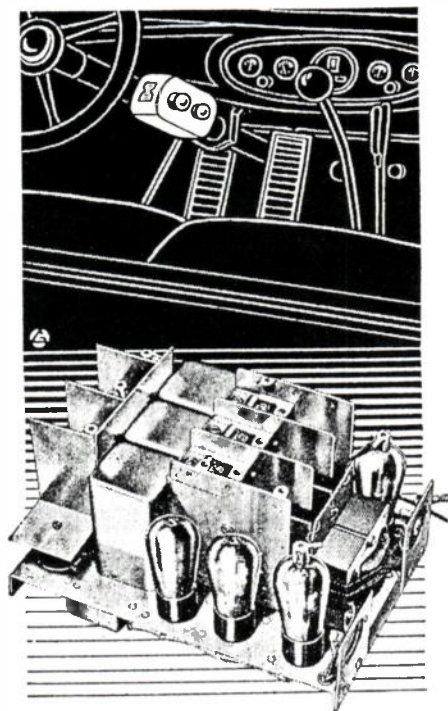
\$88⁵⁰

Complete with tubes and all accessories (except "B" batteries and antenna); ready to install.

AMERICAN BOSCH 9:20 Motor Car RADIO

American Bosch Radio is licensed under patents and applications of R. C. A.

Opposite: In the April issue of Motor, American Bosch featured their new Magmotor along with other noteworthy developments.



Motomaster announced their seven tube superheterodyne in March. They stated that it was built on a shock-proof Eraydo chassis using a special alloy container to completely shield its parts, thus eliminating motor interference. Other features were automatic volume control, electrodynamic speaker and steering column mounted illuminated remote control with lock-switch.

Motomaster seemed to have met all the requirements; nevertheless, the firm was not designed for longevity.

A MIGHTY INFLUENCE

MODERN—modern as the automotive industry itself is the new **MOTOMASTER**, the first super-heterodyne for motor vehicles. After many years of pioneering **MOTOMASTER** takes pride in announcing this new marvel. Endowed with superlative, unflinching performance and superb colorful tone, it is a magnificent achievement. It typifies modern engineering skill and reveals revolutionary characteristics. **MOTOMASTER** is the acclaimed leader.

Accepted as standard it can be installed in all types of motor vehicles within an hour. **MOTOMASTER** is a genuine contribution to the motoring world.

Over 27,000,000 motor vehicles are registered in the United States, scarcely 2 per cent radio equipped. More than one million auto-radio receivers will be sold in 1932.

Through the extensive merchandising program now under way, **MOTOMASTER**, a mighty influence, is opening new markets, winning public acceptance and becoming a definite source of profit to leading distributors and dealers.

HERE IS YOUR OPPORTUNITY TO CASH IN ON THIS VAST MARKET—Some valuable territories still open. Consult the nearest **MOTOMASTER** distributor or wire for liberal franchise plan immediately.

MOTOMASTER Radio
LICENSED UNDER R.C.A. PATENTS
 536 N. MICHIGAN BLVD., Chicago

MOTOMASTER Super HETERODYNE
R.C.A. AUTO RADIO

GATENBY

This advertisement is one of a series appearing in leading trade and class publications that will reach over two million prospective purchasers

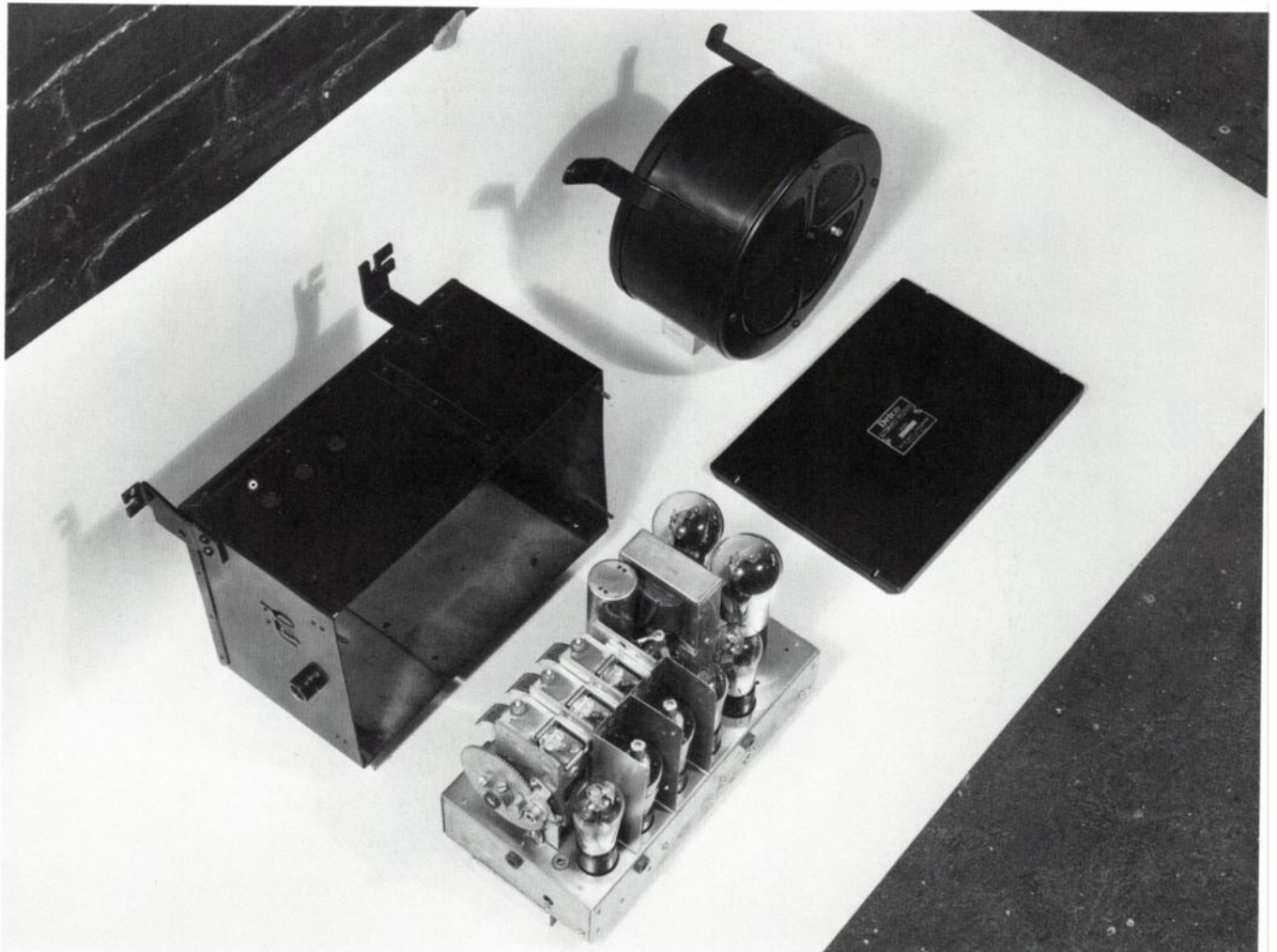
THE AUTO RADIO

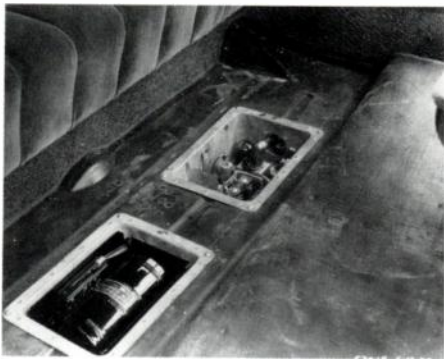
vibrator and rectifier "B" supply built into the sets. There has been some controversy as to whether any of these radios were factory or dealer installed during the 1932 model year.

One of the better remembered dynamotor powered car radio sets was the 1932 Ford radio made by Grigsby-Grunow (Majestic). This radio was first made available in the summer of 1932 and Ford purchased 25,000 of these units. The installation was very extensive. The radio unit and the dynamotor were housed in steel cases which were fitted into the floor pan on either side of the transmission tunnel behind the front seat. The speaker was mounted on the firewall to the left, and the controls were on the steering column near the driver's right hand. Fortunately, The customer could order his or her new Ford with this radio installed.

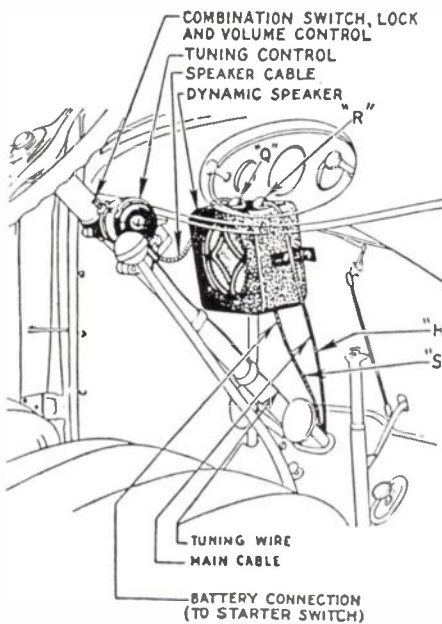
By 1932 a few other car makers were offering radios as optional accessories on the new cars in addition to the General Motors and Chrysler cars already discussed. In fact, most any car could be special ordered so equipped, since in many localities

The Model 3026 eight tube super-heterodyne was given a Delco name plate and marketed by United Motors Service.





The Grigsby-Grunow Model 111 receiver and power supply units installed in the floor pan of a 1932 Ford.



This phantom view shows the loudspeaker and tuning control locations.

All this for \$49.50 installed.



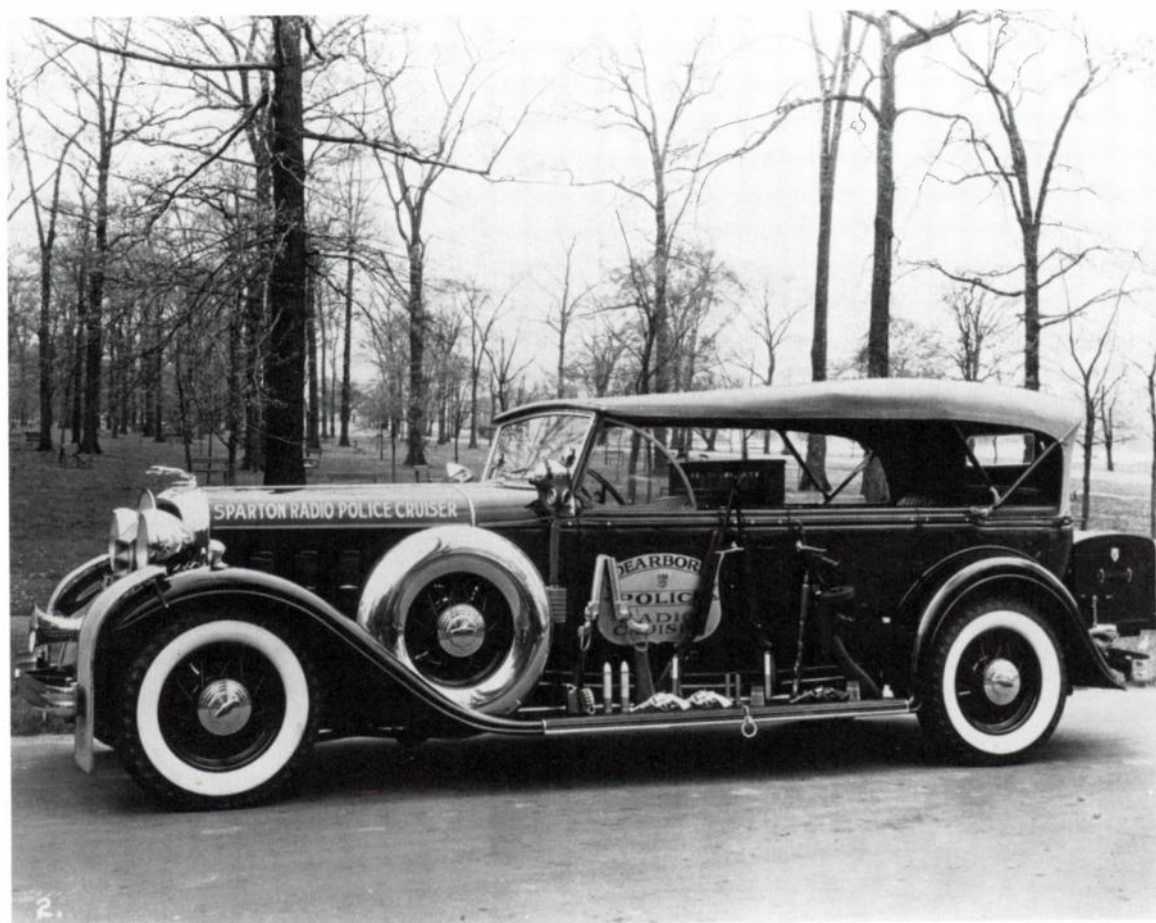
THE AUTO RADIO

there were competent installers established. The major problem was the roof antenna. This was anticipated by some car makers by installing the antenna in the vehicle as it was being assembled at the factory.

One specially equipped automobile worthy of note was the 1932 Lincoln touring car outfitted for the Dearborn Police Department. The radio and signaling equipment was provided by the Sparks-Withington Company of Jackson, Michigan, makers of Sparton radios, automobile horns and warning devices. The vehicle was fully armed and ready for any emergency.

The ranks of the automobile radio manufacturers in the United States had grown to nearly sixty in 1932. Some of these, as previously mentioned, were in and out during their first year; some never got beyond the prototype stage. The ever present problems of financing and marketing continued to be the major causes of failure. It was already a case of a few firms building the majority of the sets, but it was a colorful year, full of excitement and the best was yet to come. The total industry production for the year was 143,000 units.

This rolling arsenal must have struck terror in the hearts of violators of law and order.



1933

Across America, millions turn on their radios to hear President Franklin Roosevelt's Inaugural Address. In bold, ringing tones he asserts his belief that "the only thing we have to fear is fear itself."

On March 12, some sixty million Americans tune their radio to Roosevelt's first "fireside chat." Also another first, The Lone Ranger with "a fiery horse, the speed of light and a lusty Hi-Yo Silver!" thrills the listeners.

Millions of people throng to the Chicago World's Fair dedicated to a "Century of Progress." The Hall of Science is a big draw, but so is Sally Rand with her bubbles and fan dances.

Prohibition is repealed and hotels and restaurants stock up to fuel the big celebration.

Walt Disney tickles America's fancy with his hit tune "Who's Afraid of the Big Bad Wolf?" Is this prophetic?

RADIO'S GOLDEN YEARS

Neither the dark days of the depression nor the numerous bank closings, could hold America back from the good things that lay ahead.

The Century of Progress Exposition was so significant that it set its own styling trend to be recalled for years as the "Century of Progress Styling." It was a combination of Art Deco and Streamlining and it hit every little hamlet in America. Most important of all, the fair came at a time when America needed something important to relate to—a breath of vitality and sense of pride.

The beautiful new automobiles were there on display in all of their splendor: skirted fenders, "Knee Action," "Solar Safety Glass," and hopefully, the radios were in evidence, although they were a little trimmer and mostly out of sight—all but the switches and controls, that is.

The radio had caught on, the experimental period had ended—at least to the point that the owner had some faith in it and could relax and enjoy the programming. Yes, there were troubles on occasion, but generally speaking, once the set got going, it would operate with its "artificial heart" (the vibrator) "singing" as long as the battery held out. One could always tell by the pitch of the sound how things were proceeding inside of the black box. It worked well enough so that sales skyrocketed to 724,000 units before the year was out, a figure five times that of 1932.

Getting just a little technical, more new tubes had arrived, including multi-purpose varieties such as the type 6A7, a pentagrid converter, to perform simultaneously the functions of a mixer and an oscillator in superheterodyne sets; the type 6B7, a duplex diode triode which performed the function of intermediate frequency amplifier, detector, and automatic volume control; the type 6F7 which was a triode-pentode, both sections independent of each other except for a common heater. The customer could no longer use the number of tubes as a criterion when purchasing a radio. A four tube set could be designed to perform as well as a conventional seven tube set. Then too, another point in the numbers game to consider, was the fact that the synchronous vibrator took the place of the rectifier tube so that a five tube set with a synchronous vibrator could have the same performance as a six tube with a non-synchronous vibrator, other circuitry being identical.

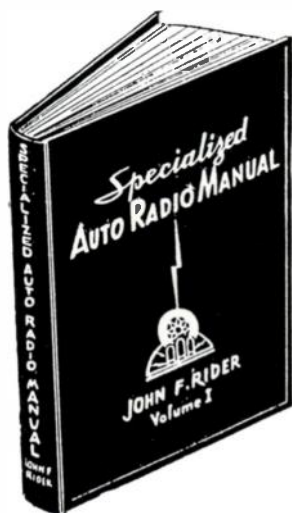
Nineteen hundred thirty-three was the year that the Radio Manufacturers Association adopted a new

vacuum tube numbering system. This was necessary because nearly all of the two and three digit numbers had been utilized; hence, the new number letter number designations indicated above. In decoding the type 6A7, the first number indicates approximately a six volt heater/filament voltage (in this case it is 6.3 volts), the letter is used to distinguish the type of tube, starting with A in alphabetical order (except in the case of rectifiers in which case starting with Z). The final number indicates the useful number of elements whose connections are brought out to the terminals. All of the above tubes had seven pins plus the grid cap above, indicating 8 connections (two are used for the heater, thus the seven elements).

As an aside, any one of those seven pin beauties, a study of shining metal sealed in their glass enclosures, would have looked right at home mounted on a velvet pillow in Tiffany's window, at least to an eleven year old lad who would get a spine tingling sensation at the sight of shiny new radio parts.

The rapid technological progress of tackling each problem, analyzing and solving it, and then gaining the final public acceptance in such a very few years are examples of Yankee ingenuity at work. Sooner or later the auto radio business attracted nearly every major radio manufacturer. The great number of different models with their individual characteristics meant both challenge and opportunity for qualified service technicians. To meet the needs of these people, John F. Rider, successful publisher of the Perpetual Trouble Shooter's Manual (Volumes I, II and III), gathered material from auto radio manufacturers in the form of schematic diagrams, pictorials, technical descriptions and installation data. He then published Volume I of the Specialized Auto Radio Manual containing close to two hundred pages of data. This answered a crying need of the many service facilities who were specializing in auto receivers due to the tremendous growth of the auto radio industry.

Some fifty manufacturers were represented, ranging from a single page schematic diagram for some of the smaller firms to over thirty exciting pages from the major firms. Up front in the manual was an eleven page symposium on ignition interference elimination, tools and equipment, and antenna installation. Within the specialized section, many manufacturers gave detailed information, drawings and photographs of their radios and full instructions for installing them in various makes of cars. This manual was a treasure trove of knowledge for anyone working with or interested in making a career of the growing field of automobile radio work.



A valuable book of schematic diagrams and circuit descriptions which were the radio repairman's "road map" to successful trouble shooting.

Zenith Radio Corporation, headed by the colorful Commander Eugene McDonald, was one of the firms that came aboard the bandwagon in 1933 with a unique automobile radio for universal application. This was the Model 460, a six tube plus rectifier set featuring modern circuitry and two multi-purpose tubes. It was a superheterodyne with AVC, push-pull pentode output, and self-contained dynamic speaker. The unusual part was the front-end (tuner) section of the receiver which was located remotely by means of multi-conductor shielded cable. This unit could be mounted on the car at the steering column or attached to the instrument panel, thus eliminating the conventional flexible cables (shafts) between the control head and the main chassis.

Radio Retailing, April 1933 (As edited by Vintage Radio Co.)

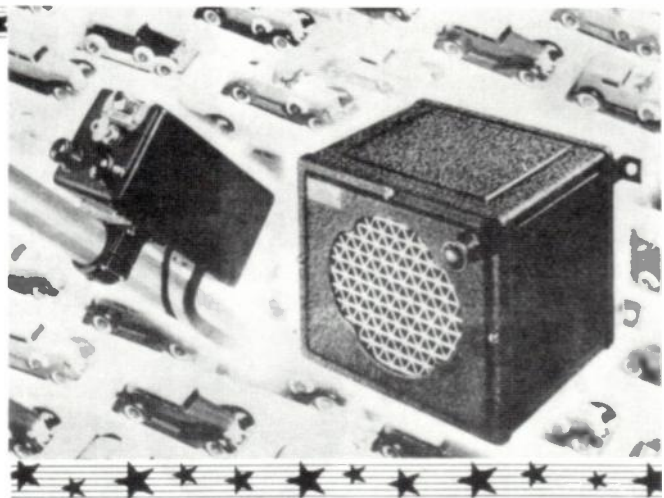
The remote control head of this Zenith contained the complete "front-end" section of the set.

NOW ★ ★ THE **ZENITH** OF AUTO RADIO

MODEL 460

\$59⁹⁵

Complete including installation equipment, but not installation (actual equipment to be required is extra).



★ Years of research, testing, improving . . . years of forgoing temporary profits which might have been made in the field . . . finally, engineers have produced the Auto Radio that can proudly carry the name, *Zenith*.

Simplicity of installation and brilliant performance have been achieved in the Zenith Auto Set.

External generators, eliminators, and batteries (excepting the one already in the car) have been eliminated. The ease of installation is indicated by the fact that there are but two units to install.

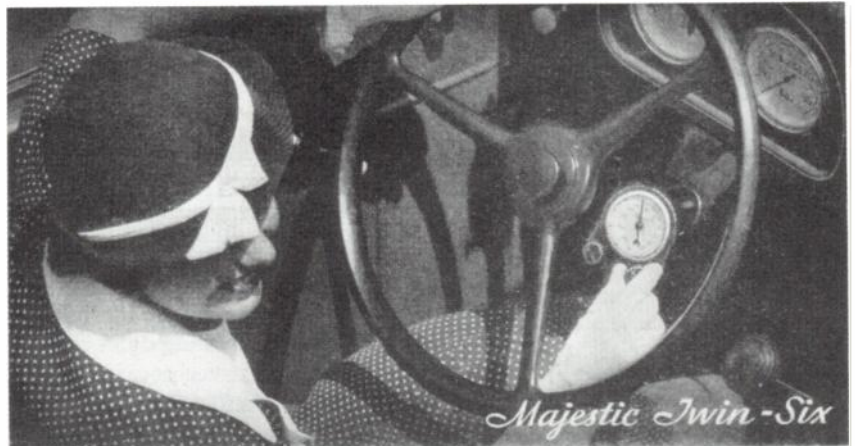
An exclusive Zenith engineering triumph—there is direct and positive drive on the tuning dial. The condensor, located in the control box, eliminates less efficient remote controls. Unique design eliminates vibration detuning after the dial is set. A seven tube superheterodyne with automatic volume control. A lock switch prevents the use of the receiver by unauthorized persons.

Fully tested under the most severe conditions, the Zenith set is now offered dealers with the assurance that it will produce both sales and satisfaction. Write for complete information.

Grigsby-Grunow, who started in car radios during 1931 with their Majestic "B" battery operated set, introduced a terrific new product in 1933, simply named the Majestic Model 66. The radio had some unique features. It was a superheterodyne with a tuned radio frequency stage up front and a low intermediate frequency of 175 kHz which was very selective and free from "images" and "tweets." (Auto radios generally use lower intermediate frequency to obtain greater selectivity and increased gain; however, the trade-off is that a lower IF generally increases the susceptibility to images.) The Majestic Model 66 featured delayed automatic volume control, advanced multifunction, spray-shielded tubes and the "Duro-Mute" vibrator which was enclosed in sponge rubber to dampen the mechanical noise. Two other nice features were the tone control and the attractive airplane type tuning dial with a pilot light.

Majestic Twin Six radios were standard equipment on Essex Terraplane DeLuxe Models and were available for all Hudson and Essex Terraplane automobiles as an optional accessory. The Grigsby-Grunow Company had established franchised service dealers to handle the warranty and routine service work on the sets.

A section of a sensational two page Majestic advertisement that appeared in Saturday Evening Post for September 23, 1933, only weeks before the company closed its doors.



THREE'S COMPANY! THE MAJESTIC TWIN-SIX CAR RADIO—AND YOU

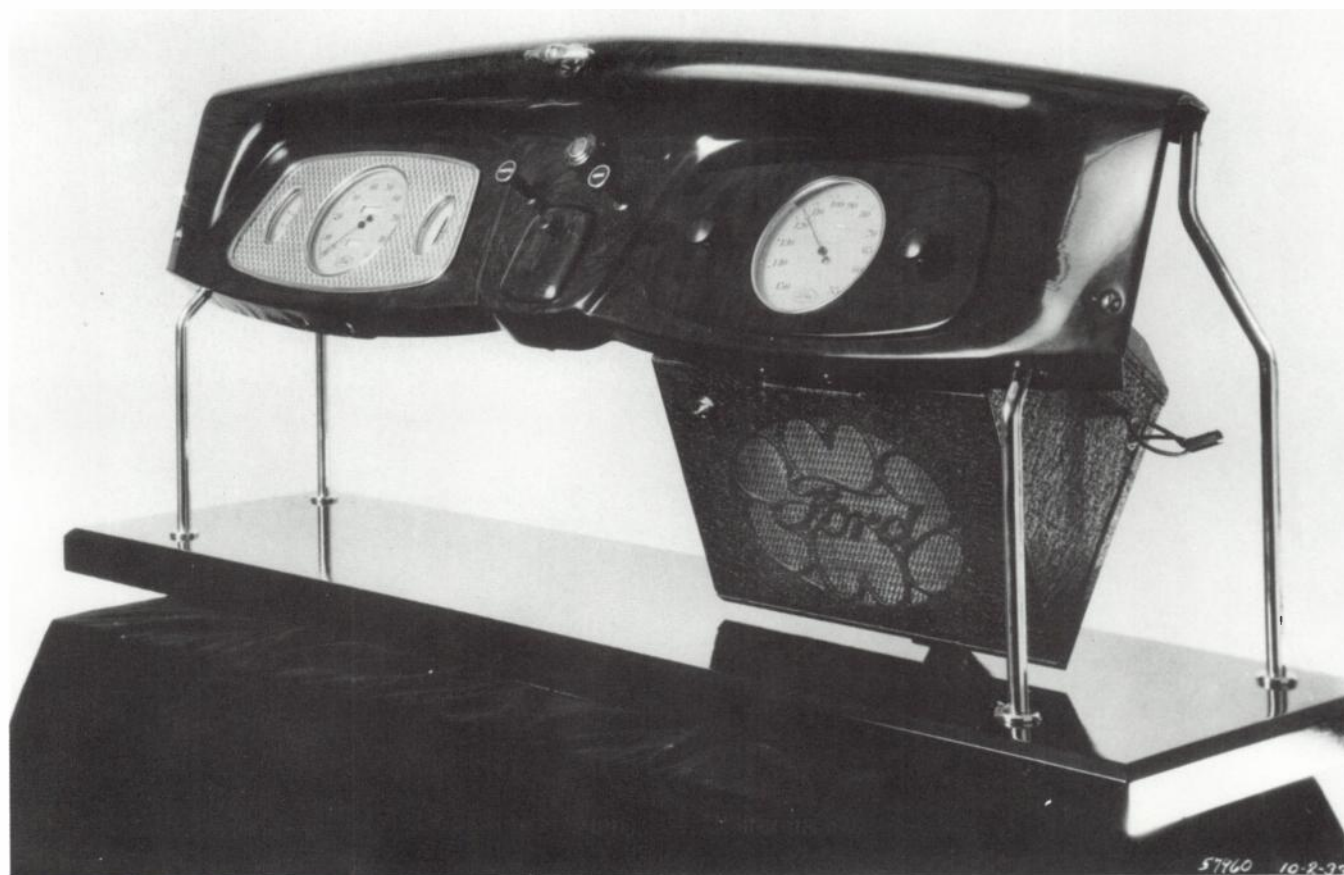
*Majestic Radios are Standard
Equipment on all Essex
Terraplane De Luxe Models*

The
SMART SET
Majestic
RADIO

Another product made by Grigsby-Grunow was the famous Ford Glove box radio. This was one of the first sets to be specifically designed to fit into a particular location in a particular car with coordinated dial and knobs. This set was a completely self-contained unit including front mounted controls, vibrator power supply, and six tubes, two of which were multipurpose. The output was from a single type 42 tube but capable of relatively high power. Again, this was a superheterodyne with automatic volume control. It was a living room quality receiver. The first 25,000 of these sets were built by Grigsby-Grunow Company but toward the end of 1933 the firm filed for bankruptcy. In the meantime, Ford had placed an order with Zenith for another 30,000 units to be produced. These sets, as the name implies, fitted into the space designed for the glove compartment. This was of some inconvenience, but the company furnished a pocket, located on the right kick pad for gloves and incidentals.

A choice of two radios as an optional accessory was available to 1933 Chevrolet buyers. The Model 600153 was a five tube, single unit, superheterodyne receiver with a six inch dynamic speaker and a full wave synchronous vibrator power supply. The Model 600249 was a six tube, two unit superheterodyne with

A mock-up of the 1933 Ford dashboard, showing the famous Glove Box radio.

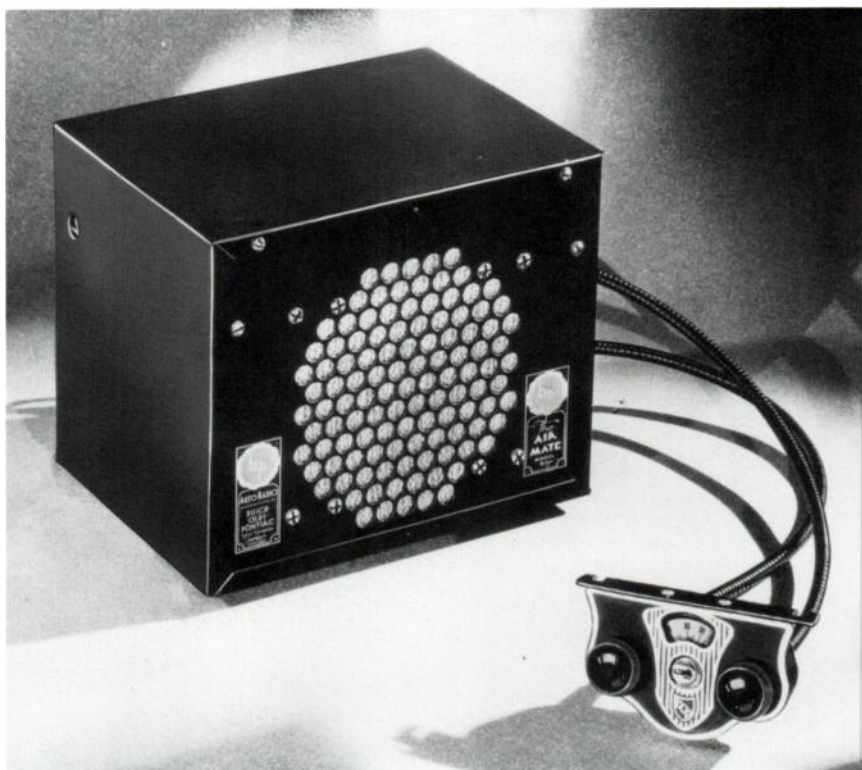


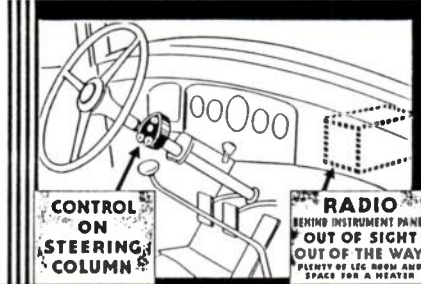
push-pull output and a synchronous vibrator power supply. The latter set featured a separate eight inch dash mounted speaker for greater output. Both radios incorporated the latest multi-purpose tubes. It is believed that both of these sets were made by Crosley for Chevrolet Division of General Motors.

The Cadillac-LaSalle buyers had a choice of two radios this year. The Model 2722 (072 and 072A) made by Wells-Gardner was a seven tube superheterodyne with either a pair of type 38 tubes or two type 41 tubes in push-pull for the output to the dynamic speaker. The "B" power was provided by either batteries or a "B" eliminator unit. The other radio, a Series 06W also manufactured by Wells-Gardner was made up of three units: the chassis unit, speaker "B" eliminator unit, and control unit. The control unit was mounted to the instrument panel, while the speaker-"B" eliminator unit and chassis were mounted on the dash. Two flexible shafts mechanically connected the control unit to the chassis.

In late 1933 Buick, Oldsmobile and Pontiac cars had the option of the "Air Mate," B.O.P. single unit radio or either of the two United Motors Service radios: Model 4036, a six tube unit with separate dash mounted speaker or Model 4037, a five tube single unit with enclosed speaker. These radios were manufactured under contract for United Motors Service by one or more of the following firms: Crosley, Colonial, RCA, U.S. Radio & Television and possibly others.

Air Mate Model 65, designed especially for Buick, Oldsmobile and Pontiac.





CONTROL ON STEERING COLUMN

RADIO BEHIND INSTRUMENT PANEL OUT OF SIGHT OUT OF THE WAY PLENTY OF LEG ROOM AND SPACE FOR A HEATER

A PHILCO Automobile Radio
that can be installed or transferred to ANY car while you wait
\$ 39.95 COMPLETE

● Drive up in your car. Drive away in a few minutes with a PHILCO Automobile Radio bringing you music—news—comedy and thrilling drama! It's simple and quick to install the new PHILCO Automobile Radio in any car.

The new PHILCO Automobile Radio is all-electric—spectacular in performance and most compact in design. When it's in your car you see nothing but the convenient control panel on the steering column. But—you hear everything from the true-toned electro-dynamic speaker—which with all the rest of this PHILCO Automobile Radio is concealed behind the instrument panel.

Naturally it's a superheterodyne—for it's a product of the great PHILCO laboratories in which the modern superheterodyne was brought to its present perfection. And only the PHILCO Automobile Radio is exclusively approved by the makers of 17 leading makes of American motor cars—a real tribute from the leaders of that great American industry to the leader in the radio world!

PHILCO Installation and Service is available throughout the United States and Canada at PHILCO-Transitone dealers and United Motors Service Stations.

MODEL 5 ALL-ELECTRIC PHILCO AUTOMOBILE RADIO \$39.95 COMPLETE AND INSTALLED <i>Installed While You Wait!</i> Nothing in sight except the convenient steering column control. Lock-switch prevents unauthorized use. So compact it can be installed while you wait—in ANY make car—any model—any year. Won't interfere with present or future installation of a heater. Easily transferred to your new car whenever you buy one.	PHILCO superheterodyne radio with new PHILCO high-efficiency tubes especially designed for automobile use. Electro-dynamic speaker furnishes rich, rich PHILCO tone. Automatic volume control keeps volume constant. Operates regardless of speed or rough road. ALL-ELECTRIC. No extra batteries required. Exclusively approved by 17 leading car manufacturers.
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PHILCO HOME RADIOS RANGE FROM CON-
 FORTS TO MAGNIFICENT "H" MODELS FROM
 \$15 TO \$600. A PHILCO FOR EVERY PURPOSE
 AND EVERY POCKET-BOOK

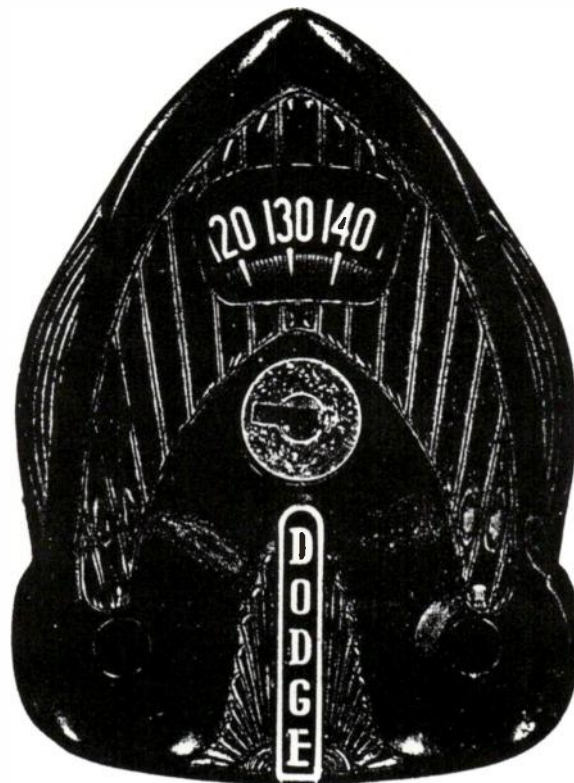
PHILCO Automobile Radio 5F	\$5950	PHILCO Automobile Radio 9	\$8950	PHILCO Automobile Radio 12	\$8950
for 12 volt electrical systems					

PHILCO
Automobile Radio
SPECIFY A PHILCO ON YOUR NEW CAR

Model 5 all-electric set, one of four Philco models available in 1933. Philco was optional equipment on: Auburn, Chrysler, Cord, DeSoto, Dodge, Duesenberg, Essex, Hudson, Nash, Plymouth, Pierce-Arrow, Reo, Rockne and Studebaker.

Philco-Transitone offered a host of models for 1933, starting with the compact Model 5, a five tube single unit set priced at \$39.95. The Model 6F was a five tube with a Model EF vibrator power pack and a separate speaker, priced at \$59.95. The Model 9 was a more powerful six tube receiver with a separate speaker and a quality built dynamotor power supply for long life. Selling price for this unit was \$89.95. Finally, the Model 12 was a six tube radio with push-pull output, separate speaker and a 12 volt dynamotor power supply for cars or boats with 12 volt electrical systems. Philco was offering a radio in every price range. These radios were available with an attractive cathedral styled steering column control head for all cars. In the case of the Plymouth, Dodge, DeSoto and Chrysler, a customized name plate was affixed to the front of the control.

Noblitt-Sparks Industries of Columbus, Indiana, came on strong with three unique models. They all followed the same format of the main radio chassis in an attractive case with front mounted speaker for attaching to the firewall. The clever steering post control unit was attached to the chassis by a multiple conductor cable which handled the tone and volume



Control head used on Chrysler Corporation cars. The legend plates were interchangeable.

THE AUTO RADIO

Noblitt-Sparks Industries, Inc., makers of Arvin car heaters, entered the auto radio race with a series of ingenious receivers.

*Hours and Miles
Fly by when You
Travel with an*

ARVIN CAR RADIO



... A *Traveling Man* is never lonesome when he drives with an Arvin Car Radio. He's up to the minute on all the news—the sports world follows him around—and the hours and miles fly by... If you've been waiting for automobile radio to be perfected, you needn't wait any longer. The Arvin is ready for your car—and it has such power and volume that it gives clear, crisp reception over all traffic and engine noise. You'll say it's great—the way your Arvin brings in stations. You'll like its smooth, well-rounded tone... There are three Arvin models to choose from—priced as low as \$39.50—all electric superheterodynes, with automatic volume control, remote control, shielded units and many other distinctive features. Installation is easy—no extra batteries required—no interference with heater or other accessories. Your Arvin dealer (automotive or radio) will gladly give you a demonstration. If you don't know the name of a nearby Arvin dealer, write us... Noblitt-Sparks Industries, Inc., Columbus, Indiana

THREE MODELS PRICED AT
\$39.50 • \$49.50 • \$59.50

Prices Slightly Higher on the West Coast



*Designed and Built Solely for
Automobiles by the Makers of
Arvin Hot Water Car Heaters*

control requirements. The tuning was accomplished by running a single Bowden wire cable from the control head to the tuning condenser on the chassis.

The Arvin Model 10A was a four tube superheterodyne circuit utilizing multipurpose tubes. Power was supplied by a separate plug-in vibrator pack which was engineered to fit just below the main chassis in the barrel-like housing, with the speaker in front. The Model 20A was a six tube circuit, with the RF, IF and detector components mounted in a separate case which was intended for mounting on the engine side of the firewall by hollow studs. The other components including the speaker, audio output tube, rectifier and vibrator were packaged in the main housing which stayed on the passenger compartment side of the firewall. The hollow studs carried the antenna, the Bowden cable and the interconnecting wires. Model 30A was essentially the same as the Model 20A above except that it was a seven tube set with an extra tube in the audio amplifier.

NOW! ARVIN CAR RADIO

By the Makers of Arvin Hot Water Car Heaters

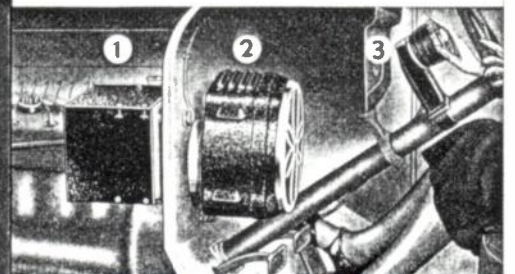
★
A Radio That Is
Really Designed and
Built for Motor Cars

★
ALL-ELECTRIC
SUPERHETERODYNE
With Marvelous Performance

★
Many Features That
Simplify Installation
and Operation



These illustrations show how the Arvin goes on any car. There are only three parts: (1) The receiver unit on the engine side of the dash. (2) The speaker, amplifier and "B" battery eliminator all combined in one small unit on the dash, right in front of the driver but well up and out of the way. (3) The remote control which clamps on the steering column in the line of driving vision.



Here is the car radio you want to make sales at a profit and cash in on a fast-growing market that offers you a big opportunity now... The Arvin is really designed and built for motor cars. It is an automotive accessory that goes on a car in much the same manner as the well-known Arvin Hot Water Car Heater. And one does not prevent the installation of the other... From the

standpoint of the trade as well as the consumer, the Arvin offers everything that is wanted in a car radio. First of all, it is easy to install and service. You're interested in that. And the Arvin has the consumer appeal you want—with its marvelous performance and many advanced features... The Arvin Car Radio is available in two models—6 and 7-tube all-electric, su-

perheterodyne sets to sell at popular prices. To thousands of automotive dealers who have been selling Arvin Car Heaters—and to countless radio dealers who have never been able to reap the benefits of an Arvin merchandising job until now—the new Arvin Car Radio means extra profits. You want full information now. Just sign and mail the coupon below.

Atwater Kent, not to be outdone by those offering the customer a wide choice of models, announced the Model 424. The four tube superheterodyne with AVC, gave five tube performance because of the synchronous vibrator/rectifier. This was a step forward in simplicity at a price of \$37.90. For those wanting more in a car radio, the Models 636 and 756 dynamotor powered units were available for \$59.50 and \$64.50 respectively.

Atwater Kent was a pioneer in the inexpensive, self-contained underdash units.

A new **ATWATER KENT** *Motor Car* **RADIO**



**As easy to install
as a spark plug!**

FOR immediate and profitable sales—a complete, compact unit (speaker included) having all features consistent with the finest automotive reception and tone, plus Atwater Kent workmanship.

By the use of a perfected synchronous rectifier, the extra non-radio tube is avoided. The troublesome rectifying tube has been eliminated and with it the additional drain on battery and the replacement problem.

Installation? It can be made as easily and quickly

as you can put in a spark plug, saving *your* overhead and *your customer's* time.

Price? We honestly believe that this instrument panel control Motor Car Radio at \$37.90 is the best value offer in the history of Atwater Kent. If the steering post control type is preferred, it is available in Model 534 at \$39.90.

Let your customers see and hear this new Atwater Kent Motor Car set—tell them the price and the sale's made.

For those desiring the utmost in Motor Car Radio, Atwater Kent dynamotor-powered models are priced at \$59.50 and \$64.50.

Prices slightly higher in Rocky Mountain region and West

ATWATER KENT MANUFACTURING COMPANY A. Atwater Kent, President 4700 Wissahickon Avenue, Philadelphia, Pa.

Crosley's contribution was the Roamio "99" featuring the Synchronode Power Unit, "B" battery eliminator.

Motorola was very much in the race with new Models 44, 66 and 77, in addition to the 88 and 61 announced in 1932. These were five, six and seven tube sets in every price range for a variety of installations. The famous Motorola airplane type control was an attention getter. This ingenious device allowed the adjustment of the volume control and the tuning of the stations with a single knob and a single control cable to the receiver.

The list of new radio set offerings for 1933 was extensive. Crosley was touting its new Model Roamio "99" with the amazing Synchronode Power Unit, a powerful set for \$49.95.

A finer...More Powerful AUTOMOBILE RADIO

**With Class "B" Amplification
and the Amazing New
Crosley Synchronode Power Unit
that Eliminates "B" Batteries**

at a price never before heard of . . .

**FITS
ANY
CAR**

\$49.95
WITH TUBES
Tax Paid

**Nothing "extra"
to Buy . . .**

Completely Installed
Including Suppressors For 8 Cylinders.

THE new Crosley Roamio "99" has taken the country by storm. The already large demand for automobile radio sets has been enormously increased. Here is opened to automobile dealers and salesmen a great possibility for expansion in their business. Think what it means to be able to offer the new Crosley Roamio for \$49.95 installed! Count the cars . . . that's the size of your market for this amazing set . . . this powerful 6 tube superheterodyne with class "B" amplification and Quiet Automatic Volume Control uses the latest automobile type 110-volt heater tubes, with full floating moving coil dynamic speaker, remote

control . . . and the greatest advance step in automobile radio—the Crosley Synchronode Power Unit that gives almost unbelievable results. Here is the newest and finest of all automobile radio sets. Compare it with any other regardless of price. Sensitive. Selective. Beautiful tone. Above all—the most simple of any to install and service. Chassis is easily and quickly removed for inspection.

At the price, this is one of the sensations of radio history. No wonder that thousands of owners of all makes of cars who see it say: "That is exactly what I want in my car."



**Crosley's
Outstanding
Contribution
to Radio**

Features of the Crosley Roamio "99"



Here are the various units of the Crosley Roamio "99". They are: The remote control, the chassis, the Synchronode Power Unit (shown), and the speaker. The universal mounting bracket (not shown) is designed to fit mounting holes which are standard in cars of the General Motors and Chrysler group.



Quick removable chassis. Mounts in 2 positions—at left, right, or over steering post. Dimensions: 8" x 5 1/2" x 4 1/2". May be removed in 10 seconds.



Placed where most convenient—right left or on top of steering post, the remote control governs every function of the Roamio.



Special Crosley full floating dynamic power speaker is one reason for the fine and powerful tone of the Crosley Roamio.

To Dealers and Agents: Here is a sales opportunity with a market as large as the number of cars in your community. The Crosley Roamio "99" fits any make car. Ask for interesting fact-sheet of this remarkable set and learn what successful dealers and salesmen are doing. Write or wire factory direct.

Montana, Wyoming, Colorado, New Mexico and west, price slightly higher.

The Crosley Radio Corporation

POWEL CROSLEY, Jr., President

CINCINNATI

Home of "The Nation's Station"—WLW

**YOU'RE THERE WITH A CROSLEY
CROSLEY ROAMIO "99"**

Opposite: RCA revived "Nipper" the Victor dog for this Saturday Evening Post advertisement.



LOOK AND LISTEN!

*His Master's Voice
is on the Road*

A NEW, EASILY INSTALLED

RCA VICTOR AUTO RADIO

only **\$34⁹⁵**
Slightly higher
in Canada and
west of Rockies

Today you can obtain the automobile radio you've been seeking. RCA Victor has it! A single-unit, extra-quality, splendidly performing instrument. Installed in 30 minutes, with Tone Control, full electro-dynamic speaker and six other important features—it costs but \$34 95. Sold at all RCA Victor dealers and many auto accessory shops.

RCA Victor

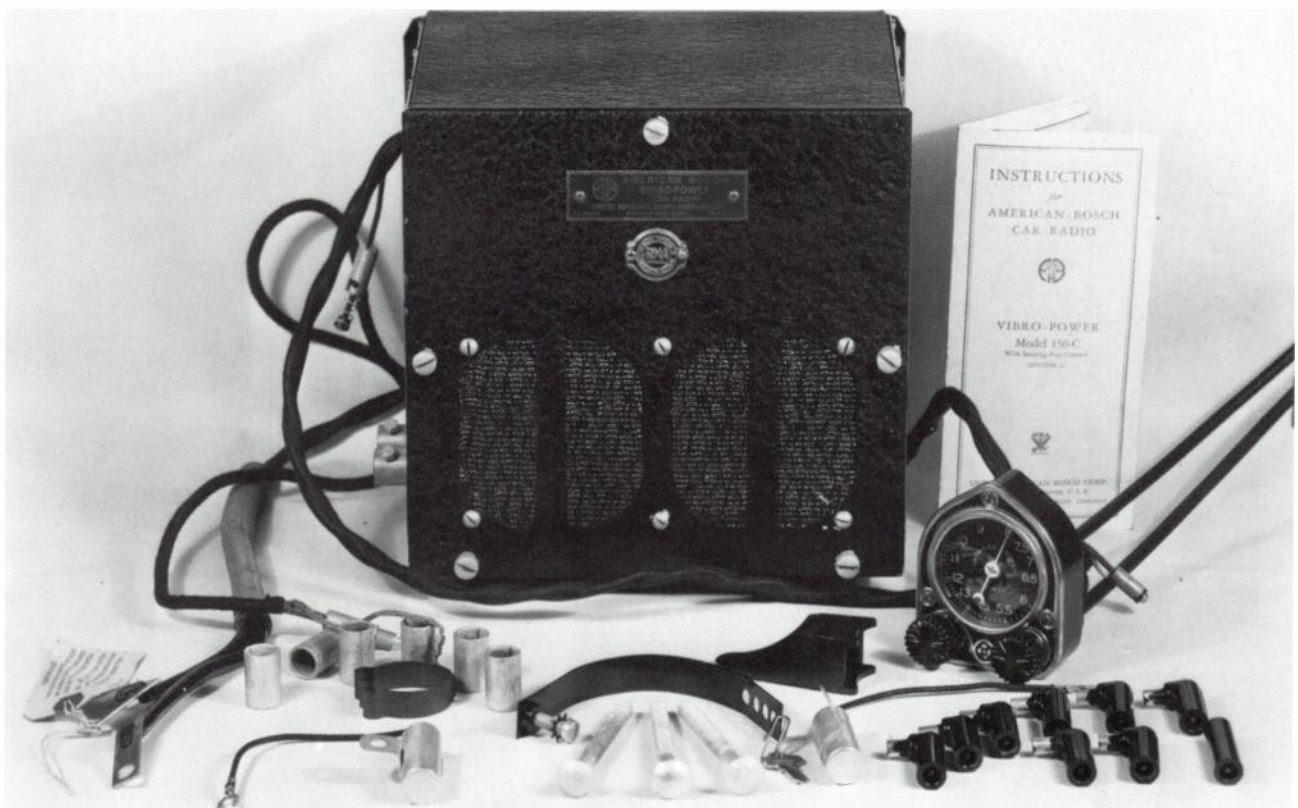
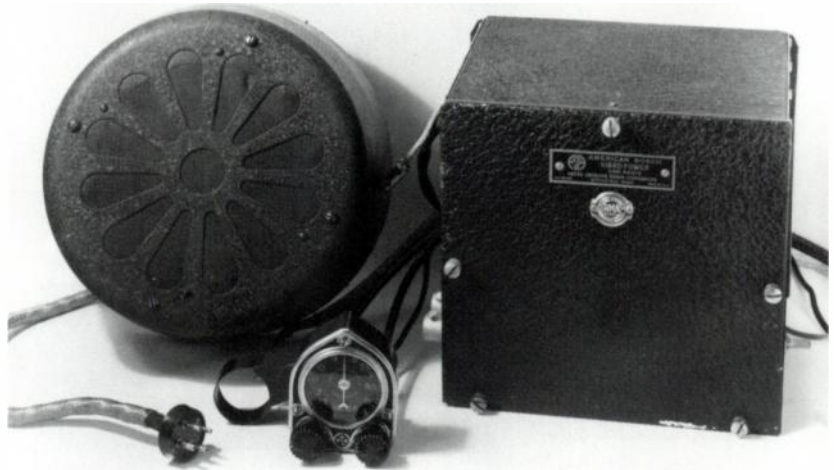
Company, Inc.
A Radio Corporation of
America Subsidiary
CAMDEN, N. J.



Solid and reliable Bosch advertised the Vibro-Power Model 150, a completely self contained six tube receiver. DeWald made the 61 All-Electric Motortone, another self-contained six tube with a distinctive remote control unit. Both General Electric and RCA Victor were marketing the same radios, only with different model numbers. Both did extensive advertising in Saturday Evening Post and other publications. The radio parts catalogs that went out to dealers, hobbyists and experimenters also offered their private label brands. This abundance of auto radios and the general enthusiasm certainly played a part in the record sales of 724,000 for 1933.

THE AUTO RADIO

Two high quality American-Bosch models featuring their Vibro-Power "B" battery eliminators.



The General Electric and RCA sets were identical except for the model designations.



Remarkably Low Price! A Genuine G-E Automobile Radio for *only* **\$39⁹⁵!**

General Electric has done it!
Made a G-E Auto Radio
that has real, glorious G-E tone, yet at a price
unbelievably low!

This radio has a new hook-up in which 4 new-
type tubes give the performance of 7. It needs
no extra batteries. It's wonderfully compact.
And it can be installed in less than an hour.

See it—hear it—*get* it—at your nearest G-E
Auto Radio Dealer's.

GENERAL  ELECTRIC
AUTO RADIO

General Electric Company, Section R-467,
Merchandise Dept., Bridgeport, Connecticut

IMAGINE! A
GENERAL ELECTRIC AUTO RADIO
... AT ONLY **\$34⁹⁵!**

ITS NEW HOOK-UP
GIVES 4 TUBES THE
PERFORMANCE OF 7

SO COMPACT.... YOU
CAN HAVE IT INSTALLED
IN **LESS** THAN AN
HOUR!

IT'S A REAL
GENERAL ELECTRIC...
A BROTHER TO THOSE
FAMOUS RADIOS THAT
WIN THE TONE-TESTS!

★ At your nearest G-E Auto Radio dealer's ★

GENERAL  ELECTRIC
AUTO RADIO

THE AUTO RADIO

Truetone Model Z6Z1 single unit receiver by Wells-Gardner. The novel placement of the tuning dial and the option of a steering post control unit, allowed the set to be mounted in one of several locations within the car.



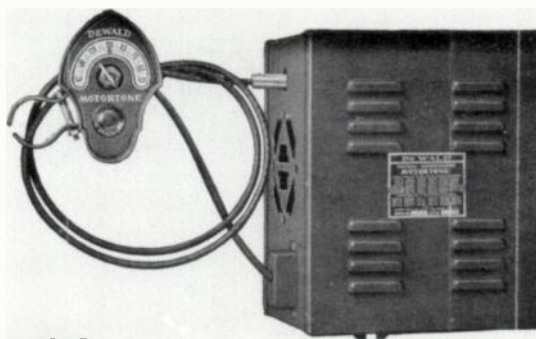
DeWald Motortone was a product of Pierce Airo, Inc., New York City.

The New DeWALD All-Electric Motortone

ALL ELECTRIC AUTO RADIO . . . SINGLE UNIT SUPERHETERODYNE RECEIVER

- Beautiful tone quality
- Improved dynamic speaker
- Full vision aero dial
- Single self-contained unit to mount only
- Advanced engineering features throughout
- Rapid, convenient detachable mounting
- Extreme sensitivity
- Illuminated steering post remote control
- Same performance that you obtain from your home radio

Six Tubes



MODEL 61

- Completely equipped with six tubes
- 100% Automatic volume control
- Thoroughly shielded units
- No cutting or marring of car to install . . . simply two wires to connect
- Hair line tuning
- All tubes and parts easily accessible for servicing
- Employs Pentagrid, Duo-Diode, Triode, and Pentode Output tubes
- Tubes used: 37, 41, 78, 85, 6A7 and 84

The DeWALD MOTORTONE ALL ELECTRIC Auto Radio invites comparison with any other auto radio on the market, for in that way you will be thoroughly convinced of its outstanding superiority even to the smallest detail.

See it ! Hear it !

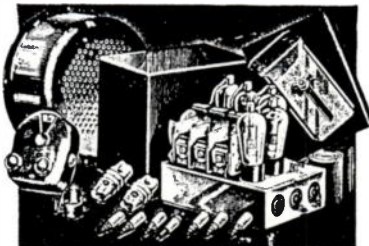
Keep in TOUCH with the WORLD as You DRIVE

PRESTIGE

APPEAL

STYLE

PREMIER Auto Radio



Tone Quality... Selectivity ... Distance

Installs Quickly in Any Car—Three (3) shielded connecting cables with plugs for quick connection to all accessories (no slow wiring) are furnished. Complete Accessories Include Universal mounting bracket, illuminated dial lockswitch remote control (attaches to steering column), 30" flexible shaft (other lengths to order), dynamic speaker, five Ken-Rad Tubes, spark suppressors and antenna,—everything—except "B" batteries. Never Before has such a complete and high quality outfit been available.

EASY TO INSTALL

Technical Data—Small and compact, 5" x 7" x 7"—uses five new type powerful auto tubes (1—36, 2—38, 2—39). Hookup is tuned radio frequency, developed to its highest efficiency. Covers band from 195 to 550 meters (adjustable to 175 meters, Police calls, if desired). Distance range of 100 to 1000 miles, depending on conditions.

Dial Is Calibrated in Kilocycles
Specify if Auto Radio Is Wanted for 4 or 6 Cylinder Car

List Price, \$34.50

Your Cost

\$18.57

INCLUDING TUBES

3—45-Volt Burgess Batteries and Sturdy Battery Box

Your Cost, \$4.40

Special "B" Eliminator for Above Set Only

An unusually low priced Auto "B" power unit that almost makes the use of "B" batteries impracticable, as it does away with replacement, and costs but little more than a new set of batteries. It is small and compact, being only 3½ x 4½ inches in size, and weighs but 1 lb. Produces 30 mts. at 130 volts or 25 mts. at 180 volts. A universal mounting bracket permits easy installation.

List Price, \$8.95

Your Cost, \$5.85

M & H Sporting Goods Co. made a special offering of the Premier battery set. A "B" eliminator was available at extra cost.

Six reasons why a Packard owner should have a radio installed.

Ask us to demonstrate the New and Advanced

PACKARD CAR-RADIO

and prove its amazing reception and performance

\$89⁵⁰

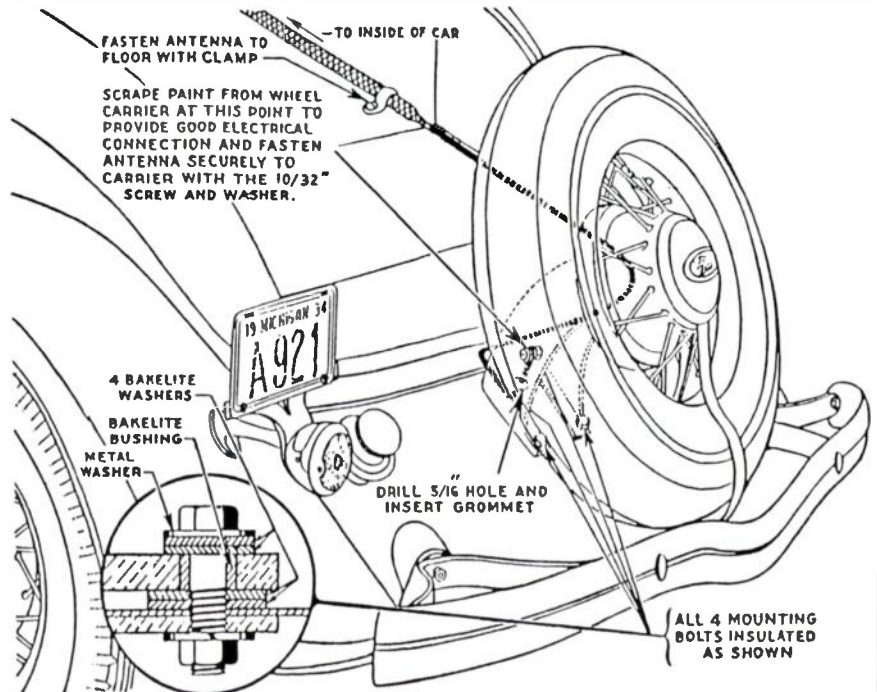
COMPLETELY
INSTALLED
IN YOUR CAR

A novel antenna solution for owners of 1933-34 Fords.

FORD MOTOR COMPANY

Spare Wheel Antenna

(48-18812-B)



1934

This year seals the doom of many of the "bad guys." In Louisiana, May 23, officers open fire on Clyde Barrow and his girl friend Bonnie Parker in their stolen Deluxe Fordor Ford V-8.

On July 22, John Dillinger, Public Enemy Number One, is shot by Melvin Purvis and his G-Men as he leaves the film Manhattan Melodrama at the Biograph Theater in Chicago.

In Iowa on October 22, Federal agents drop Pretty Boy Floyd, the last of the Dillinger big shots. Finally, on November 28, the bullet-riddled body of Baby Face Nelson is found in Chicago, heaved out of the getaway car by his pals.

In a lighter vein, the World hears of the birth of the Dionne Quintuplets in Callander, Ontario, the first known quintuplets to survive more than an hour.

General Foods, makers of Jello, hire Jack Benny and sales skyrocket.

Major Bowes and his Amateur Hour reign supreme, and travelers along the highways are noticing hitchhikers wearing signs saying: "En route to New York to appear on Major Bowes' program."

One day in June, Cincinnati's Super Power Station WLW goes on the air full time with 500,000 watts.

On the fashion scene we hear a new word, "streamlining," an arrival from the lexicon of industrial design.

The songwriters of 1934 give us the cheerful and romantic notes of, "I Get a Kick Out of You," and "Two Cigarettes in the Dark."

RADIO'S GOLDEN YEARS

Progress never stood still in the nineteen thirties any more than it does today, nor can progress be truly divided into calendar or model years. Changes in styling, methods and advancements in technology are relentless. In the automobile business these things are released to the public in somewhat regular periods, generally one year at a time—unless of course one maker decides to get a head start with a fresh idea. Nineteen hundred and thirty-four was a mixed year in respect to revolutionary changes.

The big news was the Chrysler Airflow, another highlight in automotive circles, but not a particularly profitable one. In fact, it stands today as an object lesson for design studios. "Don't get too far away from your competition." The Chrysler Eight was available only in the Airflow and it was one of those designs that people either liked or disliked. Hupmobile also had a new design but it was from a different school, more sweeping and racy looking. Other makes ran from more streamlined and longer in appearance to very few changes.

This was the year that the auto makers "put up a radio front." Put another way, much of the industry moved the radio control unit to the instrument panel (this had been done before but on a custom basis). When the radio industry began to contract with the automobile industry for custom designed receivers, they were obliged to keep in step with the styling trends, at least in regard to that part of the radio that was visible to the eye. This fact brought the automobile and the radio even closer together. However, the job of the radio manufacturers as suppliers of original equipment to the auto makers was often frustrating. First of all, they were generally bidding against their competitors for the business which meant that the profit margin was rather narrow. On the other hand, the numbers were beginning to become substantial. A successful contract often justified expansion in facilities and perhaps a more efficient operation.

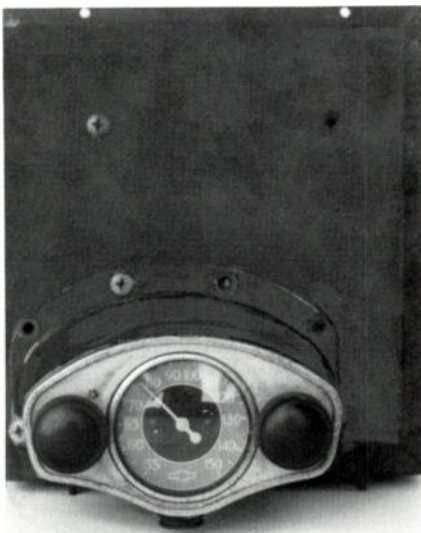
The following is a breakdown of the original equipment business as it stood in 1934:

Crosley Radio Corporation was supplying Auburn direct and Chevrolet through United Motors Service.

Delco, United Motors Service and B.O.P. (Buick, Olds, Pontiac) were purchasing sets under contract from a number of companies such as Colonial, Crosley, RCA, and G.H.U. (Grunow)

Philco-Transitone was supplying custom made sets for: Chrysler Corporation cars, Ford Motor Company

Chevrolet Model 600565, a six tube superheterodyne of advanced design. The front mounted dial and knobs matched the decor of the instrument panel.

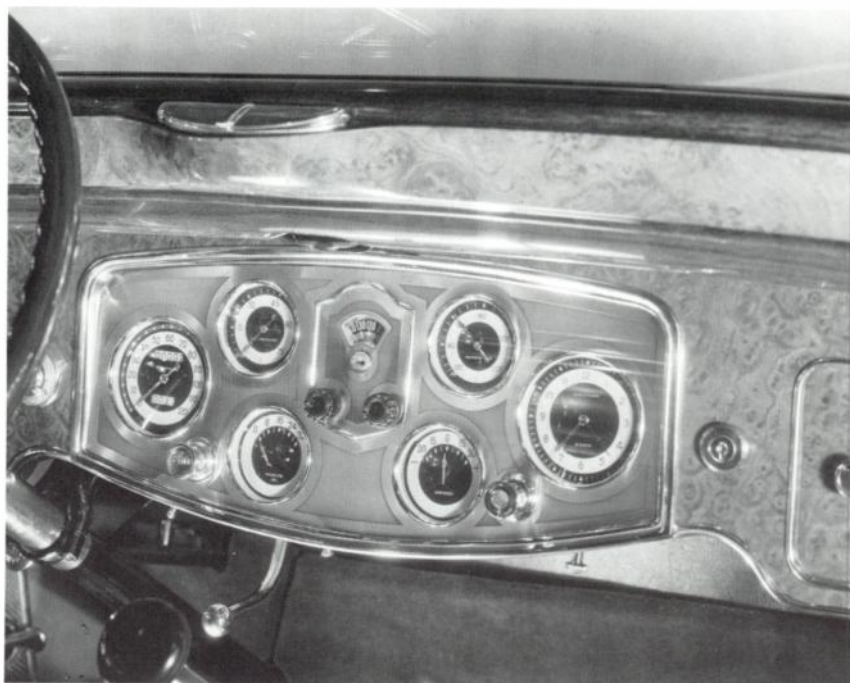


THE AUTO RADIO

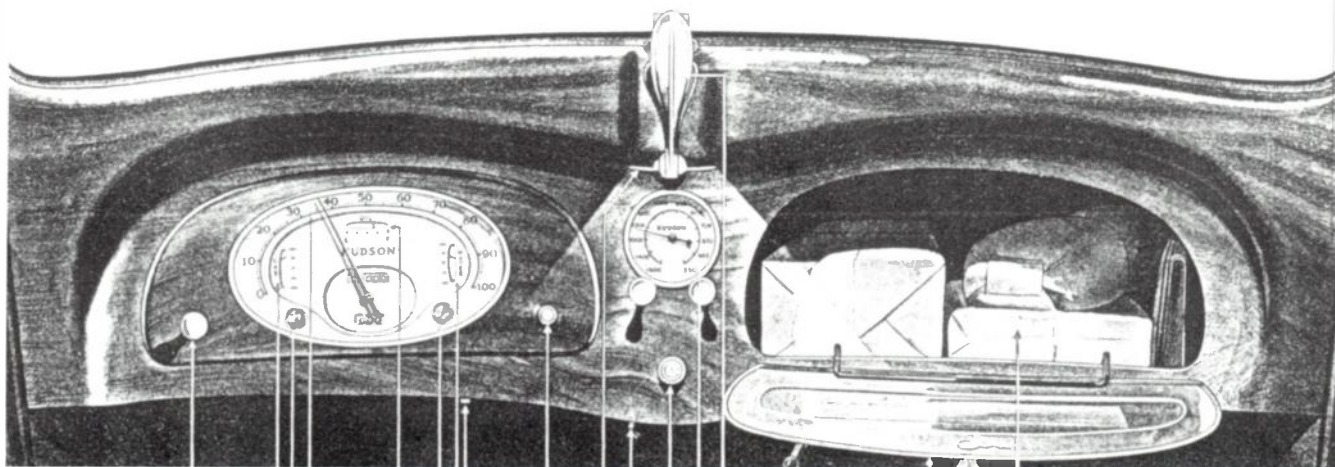
Ford with Center Control by Philco. The receiver was mounted on the firewall above the steering column.



Packard Eleventh Series with attractive center mounted controls. The Philco radio chassis and speaker were located on the firewall.



The 1934 Hudson Eight "airplane Instrument Panel" with radio designed by Zenith.



cars, Hudson-Terraplane, Hupmobile, Nash-LaFayette, Packard, Pierce-Arrow, Reo and Studebaker.

Wells-Gardner was building sets for Cadillac-LaSalle.

Zenith provided radios for Hudson and Terraplane.

In analyzing these suppliers we find some interesting marketing patterns:

Philco played a dual role: they were going after the original equipment business and at the same time building a strong image with distributors and dealers. Of course, they had an advantage in this as they had built up a strong marketing organization for their home radio line and this provided the nucleus for the auto radio line.

This Crosley Roamio was simple to install and easy to enjoy.



\$29.98 complete

CROSLEY ROAMIO "4A1"
is a Sales Booster

THE amazingly low priced Crosley Roamio "4A1" virtually doubles the size of the automobile radio market. Almost every car owner is now a prospective customer.

The Roamio "4A1" is completely self-contained. It incorporates the famous Crosley Syncrotube power unit which saves a rectifier tube, requires no "B" battery, operates from your 6-volt storage battery.

The superheterodyne circuit utilizes two dual purpose tubes which, with the Crosley Syncrotube makes performance equal to that of a seven-tube set. It is marvelously selective and sensitive.

There is also the Crosley "5A1" Roamio automobile radio receiver at \$39.95 complete. See your Crosley distributor.

Montana, Wyoming, Colorado, New Mexico and west, prices slightly higher.

THE CROSLEY RADIO CORPORATION

Home of "the Nation's Station"—WLW—500,000 watts—most powerful in the world—70 on your dial
POWEL CROSLEY, Jr., President

CINCINNATI

WHATEVER HAPPENS...YOU'RE THERE WITH A CROSLEY
CROSLEY ROAMIO

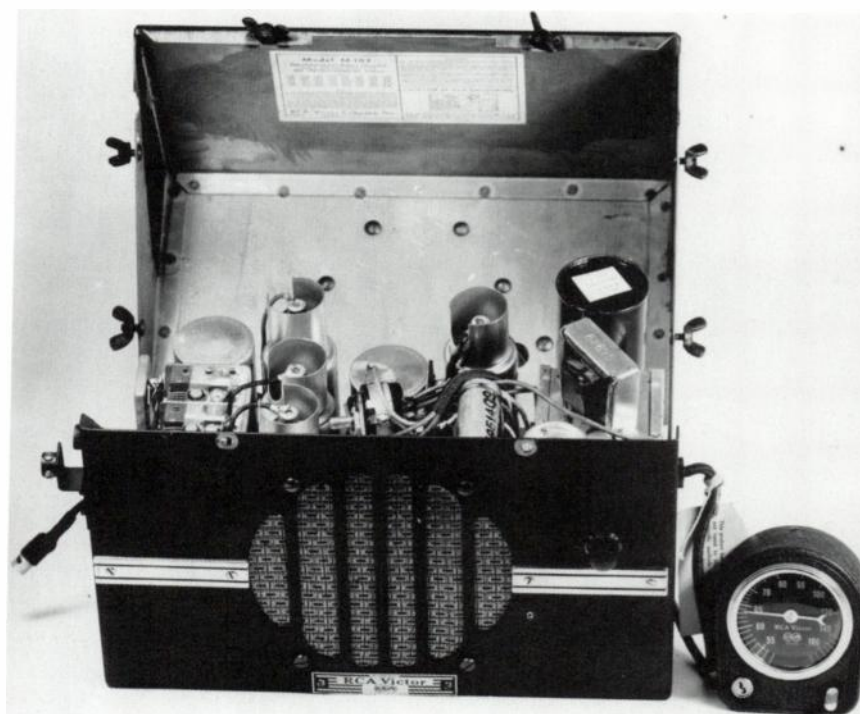
Crosley and Zenith were both interested in about the same goals as Philco, but their businesses were built heavily upon the home entertainment production and both created a limited line of universal auto radios, some with customizing plates to match most any car. It would appear that neither company wanted to bet it all on the car radio at this particular time.

Wells-Gardner apparently had worked up a long standing loyalty with Cadillac and served them well but, since they were producing their own line of products and involved with their private brand activity of building sets for a number of successful catalog houses and chain stores, they did not become involved with additional automobile O.E.M. (original equipment manufacture) business.

RCA seemed to keep in contact with all phases of home and auto radio activity with a wide range of products and would later on be involved directly with the automobile industry. For the time they offered a line of motor car receivers to market through their nationwide distributor and dealer network.

Early in the car radio activity, Paul Galvin of Motorola made the decision not to pursue the original equipment business. Instead, he chose to put all of his energy and resources into the replacement or aftermarket business. Not a bad idea at that time, since a low percentage of the cars were leaving the factory with a radio. Galvin began early in 1931 to set up a distributor and dealer organization with relentless energy and for him it proved successful. Like the proverbial Kilroy, Motorola was everywhere.

RCA Victor Model M-107 a six tube set for universal application.





NEW!...an Auto Radio
that's right at home indoors...too!



General Electric Auto Radio brings sparkling entertainment to highway and home alike!



GENERAL ELECTRIC
AUTO RADIO

This novel General Electric portable auto radio operated equally well in the home.

Motorola produced several fine models in 1934.

Overleaf: United American Bosch Corporation featured the Police Department connections in this message for the annual show issue of Motor.

Arvin, Atwater Kent, Bosch, General Electric and many others were building some excellent car and home radios, each with a dash of individuality, each with their salient features. Collectively, they were doing some advertising in automotive, radio trade publications and weekly magazines and trying to find the best marketing channels. Like Motorola, they did not get directly involved with the major automobile companies insofar as is known.

Radio Retailing, April 1934 (As edited by Vintage Radio Co.)

MOTOROLA

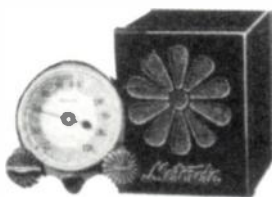
AUTO RADIO

FULL LINE

OF NEW MODELS

— Customer Satisfaction —

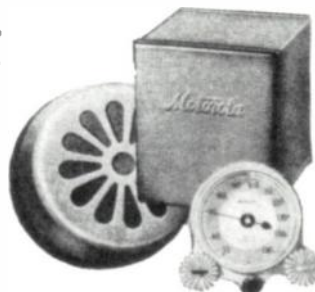
5-Years Specializing in Auto Radio
Manufacture STANDS BACK OF IT.



Motorola Dual 6
6 TUBES—6" SPEAKER

All-in-One Model. Supreme Performance in a Single Unit Auto Radio.

\$49⁵⁰



Motorola Turn 8
8 TUBES—8" SPEAKER

Ultra-Luxe Model. The Finest Auto Radio Money Can Buy.

\$64⁵⁰

Installs in Every Make Car
Super Power—Greater Distance—Finer Tone

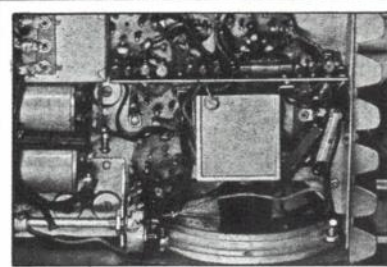
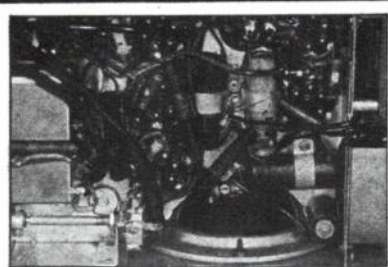
Motorola
Super Power Auto Radio

Galvin Mfg. Corporation

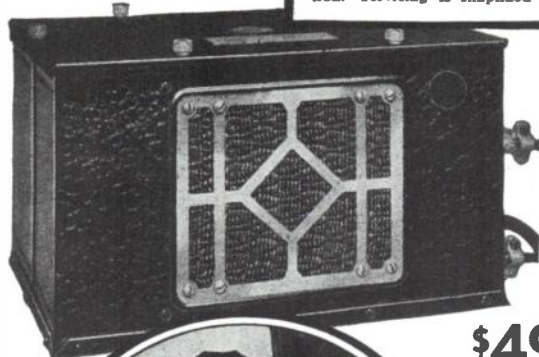
847 W. Harrison St.
Chicago

ANCHORED CONSTRUCTION... as low as \$36⁹⁵

in the new AMERICAN-BOSCH CAR-RADIO



ANCHORED CONSTRUCTION: Photograph at left above shows the wired side of an ordinary car-radio chassis. Note the cluttered hodge-podge of parts and wiring. Photograph at right shows the wired side of the new Model 79 American-Bosch Car-Radio. By means of the new Anchored Construction principle, all wires and parts are grouped into an orderly shielded arrangement that gives them greatest protection from vibration. Servicing is simplified due to the accessibility made possible by this Anchored Construction.



\$49⁹⁵

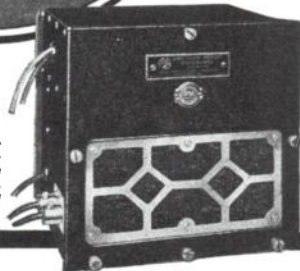
Model 79C—10-tube-performance with 6 high efficiency tubes. One piece unit. Steering post control. (Western Prices slightly higher.)



There are more American-Bosch Police Car-Radios in use than any other make.

\$36⁹⁵

Model 45A—9-tube-performance with 3 high efficiency tubes. One piece unit. Dashboard control. (Western Prices slightly higher.)



Superlative new car-radios also introduce Spark Noise Trap and Brilliancy in Tone

Out of a confusion of claims and counter claims comes proof -- positive proof -- of the reliability of American-Bosch Car-Radio. You will find that proof in the fact that more American-Bosch Police Car-Radios are in use by State and City police than any other make.

Anchored Construction, described and illustrated above, is only one of many new engineering improvements which insures reliability.

The Spark Noise Trap, a new Vibro-Power feature, suppresses ignition noises, thereby assuring clear, unmarred reception.

A more expensive power pack doubles the power output and this reserve power brings out the low notes so necessary for deep, rich tone.

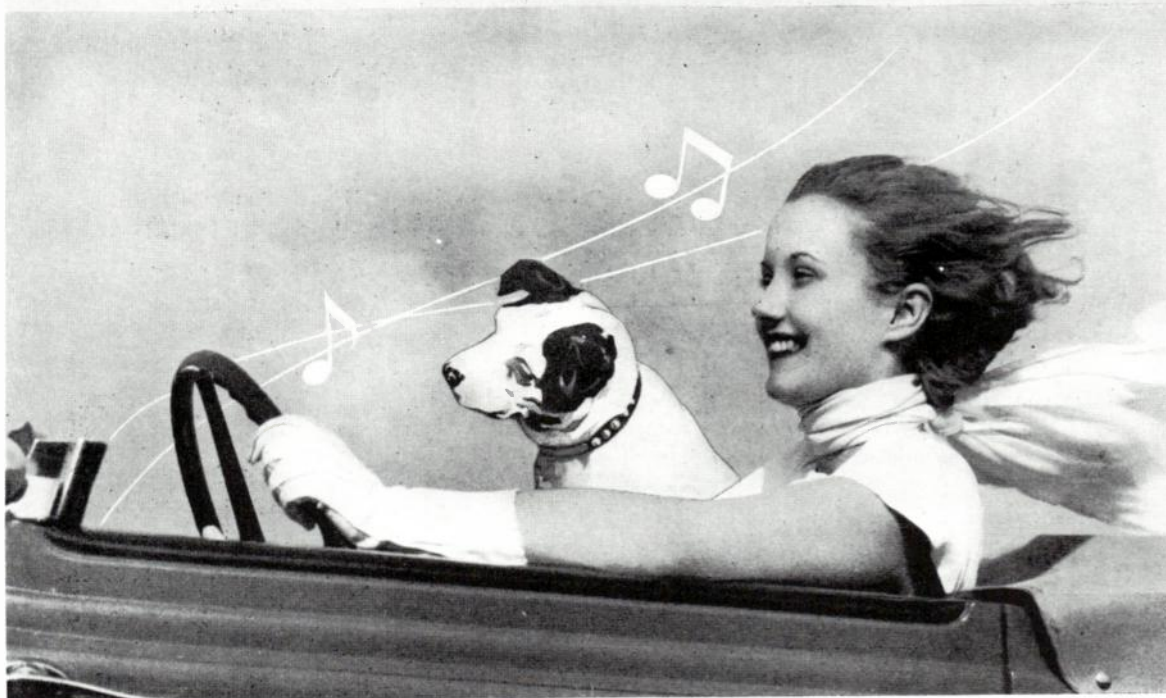
All electrical parts are sealed against heat and moisture. Metal housing and base are made from stronger, more expensive material that gives new protection against vibration and distortion.

Today—now—get the full facts about these new American-Bosch Vibro-Power Car-Radios. Learn how you can get more than your share, make more than average profits, enjoy a good old-fashioned busy and prosperous season.

UNITED AMERICAN BOSCH CORP.
SPRINGFIELD, MASS. - NEW YORK CHICAGO DETROIT

© The makers of American-Bosch products have always taken pride in creating, designing, building and selling products superior to those commonly in use. Proven leaders in their fields, they are built up to a high standard of quality and not down to a price.

"His Master's Voice" *is still master of the road!*



**RCA VICTOR
AUTO RADIO
MOVES INTO 1934
WITH UNEQUALLED
PERFORMANCE**



"RADIO HEADQUARTERS" has the experience, the volume, the engineering knowledge. Isn't it reasonable, then, to believe that from RCA Victor comes a fine auto radio? Introduced just a year ago, RCA Victor Auto Radios sprang into instant popularity. Thousands of motorists discovered what extra pleasure an auto radio gave them.

And now, RCA Victor will shortly announce a new line of auto radios for 1934... including a unique model entirely

different from any you have ever seen. RCA Victor dealers will have it soon. Watch for it.

Prices this year are such that anyone can easily afford an auto radio. Workmanship and performance are better than ever...all in all, "His Master's Voice" on the road is the one you want. For full information and latest auto radio news, write to RCA Victor, "Radio Headquarters", Camden, N. J. A Radio Corporation of America Subsidiary.

RCA Victor

RADIOS • PHONOGRAPH COMBINATIONS • VICTOR RECORDS
RCA VICTOR COMPANY, INC., "RADIO HEADQUARTERS," CAMDEN, N. J.

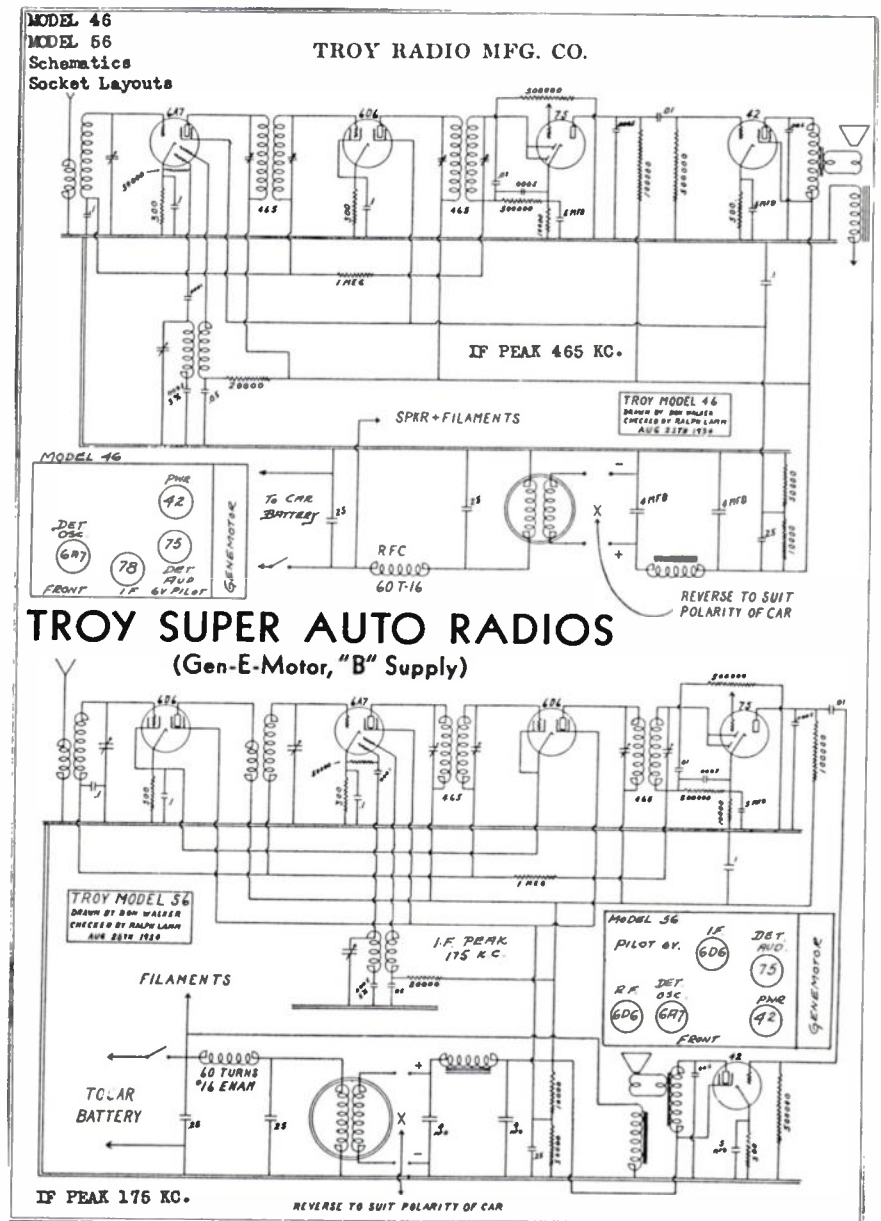


THE AUTO RADIO

Overleaf: RCA advises of their intentions to announce a new line of auto radios for 1934. Note the symbol of the National Recovery Administration.

Troy Radio & Television Co. of Los Angeles produced both vibrator and dynamotor powered sets as indicated on this page from the Specialized Auto Radio Manual.

It was at this time that a number of West Coast companies entered the auto radio business. It seems that Gilfillan Brothers had secured an exclusive licensing arrangement for the West Coast with RCA to produce radios back in the late 1920s. This meant that any firm building radios in that area had to have their chassis built by Gilfillan or make arrangements to build them with their own personnel in the Gilfillan facility. The only other way was to build them in low volume and keep out of sight, in other words, "bootleg" the sets. Some firms, in addition to Gilfillan, that built auto radios in the Los Angeles area for a few years were: El-Rey, Mission Bell, Herbert H. Horn (Tiffany Tone), Parkard-Bell, Roamer (one of several auto radios to carry this name) and Troy.



Add to this, the catalog and chain store brands and you still will not have a complete list of car radio manufacturers and brand names made for the market in 1934. If an individual wanted his own private brand in those days there were some good plans on page 262-3 of August 1934 Popular Mechanics Magazine.

All of this activity was indicative of an industry still in its infancy and an excellent example of free enterprise. There was something for everybody from an ever increasing number of sources. The general pattern for 1934 however, was toward a higher quality product and a better value to the customer with important improvements in design and construction being offered by several manufacturers. Closer cooperation between their engineers and those of the car makers lead to sturdier, more trouble-proof units designed for easier installation and adjustment with more awareness to servicing and better radio noise suppression.

This feature article appeared in the August issue of Popular Mechanics.

FIVE-TUBE ALL-ELECTRIC Auto Receiver

By FRANK M. LUND PART I

THE particular radio experimenter will find everything he is looking for in this homemade 5-tube all-electric superheterodyne auto receiver. Although the layout is of advanced design, construction has been simplified so that any careful beginner can assemble it with very few tools. Thoroughly tested by Popular Mechanics radio laboratory in actual road operation, the results were highly satisfactory in every respect. The superheterodyne circuit used has the advantage of excellent sensitivity and selectivity for a minimum number of tubes and parts. No B-batteries are required as the power unit consists of a small built-in gen-e-motor. This practically trouble-free B-eliminator costs but slightly more than a good set of B-batteries, it operates directly from the 6-volt car battery and only draws about the amount of current necessary for the operation of one auto headlight bulb. Four connections are

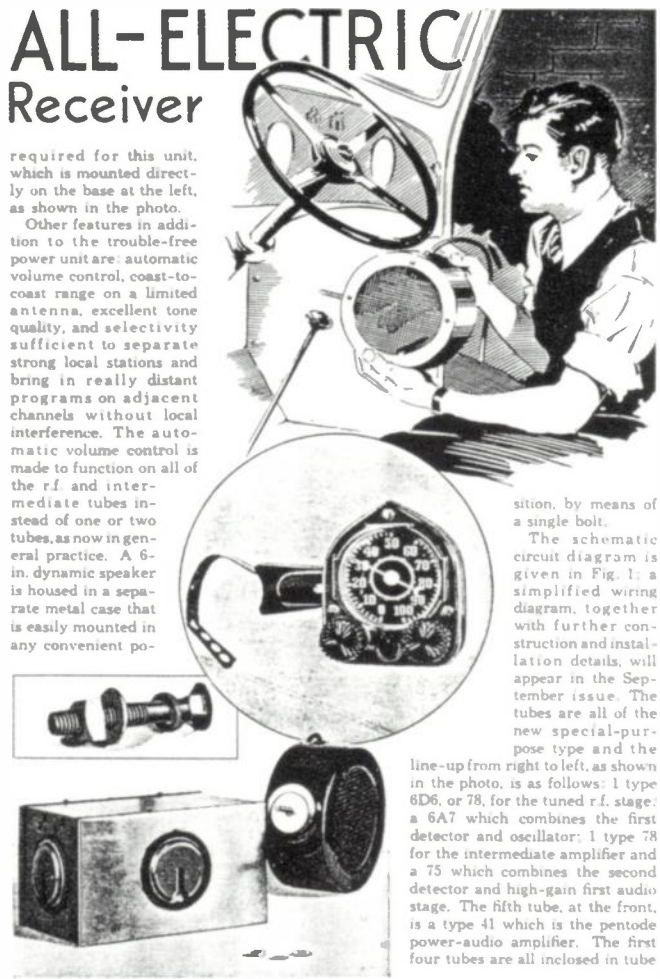
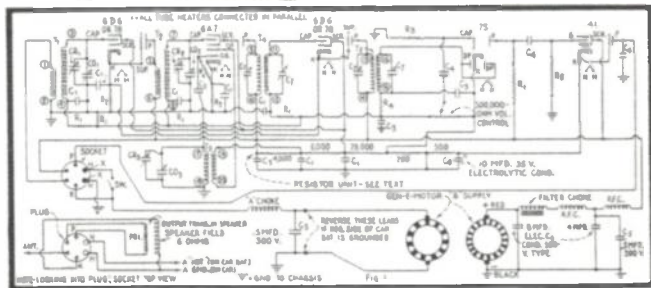
required for this unit, which is mounted directly on the base at the left, as shown in the photo.

Other features in addition to the trouble-free power unit are: automatic volume control, coast-to-coast range on a limited antenna, excellent tone quality, and selectivity sufficient to separate strong local stations and bring in really distant programs on adjacent channels without local interference. The automatic volume control is made to function on all of the r.f. and intermediate tubes instead of one or two tubes, as now in general practice. A 6-in. dynamic speaker is housed in a separate metal case that is easily mounted in any convenient po-

sition, by means of a single bolt.

The schematic circuit diagram is given in Fig. 1; a simplified wiring diagram, together with further construction and installation details, will appear in the September issue. The tubes are all of the new special-purpose type and the

line-up from right to left, as shown in the photo, is as follows: 1 type 6D6, or 78, for the tuned r.f. stage; a 6A7 which combines the first detector and oscillator; 1 type 78 for the intermediate amplifier and a 75 which combines the second detector and high-gain first audio stage. The fifth tube, at the front, is a type 41 which is the pentode power-audio amplifier. The first four tubes are all inclosed in tube



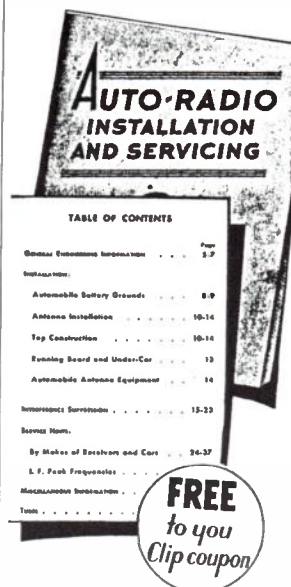
THE AUTO RADIO

Acratone auto radio as it appeared in Federated Purchaser's catalog.

Sylvania, a respected manufacturer of vacuum tubes, offered helpful booklets to the radio serviceman.



NEW KIND of Sylvania Service Book



Now Sylvania engineers have prepared a reference book on auto-radio. This handy pocket manual contains tested information on suppression of ignition interference, 6 types of antennae and their installation, the R.M.A. Resistor Color Code Chart of tube types and other important data you will need in auto-radio servicing.

Send for your free copy. It will help to put you in on the ground floor of the fast-growing auto-radio industry... that Sylvania engineers themselves promoted with their development of the 6.3 volt tube.

HYGRADE SYLVANIA CORPORATION

Makers of
SYLVANIA TUBES
HYGRADE LAMPS
ELECTRONICS DEVICES
© H. B. Corp., 1931

Factories
ST. MARY'S, PA.
EMPORIUM, PA.
SALEM, MASS.
CLIFTON, N. J.

Sylvania
THE SET-TESTED RADIO TUBE

HYGRADE SYLVANIA CORPORATION B-12
Emporium, Pa.
Please send free, without obligation, your new service book "Auto-Radio Installation and Servicing."

Name

Address

City..... State.....

Some manufacturers and wholesalers who suffered the previous year from inexpert installations became more exacting in their selection of retail outlets. They urged retailers lacking skilled electrical mechanics and modern equipment to "farm out" their service to specialists so more manufacturers and wholesalers adopted an "authorized service station" policy.

These factors combined with a rapidly growing popular acceptance, produced a more satisfying and profitable business. Production from all of the auto radio makers in 1934 was nearly 900,000 sets in the United States.

A selection of component and accessory advertisements which appeared during 1934.

THESE ARE Genuine OHIOHM SUPPRESSORS

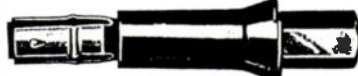
ACCEPT NO OTHER



Model WP (Plug)



Model Z (Universal)



Model WD (Distributor)

153,000 CAR MILES
Without a failure!

OHIOHM SUPPRESSORS

Have achieved such a record under conditions of 95% relative humidity, a temperature of 140° F., and connected in series to an ignition system operating at the equivalent of 60 M. P. H. for 2,550 consecutive hours.

Also
Available in
Complete Sets

consisting of
necessary
suppressors
and condenser
to fit all makes
of cars.

Get them from
Your Jobber
or directly from



THE OHIO CARBON CO.
12511 BEREA ROAD CLEVELAND, O.

I.C.A. AUTO-RADIO AERIALS

Getting the
BEST in
Auto Radio
reception

I. C. A. DE LUXE AUTO ANTENNA



Highly sensitive easily installed running board antenna for every make of car. Reception usually exceeds roof aerials. Extra sturdy construction. Completely water-proofed and rust-proofed. Will not break or crush. Has special spring arrangement to absorb shocks and also a splash guard to keep the antenna clean. Will not short or ground the antenna. Lead wire is high tension, non-shorting type.

No. 347 List \$3.00

ADJUSTABLE METAL AERIAL



No. 349

List

\$3.75

A very ingenious type metal auto aerial with shock absorbing spring, so constructed as to attach to the running board of any car, and to be adjustable both to length of running board and to pick-up strength to set used. Comes complete with insulated bushings and all hardware for attaching. Fits any make car; is easy to mount. Takes less than 5 minutes to install.

ICA "Two-Mount" Running Board Aerial

An efficient all-metal running board aerial which is mounted under the running board of any car in a few moments. It is supplied complete with two mounting springs and ample wire leads.



No. 343

List \$2.00

TESTED and proven under the most critical conditions, ICA AUTO-RADIO ANTENNAE will definitely improve the reception of any receiver. They are made to work right, good in design, scientifically planned and carefully constructed of only the finest materials. ICA offers a variety of auto aerials to meet every need of the automobile owner.

NEW—ELECTRALLOY ALL METAL AERIAL



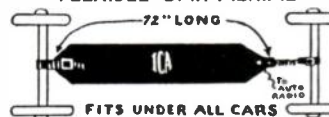
No. 346

List

\$2.50

This new, inexpensive, one-piece electralloy aerial is easily and quickly mounted under the running board of any car. Electralloy is non-magnetic and non-corrosive. It provides ample pick-up and true, noiseless reception under all conditions. It is 35" long, 8" wide and is unaffected by weather. Without a doubt the most efficient aerial of its type at any price. Supplied complete with three heavy springs and rubber washers—a protection against breakage—and an ample wire lead for connecting to the radio.

FLEXIBLE CAR AERIAL



Heavily insulated, weather-proof and rust-proof, aerial that extends between the axles at the bottom of any car. 72 inches long by 5 1/2 inches wide. This flexible aerial is universally adaptable to every make automobile. Highly effective, easily installed aerial. A heavy coil spring at one end of the aerial takes up any slack. Supplied complete with straps, buckles, spring, etc.

No. 350

List \$2.75

ICA ROOF ANTENNA



The ICA Roof Antenna can be easily inserted in any automobile by opening the roof lining about a foot, inserting the aerial and running the lead wire down the corner post to the radio set. For open cars, the roof antenna can be slid between the folds.

The Roof Antenna measures 13" x 33" and utilizes a fine grade of pure copper entirely encased in a specially prepared cloth. It provides ample pick up and selectivity for any automobile radio.

No. 342

List \$1.50

WIZARD AERIAL



A quickly installed aerial for automobile radios. It is self-contained, requiring no ground. Can be placed under driver's seat or any convenient place in the car. Ideal for use in open cars where two Wizard Aerials can be connected together and placed in the folds of the car top when down.

No. 348

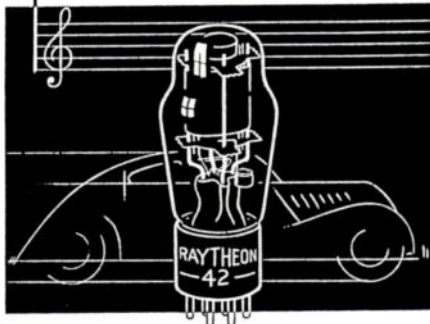
List \$1.00

INSULINE CORPORATION OF AMERICA



NEW YORK, N. Y., U. S. A.

**ITS USE REFLECTS
ITS CHARACTER**



LIKE a human being, the character of a radio tube can be told by the company it keeps. If there is an integrity of purpose behind it, a superb skill in its manufacture, these will be reflected in its use in places where only the finest of precision instruments can be used.

Huge planes of the great continental transport companies, alert police cars on watch throughout the country, expeditions probing the farthest reaches of the earth, buy and use Raytheon 4-pillar Tubes because of their precision-construction, and because of the 4-pillar-support principle which guards this precision.

The automobile radio, now vastly increasing in use, demands a radio tube that can withstand the cruelest treatment. And it is not to be wondered at if automobile manufacturers, installing these radios as standard equipment in their cars, specify Raytheon 4-pillar Tubes.

When you sell new tubes to a set owner, you can recommend with confidence Raytheon 4-pillar Tubes — making not only a satisfied customer, but a sound profit for yourself. For a tube of such excellence is merchandised only on the very soundest principles of profit.



RAYTHEON

4-PILLAR RADIO TUBES

RAYTHEON PRODUCTION CORPORATION

50 E. 42nd St. 55 Chapel St. 445 Lake Shore Drive 555 Howard St.
New York City Newton, Mass. Chicago San Francisco

1935

In a tragic accident, Will Rogers and Wiley Post, bound for Russia, crash the Winnie Mae near Point Barrow in the frozen wastes of the Arctic, and Huey Long, the "Kingfish," colorful, corrupt governor of Louisiana, is assassinated in the State Capitol.

On September 3, Sir Malcolm Campbell in his racer, the Bluebird, breaks another speed record, flashing by at 299.874 miles per hour.

Some 30,000,000 people are traveling and vacationing by car. Carl Magee sees a market and invents the parking meter.

Women are trying to achieve the flat tummy and slim waist of Ginger Rogers; the undergarment industry responds with lighter, prettier corsets and lingerie. The permanent wave is here, and women flock to beauty parlors which are springing up everywhere.

In the world of arts: Elvis Presley is born; Errol Flynn reports to work in Hollywood at \$100.00 a week; Mickey Mouse is an international star and Duke Ellington is playing jazz at the Cotton Club.

The Swing Era is born on the night of August 21, at the Palomar Ballroom in Los Angeles as an enthusiastic audience hears Benny Goodman. Goodman also makes his first air appearance in New York City on the "Let's Dance Program."

Gershwin's great Negro folk opera, "Porgy and Bess," opens; Cole Porter writes "Begin the Beguine"; Irving Berlin contributes "Deep Purple" and "You Are My Lucky Star" and Duke Ellington's "In a Sentimental Mood" becomes a favorite.

RADIO'S GOLDEN YEARS

By 1935 the success of the radio in the automobile was causing industry leaders to pay attention. According to a McGraw-Hill report, the total sales of auto radios in the United States from the beginning of 1930 until the end of 1935 had totaled 1,909,000 units for a value of \$82,488,000. The amazing part was that much of this was accomplished during the depths of the depression and the car radio was a relatively new product. Of course these figures were still small compared to the total radio market, but the projected sales for 1935 were over one million units for the year. The potential for the new car market was excellent, but the enormous market for radios in cars already on the road had hardly been tapped.

There were about eighty-two firms building radios for automobiles at the beginning of 1935, and they ranged from the top line companies to the "loft" operations. A typical example would be like this: A radio engineer, or otherwise knowledgeable individual who knew his way around in the industry, would team up with an outgoing sales type with similar background who usually knew where he could get some orders, and they would form a partnership. They would take low rent, second floor quarters in Chicago or New York where they were close to material sources; put up a row or more of benches; hire a group of girls who knew how or could learn to assemble parts, wire circuits, solder and presto, they were in the radio business. If the product was good and their price was right, there was often business to be had. (There were brokers or factors in the radio game who knew how to get orders for a price.) If they were not real sharp they would fail or just drift away.

Many of the newcomers had been in the home radio business and were adding a line of auto radios. If they had a loyal following of buyers, distributors or dealers, they would realize some additional gross sales. It was always difficult to get an accurate count on the number of actual production firms, since many were second sourcing (having some of their sets made by another contractor), thus some doubling of the figures would occur. This was especially true of mail order catalog and specialty houses as discussed earlier. It was not unusual to find an identical auto radio shown in detail in the technical manuals in two or three places, each under a different name.

As the radio became quite intricate and required more than simple tooling to fabricate and accurate test equipment to align and calibrate the final product, it became more difficult and costly to break in

the business. The matter of finding a niche in the market and organizing a sales staff required considerable planning and expense. As always happens in the business world, there comes the time when the leaders surface and far surpass the rest of the pack. This very thing was happening by 1935, but people and circumstances change, and those who were on top one day might be on the bottom the next.

The state of the art in both the automobile and radio had reached a high degree of sophistication in a very short period of time. The products looked good and they were good. The big automotive news for 1935 was the all-steel body with a one piece steel top which was introduced by both Hudson and Fisher body. The "turret top" as coined by General Motors would be a nemesis to the car radio installer, but more about that later. Another sensation, more inspiring than profit making, was the new Auburn 150 horse-power, Supercharged Speedster which was certified at 100 miles per hour. This was just in case you could find someplace to "let it out." The design theme in styling and marketing was still one of streamlining and swiftness; hence, references to the airplane were made. Streamlining was essential to an aircraft and the surface had to be free flowing, tapering toward the rear with no protuberances, and often wind tunnel proven, in order to reduce drag.

Streamlining was not limited to the automobile, however, as witness the RCA Victor "Magic Brain" auto radio. The Models M-104, M-108 and M-109 were available with the streamlined control unit which was designed to be clamped to the steering column.

RCA designed a radio especially for the 1935 Graham cars with an attractive and convenient instrument panel control. Speaking of attractive packaging, the Fada Model 166 came as a single unit radio, a five tube chassis, power pack and speaker, all packaged in a large drum type "can." Outlets from this unit were for battery lead, antenna connection and control cables.

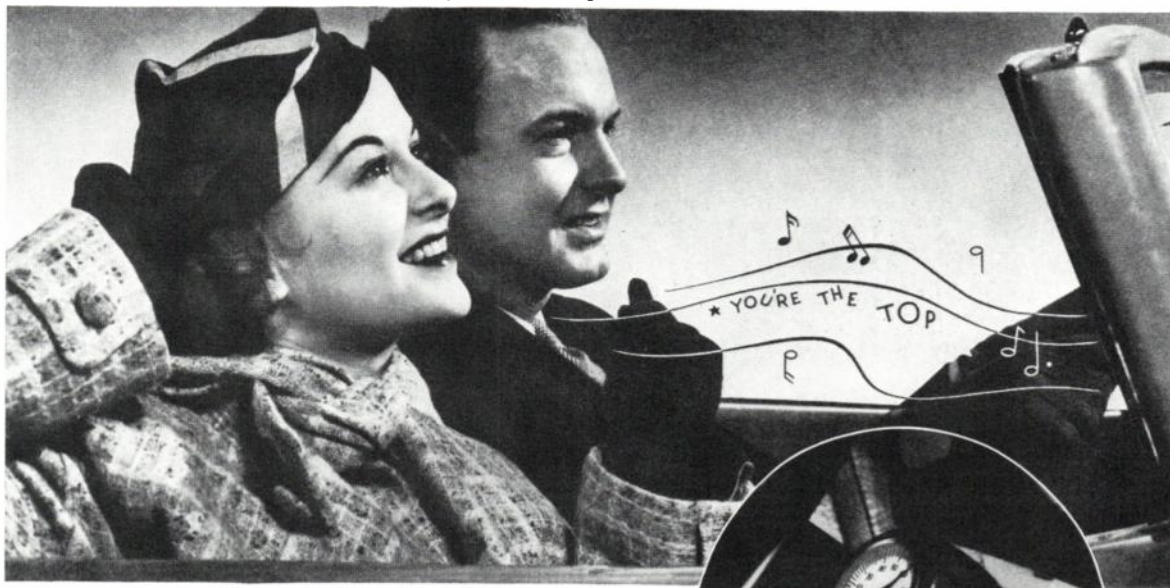
The Nash and LaFayette cars featured a very practical, fabricated compartment in the left side of the instrument panel, designed to accommodate a Philco receiver control assembly. The Nash and LaFayette line incorporated roof antennas and heavy duty generators as stock equipment.

Packard was one of the first automobiles to incorporate the radio controls in the instrument panel, and had an excellent liaison with the Philco engineers in the design of the radio and controls. (Philco maintained an engineering office in Detroit to be close to the auto makers.) Packard was a prestigious name and everything that went into the car had to be well engineered especially on the top line

Opposite: An open car, a handsome couple and music in the air. RCA captured the feeling with this "Magic Brain" advertisement.

THE SATURDAY EVENING POST

Now for your Car... "Magic Brain" Radio Joy... by RCA Victor



★ From the New York Musical Comedy "Anything Goes"

Wonderful new auto radios specially designed to bring you home-radio richness of tone and freedom from noise

YOU never heard such tone except in the big, expensive "Magic Brain" living room sets... tone so clear and rich... tone so pure and free from crackle, spark and sputter.

Another "Magic Brain" Triumph

The new RCA Victor auto radios employ the famous "Magic Brain" principle... the engineering advance that has revolutionized home radio reception. You'll be delighted with the remarkable ease of tuning—and the sweet, clear tones of domestic programs. For these outstanding auto radios are designed to meet today's driving needs. Neat, compact, easily installed.

With Built-in Noise Filter and Powertron

To guard against spark-plug interference, RCA Victor has built into these fine auto radios a remarkable antenna noise-filter... an exclusive RCA Victor development. The

"Powertron" is a special new RCA Victor power device which improves reception by actually giving you extra tube performance. And to make it easier for you to tune in station after station—even while driving at night—you have at your fingertips the new, handsome streamline control unit with illuminated airplane dial.

Remarkably Low Prices

Model M-104 (with tone control) is only \$49.95. Model M-108 is a two-unit set at \$54.95. Model M-109, de-luxe two-unit set... with over-size speaker and every improvement for modern automobile radio reception... at \$74.95. All list prices F.O.B. Camden, New Jersey.

See and hear these wonderful new auto radios—at your RCA Victor dealer's! Ask about the new RCA Victor Di-Pole Antenna, especially designed for the new steel-topped cars.

An RCA Victor Auto Radio for every car and purse—\$39.95 to \$74.95

Last Prices F. O. B. Camden, N. J. Prices subject to change without notice.

RCA Victor auto radio installation and service at RCA Victor dealers and United Motors Service Stations.



RCA VICTOR

RCA VICTOR, ONE UNIT OF RADIO CORPORATION OF AMERICA... THE WORLD'S LARGEST RADIO ORGANIZATION. OTHER UNITS: NATIONAL BROADCASTING CO., INC. ... R. C. A. COMMUNICATIONS, INC. ... RCA RADIOTRON... RADIOMARINE CORPORATION OF AMERICA

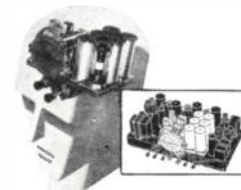


MODEL M-104. "Magic Brain" on the road
... with streamline control unit
\$49.95
F. O. B. Camden, N. J.

The "Magic Brain" brings New World of Radio Pleasure



MODEL 243: "Magic Brain" Console Grand Radio. Tuning range: U. S. Gov't. weather forecasts, domestic broadcasts, police, aircraft, amateur signals and foreign reception. 10" dynamic speaker, airplane dial, automatic anti-fade volume control. Two-toned, hand rubbed walnut finish. With RCA micro-sensitive radio tubes. List price (F. O. B. Camden, N. J.) \$119.50. Other RCA Victor instruments from \$18.75 to \$375.



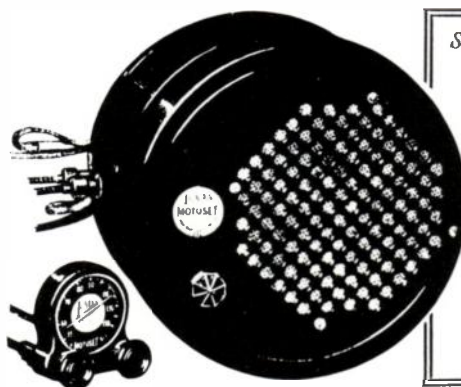
The "Magic Brain" (shown above in white) is a built-in system that directs reception—just as the human brain directs nerves and muscles. Automatically concentrates entire set on the station you select. Brings higher fidelity tone to everything you hear... more stations... tuning of needle-point precision... freedom from noise.

TUNE IN the Radio City Matinee, NBC Blue Network, Wednesday 2 to 3 p. m., E. S. T. Use full hour by famous Victor recording artists. Also Radio City Party, Saturday night, 9 to 9:30 p. m., E. S. T. coast-to-coast NBC Blue Network. Frank Black's Orchestra, John B. Kennedy, famous guest stars and the radio stars of tomorrow.

THE AUTO RADIO

Fada, Bosch, Westinghouse and others went in for the barrel shaped radio and loudspeaker package in the mid 1930s.

FADA Radio Presents the New 1935 6 TUBE MOTOSET MODEL 166



Sensational Quality Features

- 9 Tube performance
 - Superheterodyne circuit
 - Delayed automatic volume control
 - 3 Gang shock mounted condenser
 - Variable tone control
 - Plug-in vibrator unit
 - Illuminated full vision airplane dial
 - Remote control for mounting on steering column or under panel or face of panel
 - Full power supply from storage battery connected at motor
 - Three piece housing facilitates installation
 - Built-in spark plug filter eliminates spark plug suppressors
 - Diode detector
 - Low battery drain
 - 3 Watts undistorted output
 - 6 inch dynamic speaker with famous "Fada tone"
- List price only . . . \$49.95
Complete with genuine RCA Radiotrons

UNEXCELLED IN PERFORMANCE!
UNMATCHED IN BEAUTY!
UNEQUALLED IN VALUE!

Three reasons why there are greater profits for the dealer who features the sensational new Fada Motoset.

ONE MODEL: The finest that engineering skill can build.

ONE STYLE: Designed to meet immediate acceptance.

ONE PRICE: Low enough to fit the purse of every automobile radio prospect. We invite you to write or get in touch with your Fada jobber regarding our liberal discount plan.

FADA RADIO & ELECTRIC COMPANY

Cable address: "FADARADIO"

Long Island City

New York

MAY, 1935 •

SAY YOU SAW IT IN SERVICE

MAIL THIS COUPON TODAY!

FADA RADIO & ELECTRIC CO.

20-20 Thomson Ave.

Long Island City, N. Y.

Gentlemen: Please send me complete information on your new Fada Motoset.

Name

Address

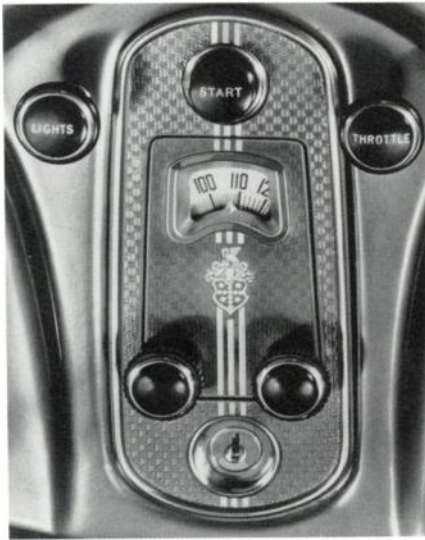
City

State

Eleventh and Twelfth series. There were usually two or three different radios and controls to meet the different models. The Philco Model PHD Deluxe seven tube radio was worthy of the expensive car for which it was intended in both performance and the appearance of the controls in the driving compartment.

Three rather exciting innovations during the year. First, was the ear-level header-mounted speaker; second, the internal device to eliminate spark plug noise; and third, the news of the all-metal radio tube.

Seemingly all of a sudden, it became the year to mount the speaker in the header area above the windshield. Since at that time the header bar was a trim piece covered with the top liner material and could be removed, it was possible to chase the speaker cable up the door post and into the area. The speaker came



Controls for the Packard 120 with a custom built radio by Philco-Transitone.

Packard Twelve with a deluxe radio installed.



fitted with an adapter to match the profile of the header and the top lining and to provide a space for the dynamic speaker. Delco (United Motors Service) and Philco provided this system to many of their original equipment customers, while Arvin and Motorola supplied header speaker kits to the aftermarket trade, finished to match the interior of the car.

One customer who made the most of this in their advertising program was the Ford Motor Company. The 1935 Ford Radio Philco Model FT6 was similar to the 1934 Model N except for the closed car installations. These units were produced with a blank plate in the radio case where the speaker opening had been. The speaker was then mounted on the header as indicated above. For the open car installations, the speaker was left in place as for the previous year. A larger, easier to read dial and controls were mounted in the space provided when the ash tray was removed. A separate ash receiver assembly was available for installing in the instrument panel at an alternate location. The factory or dealer installed price was \$44.50. In December of 1934 a sales letter went out which advised that the company would equip 75% of

their deluxe models with radios. Approximately 200,000 were contemplated for the model year.



Ford Model FT-6 open car radio showing self-contained speaker.

The Radio that's Built for your NEW FORD

... AND THE FORD IS DESIGNED TO RECEIVE IT

"What makes this radio sound so lifelike?" Many people ask this question when they hear the New Ford Radio for the first time. There are two reasons for its impressively fine performance.

First—it is designed and built exclusively for the Ford V-8, and the car is engineered to receive this particular set. Second—it is the newest development in the automobile radio field. Many advance features, including Far-level Sound Reception, Tone Control and Bass Compensation, combine to make possible the splendid results you get at all car speeds. Ask your neighborhood Ford Dealer to demonstrate this new set. Price \$11.50 installed. Convenient terms if desired.

FORD MOTOR COMPANY



FORD BATTERIES

cost less in the long run, because they're built to last longer and deliver the extra power needed by hard-working cars and trucks. Three sizes—each a big value.

FORD WHEEL BANDS

of rustless steel add extra emphasis to the beauty of Ford cars. Quickly attached. Snap on wheels without bolts or fittings.



FORD WINDSHIELD WINGS

of Safety Glass attach securely to the car and serve to deflect the wind when windows are lowered.



FORD LUGGAGE CARRIER

rigidly mounted at rear, keeps baggage out of passengers' way—a convenience you'll appreciate when touring.

FORD DUAL WINDSHIELD WIPER

improves the driver's vision in stormy weather and makes riding more pleasant for those beside him.



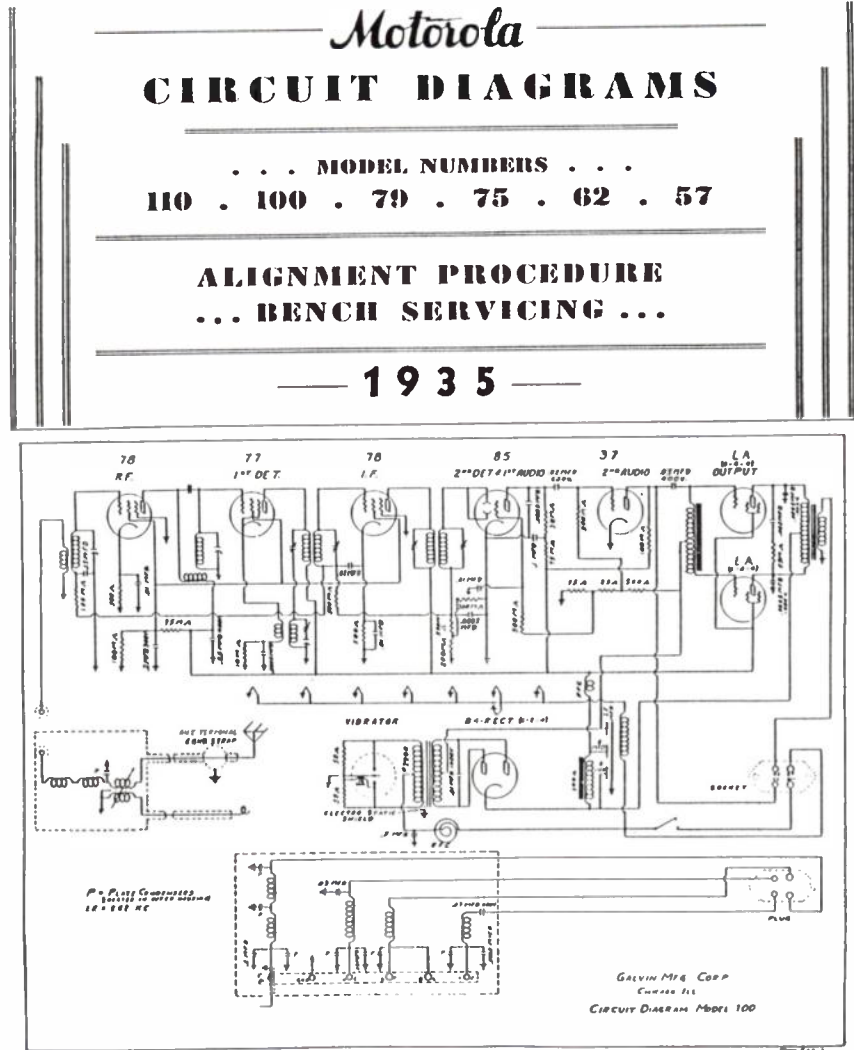
FORD SEAT COVERS

are tailored to fit Ford cars. Quickly removable for washing and easy to put back on.

The FT-6X was the same radio with the external speaker as shown in this closed car installation.

In regard to the noise eliminator, Motorola released their new Model 100, an eight tube, "suppressor-less" set. It was announced to the trade in June 1935. Of particular interest was a balancing type of filter that supposedly made the use of spark plug suppressors unnecessary. The device contained elements to perform the function of eliminating of the spark plug noise which would come into the set through the battery cable and the antenna lead. The basic principal of operation was the intentional introduction of noise into the system. This was fed into a balancer which consisted of two mutually coupled coils and a means of varying the coupling between them. The idea was that when the energy in the two coils was equal and opposite in phase, the noise would be canceled out.

Circuit diagram for Motorola Model 100 showing the noise balancing feature.

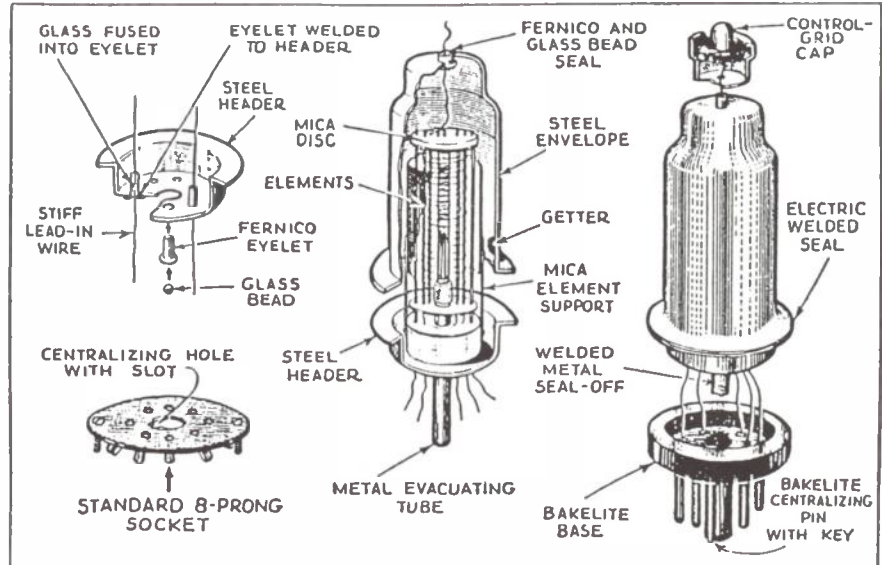


The all-metal tube was certainly an engineering triumph. The General Electric Company scientists achieved the seemingly impossible, that of exhausting and sealing the metal enclosure. The surprise to the old timers was that they were used to looking through the glass and seeing the elements of the tube. They also missed the dull red glow from the heater that meant two things: one, that the tube heater was intact and two, the set was getting current. With the metal tube, only the sense of feel was left as a physical check. But beware when the metal tube was working and drawing current, it could burn the fingers; metal tubes became hot, since they did not dissipate heat as well as glass. On the plus side, they were more compact and the elements of the tube were better supported, thus making the tube more rugged. Metal tubes did not require an external shield and they were not as easily broken.

The tubes were marketed by RCA as was the practice that had been established since their founding.

(RCA was established as the marketing group for radio products designed by General Electric Company, Westinghouse Electric and Manufacturing Co. and Wireless Specialty Co. as discussed previously.) The metal tubes did not come into immediate use in auto radios in 1935. Motorola used metal tubes in some of their sets for the 1936 model year, others used some metal and some glass tubes. For a while, some auto radio manufacturers used the metal tubes as an advertising plus, but they never swept the industry.

Exploded views of the revolutionary octal base metal tubes.

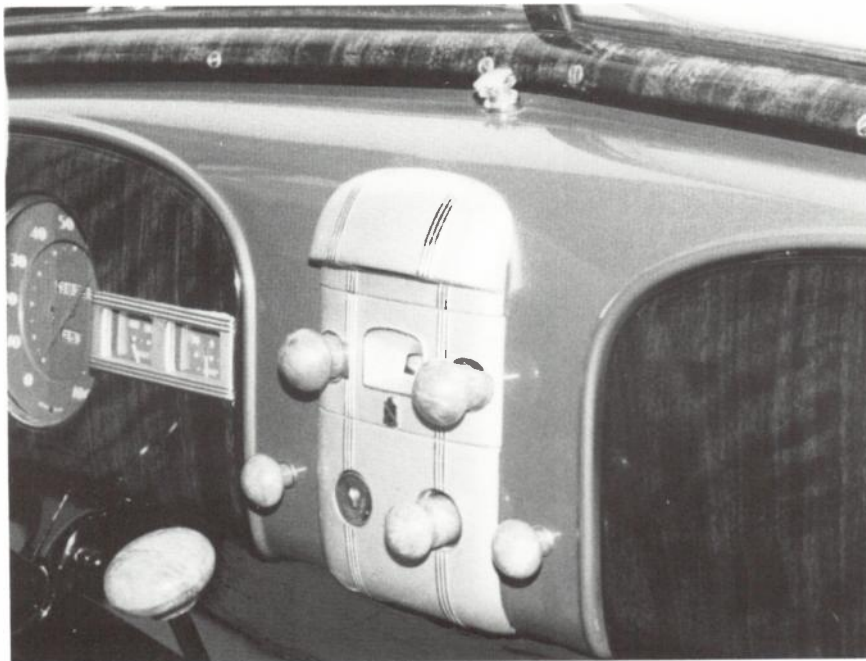


All of the latest innovations were fine if the radio had an antenna, without which there would be no need of the foregoing. The conventional in-the-roof antenna was the best and it was the antenna by which all others were judged. The turret top which appeared on Hudson and most General Motors cars for 1935 apparently was introduced without asking the radio engineers. It was long overdue from the standpoint of safety and protection from the elements, but gone was the antenna. The immediate alternatives were some form of under-car antenna, the spare tire or a fish-pole design. The most popular turned out to be the running board type which could be readily installed and was not as vulnerable to snagging as a wire harness strung between the axles. According to figures available at the time, the running board style was less than half as efficient as the roof type. This meant more reliance on the gain of the radio to make up the difference. By careful engineering and the introduction of impedance matching transformers, it was possible to offset some of the losses from the necessarily long shielded lead-in from this type of antenna.

The 1935 Chevrolet radio Model 601574 partially solved the problem by using capacity coupling and resonating the receiver with the antenna to make up for the relative inefficiency of the under-car antenna which was necessary in the all steel top cars. The receiver used four tubes, three of which were dual purpose. The speaker was designed for mounting on the header board located above the windshield. The remote controls used with this receiver mounted in the instrument panel, provisions for which were made in the manufacture of the car.

Buick, Oldsmobile and Pontiac offered a selection of radios with four, five and six tube circuits. Some were available with either header bar or dash mounted speakers. Remote controls were designed for mounting in the instrument panel or on the the bottom flange. The antennas were of the under-car type and the receivers all used a similar antenna matching network as described for the Chevrolet.

Passenger's view of a 1935 Oldsmobile with the radio controls front and center.



If you were involved with car radios or otherwise connected with the radio business in 1935 and wanted to keep up on the latest in radio parts and test equipment or meet people in the industry and just generally catch up on what was new, the Third Annual Trade Show of the radio service industry held at Chicago's Sherman Hotel was the place to be on March 22nd through the 24th. Trade shows were a great opportunity to meet old friends and make new ones.

So, 1935 was quite a year, and when the final results were in, 1,200,000 sets were sold in the United States.



THE EYES OF THE
RADIO SERVICE INDUSTRY

WILL BE TURNED TO

CHICAGO

MARCH 22, 23, 24, 1935

WHEN THE

THIRD ANNUAL CONVENTION

AND

TRADE SHOW

OF THE

RADIO SERVICE INDUSTRY

WILL BE HELD AT THE HOTEL SHERMAN

For RADIO SERVICE MEN, Engineers and Amateurs:

Exhibits of the latest things in Parts, Test Equipment, Public Address, Cathode Ray, Meters, and so forth.

Service Talks by the most outstanding speakers in the Radio Service World—on subjects close to your heart.

Demonstrations of unusual Electronic Apparatus. The opportunity to meet and become acquainted with those that manufacture the products you use every day.

For RADIO PARTS DISTRIBUTORS:

Meeting: Parts division Radio Wholesalers Association to which all Parts Distributors are invited.

For RADIO PARTS MANUFACTURERS:

The opportunity to meet real Radio Service Men. The opportunity to get their direct opinions of your products. The opportunity to effectively promote the sale and distribution of your merchandise.

The Institute of Radio Service Men, Inc. (a Professional Association)

AND

The Institute of Radio Service, Inc. (a Trade Association)

Invites You to Attend

ADMISSION FREE

SAY YOU SAW IT IN SERVICE



Even the hitchhiker demanded the pleasure of an auto radio, as this interesting Gaar Williams cartoon so amusingly portrays. It appeared in the July issue of the Ford Merchandising Bulletin through the courtesy of the Chicago Tribune.

Opposite: Trade shows, for the exhibitors it was show and tell. For the attendees it was see, learn and enjoy.

1936

Margaret Mitchell's Gone With the Wind is a meteoric success: Scarlett O'Hara and Rhett Butler kindle the imagination of millions.

All America is at the radio to hear Edward VIII of Great Britain abdicate his throne for the "woman I love," Wallis Warfield Simpson.

While she's sipping a coke at a Los Angeles soda fountain, Julia Jean Mildred Turner, tomorrow's "sweater girl" Lana Turner, is spotted by a talent scout. Artie Shaw, a twenty-six year old clarinetist, gives a swing concert at New York's Imperial Theater, and Shirley Temple is already a top box office star.

Ford Motor Company sponsors radio broadcast of the World Series. Millions of fans thrill to radio commentators: Boake Carter's, Ty Tyson's and Gabriel Heater's play-by-play reports as the Yankees beat the Giants for the World Championship. At the Olympic games, Jesse Owens, black track star, wins four gold medals for the United States.

Some behind-the-scenes broadcasting for 1936: Sponsors for CBS' "The Flying Red Horse Tavern," sign Eleanor Powell, singing and dancing star, to a long term contract.

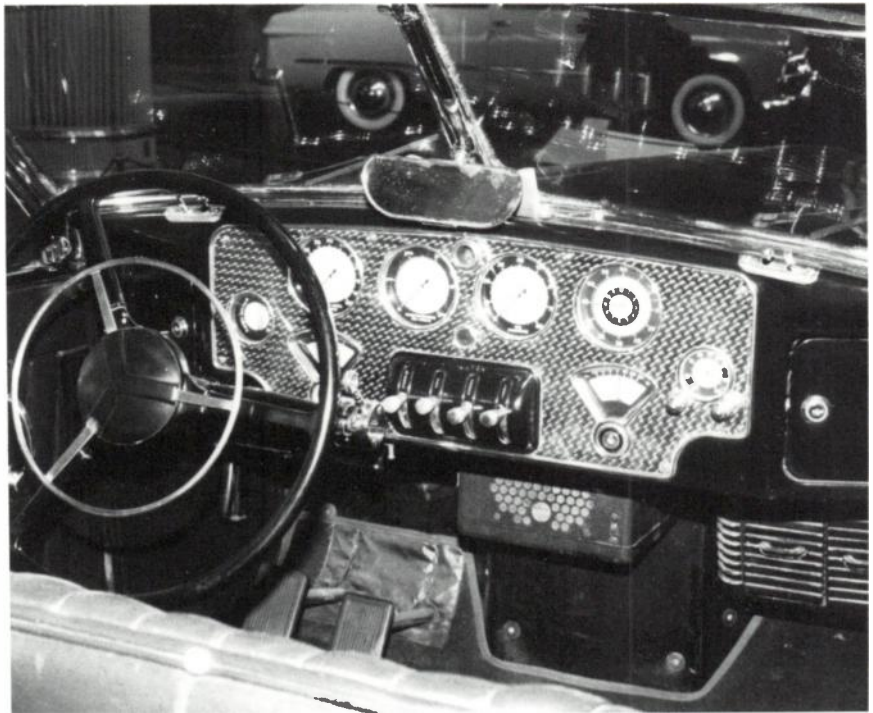
NBC brings to music lovers from coast-to-coast the unsponsored, Saturday afternoon, full-length operas direct from the Metropolitan Opera House in New York.

In a never-ending search for fresh, new material, the Hollywood talkies scour the ranks of broadcasting stars and discover the inimitable: Jack Benny, Fred Allen, Gladys Swartout, Lily Pons, James Melton, Jane Froman and Alice Faye.

RADIO'S GOLDEN YEARS

Nineteen hundred and thirty six was another exciting year for the automobile and radio industries; changes continued and 1936 had its share of surprises. On February 15th, the first of the daring new Cords rolled off the assembly line, and superlatives were not invented to describe the effect this car had on the lovers of automobile styling. The high crowned fenders with the hidden headlights, the long hood and beautifully proportioned body made this car the most recognized car on the American scene. The ultramodern interior and engine-turned-instrument panel was more like an airplane than an automobile. With one master stroke, stylist Gordon Buehrig, created for all time, a memorable impression on the automotive world.

Impressive display of instrumentation in the "cockpit" of the Cord. The radio controls are the two small knobs and round dial on the far right.



Another achievement was the new Lincoln Zephyr V-12, based on an earlier design by John Tjaarda and personally followed by Edsel Ford, gave extra dimension to the words streamlining and teardrop. It was totally new as was the Cord, yet entirely different. So much so, that if one had to decide between the Cord and the Zephyr, one would have to take both.

On the radio news scene, the shape of things to come was beginning to be evident. In home radios, the trend was toward high styled cabinets, large airplane dials with impressive markings for several wave bands,

and lots of control knobs. The Grunow "Teledial Twelve All Wave, All World" was a twelve tube set with a large telephone type dial for tuning pre-set stations. Sparton's Model 1867 was an eighteen tube giant multiband receiver, featuring three speakers and "Visi-Glow" tuning eye. Also by Sparton, styled by Walter Dorwin Teague, the Model 1186 was a large circular blue crystal mirror, framed in satin chrome. The set stood at an imposing forty-six inches high, a sensational conversation piece for \$350.00.

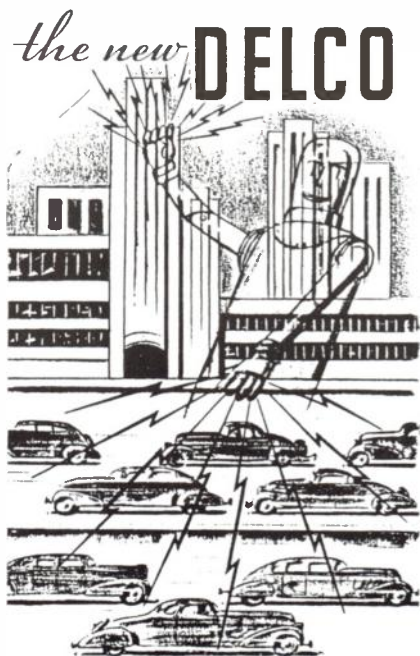
Zenith was gaining a reputation for quality. Their attractive wood cabinets with the distinctive large black dials and white markings, were immediately recognizable. The sets came in a wide choice of models featuring short-wave bands and no end of engineering achievements.

The auto radio was coming in for its share of styling. Gone were the square corners and the multitude of screws holding the boxes together. A new system of spring bronze bonding strips eliminated the need to have a dozen screws holding each cover in place. On some radios, a quick release, threaded bar held the top cover to a center stud so that it could be removed while the set was in the car. This allowed the serviceman to check the tubes and vibrator (the practice was to mount the radio upside down, so that the top would be accessible). Most of the sets were very attractive, a study of smooth shapes accented by chrome trim and the maker's logo. They were still heavy, however, and some sets weighed as much as twenty five pounds. The interior of the first line quality sets was a mosaic of tube sockets, resistors, capacitors, transformers, gears and mechanical linkages. A car radio could be beautiful in those days, an art form in its own right.

The industry was taking shape. There was a new meaning to an old name. The Delco label had been applied to car radios since 1929 but they had always been made by other groups: Delco-Remy, General Motors Radio, Crosley, U.S. Radio & Television and others. Now they had a home: Delco Radio Division of General Motors was formed in mid-1936 at Kokomo, Indiana. The plant was purchased from the Crosley Radio Corporation. Crosley had built radios for Chevrolet there since 1935 when they moved some of their production from Cincinnati. The building had been erected in 1922 by the Haynes Automobile Company as a body plant. Delco grew to be one of the largest automobile radio firms in the world. They not only built sets for some of the General Motors Cars but developed a full line of radios that were marketed through United Motors Service for universal application.

United Motors Service radio and parts distributors generally were automobile parts suppliers who had been handling the Delco, Delco-Remy and UMS lines of

Delco chose this science fiction robot as the theme for their sales folder.



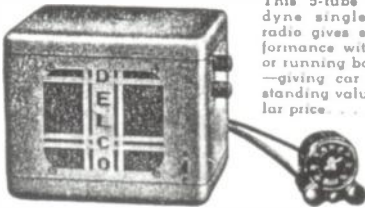
the most modern
AUTO RADIO

These five Delco auto radios featured "Robot Controlled Synchro-Tuning."

everything from bearings to ignition parts. These distributors in turn would franchise service dealers to handle the radio warranty work which included that from the General Motors dealers if they did not have their own radio shop. The service dealer could purchase Delco auto radios and parts through the local distributor at a generous discount and get either

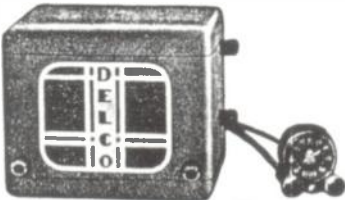
MODEL 631

This 5-tube superheterodyne single unit auto radio gives excellent performance with either roof or running board antenna—giving car owners outstanding value at a popular price. Price \$39.95



MODEL 632

An outstanding value in a 6-tube single unit auto radio—with a specially designed circuit giving exceptional performance. Beautifully designed mono-grained grille—new suede finish. Price \$49.95



MODEL 633

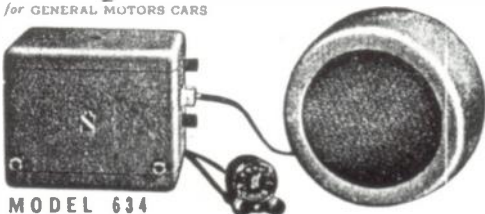
A newly designed 6-tube Auto Radio with unusual reception capacity. One of three new custom speakers can be used—one for Ford cars and a universal speaker for many others, combining a new beauty of tone and design. Finished in modernistic suede to harmonize with the interior of modern motor cars. Price \$52.95



for FORD CARS



for GENERAL MOTORS CARS



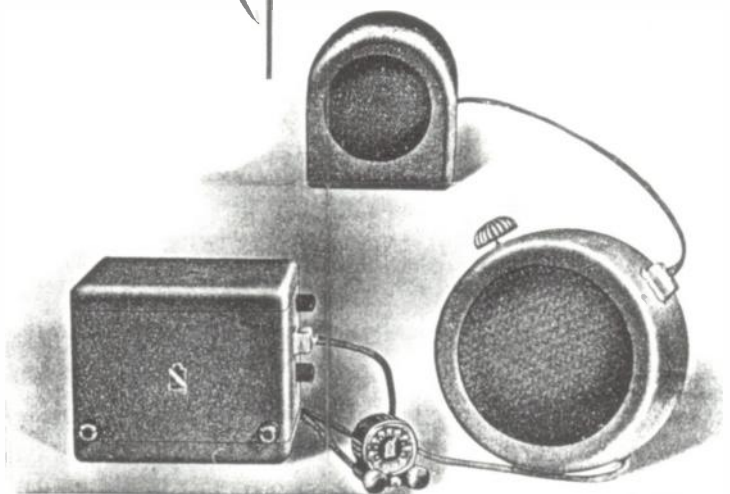
MODEL 634

Model 634 is a De Luxe 6-tube Auto Radio having greater selectivity and sensitivity, suede finish and a newly designed dash speaker with improved tone fidelity. Price \$59.95

DELCO

Leads again with

TWO-SPEAKER AUTO RADIO



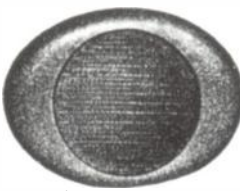
MODEL 635 DUO-SONIC

Delco leads again with the greatest Auto Radio achievement for 1936—the Delco Duo-Sonic Model 635. Two speakers provide complete range of tone—blending the bass and high notes—producing a true fidelity hifi tone—unlike that in Auto Radios. The larger speaker reproduces the high notes while the dash speaker reproduces the low notes. The Delco Model 635 is equivalent to the best in Home Radios. Come in and let us demonstrate this marvel on our new set today.

Price \$69.95

NO SPARK-PLUG SUPPRESSORS

TRUE TONE FIDELITY



for FORD CARS

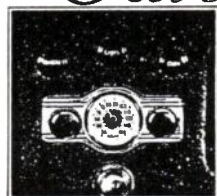


for GENERAL MOTORS CARS

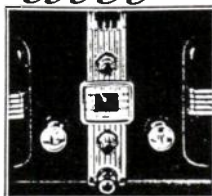
Custom - Built CONTROLS *for*

1934-35-36 MOTOR CARS

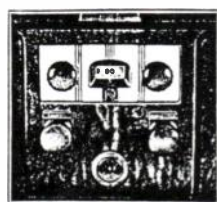
Delco Auto Radio again leads with the most complete line of controls . . . full vision dials that are easy to read . . . only a few of these controls are shown here . . . controls for other cars are also available.



for CHEVROLET



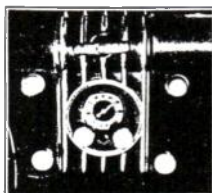
for BUICK



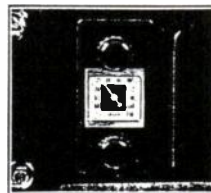
for PONTIAC



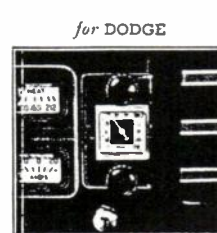
for OLDSMOBILE



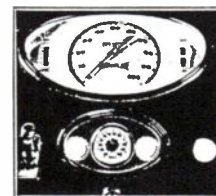
*for FORD and
LINCOLN ZEPHYR*



for PLYMOUTH



for DODGE



*for HUDSON
and TERRAPLANE*

Dial mechanisms could be exciting. Many were made with clock-work precision.

credit or cash for his warranty work, which was based on a standard scale. This was a wonderful opportunity for a qualified, ambitious individual since he would get a lot of after warranty referral work from the car dealers for which he could name his price. He could also sell the Delco line of radios in his shop. There was something exciting about being in on the ground floor of the rising tide of business. Those were exciting days for the professionals and do-it-yourselfers alike.

If there ever was a time to remember as "the good old days" in reference to the car radio, 1936 was it. The cars were good looking and the radio controls were styled to match. The music somehow sounded better when tuned in by the dim light of the attractive dial, down by the river with the moonbeams playing on the water. To own a radio with a nice automobile attached to it was a sensation indeed, but to know the thrill of spending Saturday afternoon working with the car and the radio, installing it, lying on ones back under the cowl with legs thrown over the front seat, blood rushing to the head, trying to find the parts and tools, was an experience not to be forgotten.

1936 was a vintage year because all of the ingredients were there to make it so. The auto radio and accessories were on the market from the big cities to the small hamlet; from the giant distributor in Chicago to the neighborhood dealer in Coldwater, Michigan. The radios still had their individuality, one could unpack the box and there it was - the main assembly, the speaker, the controls, the matching trim plate and the mounting hardware and small parts in a kraft paper bag. It was a good year because the roster of familiar manufacturers were offering their best

A page from a 1936 Firestone catalog.

in the competitive market such as Arvin, Bosch, Crosley, Delco, Emerson, Firestone by Stewart-Warner, Motorola, Philco, RCA, Sparton and Zenith (just to name a few); all had a line of sets with matching dial plates for most any car. As an aside, the Atwater Kent Manufacturing Company closed its doors in mid year as Arthur Atwater Kent retired, and Zenith Radio Corporation moved into the giant plant on Dickens Avenue in Chicago, formerly occupied by Grigsby-Grunow (Majestic).



Firestone STEWART-WARNER

6 TUBES EIGHT TUBE Performance

The perfect driving companion that gives clear reception equal to that of a fine home radio. Features that would cost up to \$20.00 more in any other radio—tone control in head—6 1/2" dynamic speaker—no suppressors—brown crackle finish with chrome facings. Enjoy your favorite programs while you drive. Dash mountings listed are furnished at no extra cost.

NO EXTRA Charge

TUNE IN ON THE VOICE OF FIRESTONE EVERY MONDAY NIGHT OVER NBC NATION-WIDE NETWORK

Winter series features Richard Crooks, famous American tenor and distinguished star of the Metropolitan Opera Association.

Margaret Speaks, distinguished young American soprano, star of radio and concert—heard regularly on the Voice of Firestone radio programs.

A symphonic orchestra under the direction of William Daly, and the Firestone Choral Symphony add brilliance to the Voice of Firestone.

NEW DASH MOUNTINGS FOR 1936 & 1937 CARS
Available for the following Models:

1936 Buick	1937 Buick
1936 Chrysler	1937 Chrysler
1936 Ford	1937 Ford
1936 General Motors	1937 General Motors
1936 Packard	1937 Packard
1936 Studebaker	1937 Studebaker
1936 White	1937 White
1936 Buick	1937 Buick
1936 Chrysler	1937 Chrysler
1936 Ford	1937 Ford
1936 General Motors	1937 General Motors
1936 Packard	1937 Packard
1936 Studebaker	1937 Studebaker
1936 White	1937 White



RADIOS

\$37⁹⁵
(7396-1)

Check these 25 POINTS OF SUPERIORITY

1. No Suppressors needed
2. Universal Steering Post Head
3. Dash Mountings—match instrument panel—no extra charge
4. Tone control, volume control and station selector on the head
5. Non-Glare Illuminated Airplane Dial
6. New Tuning Range—530 to 1600 Kilocycles
7. New Balanced Transmission Line
8. Special High Gain Antenna System
9. Improved Power Supply
10. Full 6 inch Dynamic Speaker
11. High Sensitivity
12. Iron-Core Coils
13. High Power Output
14. Automatic Volume Control
15. Completely Shielded Against Ignition Interference
16. 8-Tube Performance
17. 4-Way Single Bolt Mounting
18. Compact All-In-One Unit
19. Plug-in Construction
20. Fully Treated
21. Multi-Coat Baked Enamel Finish
22. New Type Control Leads
23. Exceptional Tone Quality
24. Lowest-Cost Reception
25. Low Battery Drain—Minimum Current Consumption

The New "See Magic-Sit" AUTO AERIAL
Built especially for turret top cars. Fits in to any running board. No holes to drill. Effortless. Does not leak or fade. (7396-3)

RADIO LOCK
Guard against having your radio stolen. Locks the radio to the car body. Heavy metal case encloses both head. Practically impossible to pry or hammer open. Will not rust. (8743-8-4303-1)

To emphasize that 1936 was a good year consider these exciting developments that were taking place in rapid cadence:

Chrysler Corporation went to an all steel top this year but it was actually a steel insert in place of the former composition top. This insert was the radio antenna, completely insulated from the body and matched to the input of the receiver, it worked.

The new Lincoln Zephyr had the strangest antenna of all - the spare tire door. The radio installation itself was well organized - the six tube radio was located under the right front seat with long cables leading to the tuning dial which was centered in the instrument panel. The large speaker with tone control

THE AUTO RADIO

Opposite Overleaf: Sales sheet for the 1936 Hudson auto radio made by RCA.

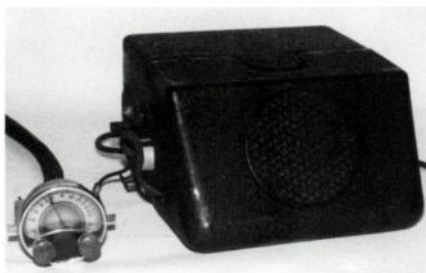
Opposite: Ford was justly proud of their invisible speaker.

Philco custom radio installation for the Lincoln-Zephyr.

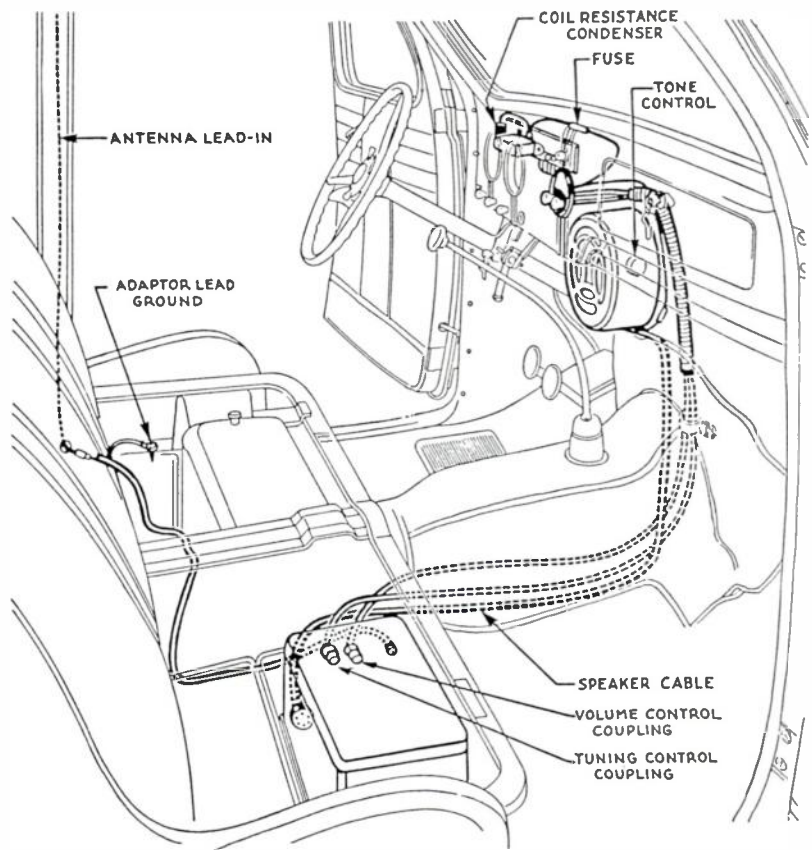
Ford-Philco Model FT-9 radio and controls for closed car installation.



The same radio as above converted for open cars and station wagons.

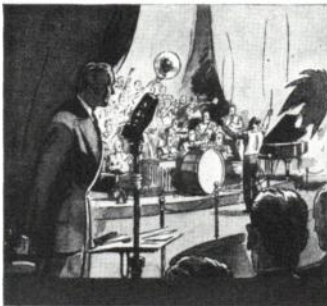


was mounted high on the center of the fire wall. The antenna lead-in ran from inside the spare tire compartment under the roof and down the left side door post to the floor and the receiver.



Ford Motor Company brought out a new and improved receiver unit with a separate speaker. The latter was slightly over five inches in diameter, small enough to mount flush in the header bar. Everything was out of sight except the trim center mounted controls. For the open cars and the station wagon, Philco furnished a die cast "piggy-back" speaker assembly to mount on the front of the receiver. The final product gave a pleasing appearance in black wrinkle finish.

The new Hudson-RCA radio was a well designed five tube set with a plug-in synchronous vibrator, AVC, pentode output, tone control and noise filter. The speaker was a separate six and one-half inch unit that had a dynamic range of seven and one-half watts. Writers of the advertising piece encouraged prospective customers to open the case and note the "clean cut glistening surfaces that greet you." This is a further indication that the design engineers were becoming conscious not only of function but of appearance, both inside and outside of the sheet metal housing, and that the radio was no longer a "haywired" affair.

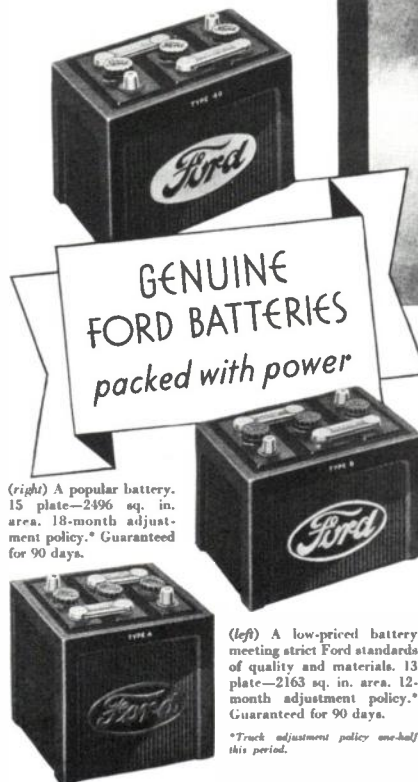


INVISIBLE SPEAKER

Mounted above the windshield, and covered by the interior trim, the invisible speaker gives sound projection throughout the car, at the ear level of the listener.

The attractive radio control dial fits into the instrument panel and is finished to match it. The compact chassis is located beneath the instrument panel where it does not obstruct body or leg room. A convenient button provides tone control—deep, mellow, or bright.

(below) This 17-plate battery, with 2559 sq. in. plate area, is regular equipment on Ford V-8's. Reserve capacity for radio and other electrical accessories. 21-month adjustment policy.* This battery is guaranteed for 90 days.



(right) A popular battery. 15 plate—2496 sq. in. area. 18-month adjustment policy.* Guaranteed for 90 days.

(left) A low-priced battery meeting strict Ford standards of quality and materials. 13 plate—2163 sq. in. area. 12-month adjustment policy.* Guaranteed for 90 days.

*Truck adjustment policy one-half this period.

NEW FORD RADIO

FEATURES INVISIBLE, EAR-LEVEL SPEAKER

MOST modern of all car radios, the Ford Radio introduces an invisible speaker, mounted above the windshield at ear level—out of sight and out of the way. The beautiful, rounded roof lines of the car interior remain unbroken.

Clear, unmuffled reception is provided for rear-seat occupants as well as for those in the front seat. The amazing selectivity of this modern radio brings in distant, as well as all your neighboring stations.

Here is new quality in car radio performance. On trips to the office or week-end jaunts, a veritable world of entertainment is yours to enjoy—symphonies or dance bands . . . comedy or drama . . . sports or news of the day!

Such radio enjoyment, adding to the pleasure of driving a Ford V-8, costs little. See the new Ford Radio for 1936 at your neighborhood Ford salesroom.

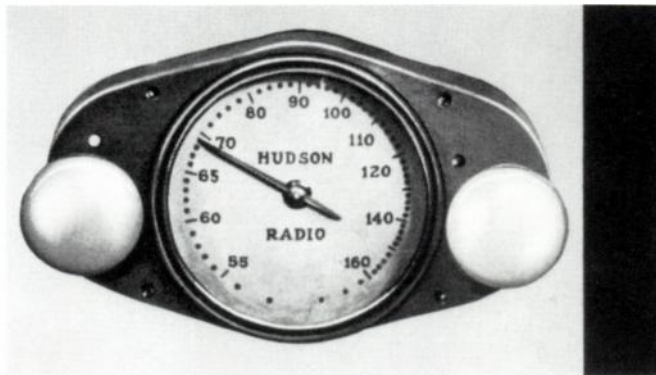
The Ford Radio for 1936 may be purchased by convenient monthly payments, if you desire.



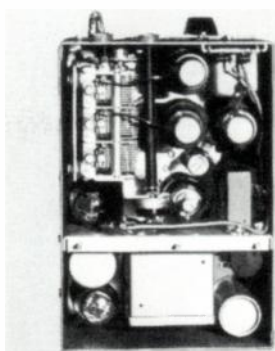
F O R D M O T O R C O M P A N Y

YOU'RE USED TO FINE ENGINEERING IN HUDSON TERRAPLANE

SEE IT..
SELL IT



IN THIS *NEW AUTO RADIO!*



This view shows the 4-tube Superheterodyne chassis with Automatic Volume Control, single Pentode Power-stage, plug-in Vibrator, Tone Control and Noise Filter. Tuning range: 540-1600 kcs.



The separate-unit, 6 1/2" Electro-Dynamic Speaker provides remarkable fidelity and has a dynamic range extending to 7.5 watts output.



Reading about them . . . selling them . . . driving them you've first learned, then felt the superior engineering behind the smooth, economical operation of these record-breaking cars. The same with their new built-in Auto Radio!

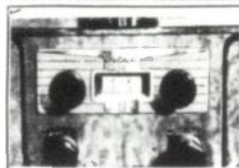
Read about it here . . . sell it and listen to the enthusiastic praise of owners. You will again learn about engineering of the kind leading radio designers know.

Go further! — Open the case and note the clean-cut glistening surfaces that greet you. Observe the superb co-ordination of circuit with circuit, tube with tube. You'll marvel at the precision with which the instrument is built.

You've stopped and looked, but for the final test — listen! Forget engineering, manufacturing, tubes and circuits. Listen to music. You will remember only that it is seven-league strides ahead of other Auto Radios, and you will hardly believe that the price is only \$59.95.

Distributors order from • Hudson Motor Car Company • Dealers order from Distributors
Detroit, Michigan

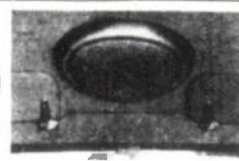
THE NEW MOTOROLA



ESCUTCHEON AND KNOBS MATCH INSTRUMENT PANEL



MATCHED TWIN SPEAKERS for Models "55" and "55" if desired. Give even distribution of sound to passengers in both rear and front seats. For combined Under-Car and Overhead installation—or also Combined Under-Car and Rear Seat Installation.



MATCHED EAR-LEVEL SPEAKERS WHERE PROVIDED FOR IN CAR DESIGN

FITS AND MATCHES YOUR CAR

REGARDLESS WHAT ANYONE TELLS YOU TO THE CONTRARY, Motorola Auto Radio is specifically engineered to fit your car perfectly and match the dash and interior fittings harmoniously. It is designed to operate with maximum efficiency in your car, giving you the utmost in auto radio reception.

Motorola's many new and revolutionary improvements insure "top" listening quality and performance. You'll thrill to Motorola's studio fidelity of tone... you'll marvel at the distant stations it brings in... you'll be pleased with the motor-noise-free reception the "MAGIC ELIMINODE" makes possible. And the performance of your car will not be harmed because Motorola positively requires NO SPARK PLUG SUPPRESSORS. **DISCRIMINATING MOTORISTS INSIST ON MOTOROLA**—it will pay you to investigate Motorola so that you may enjoy the finest entertainment as you drive.

LOOK AT THESE STARTLING FEATURES

Thrilling Listening Quality... Broadcasting Studio Fidelity of Tone... No Hum... No Ripple... No Hum... No Distortion... Unbelievably Accurate Tonal Pattern.

Matches the Dash of All Cars. Perfectly Fits Every Car, and Harmonizes with Interior Design.

Overhead Ear-Level Speakers at No Extra Cost Where Provided for in Car Design. Twin Speakers for Even Distribution of Sound to Rear and Front Seat Passengers.

Newly Improved "Magic Eliminode" Gives Motor-Noise-Free Radio Reception.

Positively NO SPARK PLUG SUPPRESSORS Necessary

"Series-Fed" Antenna System—Adjustable for Peak Performance, Using Either Under-Car or Roof Aerial

Compact New Shape—Mounts Over Steering Post on "Jiffy" Mounting Bracket—Fits Every Car—Easier Installed Than Ever Before

Plug-In Type Chassis—Easily Inspected and Serviced.

New Streamline Beauty in Sets, Speakers and Illuminated Dials.

New Multi-Purpose High Efficiency Tubes

Metal Tube Sets, Glass Tube Sets.

New "Booster" Type High Power Output Tubes

Low Current Consumption

Improved Full-Wave Interrupter Type Vibrator

Powerful Full Dynamic Speakers.

Variable Tone Control

Exceptional Sensitivity and Selectivity

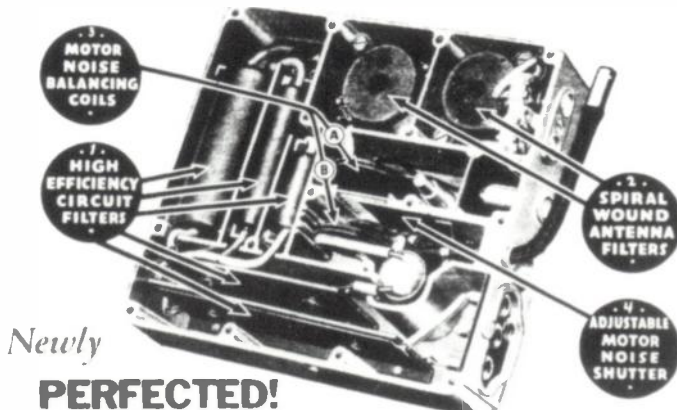
Models in Every Popular Price Range

ONLY *Motorola* HAS THE MAGIC ELIMINODE

MOTOROLA BLAZES A NEW TRAIL WITH THE NEW SANTA FE "CHIEF"

Who is the new leader in the new era of automobiles? The new leader in the new era of automobiles is the new Santa Fe "Chief". It is the new Santa Fe "Chief" that is the new leader in the new era of automobiles. It is the new Santa Fe "Chief" that is the new leader in the new era of automobiles. It is the new Santa Fe "Chief" that is the new leader in the new era of automobiles.

It should please Duke Ellington to learn that his rendition from the Morrison Hotel in Chicago came over the Arizona skies delightfully and crisply from the Waldorf in New York where the saxophone solo was played.



Newly

PERFECTED!

Revolutionary Improvement in Design Positively NO SPARK PLUG SUPPRESSORS

This exclusive patented feature guarantees motor-noise-free radio reception without the use of suppressors, which harm the performance of the engine.

The Patented "Magic Eliminode" A newly perfected device enclosed in a shielded die-cast metal case for completely eliminating motor noise without the use of Spark Plug Suppressors. It accomplishes this through:

- (1) A series of highly efficient Line Filters on all circuits entering the Motorola Receiver.
- (2) A 2-stage spiral wound Antenna Filter, operating in conjunction with

- (1) A pair of Balancing Coils (Coil A in the Antenna Circuit, and Coil B inducing out of phase motor noise into Coil A.

The intensity of motor noise induced is accurately regulated by a single all-time adjustment of (4) the Adjustable Shutter... thus perfect balance is obtained and maintained throughout the life of the set. When this balance is reached, motor noise is eliminated.

EXCLUSIVE MOTOROLA PATENTED FEATURE

THE AUTO RADIO

Overleaf: A page from Motorola Broadcast mini-newspaper, describes the Magic Eliminode device.

From Philco, a wide choice of sets and new universal control.

The new
PHILCO
Auto **RADIO**



\$39.95 to \$77.60

Motorola formally announced the "eliminode," an improved electrical noise canceling system for their line of auto radios. The "eliminode" unit was enclosed in a separate die cast metal case containing motor noise balancing coils with adjustable shutters, high efficiency circuit filters and spiral wound antenna filters. This assembly was part of the Models 60, 80, and the ten tube "Golden Voice" receivers but not available on the low cost Model 50. Prices ranged from \$39.95 for the latter to \$89.50 for the "Golden Voice." Motorola was on the move.

Philco, not to be outdone, offered a choice of five models in their distributor line to meet "every purse and purpose." The sets ranged from the Model 816, with six multi-function tubes and internal electro-dynamic speaker, to the Model 819, a seven tube unit with a separate extra large speaker or a flat-type overhead speaker. All sets featured a new streamlined control unit that fit in or on the instrument panel. The prices ranged from \$39.95 to \$77.60. The company said that they were the exclusive choice of twenty-nine great car manufacturers in United States, Canada and Europe.

TAKE YOUR FAVORITE PROGRAMS WITH YOU
WHEREVER YOU GO . . . WITH A NEW

PHILCO AUTO RADIO

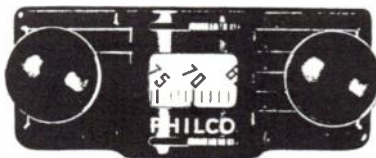
■ Philco offers a choice of five superb models . . . designed to meet every purse and purpose. Model for model they give you more worthwhile features than any other auto radio. Greater power—better sensitivity and selectivity—finer tone—more uniform reception—and low current consumption! New low prices make them more than ever the World's Greatest Auto Radio VALUES!

All five of these new Philcos are super-heterodynes, complete with special multi-

function Philco High-Efficiency Tubes, Electro-Dynamic Speaker and Automatic Volume Control. They can be quickly and easily installed in ANY car, regardless of make, model or year—or transferred from one car to another.

Make dull roads brighter and long trips shorter with a new Philco Auto Radio—the exclusive choice of 29 great car manufacturers in the United States, Canada and Europe!

New Streamlined Control Unit with "Wide-Vision" Dial



■ For beauty, compactness and convenience, Philco's streamlined Control Unit has no equal! Of special importance is the new "wide-vision" dial. The large station markings are on a curved drum . . . softly illuminated and easy to read from any angle. This unique design guarantees quick, accurate tuning, day or night.

Philco usually reserved page two of the Saturday Evening Post for radio advertisements. Shown here are a few examples.

There's a PHILCO Custom-built for your PLYMOUTH

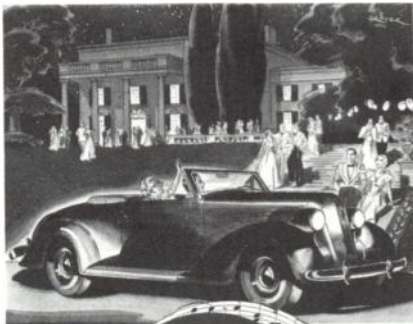
MUSIC to cheer you as you drive your Plymouth through too familiar streets on the way to work. Baseball results... news bulletins... on your way home. The music of great orchestras... the rhythms of favorite dance bands... all that radio offers... rides in the car with a Philco.

And the Plymouth-Philco custom-built auto radio is the only one designed and built for the car under the supervision of Plymouth engineers. Just as custom-built Philcos are the exclusive choice of twenty-eight other leading cars of the world.

And there are Philco Auto Radios to fit any car... radios of outstanding performance and magnificent tone... quickly installed, easily transferred to another car when desired.

With so much of interest on the air this Summer... make sure you'll hear it all... anywhere... any time. Put a Philco in your car!

Plymouth-Philco custom-built auto radios are sold exclusively by Chrysler, Dodge, and DeSoto dealers... and carry their unqualified recommendation as the radio for Plymouth.



PHILCO AUTO RADIOS from \$19.95 to \$77.60. Special installations and aerial installations are quickly and easily made at small cost by Philco dealers everywhere... PHILCO HOME RADIOS from \$20 to \$600... PHILCO REPLACEMENT TUBES improve the performance of any radio.

Twenty-nine leading cars specify Philco exclusively... and Philco has a Custom-built Radio for each



DeSoto-Philco custom-built models are sold exclusively by DeSoto Dealers... who recommend them with out reservation.

For DESOTO

AND FOR EACH OF 28 OTHER FINE CARS

... there's a

Custom-built PHILCO!

TWENTY-NINE leading car builders have approved Philco Auto Radio as standard optional equipment... and Philco provides custom-built models engineered and styled to meet the particular requirements of each of these cars.

For DeSoto cars there are two models... a richly-toned, compact single unit model for the Airstream... and a two unit DeLuxe set for the Airlux.

In addition to the custom-built models, Philco has extremely sensitive, highly selective Auto Radios which fit any car... of any year or model... quickly installed in your present car, easily transferred to another car at any time.

All over America, sunny days invite you to the open road! Get double enjoyment out of every mile... Put a Philco in your car!

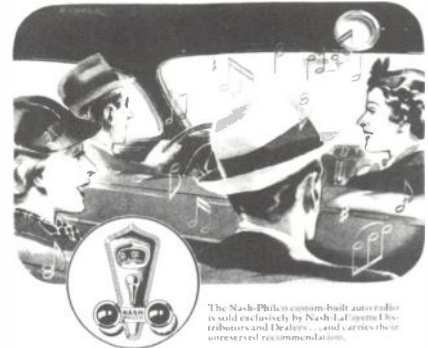
PHILCO AUTO RADIOS... \$19.95 TO \$77.60
Special installations and aerial installations quickly and easily made at small cost by Philco dealers everywhere. Custom built models available from car dealers.

PHILCO HOME RADIOS FROM \$20 TO \$600
Philco Replacement Tubes Improve the Performance of Any Radio

PHILCO Auto Radio

Perfect PHILCO performance for every NASH passenger!

CUSTOM-BUILT PHILCOS FOR 28 OTHER FINE CARS, TOO



The Nash-Philco custom-built auto radio is sold exclusively by Nash-Lafayette Distributors and Dealers... and carries their unreserved recommendation.

NASH OWNERS have the choice of two custom-built Philco Auto Radios... one with an Ear Level Speaker skillfully built in above the windshield... the other a single unit receiver, wonderfully compact and richly toned.

These Nash Philcos are specially designed to deliver perfect performance in every Nash model with the control units styled as an integral part of the Nash instrument panel.

For twenty-eight other fine cars there are custom-built Philcos...

approved as standard option to equipment by the makers. And there are Philco Auto Radios of surpassing ability and tone quality which fit any car... and are easily transferred from one car to another.

Now comes the time when you spend more hours behind the wheel... get more pleasure from your car. Get the most pleasure by carrying the world of radio with you when ever you go! Specify a Philco for your new car... or for a Philco to install in the car you are now driving.

PHILCO AUTO RADIOS... \$19.95 TO \$77.60

Special installations and aerial installations quickly and easily made at small cost by Philco dealers everywhere. Custom built models available from car dealers.

PHILCO HOME RADIOS FROM \$20 TO \$600
Philco Replacement Tubes Improve the Performance of Any Radio

PHILCO Auto Radio

"GOLDEN VOICE" *Motorola*



Matches the Dash
OF ALL CARS

The Most Remarkable Auto Radio Ever Built *Money Can Buy Nothing to Equal It!* 10 ALL-METAL TUBES — 10 Inch "Golden Voice" Speaker

The Most Remarkable Auto Radio Ever Built. Money Can Buy Nothing to Equal It—Breath taking, life-like reception. Surpasses anything you ever dreamed of. Great reserve power that is not taxed by heaviest bass tones or mighty orchestra crescendos.

This fine musical instrument embodies many startling features, such as The "Magic Eliminode" that eliminates spark plug suppressors . . . efficiency in design that conserves your battery . . . and Finger-Tip Controlled Sensitivity which guarantees reception far beyond the range of other auto radios, yet protects you from in between-station noises encountered in city driving.

Its many refinements will continue for years to evidence themselves and make the "GOLDEN VOICE" MOTOROLA your most cherished traveling companion.

10 All-Metal Tubes: 10 in. Powerful Dynamic Separate External Speaker, with adjustable mounting for acoustical compensation; Broadcasting studio fidelity of tone; Patented "Magic Eliminode" insures motor-noise-free radio reception —Positively NO SPARK PLUG SUPPRESSORS NECESSARY. Improved Superheterodyne Circuit; All-Electric; Perfected Automatic Volume Control that means Uniform Volume under all conditions; Full Variable Tone Control; Sensitivity Control; Push-Pull Amplification—using new type 6-F-6 all-metal high power output tubes; Dual rectification to conserve battery consumption; Plug-In Chassis; "Series-Fed" Antenna System—adjustable for peak performance using either roof aerial or under-car aerial. Mounts on "Jiffy" bracket. Matches the Dash of All Cars.

SPECIFICATIONS: 10 All-Metal Tubes: Two type 6 K 7, one type 6-A-8, two type 6-H-6, two type 6-F-6, one type 0-Z-4, one type 6-C-5, one type 6-K-7. Size 6 $\frac{1}{4}$ in. high, 7 $\frac{1}{4}$ in. deep, 12 in. long. 10 in. Dynamic External Speaker. Patented "Magic Eliminode."

Complete
\$89⁵⁰

POSITIVELY NO SPARK PLUG SUPPRESSORS

Opposite: Motorola's ten tube "Golden Voice" was intended for the customer who could afford a top-notch auto radio.



Sparton Model 676 featuring an Art Deco speaker grille. The six tube set was designed for universal installation with an external control head.

The foregoing is a cross section of what was happening in 1936 which could be considered a pivotal year in the story of the auto radio as it entered yet another phase. There was romance, excitement, and opportunity. The final tally of U.S. car radio production for the year was 1,412,000 units worth \$69,188,000.00.

1937

Guglielmo Marconi, the father of radio, dies in Rome, Italy, July 20th.

A large radio audience is stunned as the Zeppelin Hindenburg, at Lakehurst, New Jersey, bursts into flames as it completes its first transatlantic flight of the year.

Amelia Earhart, noted aviatrix, on her round-the-world trip, disappears somewhere in the vast Pacific between New Guinea and Howland Island.

Howard Hughes establishes a new transcontinental flight record of seven and a half hours.

The eighth annual contest at the National Air Races with a cash prize purse of \$27,000.00 is being scheduled at the Cleveland Airport for Labor Day, September 6th.

Joe Louis wins the heavyweight boxing title by knocking out Jim Braddock.

The Big Bands are in full "swing." Benny Goodman, "King of Swing," is playing from the Sunnybrook Ballroom in Pennsylvania.

Tommy Dorsey has a hit recording in "I'm Getting Sentimental Over You." Cole Porter is scoring "In the Still of the Night." Bing Crosby records Johnny Mercer's "Bob White [Whatcha Gonna Swing Tonight?]" and our heroine in the soap opera "The Romance of Helen Trent" is still trying to prove that romance is not over at thirty five.

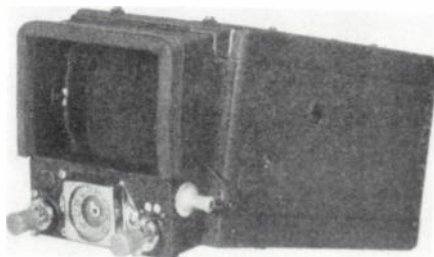
In 1937 radio provides a note of optimism, and as Irving Berlin writes, "I've Got My Love To Keep Me Warm."

RADIO'S GOLDEN YEARS

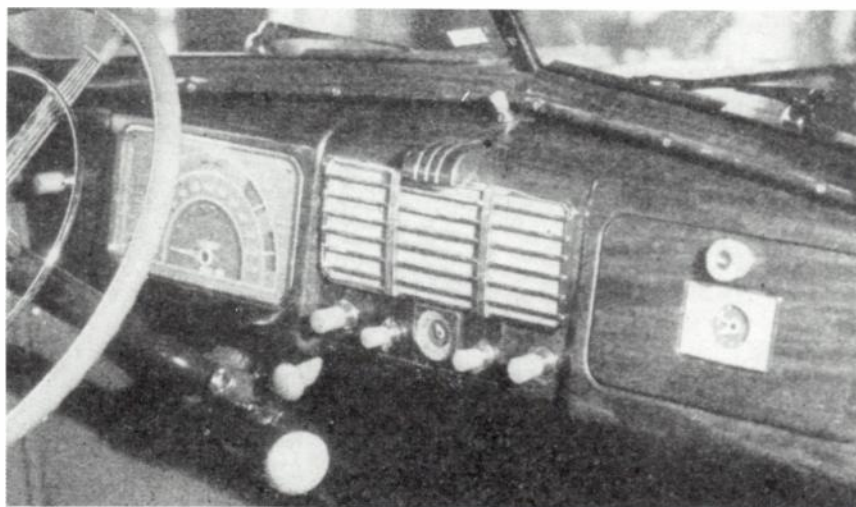
MOTOR, the prestigious automotive industry magazine, in its Annual Show Number published in the fall of 1936, reported near record sales for the first eight months of that year and predicted an even better 1937 selling season. Most the car makers' offerings were completely redesigned and to this writer's eyes, with few exceptions, were very attractive, fast and plush. The public, having been exposed to some of the classic designs such as Cord and the Lincoln-Zephyr, was becoming more conscious of styling, performance and luxury. People were in the mood to trade in the "old bus" and the industry was offering something for everybody, shooting for near record sales for 1937. Unfortunately, Auburn and Reo were missing from the scene this year; however, a number of the independents were still around and trying harder than ever to make a go of it, thus making competition keen.

The car radio had proven itself in recent years so it was rapidly becoming an integral part of the car, rather than a hastily conceived "add on." Here too, styling and performance were important. Some General Motors cars offered the radio "center stage" with speaker and control worked into the instrument panel. Most of the others provided a special cut-out in the panel to receive the controls in lieu of the necessity of removing the ash receiver. Buick was the leader with the centerline radio. The complete assembly was mounted behind an attractive speaker grille located in the center of the instrument panel. Also new on some cars were the rubber covered, insulated running boards which served as the radio antenna. Reception was good except when driving under the streetcar trolley lines.

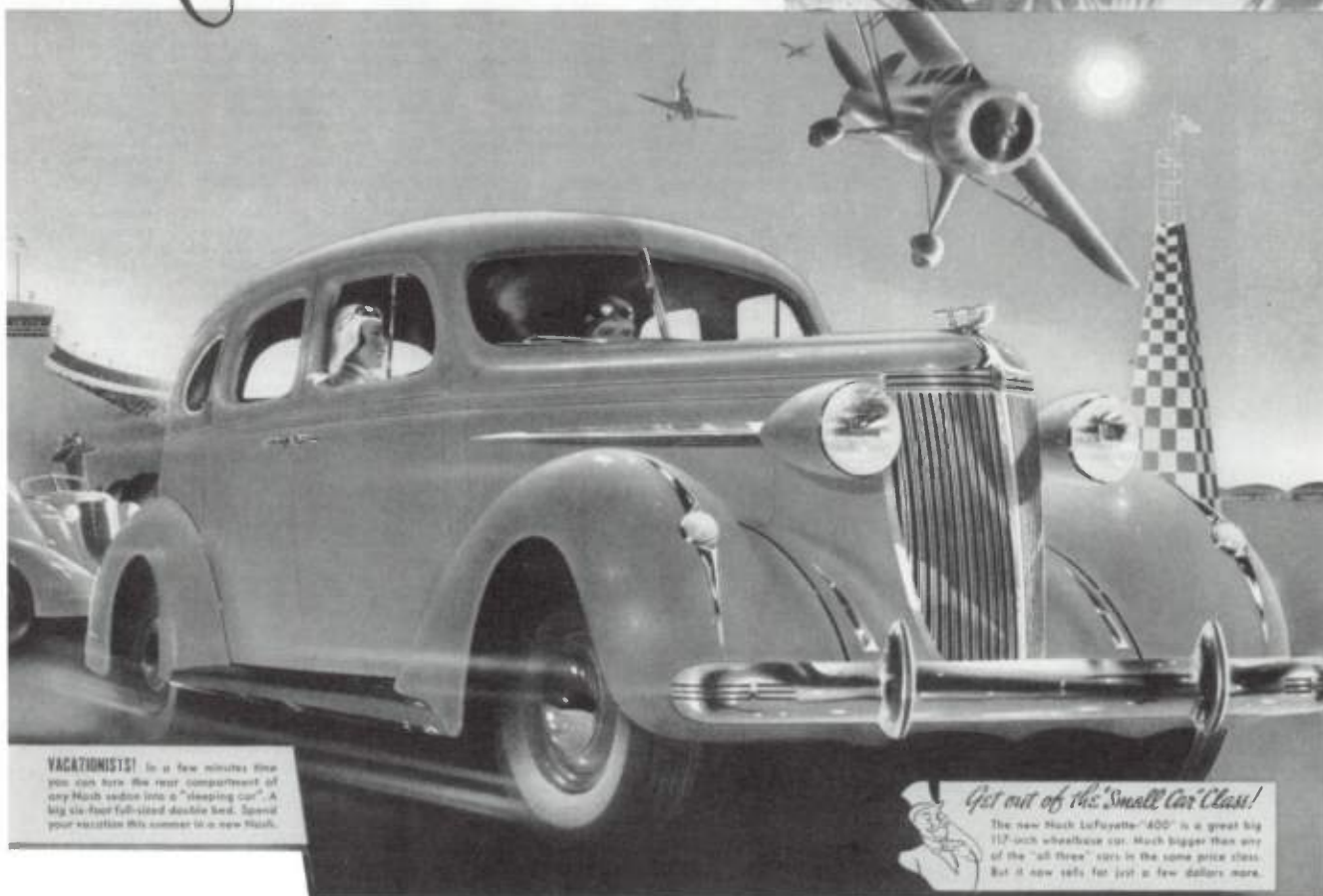
This was the first of the Buick Centerline radios, model 980534. It was a six tube superheterodyne with the speaker contained as an integral part of the receiver.



The 1937 Buick instrument panel featuring the radio grille located in the center. This made the radio a decorative and integral part of the car. The controls were within easy reach of both the driver and the passenger. This was the receiver that helped set the trend toward automobile styling to accommodate the radio.



Blue Blood
for Red Blooded People



VACATIONISTS! In a few minutes time you can turn the rear compartment of any Ford sedan into a "sleeping car." A big six-foot full-sized double bed. Special van sections this summer in new Ford.

Get out of the 'Small Car' Class!

The new Mach Lafayette "400" is a great big 117-inch wheelbase car. Much bigger than any of the "all three" cars in the same price class. But it now sells for just a few dollars more.

From aerial photograph of North American Wetlands Survey.

In big cities and small towns all over the country . . . thousands of wide-awake people are stepping out in luxurious big Nash cars this year.

If you long for luxury . . . if you like to strap
out in style . . . if you've got that real-bloated
drive inside you to treat your family to the
finest . . . then Nash was made for you.

For here are true "Blue Bloods" among motor cars, made in the finest Nash tradition, priced unbelievably low.

The new Nash LaFayette "400" is a great big six-cylinder 11-inch wheelbase car—

much bigger than any of the "all three" cars in the same price class—yet it sells for just a few dollars more. **Q** The Nash Ambassador Six is as big as cars costing over \$300 more. The Nash Ambassador Eight is a great big 125-inch wheelbase car—compared to five with cars priced much higher. Ask about low rates available through Nash C.I.T. Budget Plan.

NASH MOTORS
Division of Nash Automotive Corp., Kenosha, Wisc.
HEAR GRACE MOORE! New radio program showing lovely Grace Moore with Vincent Lopez and his Orchestra, Charles Schulz, C.B.S. station, cannot to meet more. Subscribes, 9 P.M. EST. Don't fail to tune in.

FOR AS LITTLE AS \$1 OR \$2 A MONTH EXTRA YOU CAN GET OUT OF THE "SMALL CAR" CLASS—A check-up in ten representative offers shows the Nash Infiniti "410" 4-Door Sedan with trunk **DELIVERS** for just a FEW dollars more than similarly equipped 4-Door sedans of the "All Three" cars in the same price class. Often, the **SIGHT** price difference is just \$1 or \$2 a month extra on your payments.

Dynamic Growth 1937

Opposite: This advertisement from page 31 of the June 5th issue of Saturday Evening Post wraps up the mood for 1937. Restyled automobiles, National Air Races in the background, and the invitation to tune in on Vincent Lopez and his orchestra, conjure happy thoughts.

This attractive advertisement which appeared in the April 10th issue of Saturday Evening Post shows the important features of the 1937 Ford radio. Shown are the unique V-8 tuning dial which was located in the center of the instrument panel, the invisible header speaker which was enlarged over the previous year and the novel antenna which was controlled from inside the car. The tone control knob on the Philco six tube radio was within reach of the driver.

Ford Motor Company had a "better idea" with their new radio control head which featured an attractive translucent dial face with the V-8 logo cleverly serving as a pointer. The assembly was mounted above the ash tray in a cut-out provided. Ford also offered a new roof-mounted antenna since this was their first year for the all-steel top. The "flip-up" spring loaded rod was operable from inside the car. Several other car makers would adopt this type of antenna in the future. Ford Motor Company issued sales quotas to their branches of one radio for every 3.5 passenger cars sold. Some branches had already been selling as many as 60% of the new cars with radios.

**The Quality Radio for
The Quality Car in the Low-Price Field**

Large, illuminated non-glass dial is easy to read. Harmonizes with other instruments on panel.

Invisible ear-line speaker projects sound throughout car.
(Below) Antenna control knob within easy reach of front-seat passengers.

New adjustable, outside antenna is turned by means of inside control knob to "up" position for distant stations, to "down" position for local stations. When in "up" position it may be extended to 30 inches for even greater range.

Compact 6-tube chassis fits behind instrument panel out of the way. The tone of the radio may be adjusted by means of the conveniently located tone control knob.

THE NEW 1937 Genuine Ford Radio is the only approved radio built for your Ford V-8. In building it, radio engineers have worked side by side with Ford engineers. They have matched and balanced the radio chassis, circuit, lead-in, antenna and speaker with Ford V-8 construction. They have built a quality radio that is a worthy accessory to a quality car.

The new Ford Radio is powerful. Wherever you drive you can tune in—and enjoy—distant stations as well as local broadcasts. Greater volume, better tone values, improved selectivity—these are the results of improvements in design and construction. A new outside antenna that may be adjusted from the driver's seat provides clear reception for distant stations.

Ask any Ford dealer to show you this radio. It will convince you that to get the best in radio you should get the radio that's built for your Ford V-8 . . . a Genuine Ford Radio.

FORD MOTOR COMPANY, DEARBORN, MICHIGAN

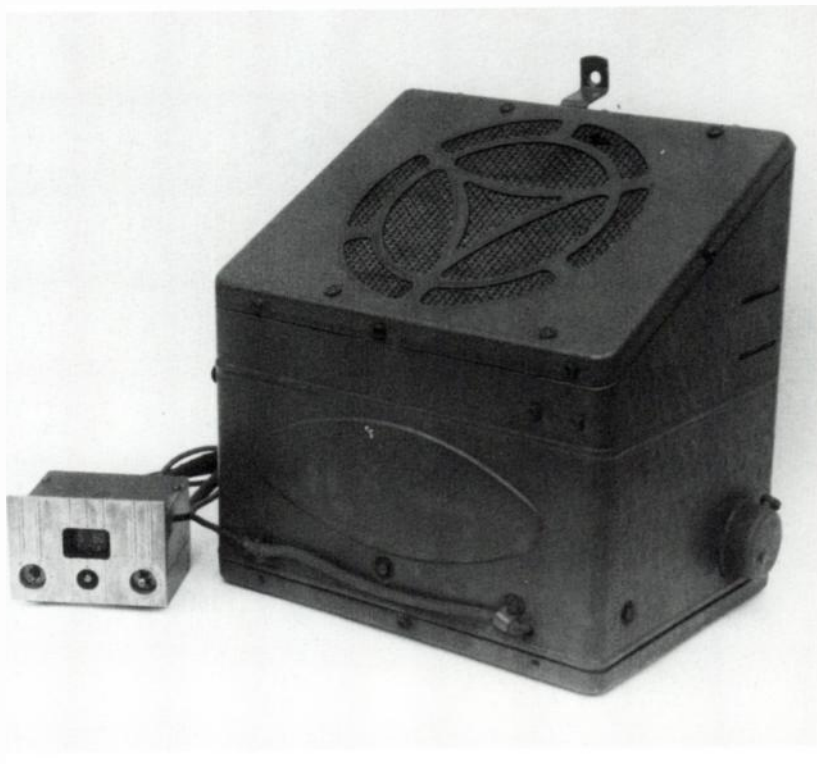
GENUINE Ford ACCESSORIES

GENUINE FORD RADIO

THE AUTO RADIO

Among the car radio producers in 1937, Philco had the lion's share of the original equipment business, providing custom sets for Plymouth, Dodge, DeSoto, Chrysler, Ford, Lincoln, Graham, Nash, Packard, Pierce-Arrow, Studebaker, Willys and Mack truck, plus foreign business. Delco provided radios for a number of the General Motors cars (except for the Cadillac-LaSalle which were made by Wells-Gardner and some of the Buicks which were made by RCA), while Crosley made a unit for the Cord.

Philco Transitone C-1450, six tube single unit, designed for Chrysler Corporation built cars. A two position antenna selector compensated for either an under-car or roof-mounted antenna.

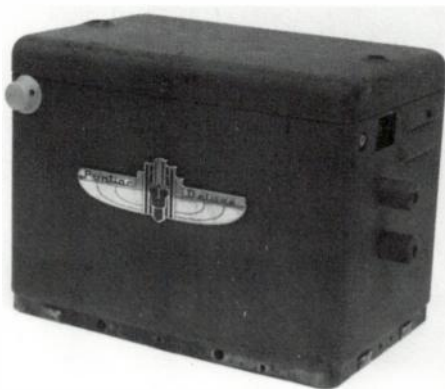
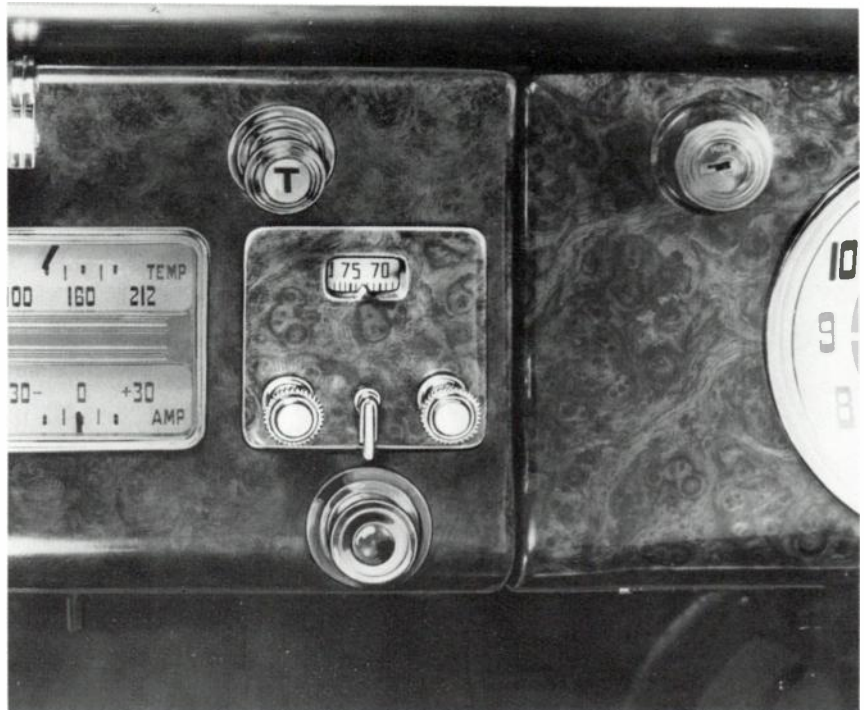


Overhead speaker installed in a 1937 Packard. See radio details next page.



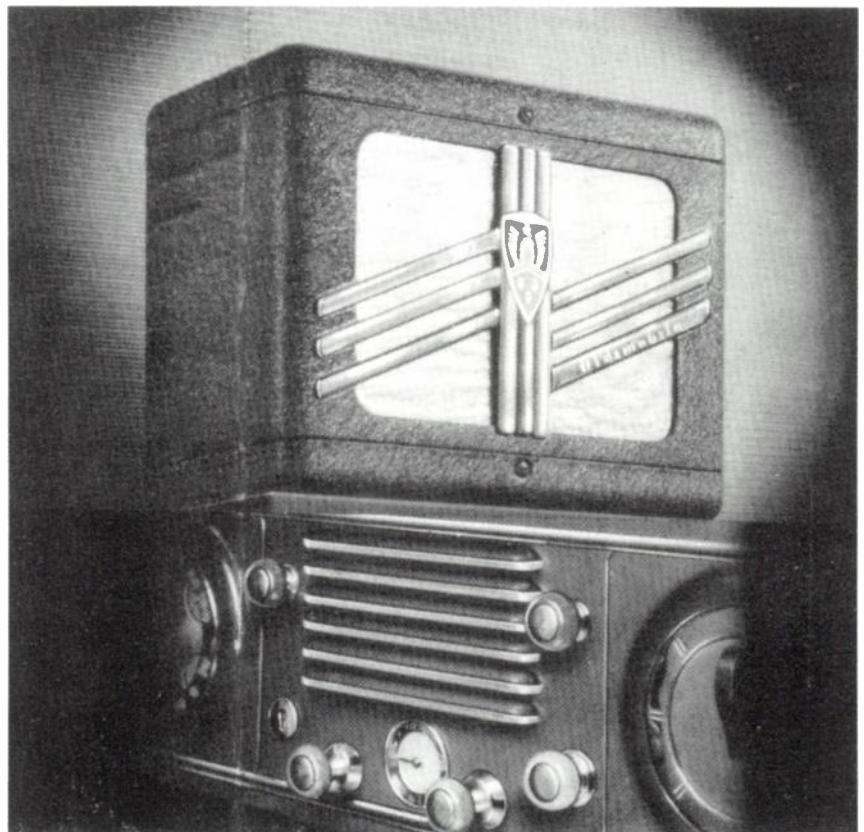


Philco Custom car radio Model P-1430 and control plate for Packard Models 115 and 120.

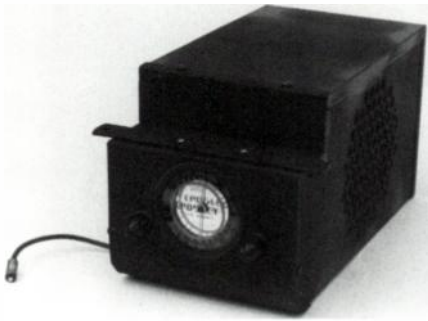


Pontiac Deluxe Model 983526 seven tube receiver designed for a separate speaker. Controls were centered in the instrument panel.

Oldsmobile Standard Model 982043 had a self-contained eight inch speaker in the receiver housing. Flexible shafts (control cables) linked the set with the centrally located dial and controls. The deluxe model had twin speakers, one of which was located behind the grille in the instrument panel.



THE AUTO RADIO



Crosley introduced this "Fiver Roamio," a five tube set with a very attractive mirror-backed dial.

Arvin Model 9A, a six tube receiver with a self-contained speaker. The selling price was \$29.95 including any one of forty-seven matching controls.



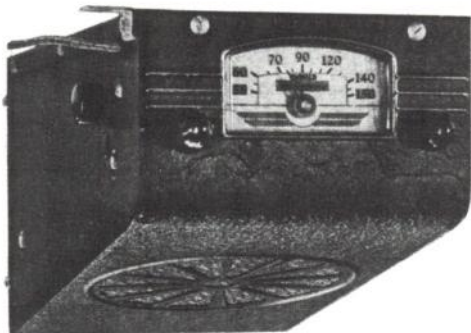
Delco Model R-641, a six tube single unit job with a variable tone control and "Beam Power Output."



Opposite: A "new" DeWald Motor-tone at a price aimed to under-sell the competition. The name DeWald came from David Wald the president of Pierce-Airo, Inc.

Most all of the home radio manufacturers, including those mentioned above, and some strictly car radio people, made sets for the after-market. These were for all cars that left the factory without a radio which, in spite of the growing number of new cars shipped with a set, were still in the majority. It was estimated that there were still about 18 million cars without radios. This then was good potential business, but the competition was fierce. The following large specialty houses marketed car radios under their private labels: Montgomery Ward, Sears Roebuck, Spiegel, Goodyear Stores, Western Auto Stores, Firestone Stores, Gamble Stores, Allied Radio Corporation, LaFayette Radio Corp. and many others. At the beginning of 1937 there were about seventy-five firms involved in the manufacture of auto radio sets, all hoping for a piece of the action. Some would not last the year out. We were experiencing one of the greatest examples of free enterprise in action. They were all U.S. companies paying U.S. taxes so in that respect no one had an unfair advantage.

Beauty plus PERFORMANCE—Every model a sensational trade-builder for YOU!
HIGH—LIGHTS from the great NEW line of



EXCLUSIVE FEATURES

Flat top permits mounting without removing compartments, instruments or dashboard obstructions.

No repercussion on sound waves. Sloping speaker permits clear tone to reach rear of car.

Complete streamlined container with handsome baked finish.

Hi-audio undistorted output. New high efficiency iron core antenna coil.

Individual construction permits removal of chassis from case without unsoldering wires.

Tubes and vibrator may also be replaced without removing chassis from container.

Has the tone and sensitivity of higher priced home sets.

Streamline MOTORTONE

MODEL 527

SUPREME IN DESIGN...TONE...SENSITIVITY

For any type car, carefully engineered to give perfect performance in compact space. 5-tube superheterodyne circuit—automatic volume control—tone control—dynamic speaker—indirect illuminated non-glare bronze gold finish dial—indirect Vernier tuning—low battery drain—plug-in vibrator—11½" long, 6½" wide, 4" high front, 6½" high rear.

NEW MODELS WITH SYNCHRO-BEAM TUNING

AMERICAN—FOREIGN—POLICE

MODEL 703—Two-band . . . 34-125 and 180-550 meters; American, foreign, police. Seven-tube, AC-DC Superheterodyne; full automatic volume control; synchro-beam tuning; new indirect illuminated etched instrument dial; two-watt output; full range dynamic speaker.

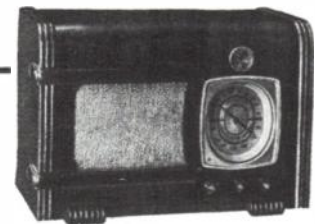
AMERICAN—FOREIGN—POLICE

MODEL 529—Two-band . . . 42-125 and 180-550 meters; American, foreign, police. Five-tube AC Superheterodyne; full automatic volume control; smooth Vernier tuning dial; new indirect illuminated etched instrument dial; nearly three watts output; full range dynamic speaker.

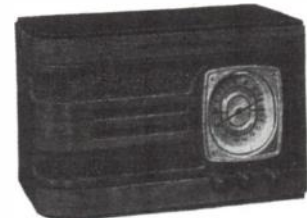
AMERICAN—FOREIGN—POLICE

MODEL 700—Three-band . . . 19-550 meters continuous; American, foreign, police. Seven-tube AC-DC Superheterodyne; full automatic volume control; synchro-beam tuning; new indirect illuminated etched instrument dial; band indicator; 6½-inch high fidelity speaker.

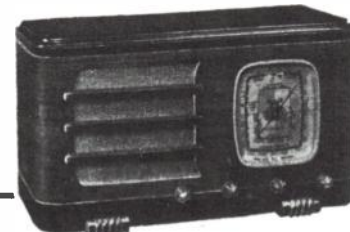
BEAUTIFUL MODERN CABINETS



MODEL 703



MODEL 529



MODEL 700

Models at **\$16.75** List price and upward

JOBBERs and DEALERs . . . Be sure to communicate with us for details of our profitable 1937 franchise.

PIERCE-AIRO, INC.

512 SIXTH AVENUE
NEW YORK, N. Y.

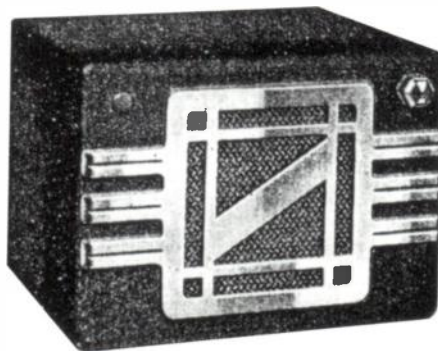
LICENSED BY RCA AND HAZELTINE COMPANIES

Trav-ler, one of the early makers of radio receivers, announced its entry into the highly competitive auto radio field.

March 24, 1937

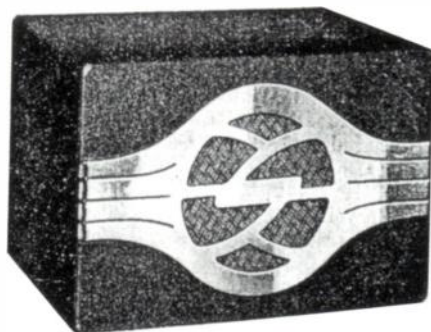
CLINTON ANNOUNCES TWO NEW AUTO SETS

CHICAGO, ILL., Thursday—Two automobile models have been added to the set line manufactured by the Clin-



Clinton Model 805

ton Mfg. Co., of this city. Announcement of the new models had been held in abeyance until deliveries were ready for the trade. The new sets are known as Model 805, which is a seven-tube job with remote control and available in

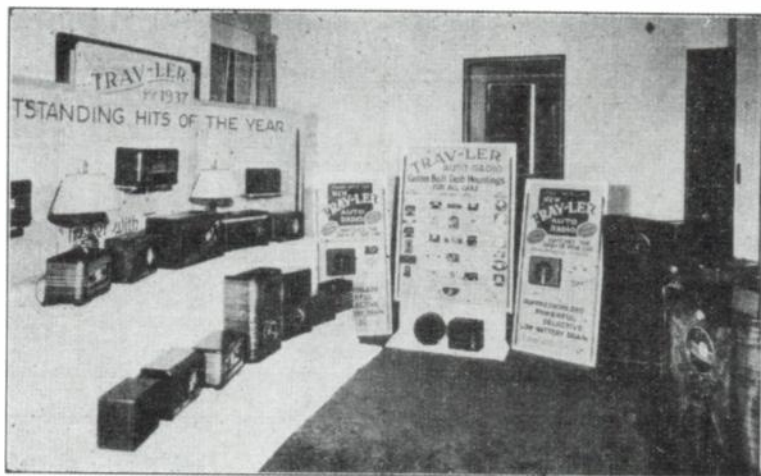


Clinton Model 804

both Universal installation and dashboard. A three-gang condenser is employed.

The other Clinton radio set, designated as Model 804, is a six-tube auto set with many of the same features as the seven-tube model. Both sets, illustrated herewith, are in the popular price range, according to officials of the Clinton organization, which is located at 1217 W. Washington boulevard, here, and a substantial demand is anticipated from the national trade.

TRAV-LER EXHIBITS HOUSEHOLD AND AUTO RADIOS AT NEW YORK AND CHICAGO SHOWS



Trav-Ler Display at Automotive Accessory Shows

Herewith is the display of the Trav-Ler Radio and Television Corp., of Chicago, Ill., at the Automotive Accessory Shows, held recently both in Chicago and New York. For the first time the firm's new automobile set line, which comprises three models, was shown to the trade. In addition to the car radios, many of the table, compact and console

sets in the firm's line were exhibited.

Jack Hoffman, president of the company, in commenting on the shows, reported that the New York affair was one of the most successful his organization ever participated in and that orders were received from many new accounts as well as from a number of the concern's oldest customers.

At this period of time the state of the art in auto radio design was somewhat stabilized, although there was a wide variety of shapes, sizes and degrees of sophistication. Most of the sets were of the superheterodyne circuit and they utilized a vibrator power supply. Because of the antenna limitation imposed by the design of the car, it was important for good reception to have a stage of radio-frequency amplification "up front" and most receivers on the market had that circuit feature. The differences came in the special features: the type of installation, the size, location and number of speaker(s) and the number of tubes, which sometimes was an indicator of the number of intermediate and output stages.

In reference to the latter, many used at least one of the multi-function tubes which as discussed would take the place of two or more tubes in the circuit. Also, some designers preferred to use synchronous vibrators in the power supply. As mentioned earlier, this served the function of the rectifier and thus eliminated one tube in the line-up. Considering these factors, one maker's five tube set could be comparable to another's seven tube set or even more extreme. Even a four tube set was no sign that it was



The little Crosley discussed earlier, as shown in a Post adv. A radio that almost anyone could purchase on a Saturday morning and have installed before the big date that evening. A contrast to the first Roamio that took several days to install.

inadequate for the task. These design options gave the engineer considerable latitude and often the opportunity for cost savings.

1937 then was a year of innovations: Crosley was promoting their "Fiver Roamio" five tube universal under-dash model for \$19.99; Arvin by Noblitt-Sparks Industries, offered the "Phantom Filter" line of radio sets; Motorola by Galvin Manufacturing Corporation announced the "Acoustinator" as well as holding over their "Magic Eliminode" feature, while RCA released their "Magic Voice" line. Most manufacturers were offering customized escutcheon plates and controls to match the instrument panel for cars 1934 through 1937, as well as universal under-dash and steering wheel mounts to mate with their sets. The advertising emphasis was on cost, interference filters, tuning and tone compensating controls, and the matching of the sets to the cars.



Three powerful models — a wide choice of Tailor-Fit speaker and control equipment, as low as \$39.95

Tailor Fit controls to match instrument panels. Overhead, separate case or in the set speakers



Doubles Station Range — Improves Tone Quality • Enjoy a new treat in Radio — Arvin Car Radio with the Phantom Filter. Many stations formerly "hard-to-get" come in as strong and clear as "locals." The beauty of tone and clarity of reception are amazing.

Have a genuine Arvin in your car — for more pleasure than you can imagine. Noblitt-Sparks Industries, Inc., Columbus, Indiana. Makers of the famous Arvin Car Heaters and Arvin Home Radios.



This Arvin advertisement from Saturday Evening Post typifies the efforts of set makers to improve the range and signal-to-noise ratio of the automobile antenna system.



December 16, 1936

The RADIO WEEKLY

NOW! *Magic Voice* in RCA Victor 1937 Auto Radio Line!

• Cash in! Push these new sets with great sales features . . . Magic Voice, Finger-Tip Control, Escutcheon Plates for 1934, '35, '36, and '37 cars. A unique merchandising plan and aggressive, compelling promotional advertising will help you.



• RCA Victor Magic Voice Model 67M-2 . . . 8-inch Magic Voice speaker, 6 tubes and Powertron, 9 watts output, 2 audio stages. Tone control and local-distant switch on control panel.

• RCA Victor Magic Voice Deluxe Model 67M-3 . . . 8-inch Magic Voice speaker, with auxiliary overhead speaker and three-way switch to select either or both speakers, 6 tubes and Powertron, 9 watts output, 2 audio stages.

RCA Victor's 1937 automobile radios are made to order for easy and profitable selling by *you*! They bear radio's greatest name. They offer many features for finer performance. They are backed by a new, sales-inspiring merchandising plan!

Features? The famous RCA Victor Magic Voice makes its initial auto radio appearance—providing tone never before equalled in cars. Finger-tip control of *everything*. Escutcheon plates to match 1934, '35, '36, and '37 models. Two audio amplification stages. 9 watts output. And still others! For beauty, performance and tone—they're magnificent! And their low prices are an extra appeal that mean

extra sales! Order your stock now. Feature these superb new sets. Push them at every opportunity. Cash in on real auto radio value!

• (Below) RCA Victor Model 67M-1 . . . 6 tubes and Powertron, 2 audio stages, 9 watts output, built-in speaker, connections for extra (overhead) speaker if desired.



• (Above) RCA Victor Model 67M . . . 6 tubes, 3½ watts output. Outstanding performance at low price.

• 1937 RCA Victor Auto Radio escutcheon plates and controls to match instrument panel for cars, 1934 through 1937. Also available for steering post and under-dash mounting.



Tone and volume controls on left knob; tuning control and local-distant switch on right—for Magic Voice Models 67M-2 and 67M-3.

RCA presents the Metropolitan Opera beginning Thursday, Dec. 24 and Saturday afternoons thereafter. Also "The Magic Key of RCA" every Sunday 2 to 3 P. M., E. S. T. Both via NBC Blue Network.

RCA Victor AUTO RADIO



RCA MANUFACTURING COMPANY, INC., CAMDEN, N. J.
A Service of the Radio Corporation of America

Opposite: This powerful, full page advertisement from The Radio Weekly tells it all. RCA was going after the auto radio business with their "Magic Voice."

Motorola announced "Acoustinator" a small device for operator control of the sensitivity and fidelity of the set.

Cover of a Zenith sales folder stressing the attractive black dial with illuminated pointer.



THE *Motorola* ACOUSTINATOR IS BRINGING FLOCKS OF CAR OWNERS IN TO BUY!

*Your Enthusiastic
Customers Are Saying:*

**The NEW "PERSONAL PREFERENCE SELECTOR" IS
TODAY'S BIGGEST AUTO RADIO FEATURE**



Speaking further of car radio advertising, Ford led the way with full page advertisements in The Saturday Evening Post, Liberty and Colliers. Some of these were in the form of factory approved accessories. Philco again took out half pages in Post on page two to advertise their Custom-Built series. They also appealed to their dealers through national trade publications. Arvin, Crosley, General Electric featured their auto radios in Post.

Arvin and many others also did eye catching ads in radio trade publications such as The Radio Weekly and Radio Retailing. Some car makers commissioned their advertising agencies to prepare colorful printed folders for mailing and handing out at the dealerships. Advertising not only contributed to the success of the car radio but provided many jobs for creative people in the graphic arts and printing trades in 1937. It was not just the radios that were being promoted, but also batteries, components, tubes and accessories such as antennas, engine noise suppressors, and speakers came in for their share.

The antenna makers such as Ward Products, Snyder, Philco, Lynch and many others were having a challenging year since the industry had not yet settled on the ultimate antenna for the automobile. The all-steel top was at least in part responsible for this situation since it ruled out the "chicken wire" in the roof. Of course, opportunity was there for the firm that was far-sighted enough to place its emphasis on the antennas that would become the accepted standards. Among the choices were: the running board and the "flip-up" roof types previously discussed; the "topper" over the roof with suction cups; the "fish-pole" bumper attachment and the "buggy whip" side cowl, just to name the more popular choices. These were some of the challenges for the radio technician.

Cooperative advertisements were an excellent manner in which to introduce both the automobile and the radio.

For Willys ... there's a custom-built PHILCO

Where there's a Willys ... there's apt to be a Philco Auto Radio! For Philco provides a model especially custom-built for the car which has made such astounding gains during 1937 ... the only auto radio designed and built especially for Willys, the only radio approved as standard optional equipment by the maker. There are custom-built Philcos for thirty-one other American, Canadian and foreign cars ... each one exclusively approved by the manufacturer of the car for which it was designed. And in addition there are simply powered, beautifully toned, highly selective Philco Auto Radios that can be quickly installed in the car you are driving today ... no matter what its make or model!

The Philco custom-built auto radios for Willys cars are recommended and sold exclusively by Willys dealers.



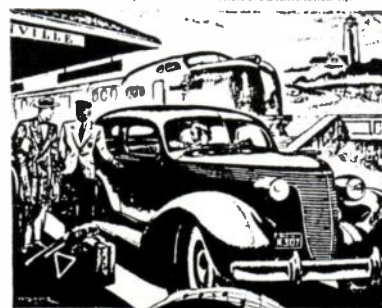
PHILCO AUTO RADIOS, \$41.95 and up. Special installations and aerial installations are quickly and easily made at small cost by Philco dealers everywhere ... PHILCO INLAND RADIOS from \$12.50 to \$40.00. PHILCO REPLACEMENT TUBES improve the performance of any radio.

Thirty-two leading cars specify Philco exclusively ... and Philco has a Custom-built Radio for each!

Since the first auto radio Studebaker has specified PHILCO!

STUDEBAKER is enjoying one of its most successful years ... and as always, since the first days of auto radio, the demand for new Studebakers has resulted in a demand for custom-built Studebaker-Philco Auto Radios! Higher than ever is the proportion of Studebakers equipped with auto radios! And Philco is the only radio approved as standard optional equipment by this pioneer of the transportation world. There are specially custom-built Philcos for thirty-one other leading American and foreign cars ... each with the exclusive approval of the car manufacturer. And there are other Philco Auto Radios ... powerful, highly selective, richly toned ... that will reach out and get stations near and far in any car on the road. They are quickly installed in your present car ... will add tremendously to your pleasure every mile of every trip ... so why not start enjoying perfect Philco reception today?

The custom-built Studebaker-Philco with the speaker mounted over the windshield is sold by Studebaker Distributors and Dealers exclusively.



PHILCO AUTO RADIOS, \$41.95 and up. Special installations and aerial installations are quickly and easily made at small cost by Philco dealers everywhere ... PHILCO INLAND RADIOS from \$12.50 to \$40.00. PHILCO REPLACEMENT TUBES improve the performance of any radio.

Thirty-two leading cars specify Philco exclusively ... and Philco has a Custom-built Radio for each!

A colorful, promotional piece by the car maker from Lansing showing the occupants of a convertible enjoying sweet music from the radio.

Spring sales promotional folder designed for the throttle button of the 1937 Ford cars. Inside are listed all of the important features and a message: "You can buy a genuine Ford radio on the time payment plan."

Opposite: This Delco-Remy battery advertisement captures a romantic setting. The Buick four-door convertible provides the music and a great backdrop.

MORE PLEASURE PER MILE!

With a
POWERFUL
New 1937
OLDSMOBILE
RADIO

The
GENUINE FORD RADIO
is built for your Ford V8

★ Ask for a demonstration. Let the performance of this radio convince you that it is the best radio you can buy for your Ford V-8.

\$48.00
INSTALLED WITH ANTENNA

Open Cars \$40.00 installed with an antenna

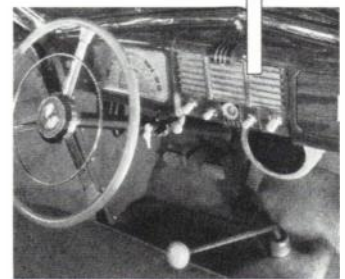
There's music in the air



...and a DELCO
battery makes sure you'll get it

The increasing popularity of radio offers Delco batteries another opportunity to demonstrate how thoroughly and dependably they serve the modern motor car. The ample flow of power delivered by Delco more than meets the demands of radio, starter, lights, and every other electrical unit in the car. Designed by engineers with a background of more than a quarter of a century of automotive

electrical experience; built throughout at the Delco-Remy plants by skilled workmen; carefully inspected at every stage of manufacture—it is only logical that Delco batteries should be standard equipment in many leading motor cars—including all General Motors cars. It is only natural that their effective and dependable performance should serve 5,000,000 motorists the world over.



Delco-Remy

World's Largest Manufacturer of Automotive Electrical Equipment

MANUFACTURER OF DELCO-REMY
STARTING, LIGHTING, AND IGNITION
ELECTRIC HORNS • DELCO BATTERIES
AUTOMATIC CARBURETOR CONTROLS



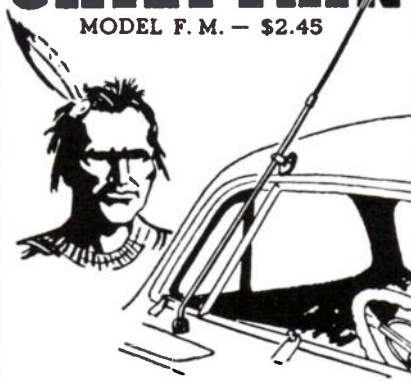
DELCO-REMY PRODUCTS AND COMPONENTS ARE AVAILABLE AT UNITED MOTORS SERVICE STATIONS EVERYWHERE . . . WHEREVER YOU SEE THIS SIGN.

THE AUTO RADIO

Opposite: A rare illustration of the Admiral Touch-O-Matic tuning from Continental. This appeared in Radio World magazine.

These clips from The Radio Weekly are only two of many that appeared during 1937. With all of the challenges presented by the automobile body design trends, the innovators were having a field day with their new antenna creations.

Introducing the CHIEFTAIN
MODEL F. M. — \$2.45

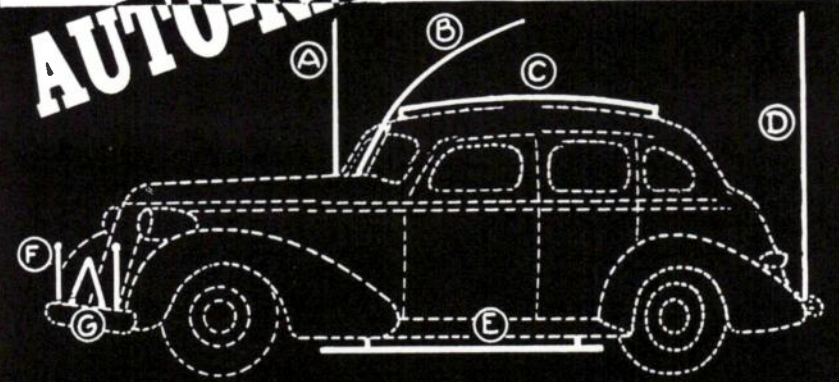


WARD'S NEWEST TOP AERIAL
Made of Stainless Steel and Brass — Chromium Plated — Telescopic

WARD PRODUCTS CORPORATION
MANUFACTURES THE WORLD'S
FINEST LINE OF AERIALS
TOP -- POLE -- UNDERCAR
SEND FOR CATALOG TODAY

WARD PRODUCTS CORP
WARD BUILDING CLEVELAND, OHIO

Snyder's
MANUFACTURERS OF
AUTO-RADIO AERIALS



Every Conceivable Style!

A—BUGGY (HINGE) WHIP	D—FISH POLE
B—WINDSHIELD TOP WHIP	E—UNDER CAR
C—TOPPER	F—STRAIGHT PROTECTOR
G—GRILLE GUARD COMBINATION	

DETAILS ON REQUEST **SNYDER Inc.**
813-23 NOBLE STREET, PHILADELPHIA

The installation and servicing of automobile radios became a large-scale business conducted for the most part by independent operators. If a person was a good technician, had some business ability and was ambitious, he would find numerous job opportunities. Many fine schools offered both residence and home correspondence courses of study in general radio theory as well as specialized auto radio work to train service personnel to fill job openings.

As one old-timer stated, "The only drawback to being in the auto radio business in those days was that you had better not plan on a vacation during baseball season. Those fans had to have their sets working for the big game."

EVERY CAR OWNER IS A PROSPECT FOR

Admiral TOUCH-O-MATIC tuning!



TWENTY million or more car owners—each and every one of them a potential customer for touch-o-matic tuning. This latest Admiral sensation is easily installed on *any* car radio . . . old or new. Just touch a button ; , and presto! in comes one of your favorite stations clear as a bell.

Streamlined, handsomely faced with chromium, the touch-o-matic control mechanism is easily attached to steering column. The operating mechanism is housed in a compact metal case installed on the side of the radio. Make 1937 your biggest auto radio year with touch-o-matic tuning and the new 1937 Admiral Auto Radios. Write for details.

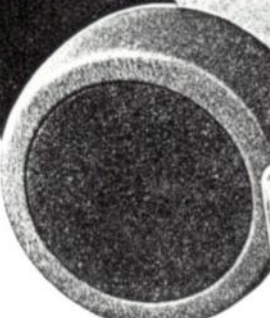
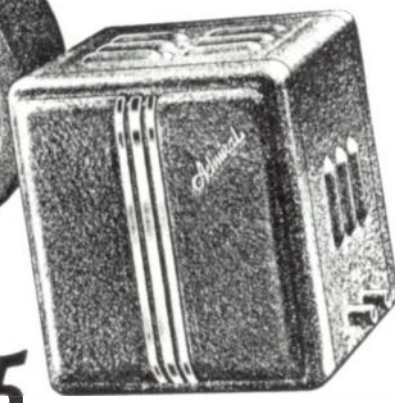
CONTINENTAL RADIO & TELEVISION CORPORATION
325 W. HURON ST. CHICAGO, ILL.

\$8.95
PLUS INSTALLATION ON ANY CAR RADIO

AMERICA'S SMARTEST AUTO RADIOS

6-7-8 Tube Models
External or Self-Contained Speakers

Powerful superhet circuit operates entirely from 6 V car battery. Lowest drain. 10 KC selectivity. Variable tone control. Iron core antenna "pick up" 1/4 MV sensitivity and increases antenna "pick up" 2 to 7 times over other car radios. Heavy duty dynamic and permanent magnet type speakers. Dash controls to match dash. (Touch-O-Matic tuning optional.)

**Admiral
AUTO RADIOS**

\$35.95 AND UP
DASH CONTROLS TO MATCH ANY CAR



New "4-in-2" Dash Control.

1938

Against a background of international tension and crisis, Orson Welles on Mercury Theater broadcasts the adaptation of H.G. Wells' "War of the Worlds." Seemingly authentic news bulletins cause widespread panic as people everywhere rush to escape the Martian invaders.

A baby from the beleaguered planet of Krypton arrives on Earth as Superman—able and eager to combat the demons of evil. The exploits of another hero are chronicled as Republic Pictures releases the first Lone Ranger movie serial.

Al Pierce receives a plaque for "Distinguished service in radio." His "Watch the Fun Go By," sponsored by Ford Motor Company, is broadcast coast-to-coast on CBS. Pierce's Elmer Blurt, characterization of the low pressure salesman with the routine "Hope There's Nobody T'home... I Hope... I Hope... I Hope," becomes widely imitated.

Benny Goodman's Carnegie Hall Concert is a huge success, and an open air "Carnival of Swing" (at Randalls Island, N.J.) with twenty-five bands and thousands of jitterbugs performs for nearly six hours. Another form of swing finds 3,000,000 Americans batting Ping-Pong balls across table tennis nets.

More names in the news are: Mary Martin in "My Heart Belongs to Daddy"; Ella Fitzgerald singing "A-Tisket-A-Tasket"; Gene Kelly dancing in the back of a chorus line and Edward R. Murrow beginning direct news broadcasts from London.

The top money making movie of the year is Walt Disney's Snow White and the Seven Dwarfs. The top tunes are: "Jeepers Creepers (Where'd You Get Those Peepers?)"; the far out "Flat Foot Floogy with the Floy Floy" and the nostalgic "Thanks For the Memory."

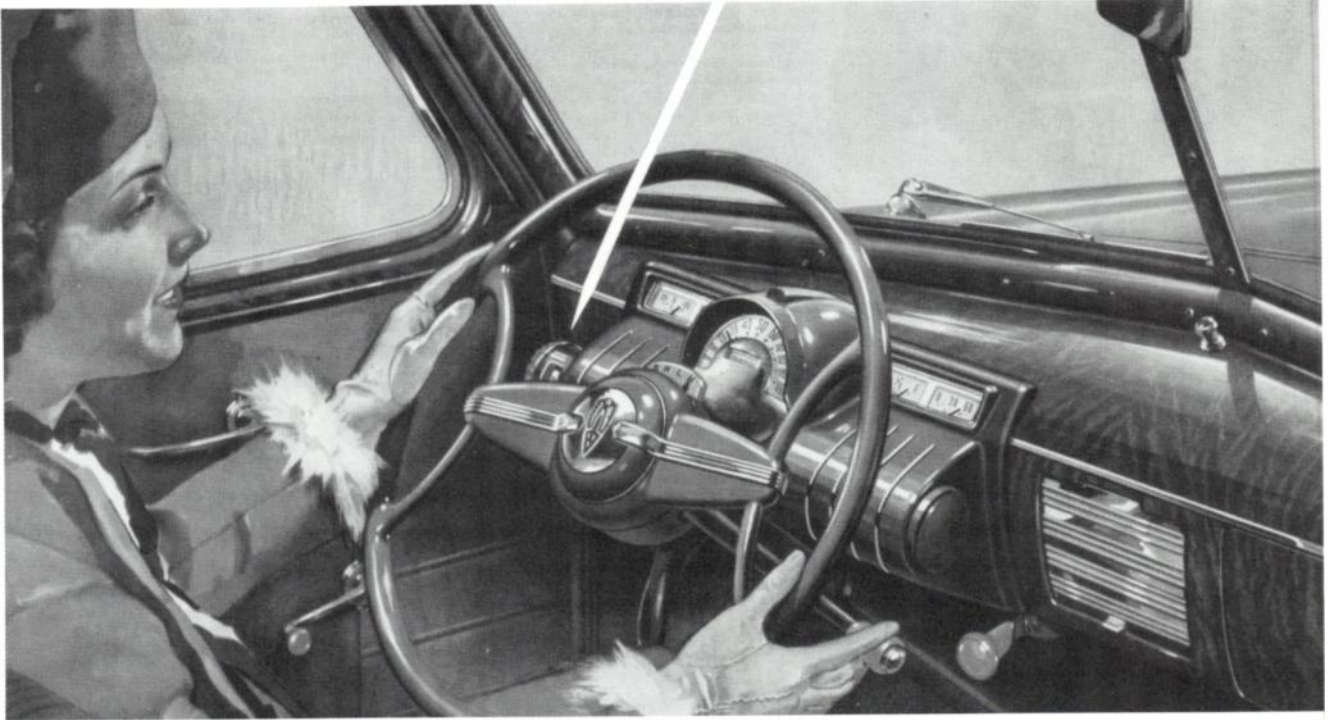
RADIO'S GOLDEN YEARS

Most car makers' 1938 models were similar to those of 1937 except for mechanical improvements and face lifting. These improvements included many boldly restyled radiator grilles which created a striking appearance. The completely restyled "shark-nosed" supercharged Graham was the most dashing of all. It looked fresh off a race car designer's drawing board. Public opinion, however, was mixed and sales did not reflect the effort that went into the design, as we have seen with certain other radical departures from the norm. Due to no fault of the fine automobile offerings, but rather to social and political issues, U.S. economy suffered a relapse, and automobile production fell nearly 50% from the 1937 total of 3,915,889 cars to 2,000,985 units.

This then would be another period of re-adjustment and cost-trimming. Technological progress, however, did not stand still, as this was the year that changes began to appear in the driving controls. Pontiac was offering Safety Shift Gear Control, an option for only \$10.00 extra. Oldsmobile went one step further by offering an optional Automatic Safety Transmission on all 1938 models, while Buick offered an optional automatic transmission on Series 40, the Special.

There was some justification for clearing the floor of that "old stick," although the pros and cons are still taking a stand on the issue. The "stick" was often an obstacle for couples who wanted to snuggle up, though the resourceful ones had somehow gotten by for years. In a more serious vein, the cars were getting wider and the front seat could comfortably accommodate three people, but it was somewhat awkward for the center passenger who had to straddle the gearshift lever. The column or "tree" shift was in this respect a safety measure. The innovators were learning to use the basics of remote control, whether it be purely mechanical, electrical or a combination of both to improve creature comforts.

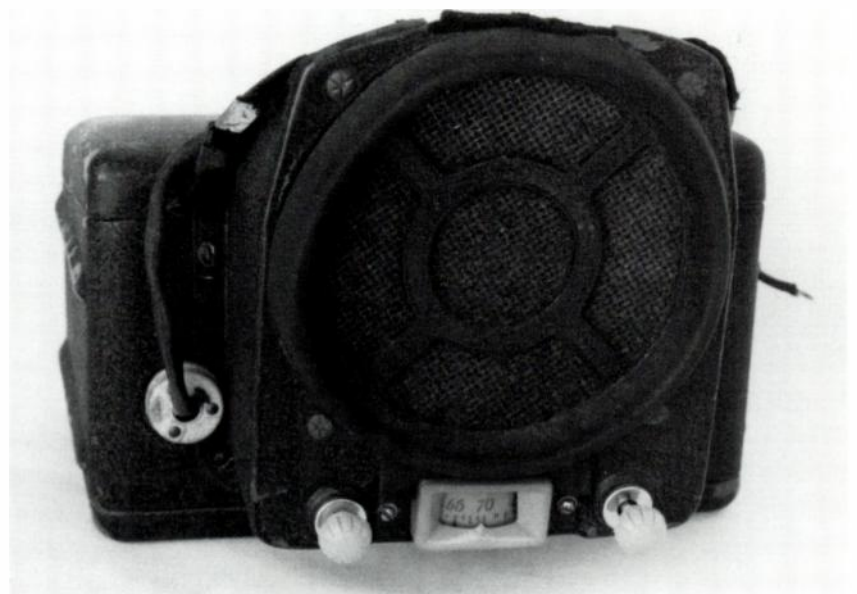
Further inroads along this line were seen in the auto radio. A highlight of Oldsmobile's Safety Instrument Unit and Safety Dash was an attractive drum-type radio remote control pod mounted almost at the driver's finger tips. One of three options was the Model 982084, an eight tube Deluxe receiver having tone and sensitivity switches, in addition to the tuning and volume controls, all located in the remote control assembly. Another feature incorporated in the receiver was an automatic speed volume control that increased the volume with car speed, the idea being to



Arrow points to the radio controls at left of Oldsmobile's streamlined instrument pod. Also visible is the column shift, new for 1938.

counter the road noise. Differing from previous Oldsmobile models, this set used the type 0Z4 cold cathode rectifier tube which was becoming popular as a power saver. The antenna system consisted of the running boards as in the previous year with the set's antenna coil having two taps, one for the running boards and the other for an overhead (roof) type antenna if desired.

Philco-Ford radio was mounted behind the louvers in the instrument panel. Innovative drum dial created a trim effect.



The Pendulum swings again for 1938 CARS

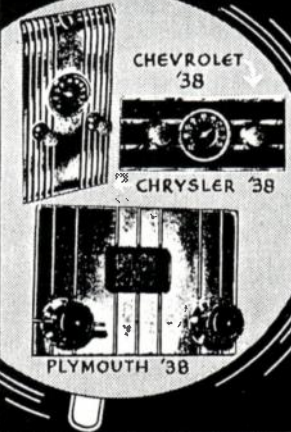
AGAIN CROWE LEADS
with new Panel Mounting Kits for 1938 cars! Official styling! Attractive escutcheons! Softly illuminated dials! Colored knobs! All blending with instrument panel of car. Airplane and drum-type dials. Crowe Interchangeable Controls and Shafts make auto radios adaptable to any car. Re-installation simply by changing Panel Mounting Kit. Get complete details!

ASK FOR SUPPLEMENT 204 AND BULLETIN 202

PHILCO DEALERS!
Crowe-Philco program increases sale of Philco auto radios. Stock Crowe Panel Mounting Kits. Ask for Supplement 204 and Bulletin 201!

CROWE ANNOUNCES NEW PANEL MOUNTING KITS
CROWE CUSTOM-BUILT

Manufacturers! Crowe Method of Distribution reduces inventory—improves service—standardizes prices—simplifies selling—stabilizes profits. Write for details.



CHEVROLET '38
CHRYSLER '38
PLYMOUTH '38

CROWE NAME PLATE & MFG. CO.
1769 Grace Street
CHICAGO, ILL.

Custom controls were available for matching universal radios to the latest cars.

The radio continued to evolve into a position of prominence on the instrument panel. As we learned from the preceding section, Buick took the lead by placing a single unit, including receiver, speaker, and controls behind an attractive chrome grille in the center of the panel. Buick repeated this layout in 1938 with their Centerline radio incorporating a new tube lineup. Ford and Philco engineers came up with a unit for installation in the center of the instrument panel so that the speaker was centered behind a louvered grille. Matching knobs and drum dial were convenient to both the driver and passenger. The six tube Philco radio chassis was similar in circuitry to the previous year. The cost of the radio and flip-up windshield antenna was \$45.00.

Chevrolet had not yet moved the entire radio up to the instrument board, but the speaker was there and the radio was a surprise package. The premium unit was a seven tube superheterodyne receiver with automatic volume control; full range bass compensation; triple tuned, intermediate frequency transformers; beam power output; cold rectifier and an electric motor operated tuning assembly. An eight position, push-button tuning station, volume and tone controls, were located in the remote control unit, mounted in the instrument panel. The dash-mounted speaker was of the permanent magnet dynamic type, a feature made possible by improved magnetic materials and techniques. The advantages were: possible quieter operation and one ampere less current drain on the car battery.

In addition to Ford, Philco was busy supplying specially engineered radios for many other leading American and foreign cars. The Model C-1550, for the Chrysler and DeSoto cars, featured an attractive instrument-panel-mounted remote control unit with a large matching airplane-type dial incorporating tuning, volume, and tone adjustments. The Packard model P-1530, a seven tube two unit system, featured an elaborate remote control head for instrument panel mounting which had four cables leading to it. These were station tuning, volume/on/off, tone, and local/distant controls. These functions were accomplished by two sets of concentric shafts and a complicated array of gears and pinions, a spectacular bit of engineering.

For Chrysler products, Graham-Paige, Nash, Packard, Studebaker and others, Philco generally offered standard and deluxe radios with a choice of speaker locations which for 1938 included dash and header mounted. The inputs of the receivers were designed to be used with either the "Roadway" (running board) or "Skyway" (side-cowl or roof-mounted) antennas. On some cars the roof-mounted type was a stainless steel rod or tubing which began at the windshield

PACKARD CAR RADIO



PACKARD SIX *and* EIGHT

The Philco built for Graham is tuned to tomorrow's tempo, too!

GRAHAM's third successive victory in winning the National Economy Sweepstakes... coupled with the dashing style of the 1938 Graham... has made it one of the most talked about of all cars. And for this smart new Graham, there's a special Philco Auto Radio... designed, engineered, built with the single thought of providing radio reception as up-to-the-minute as the Graham's dynamic lines. The same policy has prevailed in the production of specially engineered Philco Auto Radios for 31 other leading American and foreign cars... and each of these has been exclusively approved as standard optional equipment by the maker. In addition, there are Philcos incorporating all the latest Philco developments... greater selectivity... new fast-reading, inclined dials... perfectly matched aerials... which fit *any* car... any model... any year.

Graham-Philco factory-engineered and approved radios are sold exclusively by Graham dealers.



PHILCO AUTO RADIOS, \$24.95 and up. Special installations and aerial installations are quickly and easily made at small cost by Philco dealers everywhere... PHILCO HOME RADIOS from \$22.50 to \$60.00. PHILCO REPLACEMENT TUBES improve the performance of any radio.

Thirty-two leading cars specify Philco exclusively... and Philco has a Custom-built Radio for each

Philco rode with the
"Sharknose" Graham.

A full line of antennas, test equipment and parts were available to Philco dealers.

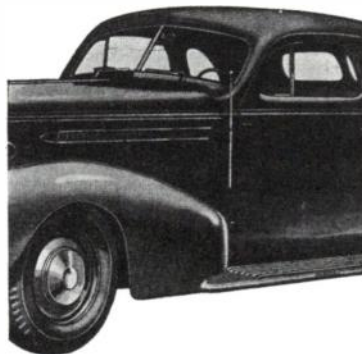
Opposite: A luxurious open car fitted with Model P-1517 radio, one of three Philco-Packard options for 1938.

and ran the length of the top and down the rear window.

As in previous years Philco did not limit themselves to the manufacture of original equipment automobile radios; rather, they marketed an extensive line of distributor models for universal application. These units were highly competitive, encompassed the latest circuitry and were available with matching controls and hardware for most any model car. To support the dealer in the installation of these sets, Philco offered a line of aerials including: the "Hi-Way" roof-top, a telescoping cowl-mount and an undercar type. These units were designed in connection with the firm's 1938 Philco car radios and were claimed to be perfectly matched and balanced electrically to the circuits of the sets.

PHILCO Telescope COWL AERIAL

Part No.
45-2628



Height: Extended, 55"; Contracted, 24".

An improved type two-section telescoping cowl aerial, electrically matched to the new 1938 Philco car radios. Gives splendid performance on any make of automobile radio.

Sections are of seamless rustproof metal; smooth telescoping action. Mounted to cowl by two small bakelite supports; flexible rustproof lead-in brought through lower section.

Ideal for the person desiring an attractive yet inconspicuous and highly efficient car aerial.

New Three-
Section Cowl
Aerial.
62" long.
Part No. 45-2617
List \$5.00

List Price . \$4.00

NET DEALER PRICE.....

PHILCO
Part No.
45-2568

"Hi-Way" Aerial



Neat Appearance, Fine Performance

Newest design Philco aerial for car roof installation—one of the fine new aerials developed in connection with the 1938 Philco car radios, and essential to their performance.

Extremely attractive in appearance, the "Hi-Way" Aerial performs very efficiently on any car radio. Easily mounted by suction cups and drilling of one small hole. Special lead-in of permanently rustproof flexible material.

Blends with modern car streamlines perfectly.

List Price . . \$4.00

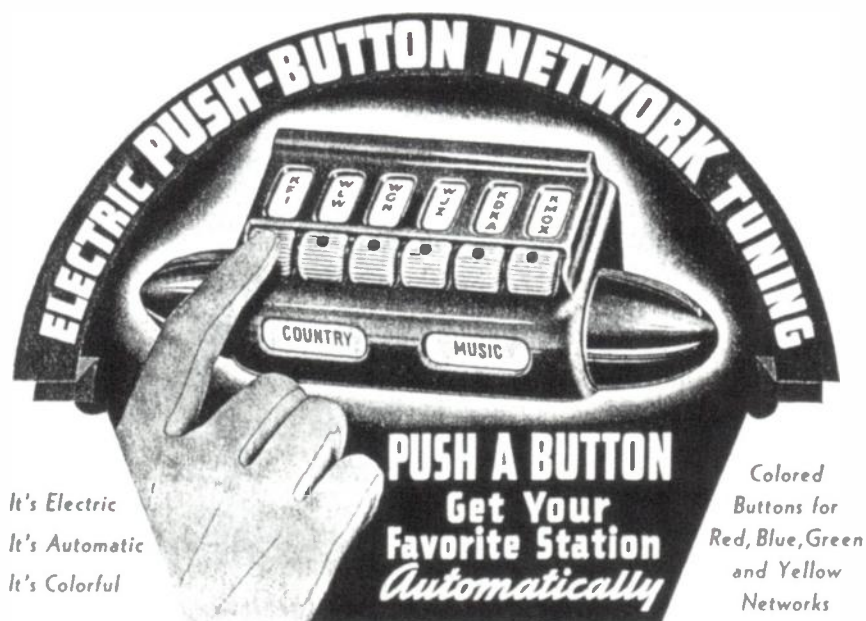
NET DEALER PRICE.....

Delco Radio Division of General Motors was in full swing at Kokomo, building many of the original equipment sets for the GM car divisions, as well as marketing through United Motors Service, a line of aftermarket radios and accessories. They also made available matching controls for the popular automobiles. It is safe to say that Philco and Delco were strong competitors, both deeply involved in all aspects of the auto radio field.

There were others: Wells-Gardner was still building fine sets for Cadillac and one set for Chrysler in 1938 as well as some private label activity; RCA had the Hudson-Terraplane account and marketed a line of aftermarket radios through the RCA dealer network. With Reo, Auburn, Cord, and Duesenberg gone, and Pierce Arrow sold at auction on May 13th, there weren't as many car makers to go around for a piece of the business, even if the radio industry did want it. The rest of the radio industry, for this year at least, were going solely with the aftermarket trade which was still a huge market.

Galvin Manufacturing Corp., still not as yet interested in the O.E.M. business, was steadily increasing their distributor and dealer network, broadening their line, and expanding their facilities by

Motorola combined the "Acoustinator" unit with push-button tuning.



6 ELECTRIC PUSH-BUTTONS
FAST • ACCURATE • FOOLPROOF • COLORFUL

Tunes NETWORK Programs by Color. Just touch a button . . . and your station comes in instantly. The button with the tiny Red Dot brings in NBC RFD Network. The Blue Dot for NBC BLUE Network. Green for Columbia, Yellow for Mutual, and 2 additional buttons for your other Favorite Stations.

• AN ACE MOTOROLA FEATURE •

ACCURATELY • EASILY SET
SIMPLICITY ITSELF • EFFICIENT • NEW

The biggest thrill in auto radio. Truly automatic Push Button with color designation for Network Tuning. No backlash . . . no drift . . . no slip. Buttons are of transparent lucite with tiny slots into which station call letter tabs may be inserted. Buttons quickly and easily snapped out for changing tabs.

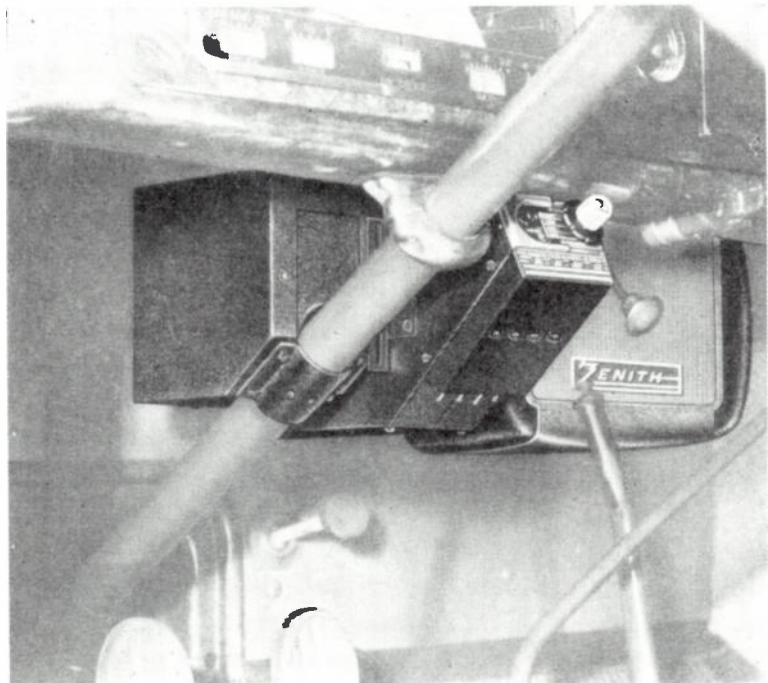
• ON MODELS 8-60 AND GOLDEN VOICE •

moving into their attractive new building on Augusta Boulevard in Chicago. It was about this time that they had decided to branch out into the home radio field to even out the seasonal hump, which was characteristic to the car radio business. They were also developing a push-button tuning feature for their line of products which had some "bugs" and many of the units were being returned for credit. All of this, when the economy was experiencing a period of recession and "dumping" of radios was occurring, was proving to be a source of concern.

The misfortune of one of their competitors, in the form of a severe labor strike, proved to Galvin's benefit when Philco arranged to have a part of their production done by Motorola. In the end this saved both firms from embarrassment in their respective markets. It was during this time that some of the marginal auto radio makers fell by the wayside, but the major firms somehow survived.

In addition to Motorola, automobile radio makers from Arvin to Zenith, were offering a line of after-market and replacement sets with controls and hardware for mounting in most any car, new or old. Zenith developed an unique set in their Model 5-M-294. This was a compact five tube two piece receiver assembly that could be converted by means of adjustable brackets for either left or right side of steering post mounting. This set was called automatic, because in addition to the manual tuning, it featured four push buttons, each of which electrically switched an individual pre-set tuned circuit when depressed. This was one of five Zenith models offered during the year.

This truly ingenious Zenith
would fit most any car includ-
ing a Model A Ford.

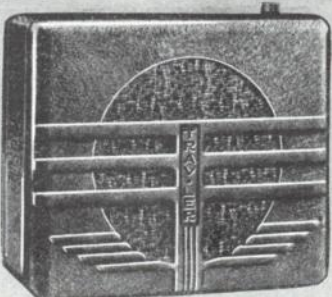


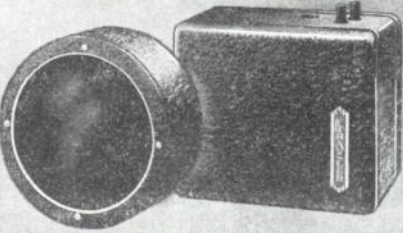
In reviewing the progress made in 1938, most historians will agree that the many innovations, the refinement of product, the accumulated knowledge, and the excitement of the times for those involved, will be remembered long after the rather disappointing production figure of 800,000 units is forgotten.

The Trav-ler logo appeared in a well known radio parts catalog.



ONLY \$19.95
 FOR THIS IN LOTS OF 6





6 Tube Auto Radio

Here's your Leader for Auto Radio's Biggest Year. A high quality, full power, more sensitive, highly selective 6 tube auto radio—PRICED RIGHT to give you quick, easy, regular profit sales. Attracts customers that will be sold-up to higher priced models. Sturdy and reliable in operation. Superheterodyne Circuit insures excellent selectivity and sensitivity. Many features found only in high priced sets. Automatic volume control . . . Variable Tone control . . . Low battery drain . . . High frequency filtering system . . . Suppressorless . . . New iron core coils . . . 3 gang condenser mounted on rubber . . . 6" full size dynamic speaker . . . Power output 3.25 Watts . . . Plug-in connections throughout . . . Single-hole mounting . . . Rugged compact steel housing. Panel mounting in any automobile. Tubes used: 2-7's, 1-6A7, 1-7's 1-41, 1-84. Case finished in brown crackle, size, 8 7/8" long, 7 1/2" high, 6" deep. N16815—Trav-Ler Model 560—Complete with Tubes, Control Head Mechanism, and Flexible Shafts. Less **\$19.95**
 YOUR PRICE, In Lots of 6, Each . . . **\$20.65**
 In Lots of 3, Each . . . **\$21.45**
 Single Lots . . . **\$21.45**

7 Tube Auto Radio

★ Superheterodyne Circuit. ★ Variable Tone Control. ★ 3-Gang Tuning Condenser. ★ Local-Distance Switch. ★ Automatic Volume Control. ★ Entirely Suppressorless. A newly designed 7 tube superheterodyne auto receiver using the latest type tubes and iron core coils. Sensitivity is less than 1 microvolt. 10 Kc. selectivity. Variable condenser is rubber mounted. Local-Distance switch for city or country driving. 6 1/2 inch heavy duty high fidelity curvilinear speaker gives excellent tone response. Extra socket provided for easy connection of an auxiliary overhead or underdash speaker. Undistorted power output of 4.25 watts. Special high frequency filtering system automatically eliminates all motor and ignition noise. Tubes: 1-6AG5, 2-6K7's, 1-6V6's, 1-6X5's, 1-6F5's, and 1-6H6. Housed in attractive metallic gray finished steel case with chromium plated front grille. Single hole mounting. Four In One Controls—Tone control and local-distance switch on control head. Size: 8 7/8" long, 7 1/2" high, 6" deep. N16816—Trav-Ler Model 601—Complete with Tubes, Control Head Mechanism, and Flexible Shafts. Less **\$23.62**
 YOUR PRICE, In Lots of 6, Each . . . **\$24.41**
 In Lots of 3, Each . . . **\$24.41**
 Single Lots . . . **\$25.20**

7 Tube Deluxe Auto Radio

Separate Large 8 Inch Permanent Magnet Dynamic Speaker—requires no field current—reduces battery drain—delivers tremendous volume—provides finest home-like tone quality. A compact dual unit radio. Undistorted output of 5 watts. All other features same as above model. Sturdy receiver and speaker cases finished in attractive olive green. Size of receiver unit: 8 7/8" long, 7 1/2" high, and 6" deep. Speaker: 8 1/2" diameter, 5" deep. N16817—Trav-Ler Model 770—Complete with Tubes, Control Head Mechanism, and Flexible Shafts. Less **\$26.55**
 YOUR PRICE, In Lots of 6, Each . . . **\$27.54**
 In Lots of 3, Each . . . **\$27.54**
 Single Lots . . . **\$28.43**

CUSTOM MOUNTINGS FOR ALL TYPES OF 1937, 1936 AND 1935 CARS



BUICK-37



CHEVROLET-37



CHEVROLET-36



HUDSON AND TERRAPLANE-37

PANEL MOUNTING KITS
 Used with control mechanism supplied with Trav-ler radios for making complete Dash Panel installations in any car. Make selection of Panel Mounting Kits desired from listing of car makes and models on page 153.
 YOUR SPECIAL PRICE
 Each Kit . . . **\$1.15**

THE RADOLEX COMPANY

Copyright 1938 by W. C. Braun

202

WRH



FIRST, it was Radiart Styling everyone could SEE that. Then service men learned that Radiart Aerials are quiet, electrically — because built by a manufacturer who has ALWAYS done precision work. Owners found that Radiart aerials don't rust, tarnish or corrode, because Radiart demands, and pays for the highest grade of nickel AND chrome plating on Admiralty Brass. Now comes the latest Radiart betterment — an ANTI-RATTLER (Patent Applied for) which, at last, quiets that maddening noise of long telescopic aerials. Learn about the Anti-Rattler. Learn the whole Radiart Story of quality and profit.

THE RADIART CORP.
SHAW AVENUE, CLEVELAND, OHIO
Makers of RADIART VIBRATORS

**It's RADIART
for AERIALS in '38**

Radiart became a big name in antennas and vibrators.

THE AUTO RADIO



A clever cartoon from Saturday Evening Post.

1939

The Golden Gate International Exposition, World's Fair pageant of the Pacific, opens February 18th on man-made Treasure Island in San Francisco Bay. The largest single commercial exhibit is the Ford Building.

On April 30th, the New York World's Fair, the colorful, fantastic "World of Tomorrow," opens in a magical city which has risen from a dump heap, Long Island's Flushing swamp. Architectural marvels: a huge white sphere and a triangular 700' obelisk dominate the Theme Center. New words are coined to describe these wonders: Perisphere and Trylon.

Performing on the stage at Radio City Music Hall, the World's largest theater, are the internationally famous Rockettes.

Women learn that the best wardrobe choices are a four-piece woolen suit ensemble: tweed hat and jacket in three tones, dark skirt, silk blouse and a topper coat in a matching bright hue. For sight-seeing and dinner or dress-up occasions, good additions are: tailored shirtdresses and a dotted crepe jacket frock that can go anywhere. Don't forget your new nylon stockings and nylon bristle brush.

Americans are on the move everywhere. Motels and courts with tidy bathrooms and tile-lined showers, kitchenettes with instantly available hot water, and even a few swimming pools are becoming popular with the tourists. A recent magazine article describes a 14,695 mile, eighty-eight day cross country motoring trip for only \$607.76.

The airways are busy too: America's 28 million radios are used an average of 4 1/2 hours per day. "Challenge of the Yukon" with Sergeant Preston and King, his Husky dog, (created with appropriate sound effects) goes on the air. The Lone Ranger's popularity continues unabated, and the show is producing new installments three times a week. When you are traveling, turn the dial or push a button and the world of sports, music, drama, comedy or news is with you wherever you go.

RADIO'S GOLDEN YEARS

Statistics reflected the developing story of the auto and radio industries. Although 1939 radio production did not reach the previous highs of 1936 and 1937, total radio industry sales established a record of 10,000,000 sets. The dollar value of 354,000,000, however, was below that of 1936 and 1937 due to dropping prices and increasing sales of the small table radios.

These sets were becoming more refined and were being packaged in highly styled wood and plastic cases. Some of these cases were molded from a translucent material known as catalin which gave the appearance of a solid onyx carving. With their effective built-in loop antennas, it was possible to carry them from room to room, plug into the AC outlet, and tune in to a favorite program. At an average price of about \$19.95 some could afford to have several in matching room colors. Several of the techniques used in the engineering of these sets, such as the high gain "front-ends" and compact packaging, were learned in the evolution of the car radio.

The large family consoles and radio-phonograph combinations usually resided in the living room or parlor, the home entertainment center in those days. For 1939 these were outstanding values. The styling trend toward the rectangular look seemed to be having an influence over the cabinetry of several sets and the linear or slide rule type dial was even more in evidence. Automatic tuning, multiple wave bands, built-in antennas, and some form of tone compensation continued to be selling features.

Additional statistics continue to tell the story. When the automobile radio production of 1,200,000 was compared to a passenger car output of 2,866,000, the resulting ratio was one radio set to every two and four tenths vehicles. This is good progress when considering a time frame of less than ten years since the car radio was first introduced. The total motor vehicle registrations on January 1, 1939, were 29,942,316 compared to a total 6,500,000 auto sets in use. With over twenty million cars traveling the highways and byways without a radio, a good potential existed for the radio retailers and installers. The accessory manufacturers were supplying radios, antennas, matching controls, and associated hardware of unquestioned quality to fit any car and anybody's purse, and for the short-wave buffs, ABC Radio Laboratories of Indianapolis, Indiana, made a converter that could be attached to any car radio.



WARD
AERIALS
ARE
EASY TO SELL
- EASY TO INSTALL
FREE! Write
for new catalog of Ward's
complete line of low-priced
manufacturers - approved
aerials for car and home -
also get on mailing list for
free magazine packed with
selling and service tips.

WARD
PRODUCTS
CORP.

WARD BLDG.
CLEVELAND, O.

This striking advertisement by an accessory manufacturer appeared in several trade publications.

Overleaf: Motorola addressed the trade with an all new model, one of the first to use the Loktal (locking base) tubes introduced in 1939.



Motorola
MODEL 9-24

4-STATION AUTOMATIC PUSH-BUTTON TUNING
6 TUBES—Using LOKTAL COMPACT TYPE
OVERSIZE SEPARATE SPEAKER

4-Station Automatic Tuning—Each button can be set for ANY station in ANY sequence as close together as desired. Also Manual Tuning: Compensated trimmer condensers to overcome drift.

6 Tubes—using latest Loktal compact type.

Separate Electro-Dynamic Speaker in oversize acoustically treated and weather-proofed fibre housing.

Superheterodyne—5 tuned selective circuits: Heavy-duty vibrator: Cold cathode rectifier tube: Pentode output system: Great power.

Low battery drain: shielded power transformer: Full-vision illuminated horizontal dial: AVC: High gain iron core antenna coil: Broad range antenna system to match all antennas: Built-in motor noise filter: Installs under dash of any car—even under the glove compartment.

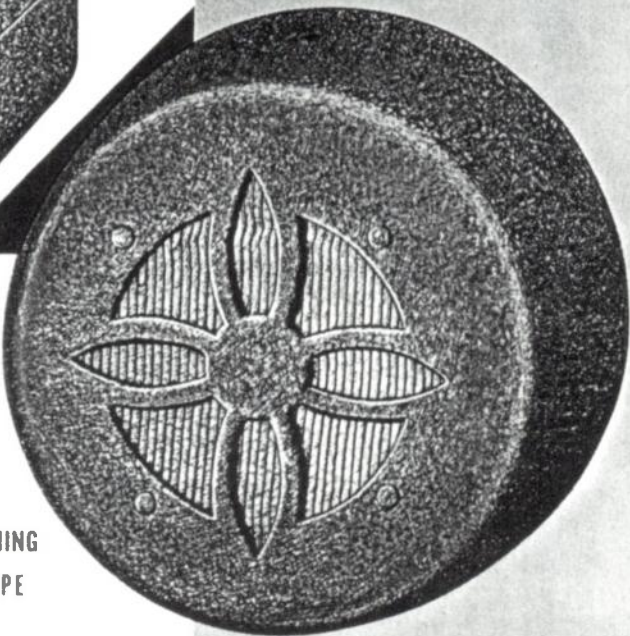
SPECIFICATIONS

6 Tubes—7A7 RF; 7B8 Modulator Oscillator; 7A7 IF; 7B6 Detector, AVC, 1st Audio; 7B5 Output Pentode; OZ4 Rectifier. Size 4 1/8" wide, 4 1/4" high, 10 1/2" deep. Separate 8" Baffle Electro-Dynamic Speaker.

2 UNIT LEADER

SENSATIONAL VALUE

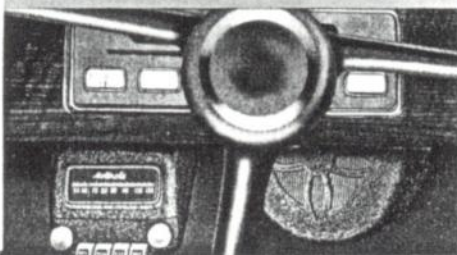
LOWEST PRICE
IN MOTOROLA HISTORY



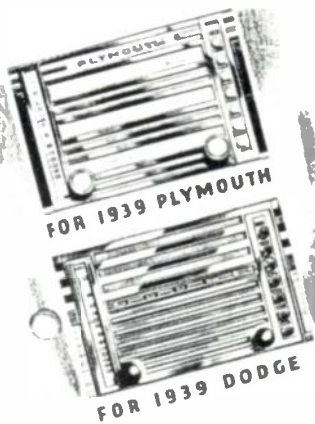
OVERSIZE SEPARATE SPEAKER
6 TUBES— (Using LOKTAL Type)

Compact!

MOUNTS UNDER DASH
FITS ALL CARS



LIST
\$24.⁹⁵

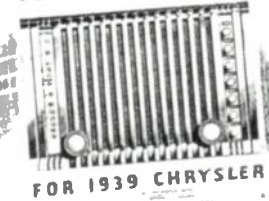


FOR 1939 PLYMOUTH

FOR 1939 DODGE



FOR 1939 DE SOTO



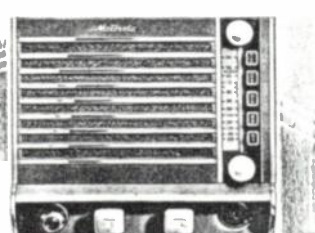
FOR 1939 CHRYSLER



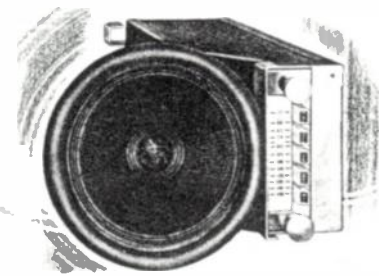
FOR 1939 FORD & MERCURY



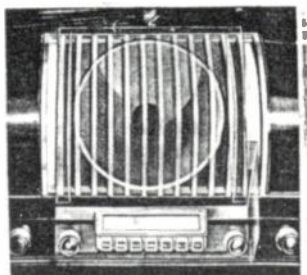
"Specifically Designed" sets by Motorola were excellent examples of creative packaging.



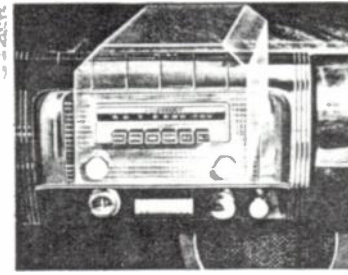
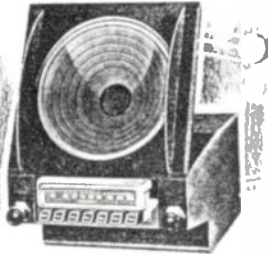
FOR 1939



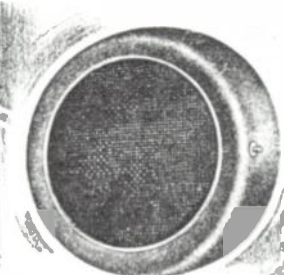
CHEVROLET

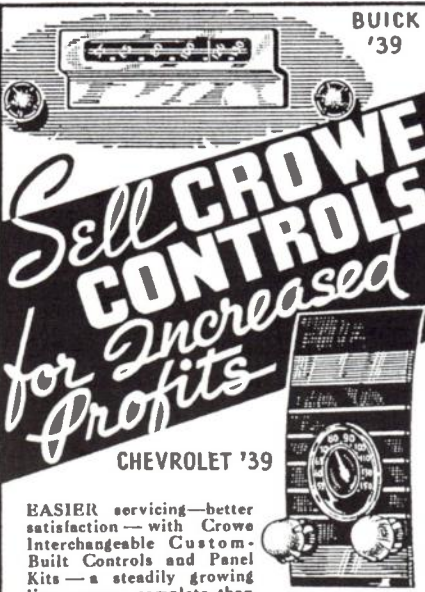


FOR 1939 BUICK



FOR 1939 OLDSMOBILE





BUICK '39

Sell CROWE CONTROLS for Increased Profits

CHEVROLET '39

EASIER servicing—better satisfaction—with Crowe Interchangeable Custom-Built Controls and Panel Kits—a steadily growing line—more complete than ever! They're different! They exactly match official styling!

Thousands of auto radios in use with Crowe Controls need only new Crowe Kits to fit 1939 cars. Others need Controls and Kits for new cars. A highly profitable, growing market. Cash-in on it!

Ask for Bulletin 230

CROWE NAME PLATE & MFG. CO.
1775 GRACE ST. CHICAGO, ILL.

•FADA• •ARVIN•
•SPARTON•HORN•DELCO•KARADIO•
•PHILCO•EMERSON•FIRESTONE•
•TRAVLER•STEWART•WARNER•
•PACKARD•BELL•TIFFANY•TONE•
•ADMIRAL•MISSION•BELL•TROY•

Although push buttons were gaining in popularity, there was still a market for conventional controls, especially in upgrading existing radios for the later cars.

Opposite: A very descriptive Ford reprint showing the driving compartment, radio controls and the flip-up antenna.

Granted, many of those cars did not rate a first class, custom installation and would not be so fitted before they were taken out of service. They were, however, targets for the low cost single unit "under-dash" sets which could be readily transferred when one traded cars. As the percentage of new cars leaving the factory with radios increased and the competition in auto radios became keener, nearly all manufacturers began to include one or more models of these low cost, high volume units in their product line. Some car manufacturers sought to keep this business in-house by offering an economically priced radio in their accessory line.

The new cars seemed to be more desirable each year: the designs were truly objects of art. A new member in the lineup of motorcar transportation this year was the Ford Motor Company's Mercury which began a long and respected life. There seemed to be no end to beautiful chrome radiator grilles which gracefully blended into the long flowing bodies. This was the last year for the Ford rumble seat, the end of a long line. The club coupes and club convertibles had become very popular, and it was safer and chummier to move the other couple inside; all the better to hear the car radio.

The driving compartments of the new cars were restyled as usual and there was a decided trend toward rectangularly shaped instruments with radio dials to match. The most popular radio control for 1939 was the slide rule dial with a row of tuning buttons underneath. In the case of some Chevrolet models and the Chrysler family of cars, the dial was in a vertical position while still others used the small drum dial behind a peep-hole, but most of those were part of a linear design.

Some automobiles were losing their running boards to streamlining as was the case with the trunk bustle, the latter being sacrificed in favor of the teardrop design. The loss of running boards further reduced the choices for the radio antenna location. Rapidly gaining in popularity, however, were the telescoping side-cowl antenna and the windshield center bar types.

As with the home radios, the motor car radios for 1939 were generally featuring some kind of automatic tuning system. If a car owner generally did most of his or her driving within a limited radius or commuted regularly over a fixed route, automatic tuning could be a convenience; otherwise, it had little advantage. When traveling long distances such as on vacation trips, automobile occupants would find that most radio stations had a limited range for reliable reception. Someone would have to do the manual dial searching for strong, desirable signals. Regardless of this philosophy, it was the "in" thing to have, and

AUTOMATIC TUNING
WITH
JUST ONE BUTTON

1939 Ford Radio



ANTENNA CONTROL HANDLE IS ABOVE REAR VIEW MIRROR, WITHIN EASY REACH OF DRIVER'S SEAT



WITH THE NEW 1939 Ford Radio, you can tune in any of your five favorite stations automatically--by pushing a single button! The automatic, rotating dial on the right of the radio will be set to the chosen local stations by the Ford dealer. All you do is press the control button until the station you want appears on the dial. Then adjust the volume. No fumbling! No guessing! You soon learn the position of the button *and then tune in without taking your eyes off the road.* If you are out of town or want a station not on the Roto-Matic dial, press the button until "dial" appears on the right. Then tune in on the conventional hand dial at the left.

The radio chassis fits neatly behind the steering column; the speaker behind the attractive grille in the instrument panel. Tone, receptivity and selectivity are excellent. Take the world of sports, music, drama, comedy and news with you wherever you go.



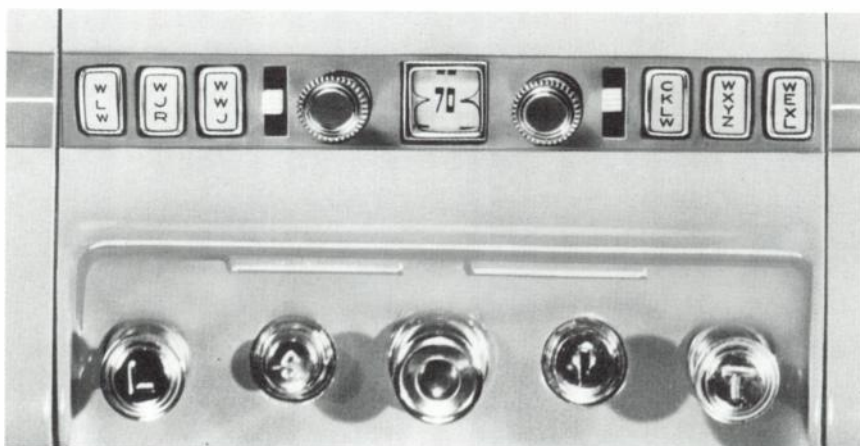
PRINTED IN U.S.A.

it sold sets. A variety of automatic tuning systems were available on the market, but the new car buyer found that factory equipment differed from one automobile brand to another, and each was featuring a particular method of station selection. There are no records of how many people bought the car for the radio, but radios did help sell cars.

The new Ford and Mercury radios made by both Philco and Zenith had a separate tuner and speaker unit which mounted behind the speaker grille in the instrument panel. The main radio assembly was secured to the fire wall above the steering column as it had been for several years prior to 1938. The former unit contained a manual dial drum indicator, a rotating wheel on which the user could insert paper tabs with the station call signs, a single push button switch and a volume control. In operation, the user had a choice of five preset station selections plus manual tuning. When the single button was depressed, it operated a stepping motor within the main radio assembly which switched one of the five preset tuned elements into the circuit. Another stepping motor in the control head simultaneously rotated the indicator wheel one position, which surprisingly enough generally did match the desired station. One of the six positions was marked "M" for manual which put the tuning knob into play. It was an excellent radio when all went well.

In contrast, the Packard Model P-1630 made by Philco was a three-piece system. The main radio chassis mounted on the firewall to the left. The separate speaker was located on the fire wall to the right, out of the way of the passenger's feet. The control assembly was placed in the cut-out provided in the instrument panel. This unit consisted of six buttons, tone and "return to manual" switches, in addition to the customary manual tuning and volume/on/off controls. The six push buttons corresponded to six preset positions inside of the radio which were engaged by a motor-operated switching arrangement.

The control center of the Packard P-1630 Custom Car Radio was impressive.



These controls were designed into a long horizontal strip which matched the car's interior.

The Chevrolet for 1939 offered three different radios, namely: a five tube single unit push-button standard model, a six tube deluxe push-button model and a seven tube dual speaker, super deluxe model. The first two sets were single unit receivers with five simple mechanical push buttons involving a system of adjustable levers, cams and return springs. They were the easiest of all to set on the desired station; however, they did require more finger pressure to engage.

The seven tube set was the top of the line with two speakers. A small capacity-coupled permanent magnet dynamic "tweeter" was incorporated in the central tuning unit, and a larger electro-dynamic speaker was located in the drum shaped amplifier and power unit which was mounted on the fire wall. The push buttons operated a complex system of electric solenoids and clutches to mechanically adjust the conventional tuning condenser in accordance with the pre-set positions. When all was operating as planned, a slight pressure on the buttons would tune in the desired broadcasting stations.

Model 985424 two unit Chevrolet
super deluxe receiver.

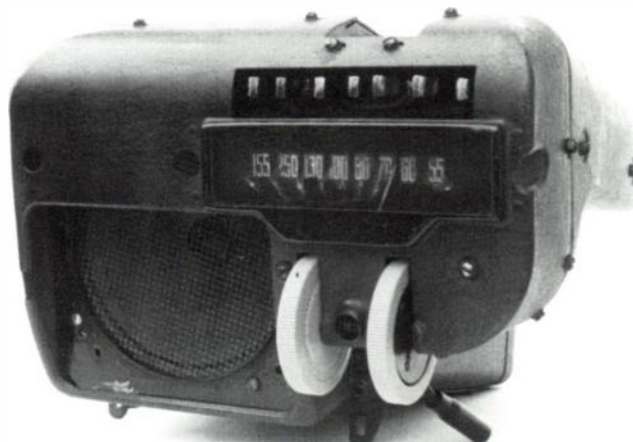


Still another push-button tuning design was used on the Cadillac-LaSalle radio. The model 8C8 was an eight tube masterpiece made by Wells-Gardner & Co. of Chicago. This was a very large and heavy unit as one might expect to find in a Cadillac in those days. Inside, there were eight tubes and a synchronous vibrator. Power output was six watts, undistorted. The unusual shape was due to the fact that the radio had to clear several obstacles in order to fit behind the speaker grille. The exterior case was an example of fine metal work, finished in a brown wrinkle varnish.

A distinguishing characteristic of the set was the two large ivory knobs set in a vertical plane with a portion showing through the slots in the instrument panel. These were the manual tuning and volume controls. The push buttons were seven in a row, five for

This Model 8C8 Cadillac-LaSalle radio by Wells-Gardner weighed in at twenty-two pounds.

the pre-set tuning, one for manual tuning and one for the "off" button. The buttons operated levers which in turn "switched in" one of six banks of three each permeability-tuned inductance coils (sometimes called slug tuning). The "slugs" were adjustable from the front after removing a trim panel.



A final variation of tuning systems to discuss in this chapter is the Belmont Radio Model 678 made by the Belmont Radio Corporation in Chicago (later to become part of Admiral). This set was made for the aftermarket trade and sold in automobile accessory stores for installation by either professionals or do-it-yourselfers. The set was a six tube self-contained unit with speaker, housed in a barrel-like enclosure for mounting on the fire wall of the automobile. The push buttons were contained in an attractive moulded control box which included the actual tuning coils of the radio. This was connected to the radio by shielded multiple conductor cable. Adjusting the six push buttons was accomplished by closely following the prescribed procedure in the instruction book. In essence, it was a matter of setting the depth of travel of the "slugs" in the three inductance coils which were contained in the control head. The

An unusual Belmont radio with automatic remote tuning. It was marketed by Montgomery Ward and others.

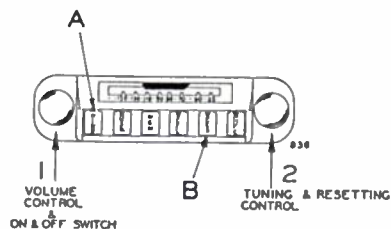


Fig. 2—Front View of Remote Tuner Unit

Fig. 2A—
Bottom View of Remote
Tuner Unit Showing Push
Button Release Pin.

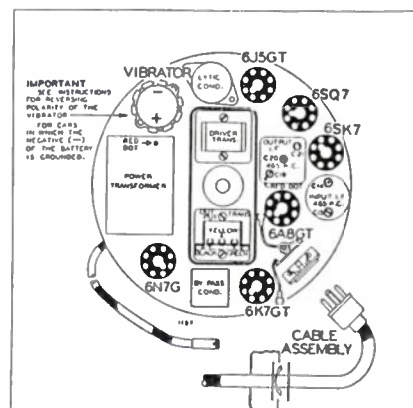
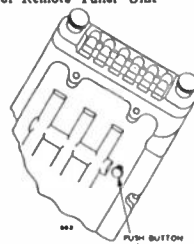
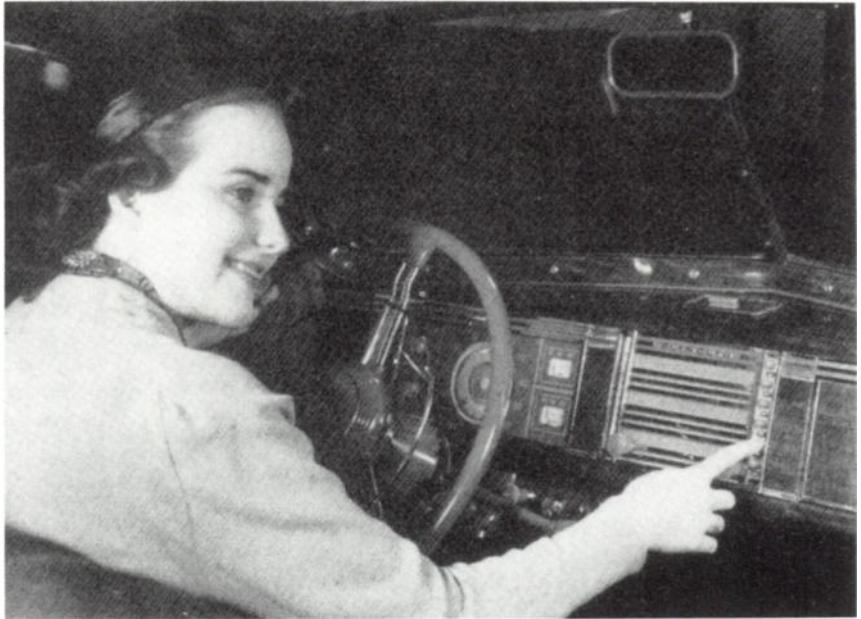


Fig. 3—Top View of Chassis

Dynamic Growth 1939

The young lady presses a button on her Plymouth's instrument panel and presto! one of five pre-set stations or the manual tuning position answers the call in a flash.



Mechanical push-button tuning and low cost were features of this RCA model.



Separate speaker, and a compact, underdash unit were evident in this Howard radio.



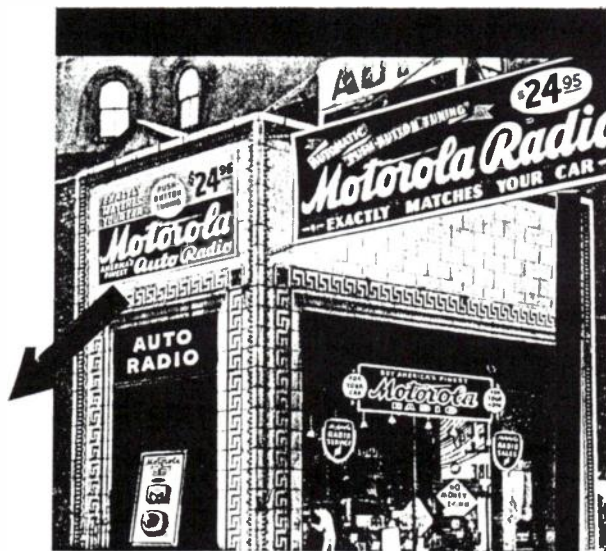
Arvin Model 8A designed for mounting under the dash, boasted six push buttons.



Philco Model 933 six tube set, tuned by a single push-button actuated rotary switch with a manual control position.

POINT-OF-SALE SIGNS THAT STOP CUSTOMERS

Brilliant, eye-catching, out-of-door advertising material that stops motorists and brings them into your store. Use liberally and build up your Motorola sales.



5 x 3-FOOT WEATHER-PROOFED FIBRE DISPLAY POSTERS

Size 5' by 3', made of heavy Kanvet fibre. Printed in bright red and dark blue. Real attention-getters when prominently displayed outdoors where passing motorists can see them. Also used advantageously indoors, in stores, garages, service stations, etc. Packed 10 in a roll.

Order D-402 Fibre Posters—Each 18c net



GIANT 3 x 10-FOOT OUTDOOR DRILL CLOTH BANNERS ON ROPES

Size 3' by 10'. Made of heavy weather-proofed drill cloth, printed in bright red and blue. Sewed all around, with heavy rope sewed in top and bottom and 3 sticks to hold upright. New sturdy construction insures long life when hung between posts. Packed 5 in a roll. Worth \$2.00.

Order D-401 Giant Drill Cloth Banners—Each 98c net



STRING UP THESE DOUBLE-FACED HEAVY FIBRE PENNANTS

Made of heavy weather-proofed fibre, securely double-sewed on strong tape. Will give long life in protected spots outside your place of business and inside your store, in garages, service stations, etc. 8 double-faced pennants, size 12" by 16". Printed on 2 sides in alternate bright red and blue. Colorful and effective. Complete set on tape ready for hanging. 10 sets in package. Worth 65c per set.

Order D-406 Set of 8 Fibre Pennants—Set 38c net

Dynamic Growth 1939

Opposite: From the 1939 Motorola catalog - posters, banners and pennants were just a few of the sales promotion aids which were available to the dealer.

latter was fastened at a convenient location under the instrument panel.

Galvin Manufacturing Corporation was creating a legend in the establishment of active distributors and their dealer networks. They had come a long way since Paul Galvin and Elmer Wavering went out into the territory personally to select qualified people to handle their products. The company had been honing their skills since 1930. Having survived the initial lean years and the recession of 1938, things were looking good. Somewhat different from their competitors, they were building several models of "Specifically Designed" Motorolas for the popular cars such as Buick, Oldsmobile, Chevrolet, Chrysler Cars, Ford, and Mercury, in addition to their line of universal radios with matching controls and speakers for the instrument panels of virtually any car. The customized sets were ingeniously made up by adapting circuitry, push-button systems, sheet metal, and speakers to equal or exceed the original equipment. Many customers bought their new cars without the radio and immediately had their local Motorola dealer install one of his.

The company was doing more advertising now in the form of their outdoor signs along the highway, dealer signs, and all kinds of premiums for servicemen such as uniforms and caps. Being an authorized Motorola dealer carried some respect in the community.

Noblitt-Sparks Industries, Inc. of Columbus, Indiana, makers of the Arvin line of auto and home radios, used a very colorful logo in the form of a bell-boy, to identify their mailing envelopes and labels. Arvin had done a credible job with their auto radio line. Having gained a reputation with their car heaters, their sets were carried by auto supply stores as well as radio dealers. Arvin seemed to be very prompt and helpful in assisting technicians who were seeking service data on their products.

In summing up 1939, it was a strikingly colorful and technologically progressive year. Lots of activity and growth in the quality and quantity of the automobiles and radios as well as other products, was the rule. A certain indescribable style and substance became their trademark. Whether this had anything to do with the fact that two international expositions were taking place on the east and west coasts of our continent simultaneously, is something to ponder.

Section 562 P. L. & R.
U. S. POSTAGE
PAID
COLUMBUS, INDIANA
Permit No. 93



Wi
Comp
You
Cop
A
R
S
M
Noblitt-
C

HR
714



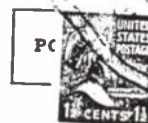
This is your material from
ARVIN
HEADQUARTERS
Consisting of

1 H27
1 H25E
1 complete set of service data -

For Summit Radio Shop,
302 Wright St.,
Jackson, Michigan.

Attention Mr. D. W. Matteson.

CONTENTS Fourth Class. May be opened for postal inspection if
necessary. Return Postage Guaranteed.
From NOBLITT-SPARKS INDUSTRIES, Inc., COLUMBUS, INDIANA



A colorfully imprinted mailing
envelope from Noblitt-Sparks
Industries, Inc. addressed to
a high school student engaged
part time in the radio business.

Is It Any Wonder That P. R. MALLORY & CO. Inc. **MALLORY VIBRATORS** REPLACEMENT Lead the Field?

They are Original Equipment in Auto Radio Receivers built for:
 BUICK . . . CHEVROLET . . . FORD . . . HUDSON . . . NASH . . . OLDSMOBILE
 PONTIAC . . . SEARS-ROEBUCK . . . WESTERN AUTO . . . FIRESTONE

and in Receivers made by:

Canadian Marconi	RCA
Colonial	RCA-Victor, Ltd. (Canada)
Crosley	Radio Products
Detrola	Rogers-Majestic, Ltd.
Delco (Kokomo)	Sparton (Canada)
Fairbanks-Morse	Stewart-Warner
Galvin (Motorola)	Stewart-Warner-Alemite (Canada)
Gilfillan	Stromberg-Carlson (U.S. and Canada)
Mission Bell	Zenith
Noblitt Sparks (Arvin)	Western Electric
Northern Electric (Canada)	
Packard Bell	
Pilot	

★ Millions in use
★ Trouble-free Long Life
★ Lowest Cost per Hour
Insist on Mallory
Buy the best
They cost no more!

Only the Second Edition Mallory-Yaxley Radio Encyclopedia gives you all data on every vibrator application. It covers every servicing problem — you cannot afford to be without it. Ask your distributor.



Use
MALLORY
P. R. MALLORY & CO. Inc.
 REPLACEMENT
 CONDENSERS...VIBRATORS

P. R. MALLORY & CO., Inc.
 INDIANAPOLIS, INDIANA
 Cable Address—PELMALLO

Use
YAXLEY
 REPLACEMENT
 VOLUME CONTROLS

Compare these easy-to-install plug-in vibrators with the units shown on page 103. It was good practice, however, to check over other components in the set before turning it over to the customer.

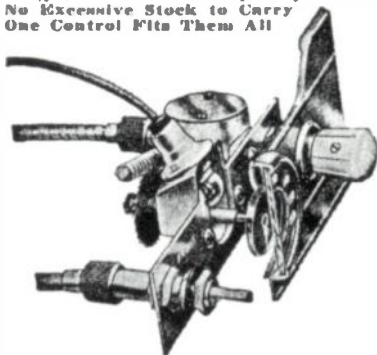
Overleaf: Another leading name in dial mechanisms and custom escutcheon plates for the car radio installer.



AUTO RADIO CONTROLS

Simplest of All to Install
THE ONLY CONTROL WITH ALL
RATIONS SELF-CONTAINED

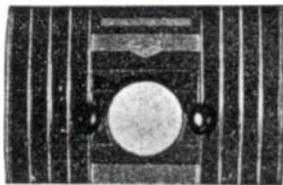
Works Clockwise or Counter Clock-
 wise With Same Dial
 Absolutely No Back-Lash
 No Cord, No Cable, Positive Gear Drive
 No Mutilating of Instrument Panel
 100% Universal in Every Way
 No Excessive Stock to Carry
 One Control Fits Them All



COMPLETE LINE OF

1934-35-36-37-38 and

1939 Custom Matched Escutcheon
 Plates with Edge Illuminated
 Non-Glare Glass Dials.



1939 CHEVROLET SPECIAL

To re-install any 1936, 1937 or 1938 DELCO,
 UNITED MOTORS or CHEVROLET custom-built
 radio into a 1939 CHEVROLET car, only this
 plate is necessary UTILIZING ORIGINAL CONTROL.
 Plate is heavy die casting—exact duplicate of original
 dummy plate on dash of 1939 CHEVROLET. Makes
 excellent custom-matched installation.



1939
 CHEVROLET



1939 FORD



1939 PONTIAC

The reason for this business is now
 at hand. With a reasonably priced
 STAR Control and STAR Escutcheon
 Plate, a profitable business can be done.

CASH IN ON IT NOW!

STAR MACHINE MANUFACTURERS, INC.
 1373 East Bay Avenue, Bronx, New York, N. Y.

1940

Radio commentators and correspondents bring daily, on-the-spot reports of the war raging in Europe. The American people hear the rantings and ravings of Hitler and Mussolini. They "hear" Hitler "march" into Denmark, Norway, Sweden, Belgium, the Netherlands, Luxembourg; occupy Paris; blitzkrieg Britain in never-ending waves.

And yet much of the news seems remote to many back home in America. The future is uncertain—get a job, go away to college, seek the fun-life while you can. Dance the night away to the big band sounds of Glenn Miller, the Dorsey Brothers or Wayne King. Take moonlight drives; tune out the dreary, far away war news; turn the radio dial instead to Lanny Ross' theme song, "Moonlight and Roses." Catch the swing of Charlie Barnet playing "Pompton Turnpike" from Frank Dailey's Meadowbrook or listen to the sentimental notes of "I Hear a Rhapsody," "Blueberry Hill," "Maria Elena."

But somehow the war won't go away. The first peacetime draft takes effect and conscription becomes the law of the land. America's rearmament program begins, and Roosevelt asks Congress for billions of dollars to "help our British allies."

The annual automobile shows, however, still open to record crowds in New York, Detroit and Chicago. Automotive designers style women's clothes to match their 1941 model cars. A Mercury 8 sports dress features a belt taken from its bumper design and a hubcap inspires a handbag. Lincoln-Zephyr's sleek front-end lines are used on an evening bag and the triangular V-12 motif is seen on a purse.

New technology popularizes portable radios: 125 types on the market, ranging in price from eight to eighty dollars and weighing from four to thirty-five pounds. Nylons go on sale in New York and 72,000 pairs sell out in eight hours.

Another highlight of 1940: TV debuts as the "first television network" links New York and Schenectady stations. A preview of things to come? And so, the crucial first year of the 40s decade ends.

RADIO'S GOLDEN YEARS

Progressive development in the automotive and radio fields made 1940 another year of firsts. Welcome news to the promoters of Major Edwin H. Armstrong's Frequency Modulation was the announcement that the Federal Communications Commission had established a 42-50 megacycle (megahertz) FM band. This had no immediate impact upon the automobile radio industry, but by the end of 1941 there were about 400,000 FM radio receivers and twenty-five commercial stations on the air. This was only a prelude to the future of Frequency Modulation and a time when the system would free the car radio from atmospheric static.

Big news in the automotive field was the introduction of Sealed Beam headlamps. These new lights promised to spread 50 per cent more light over the road. This advance represented a combined effort by car and lighting manufacturers as well as vehicle commissions and safety organizations.

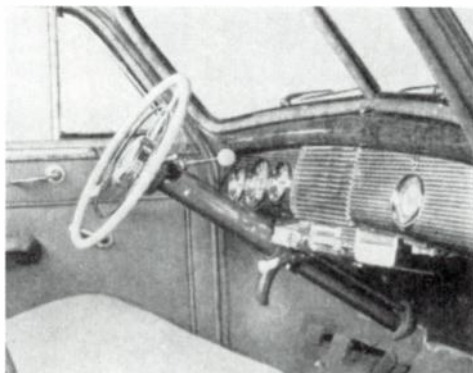
This news did not overshadow Oldsmobile's introduction of a silent, fully automatic four-speed transmission. Figuratively speaking, all the driver had to do was to point the car and step on the accelerator.

Ford Motor Company launched their new, limited production Lincoln Continental. To many, the mere sight of this magnificent machine would produce an instant state of ecstasy. The Continental was introduced to local communities as an added attraction of the Ford traveling road show. To watch this long, low, sleek black convertible cabriolet drive up and to see the automatic top lowered, cast a spell over the audience, such that one could have heard a pin drop in the grass.

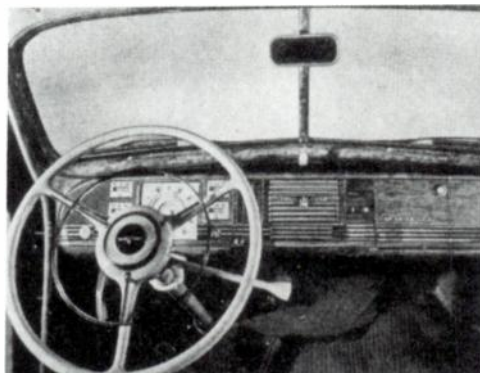
In general, improvements were initiated to provide increased comfort, convenience and safety for driver and passenger. Comfort benefits included: foam rubber padding in seat cushions, wider seats, longer wheelbase, larger windows and easier acting striker plates which permitted closing the doors without slamming. Items to enhance convenience and safety were: vacuum operated convertible tops, direction signals and electric windshield wipers. All of this was certainly welcomed by radio lovers as they could relax and enjoy what the airwaves had to offer.

The radio too was undergoing more changes with the use of attractive tuning dials and controls to match the fresh new beauty of the driving compartment. The attractive radio speaker grilles appeared larger than ever; however, in some instances the sets themselves were becoming more compact and lighter weight

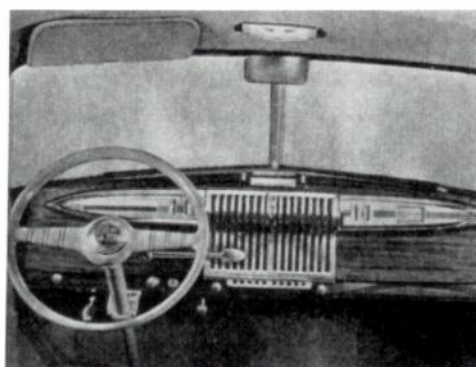
Overleaf: Driving compartment photos showing radio grilles and controls for some of the 1940 automobiles from Car Buyer's Guide.



Buick 40 Special



Dodge DeLuxe, D14

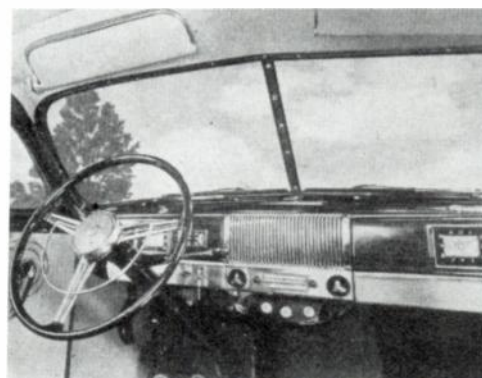


Hudson Super 6, 41

8, 44 Similar



Lincoln-Zephyr



Studebaker Commander 6, 10A

due to the constant developments in tubes and other components.

Delco Radio, division of General Motors, were building a greater percentage of the radio sets for the GM family of cars in 1940. These included the Cadillac-LaSalle for the first time. Delco made excellent quality sets offering a wide selection of models for most cars with the customer's choice of tuning systems, number of tubes, tone controls, local/distance switches and number of speakers. Chevrolet was offering three models again this year which were custom designed for the instrument panel except that they were all redesigned with slide rule dials, and the seven tube Super Deluxe model had become an eight tube because of an extra audio amplifier.

An added attraction by Chevrolet was the model 985538 five tube mechanical push-button radio for universal mounting in any car. This set incorporated the new "Bantam" glass tubes 6SA7GT, 6SK7GT, 6SQ7GT and 6V6GT. These tubes used the same octal-type base as the metal tubes and were interchangeable spacewise due to their small glass envelope. The "S" in the tube code indicated that the tube was "single ended," meaning that signal grid connection was made at one of the bottom pins instead of to a top cap.

Oldsmobile introduced a six tube single unit receiver with an eight inch speaker for mounting behind the instrument panel speaker grill. It featured push-button tuning which operated on the principle of a simple mechanical motion to rotate the tuning condenser. This set used the new loktal tubes that were introduced in 1939. Pontiac offered a similar unit that used five of the loktal tubes. Each of the push buttons mechanically moved the permeability cores to preset positions in the coils of the tuning assembly by means of a gear and sector arrangement.

The Buick Model 980620 Sonomatic was a different creation. This was a single unit receiver with an eight inch dynamic speaker. It had a synchronous vibrator and six tubes with 6V6G beam power output tubes in push-pull. The 1940 Buick used a roof peak antenna as standard equipment and offered a vacuum operated whip antenna as an option. Tuning was accomplished by a conventional manual tuning control or by means of a five button mechanical tuner which could be readily set up for any desired group of stations. An electric clutch automatically disconnected the manual tuning mechanism when any one of the buttons was pressed. The Buick radio was made by RCA Manufacturing Company.

The above brief descriptions, show the wide range of design possibilities that existed at that time, and great freedom of expression of the specifying engineers at the various car divisions of General Motors.

THE AUTO RADIO

The powerful and rugged Buick Sonomatic radio.



The 1940 Ford radio which was supplied by both Philco and Zenith represented an entirely new design. This single unit with integral speaker fit the space behind the instrument panel like a glove. To make

Ford returned to a single unit with this Roto-Matic model.



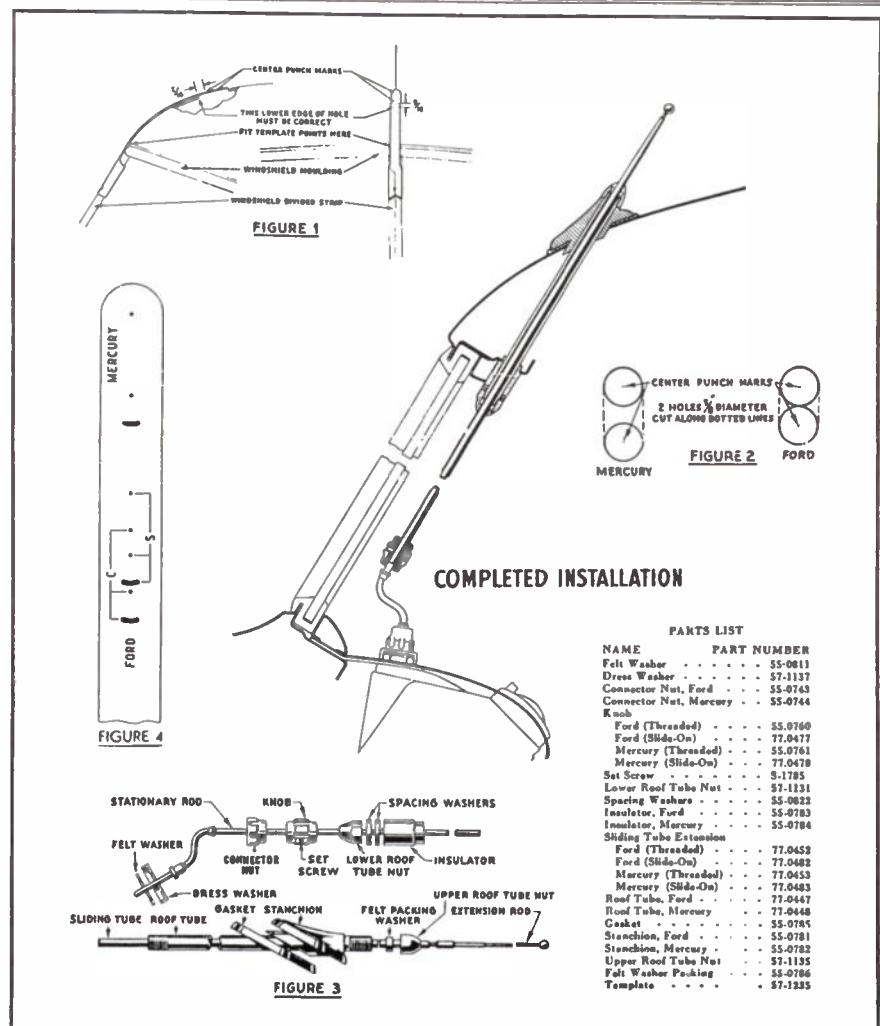
sure that the windshield linkage didn't strike the top of the set, an intentional box-like cut-out was designed into the case. This was a six tube circuit incorporating the new loktal base tubes. The feature that interested the owner was the single button "Roto-Matic" tuner similar to the 1939 model in appearance but much simpler in operation. The antenna rod came through the roof and plugged directly into the top of the radio (with suitable trimwork). The two section telescoping rod could be extended from the inside by pushing up on a plastic sleeve provided. The remarkably low price, was \$40.00 installed.

The Nash-LaFayette radios were supplied by Zenith rather than by RCA as in the previous year. Unlike the Ford receiver, this Zenith made set used the "Bantam" "GT" type tubes described earlier. A

Ford Integral Aerial

For 1940 Closed Car Models 09A and 01A

INSTALLATION INSTRUCTIONS



The Ford antenna with a telescoping extension rod plugged into the top of the receiver and extended through the car roof.

DETROLA

Model 297 — \$14.95

PEE-WEE AUTO RADIO



Now the famous Nationally and Internationally known Pee-Wee Radio is available in an Auto Radio Set. Four-tube Superheterodyne with five-tube performance. Permanent magnet 4" dynamic speaker. Illuminated disc tuning dial. Can be installed by anyone in a few minutes. Lowest battery drain, high sensitivity, very selective. Covers standard broadcast band. For use with cowl or whip type antenna. Metal cabinet with universal mounting for steering column of instrument panel. Finish—Brown Satin Cracked. 7" long, 4 1/4" high, 4 1/4" deep. Weight 5 1/2 lbs.

DETROSCOPE CAR AERIALS

MODEL B-15—Detroscope Car Aerial for side cowl mounting.....	\$2.95
MODEL B-5—Detroscope Car Aerial for door hinge mounting.....	\$2.95

DETROLA CORPORATION

DETROIT, MICHIGAN

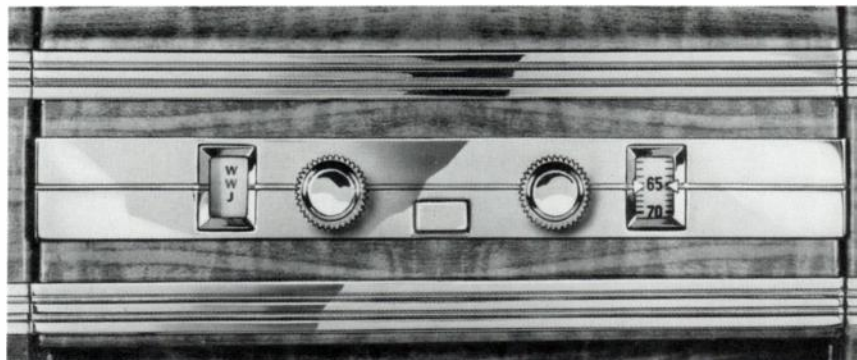
Compact Detrola Pee-Wee could be installed on the steering column or under the instrument panel.

The trim, control panel of a 1940 Packard radio by Stewart-Warner.

further departure was the six push buttons separating the dial by two groups of three. The so-called automatic tuning was entirely mechanical and extremely simple in construction, consisting of push rods that operated a cam and gear assembly which in turn rotated the conventional tuning condenser. This required very little attention and setting up the push buttons was a simple procedure.

Hudson again chose Stewart-Warner to build radios for their 1940 Hudson-Terraplane cars. The Model DB40 receiver was an elaborate seven tube set using six metal tubes and a 6V6GT output tube for better heat dissipation. The set was built in two sections. One, called the "Feather touch Tuner," housed the R.F. amplifier and oscillator-mixer tubes with the appropriate automatic tuning mechanism consisting of a solenoid-controlled system of gears, a clutch, and a drum indicator. The other section comprised the I.F. amplifiers, detector and audio output stages. The instruction manual consisted of four pages, including two pages of fine print on setting up and repairing the tuner.

Stewart-Warner also made Packard's radios for this one year. There could have been as many as five different models or variations in all. Four of them were seven tube sets incorporating five metal tubes and two 6V6GT push-pull output tubes. The other model was a six tube unit, similar circuit with a single output tube. These sets also had a rather elaborate tuning system.



Galvin Manufacturing Corporation again provided their distributors and dealers with an extensive line of universal and "Specifically Designed" Motorola automobile receivers. The latter included sets for Ford-Mercury, Chevrolet, Chrysler line, Buick, Oldsmobile, Pontiac and Packard. Philco also continued to produce their fine line of distributor radios for universal application.

The competition in the low cost universal models was increasing. These sets could be easily attached to the lower flange of the instrument panel in a few minutes with no special tools or skills required. A



MODEL
JA-64



Automatic Touch Tuning
(5 Buttons)
Powerful Superheterodyne
6 Tubes Including Rectifier
Full 6-inch
Electrodynamic Speaker
Illuminated
Full Vision Dial

Here's a modern entertainment convenience that no car should be without. Operates from auto battery. Built-in Electrodynamic Speaker delivers rich, full

tones. Complete, self-contained, single unit mounts under the instrument panel of any car. Sturdy construction for dependable performance. Attractively styled to harmonize with car interior.

SIMPLIFIED INSTALLATION IN ANY MAKE OF CAR

Grinnell Brothers Music House
10454 W. Jefferson
River Rouge

13-446

3-40

A very stylish underdash model with built-in speaker from General Electric.

squeeze type, quick fastener was furnished for connecting the battery lead to the ammeter or ignition switch. Several antennas were available, including door hinge pin and under-hood mounts that could be readily installed with no or minimum drilling. The radios were very neat and trim and could be had in a variety of styles, with or without push buttons, and even large auxiliary speakers were available for mounting behind the radio grille of the instrument panel. The advertised price of \$14.95 for the four tube Model 297 Detrola Pee-Wee sparked impulse buying. Some of the other makers of these low cost sets were: Automatic, Arvin, Belmont, Continental, Crosley, Delco, Detrola, General Electric, Motorola, Philco, RCA, Sonora, Warwick and Wells-Gardner.

Added to this array of motorcar radio receivers, were those sold by auto supply stores and mail order houses; among which were: Firestone "Airchief," Spiegel "Aircastle," Montgomery Ward "Airline," Gamble Stores "Coronado," Allied Radio "Knight," Lafayette Radio Corp "Lafayette," Radolek Co. "Radolek," Sears Roebuck "Silvertone," and Western Auto Stores "Truetone."

The above receivers were generally made by any one of a dozen or so companies who would build private label sets under contract, in addition to manufacturing sets under their own brand. The best known of these were: Belmont Radio Corporation, Clinton Manufacturing Company, Continental Radio & Television Corporation, Kingston Radio Co., Inc., Warwick Manufacturing Company and Wells-Gardner & Company. Some others were a well kept secret.

Even though some of the old timers had removed themselves from the competition, the automobile public in 1940 had a wide choice of radio makes and models available to them. The vital statistics for the year were 1,700,000 auto radio sets made for a total value of \$60,000,000.

1941

The year opens for New Orleans as they once again celebrate Mardi Gras time. Glittering horse-drawn floats parade through the streets, torches and rockets burst forth, glamorous balls entertain masked dancers. For young and old alike, the name of the game is Have Fun!

Black telephones, following the trend of the times, give way to bright, decorator colors: old rose, ivory, pekin red.

The first state-wide installation of 24,000 reflective Lucite plastic highway markers make night driving safer in Maryland.

Quiz shows abound—more than 400 such radio programs can be heard.

On February 20, the first television color pictures are transmitted experimentally from the Empire State Building. On July 1, NBC's television station WNBT becomes the first commercially licensed transmitter to go on the air with four sponsored programs on day one.

Beneath the surface fun, color and romance of the "Hut-Sut Song," "Tangerine," "Tonight We Love," are the serious, hopeful words of "The White Cliffs of Dover."

Even as Charles Lindbergh warns America not to enter a war she cannot win, America gears for defense production. On March 28, work starts on the Willow Run, Michigan, B-24E Bomber Plant, the largest (in terms of floor space) of its kind ever to be constructed. Mass production techniques, engineering genius and skilled, dedicated workers will succeed by September 2 in building one bomber a day—well before the planned completion date of December 4.

In 1941 many of the leading radio manufacturers "go to war." With a spirited team effort, they gear up around the clock to produce needed military equipment: communication receivers and transmitters, two-way radio sets, direction-finding equipment, aircraft instrumentation and flight simulators, and a myriad of associated hardware.

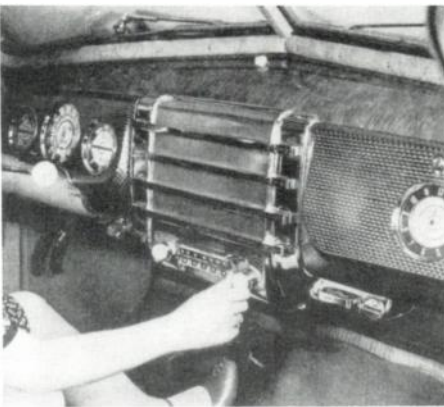
Then that fateful day—December 7. News is flashed by radio: Japan attacks Pearl Harbor! On December 8, Roosevelt addresses a joint session of Congress, and a declaration of war is broadcast worldwide via a record-breaking radio hook-up. Roosevelt speaks of December 7, 1941, "as a day that will live in infamy." Tony Martin sings, "Remember Pearl Harbor."

RADIO'S GOLDEN YEARS

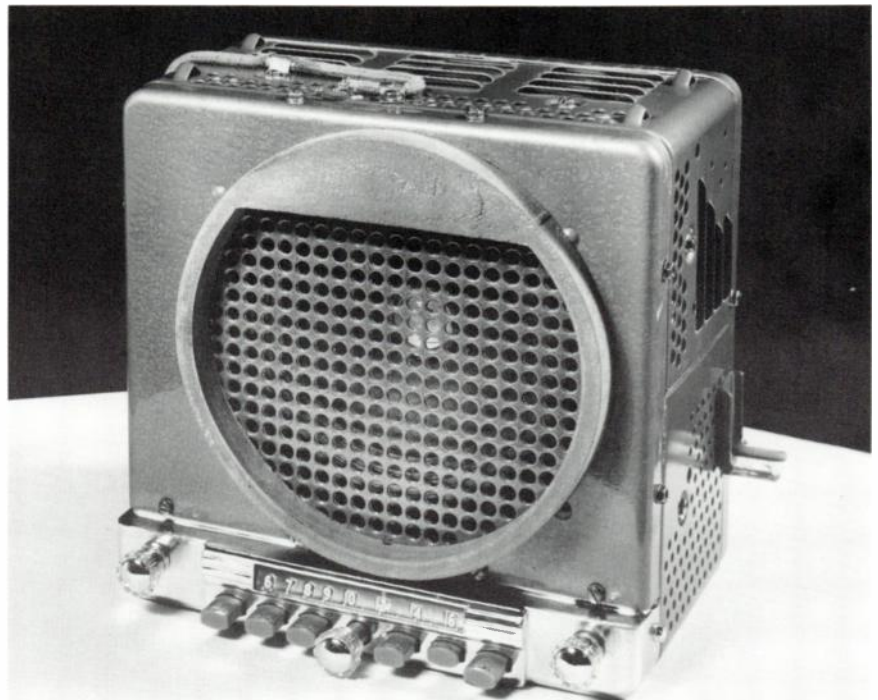
As we enter each new buying season it seems that consumer products are always new and improved. Automobiles are advertised as longer, lower and wider. The horsepower has been increased and the car handles better, has more acceleration, and realizes better economy. The interiors are more luxurious and roomy. The radios are said to have more tubes, give better performance and are easier to tune.

Nineteen hundred forty-one was no exception to this pattern of continued improvements; however, we were seeing more contrasts. There was a car for every mood and pocketbook by way of a wide range of features and prices. This was particularly true in the area of our interest - automobiles and radios.

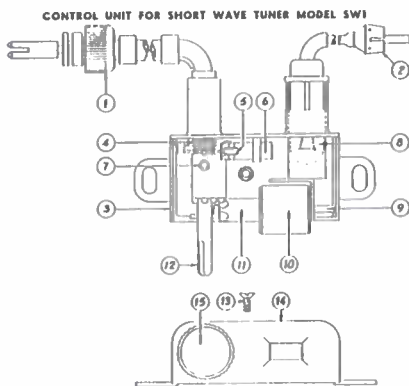
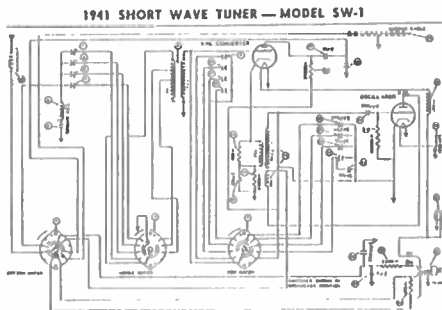
In the fall of 1940 automobile industry was gearing up to a hoped for 4,000,000 customers, again with more imposing front ends, highly crowned fenders, lots of chrome on roomier bodies with smoother contours. The interiors were more plush and set off by attractive hardware; the driving compartments were a joy to the eye. This year Packard, to conform with the rest of the industry, mounted the radio behind the instrument panel and installed an attractive speaker grille. Sadly, this was the final model year for the



Imposing entertainment center of the Buick 70 Roadmaster carried the theme of the car's front-end treatment.



Packard went back to Philco for this attractive radio. The case is finished in beige hammertone with chrome fittings.



Schematic diagram and control layout for Philco Model SW-1 Short Wave Tuner.

Opposite: Chevrolet offered a wide range of models for 1941.

Hupmobile and the Graham-Paige. Both were out of the automobile business late in 1940 but a few cars were listed as 1941 models.

The customer had a wide choice of purchase prices. He could have the Cadillac V-8 Seventy-five, priced at \$2995; the Lincoln Continental V-12 at \$2778 at the upper end compared to the Willys 440 at \$672; or the Crosley Convertible Coupe for the amazingly low price of \$299.00. The Crosley owner need not sacrifice his radio, however, because at a small extra cost he could have the Model A-459 five tube Crosley Roamio with simple mechanical push-button tuning, designed expressly for the automobile of the same name.

Another contrast, this time in the consumer radio market, both RCA products. For the home, there was the very handsome RCA Victrola Model V-205, radio-phonograph combination in a magnificently matched veneer cabinet or, if it was music to take with you, the RCA Victor Personal Radio weighing only 4.5 lbs. was yours for only \$20.00. The latter was made possible by the newly released miniature 1.4 volt tubes. These tubes in a 6.3 volt version would later find application in auto radios.

In the meantime, the radio design engineer had a number of options in choosing existing tubes for specific functions. The following is an example of tubes that were available to fulfill the function of a pentagrid converter in a superheterodyne receiver for operation from a six volt system: the 6A8, metal type; 6A8G, glass-octal; 6A8GT bantam or the 7A8 loktal type tube. The final selection would depend perhaps on the physical parameters and personal preference. We have often seen a mixture of these types of tubes used within the same receiver.

On the subject of car radios and choices, the 1941 Chevrolet was once again available with a choice of three custom-built radios and a five tube universal underdash set. The big news, however, was the nine tube short-wave receiver as one of the options. This was the last word in automobile radios. In addition to the standard broadcast band, there were the 31, 25, 19, and 16 meter bands. This made the model 985697 a private communications center.

The international crisis and the current interest in news from around the world no doubt initiated the idea for such a receiver. Short-wave sets were not new to the automobiling public in Europe. An added feature was a tone control which offered a choice of "soft," "voice," "music" and "bass" settings. This was especially effective when tuning distant stations to help filter out some the background noise and make listening more pleasant.

Another nicety from Chevrolet was the small, self-contained, four tube portable radio. This would enable drivers to continue receiving their favorite

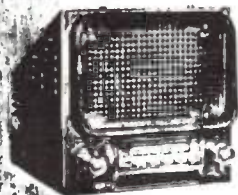


RADIO ADDS SO MUCH TO THE JOY OF TRAVEL

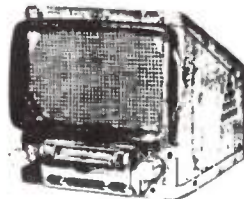
★ And Chevrolet Radios make it possible for you to offer your customers the very best in automobile radio reception. Besides having four of the finest radios to choose from—with a price range to meet all competition—you have the first opportunity to sell a Genuine Chevrolet Radio to every New Car buyer. What's more, you can include the cost in their monthly payments. All you have to do is ask and get the business.



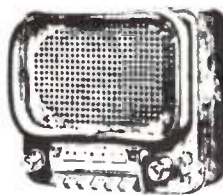
ORDER FROM YOUR ZONE WAREHOUSE



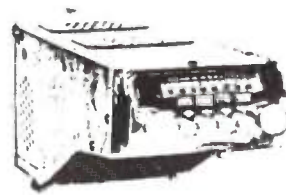
9 TUBE SHORT WAVE
Incorporates four short wave bands in addition to standard broadcasts.



8 TUBE SUPER DE LUXE
Single push-button controls four tone ranges—voice, music, soft, bass.



6 TUBE DE LUXE
Five piano-key type push-buttons automatically tune in pre-selected stations.

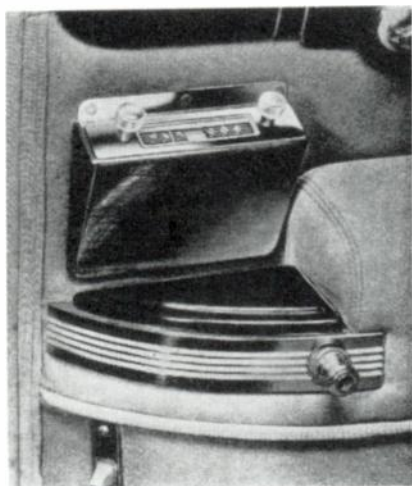


5 TUBE UNIVERSAL
Designed for universal mounting. Fits 1941 Chevrolets and other types of cars and trucks.



TUNE RADIO SALES TO NEW CAR SALES - AUTOMATICALLY

THE AUTO RADIO



Cigarette case and rear seat radio control on the Packard 180.

program after leaving the car. This set used the new miniature tubes mentioned earlier.

Not all of the surprises would come from Chevrolet though. Buick also offered a short-wave receiver in addition to their regular six tube broadcast receiver. This was very similar to the Chevrolet but it had eight tubes instead of nine as it had a synchronous vibrator, thereby eliminating the requirement for a rectifier tube. Another Buick accessory worthy of mention was a seven tube, three unit set for chauffeured vehicles. There was the armrest-mounted tuner, a header speaker for the rear compartment and the amplifier assembly which was mounted in the trunk. For an antenna, the 1941 Buicks used the roof peak type similar to Studebaker, Packard, Ford and others.



*NOW! A Foot Control for the
Ford-Mercury Roto-Selector Radio*

NO hands! Don't even take your eyes off the road. A flick of the foot—and you've switched from any one of five pre-tuned stations to another! A slight pressure—and your radio is silenced until you're ready for it again! How often you've wished for just this convenience when approaching a railroad crossing signal or during short conversations. The FOOT CONTROL is a remarkable

advantage, and it's available at only slight extra cost with the Ford-Mercury Roto-Selector Radio—the only radio with a foot control built for these cars!

**ORDER THROUGH
YOUR FORD DEALER**



A new Ford Special
Radio without foot
control is also avail-
able at only—

\$29⁰⁰
INSTALLED

State and local sales taxes
are extra. Prices subject
to change without notice.



Back cover of March 1941
Ford News tells all.

PRINTED IN U.S.A.

For Ford Motor Company there was another new idea. For the first time three vendors were involved in the production of Ford original equipment radios: Philco, Zenith, and Sparton (Sparks-Withington Co.). Visually, the 1941 set was similar to the 1940 except for the simplification of the "Roto-Selector" over the "Roto-Matic." A small, manually operated wing-shaped knob in the center of the trim plate selected the five preset channels and the manual position. An optional foot control was also available which would select the stations remotely without the operator's eyes leaving the road. By lightly pressing the toe button, the driver could mute the radio temporarily as a safety measure or to make conversation easier. Behind the scene, however, the Philco version used the new concept of permeability (variable inductance) tuning instead of the conventional variable tuning condenser in the manual mode. Permeability tuned coils had been previously used only in the preset station selectors in the "Roto-Matic" tuners.

The Ford 6-Tube Special Radio which used the same inside adjustable antenna system differed from the "Roto-Selector" described above in that it was strictly manually tuned with a knob. A quality set, but built to sell at a price so low that "every Ford owner can enjoy the thrill of music ... entertainment ... news bulletins" at only \$29.

A QUALITY RADIO

AT A LOW PRICE

Now all the stars of radio can be your driving companions ... for the new 6-tube Ford Special Radio is priced so low that every Ford owner can enjoy the thrill of music ... entertainment ... news bulletins.

The Ford Special Radio is a quality instrument throughout, designed and built to Ford specifications exclusively for Ford cars. Rich, full toned, highly selective.

Your Ford Dealer will gladly demonstrate.

FORD
Special
RADIO

\$29

INSTALLED
State and Local Sales Taxes are Extra

EASY TUNING



This radio provides clear, sparkling reception and unusually fine tuning without interference. Automatic fade control, wide range and full power for distant stations.

INSIDE ADJUSTABLE ANTENNA



The antenna is instantly adjustable from the driver's seat. No special attachments, no lead-in wires. It's a filtered system that reduces usual interference from street cars, power lines and motor noises.

The Ford Special Radio at a price which must have been hard to refuse.

Motorola offered eight models in their universal line of auto radios at prices ranging from \$24.95 for

THE NEW • THE BETTER • THE BEST

ALWAYS FIRST *Motorola* AUTO RADIO



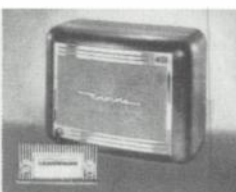
"GOLDEN VOICE" MODEL 701
8 TUBES • 5-BUTTON TUNING • TONE CONTROL
Push Pull • Speaker installs in Dash Panel or on Bulkhead
The Acutestest of Auto Radios! 5-Station Push Button Tuning; 8 Tubes including Rectifier; Push Pull; 5-Gang Condenser—Tuned R.F. Stage; Matched Instrument Panel or 4" Bulkhead Speaker; 5-Position TONE CONTROL; Sensitivity Switch; Superheterodyne Output; 11 Watts Beam Power Tubes.
\$69.95



Motorola MODEL 451
5-BUTTON TUNING
TONE CONTROL
Speaker installs in Dash Panel or on Bulkhead
5-Station Push Button Tuning; 6 Tubes including Rectifier; 5-Gang Condenser—Tuned R.F. Stage; Extreme Sensitivity Range; Sharp Selectivity; Matched Instrument Panel or 4" Bulkhead Speaker; 5-Position TONE CONTROL; Sensitivity Switch; Push Button on Control Head; Superheterodyne AVC; Finished in Tan Hammerhead.
\$44.95



Motorola MODEL 501
7 TUBES • 5-STATION TUNING
T. Speaker • Push Pull • Tone Control
5-Station Push Button Tuning; 7 Tubes including Rectifier; 5-Gang Condenser—Tuned R.F. Stage; Extreme Sensitivity Range; Sharp Selectivity; Push Pull and VITA-TONE circuit provides fine tone quality; 5-Position TONE CONTROL on Control Head; Sensitivity Switch; Superheterodyne AVC; Finished in Tan Hammerhead.
\$49.95



Motorola MODEL 401
7 TUBES • 7" BUILT-IN SPEAKER • PUSH PULL
Outstanding Power and Performance! 7 Tubes including Rectifier; 2 Push Pull Power Tubes insure transmission and control volume; 5-Gang Condenser—Tuned R.F. Stage; Extreme Sensitivity Range; Sharp Selectivity; 5-Position TONE CONTROL; Large acoustic housing and VITA-TONE circuit provide exceptionally fine tone quality; 5-Position TONE CONTROL; Superheterodyne AVC.
\$39.95



Motorola MODEL 301
6 TUBES • MARVELOUS TONE
SMART NEW STYLING
6 Tubes including Rectifier; 5-Gang Condenser—Tuned R.F. Stage; Extreme Sensitivity Range; Sharp Selectivity; Powerful Self-Contained Speaker; Large acoustic housing and VITA-TONE circuit provides exceptionally fine tone quality; Superheterodyne Low battery drain; AVC; Finished in dark blue Ham.
\$29.95



Motorola MODEL 351
6 TUBES • TONE CONTROL
Speaker installs in Dash Panel or on Bulkhead
6 Tubes including Rectifier; 5-Gang Condenser—Tuned R.F. Stage; Extreme Sensitivity Range; Sharp Selectivity; Push Pull and VITA-TONE circuit provides fine tone quality; 5-Position TONE CONTROL on Control Head; Sensitivity Switch; Superheterodyne AVC; Finished in Tan Hammerhead.
\$34.95



Motorola MODEL 251
6 TUBES • 4-STATION PUSH BUTTON TUNING
Output Super Speaker • Fit All Cars
6 Tubes including Rectifier; 5-Gang Condenser—Tuned R.F. Stage; Extreme Sensitivity Range; Sharp Selectivity; Push Pull and VITA-TONE circuit provides fine tone quality; 5-Position TONE CONTROL on Control Head; Sensitivity Switch; Superheterodyne AVC; Finished in Tan Hammerhead.
\$24.95



Motorola MODEL 551
8 TUBES • 5-BUTTON TUNING • PUSH PULL AUDIO
Tone Control • Speaker installs in Dash Panel or on Bulkhead
5-Station Push Button Tuning; 8 Tubes including Rectifier; Push Pull; 5-Gang Condenser—Tuned R.F. Stage; Matched Instrument Panel or 4" Bulkhead Speaker; 5-Position TONE CONTROL on Control Head; Sensitivity Switch; Superheterodyne AVC; Output 9 Watts Beam power; Red Hammerhead.
\$59.95

Motorola VITA-TONE CHALLENGES ALL COMPETITION • WINS ON DEMONSTRATION

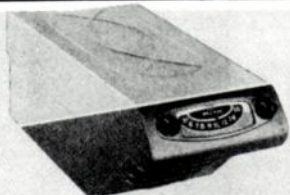
Motorola was backing up its dealers with this full line of products.

the six tube under-dash Model 251 to \$69.95 for the famous eight tube "Golden Voice" Model 701. This fine line proved that a car radio could be beautiful. All but the lowest priced model, included controls to match the customer's new car, and most gave a choice of speakers for bulkhead (fire wall) or dash (instrument panel) mounting.

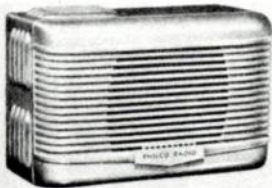
The Philco array of Distributor Model auto radios included the single unit under-dash model AR-10 and six models with separate instrument board speakers and control heads for appropriate installation within the car. These ranged from the six tube manual tuning models AR-40 and AR-45 to the six tube electric step tuning models AR-50, AR-55 and AR-65 each with slightly different features, and finally, the powerful eight tube Model 75, the top of the line. To these were added the 822P and 822PV police models. Another item of interest was the model SW-1 short wave tuner for the distributor line and certain export sets.

The above lineup and the original equipment sets for Chrysler, Ford and Mercury, Packard and Studebaker from Philco, the world's largest manufacturer of automobile radios, posed stiff competition. The Philco Radio and Television Corporation's 1941 catalog of parts, accessories, tubes and batteries was a one step shopping guide for the Philco dealer. It contained tools, test equipment, radio component parts, accessories, tubes and money-making items, plus all kinds of promotional merchandise such as stocking shelves, stationery, posters and metal signs. It was these things that made the dealers feel part of the team. The company also held service seminars and backed them up with abundant descriptive material

AUTO RADIOS FOR 1941



AR-10. Attractive, rugged one-piece case finished in beautiful Crystal Green. Fits snugly under the instrument panel of any car. 6-tube Superheterodyne with Built-in Speaker and Illuminated, Easy-to-read Dial. The finest low-priced auto radio ever offered. **\$19⁹⁵**



AR-40. Single-unit Superheterodyne in a smart new case finished in Tan. 6 tubes, powerful Built-in 6-inch Speaker. Separate Control Unit with 2-point Tone Control, Illuminated Dial and Plate to match any car. Fine all-around performance. A big value. **\$29⁹⁵**



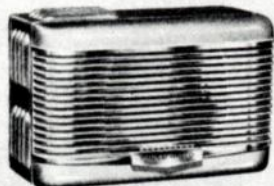
AR-45. Two-unit Superheterodyne in a beautifully finished Tan Case with Yellow Ornament. 6 tubes. Choice of separate 7-inch Grille Speaker or Under-Dash Speaker. Separate Control Unit with 2-point Tone Control, Illuminated Dial and Plate to match any car. **\$34⁹⁵**

Control Plates to Match the Panels of ALL Cars ...AT NO EXTRA COST!



Philco offers you for 1941 an extremely simple and flexible control plate proposition. The controls for all models are exactly the same size and shape.

Speakers to Mount in Grilles of All Cars



AR-50. Single-unit Superheterodyne in the new Crystal Green Case with Chrome Trim. 6 tubes, powerful Built-in 6-inch Speaker. Separate Illuminated Control Unit with new tuning convenience—left knob controls volume and tone, right knob tunes all stations or acts as push-button for 5 favorite stations. Plate to match any car. Only **\$39⁹⁵**



AR-55. Two-unit Superheterodyne in Crystal Green Case with Yellow Ornament. 6 tubes. Choice of separate 7-inch Grille Speaker or Under-Dash Speaker. Separate Illuminated Control Unit—left knob controls volume and tone, right knob tunes all stations or acts as push-button for 5 favorite stations. Plate to match any car. Superb tone and performance. **\$44⁹⁵**



AR-75. De Luxe two-unit Superheterodyne with 8 tubes. Separate 8-inch Under-Dash Speaker. Both set and speaker finished in refreshing Lodington Green with Chrome Trim. R. F. Stage Push-Pull Beam Output. Separate Illuminated Control Unit with Single Push-Button for 5 stations, 3-point Tone Control and Plate to match any car. **\$59⁹⁵**

New! Exclusive! Short-Wave Tuner

A brand-new accessory, invented by Philco engineers, that makes a short-wave radio out of any 1941 Philco Auto Radio (except AR-10)! Adds two tubes and four short-wave tuning bands to the set and enables users to enjoy powerful American and Foreign Short-Wave reception. Tunes in programs by short-wave in spots too far or too noisy for good reception on standard bands. A sensation at PLUS for Philco dealers. **\$20** Only Philco has it! Only . . .

Today, the great majority of radios operating in the cars of America have been manufactured by Philco.

PHILCO ALL YEAR 'ROUND

Philco was not letting the trade forget that it was in the auto radio business.

such as service manuals and literature. It paid dividends for them to identify with Philco, since the latter was spending millions in support activities and advertising every year.

In contrast, Allied Radio Corporation of Chicago listed three auto radios in their 1941 catalog. The four tube compact set for mounting anywhere, cost \$9.80; the six tube under-dash model with six push buttons, was priced at \$15.25; and the seven tube universal receiver with custom controls was a bargain at \$22.95. In addition, there were several pages of aeriels (antennas), controls, suppressors, vibrators, and accessories at unbelievably low prices. It was a real thrill for the hobbyist or professional to browse through the Allied catalog. Allied was just one of many such firms that served the "little fellow" who did not qualify for the big franchise or dealership.

When all of the manufacturer's reports had been tallied it was found that a new U.S. record of 2,000,000 auto radio sets had been established. Comparing this with the nineteen forty-one automobile production of 3,779,682 units, confirms that the public had overwhelmingly accepted the radio as a desirable accessory.

Knight 4 TUBE AUTO RADIO

A compact Auto Radio that's a real Value Hit! Performs with the best of them! Has what it takes in tonal clarity, volume, and easy operation. And it's priced so low that no car owner need be without an Auto Radio! Anyone can install it quickly and easily; and it fits any car perfectly! No suppressors required—no complicated connections! Just clamp it on where you want it, connect to aerial and battery—and you are ready to enjoy fine radio entertainment.

Easy to Tune. The ingenious slant opening on the dial face gives the driver full view of the easy-to-read "Spot Dial." Large numerals show clearly through the "Spotlight" opening as you rotate thumb-type tuning wheel at right hand side of case.

Latest Circuit. With the Knight 4 you get a wonderful new Super-het circuit, licensed by R.C.A. Uses the following tubes: 6SA7 as Conv.-Osc.; 6XK7 as I.F. Amp.; 6SQ7 as Diode Det.-A.V.C.-1st Audio; 6K6GT as Audio Output. Multi-purpose tubes achieve 4 tube efficiency. We are proud to offer this fine auto radio with its high record of efficient performance.

Fits All Cars. The Knight 4 is completely contained in one attractive, car-taupo, crackle-finished steel case, only 6 1/4" x 7 1/2" x 4 1/2". Comes equipped with special clamp, adapting the set for mounting along edge of dash. (Clamp for mounting on steering column of both old and new cars available at small additional cost; see below.)

Advantageous Features. Other important features include: Full A.V.C. for uniform volume; special Electro-dynamic Speaker of highest quality; rubber mounted against vibration; 535 to 1600 K.C. range for all standard Broadcast coverage; built-in synchronous vibrator power supply; amazingly economical low 3 ampere drain; fused "A" lead, etc. Only the best quality components are used.

A Wonderful Auto Radio Value. Now everyone can afford reliable Auto Radio entertainment. The Knight 4 is offered as described above, complete with tubes and with special bracket for dash-edge mounting. Ship. wt. 11 lbs. Code: IDEAL.

NET PRICE, EACH

B10525. Special clamp for mounting above set on steering column of older model cars. **NET 35c**

B10651. Special clamp for mounting set on steering column of new cars with gear shift on wheel. **NET 50c**

\$980

Knight 7 TUBE AUTO RADIO

Our De Luxe Auto Radio—the finest you can buy at the price! "Tops" for tone quality, power and new features.

Fits Any Car. Completely self-contained in a single taupe-finished all-steel case. Size: 6 1/2" x 10 1/2" x 6 1/2". Easy to mount in any car. Has remote control tuning mechanism.

1941 De Luxe Features. No suppressors required—absolutely noise-free filter circuit. Includes A.V.C.; Tone Control; Bass Boost; R.F. Stage; 3 Gang Condenser. Remarkable for its tuning sensitivity and selectivity—powerful and dependable anywhere you drive.

Latest Circuit. Uses the newest low-drain tubes: 6XK7 as R.F.; 6SA7 as Osc. Conv. (dual-purpose); 6SQ7 as I.F.; 6SQ7 as Det.-A.V.C.-1st Audio (triple-purpose); 6J5GT as Driver; 6K6GT as Output; 6X5GT as Rect. Develops more than 3 watts power Output.

Sparkling Tone. Rich and full tone—the kind you expect from the finest home-type radio—is yours in the Knight 7. The secret's in the flawless reproduction of the special built-in 6-inch Electro-dynamic Speaker. There's no finer tone in auto radio.

Great Car Radio Value. The Knight 7 (with rectifier) is offered complete with built-in speaker, tubes, flexible shafts, tuning mechanism and hardware. Requires either of tuning control heads listed below. Ship. wt. 20 lbs. Code: REGAL.

B10553. Value \$39.95

NET PRICE EACH, \$23.95

YOUR NET PRICE, LOTS OF 3, EACH

Special Central Mounting Kit. **B50888.** Universal control—adjusts tuning mechanism of the Knight 7 to fasten to lower edge of dash instrument panel. **NET \$1.32**

B50899. Custom control for mounting on dash panel of cars equipped with radio control compartment. When ordering, specify make, model (standard or de luxe) and year of car. **NET \$1.32**

\$2295

Knight 6 TUBE AUTO RADIO

You can look everywhere, but you can't find an Auto Radio value to compare with this! Never before have you been able to buy 6-tube power plus the convenience and driving safety of Push-Button Tuning, at this low price. Fits any car perfectly. Brings you radio at its best wherever you drive.

Automatic Tuning. Tune without taking your eyes off the road! With this new Knight 6 you can tune your choice of six favorite stations just by pressing a button! Positive, accurate tuning, does not interfere with regular manual tuning of all other stations.

Slide-Rule Dial. Easy-to-read, easy-to-tune; inclined to provide full vision and complete safety while driving. Good-looking, too, even in the finest of car interiors.

All-Electric Radio. The 1941 Knight 6 (with rectifier) offers all-electric operation. Has built-in vibrator power supply. New Super-het circuit, licensed by R.C.A. and Hazeltine, uses the newest tubes for extra tube power and efficiency. Tubes are: 2-6K7GT, 6A8AT, 6Q7GT, 6K6GT, 6X5GT. No suppressors are required.

All These Fine Features. Full A.V.C. for freedom from fading; full 3 watts power output; heavy-duty Electro-dynamic Speaker for splendid tone quality; R.F. Stage for super-sensitivity; 315 to 1550 K.C. tuning range; low-drain; plug-type antenna connection, etc.

Fine Looks. You'll like the simple, sturdy all-steel case that houses the Knight 6, beautifully finished in grey, measures 12" x 6 1/2" x 5 1/2". Designed to mount neatly along the lower edge of car dash panel. The Knight 6 has been designed and built with all the care and precision demanded by the highest automotive standards. It is constructed to withstand vibrations and shock and to give maximum radio enjoyment wherever you drive.

Set Complete. The 1941 Knight 6 is offered as described above, complete with tubes. Ship. wt. 14 lbs. Code: RIGHT.

B10554. Value \$37.95

NET PRICE, EACH, \$15.95

NET PRICE, LOTS OF 3, EACH

\$1525



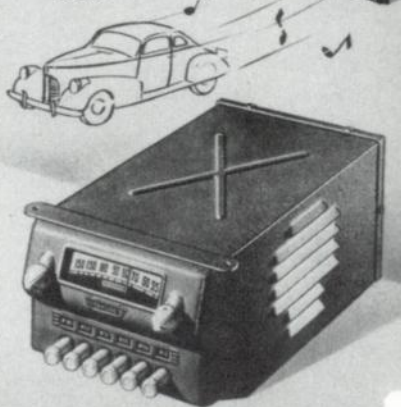
LATEST AUTO RADIO FEATURES!

- All-Electric Radio
- Full-Acting A.V.C.
- Dynamic Speaker
- Suppressorless
- New "Spot" Dial
- Thumb Tuning
- Low Drain
- Compact Size

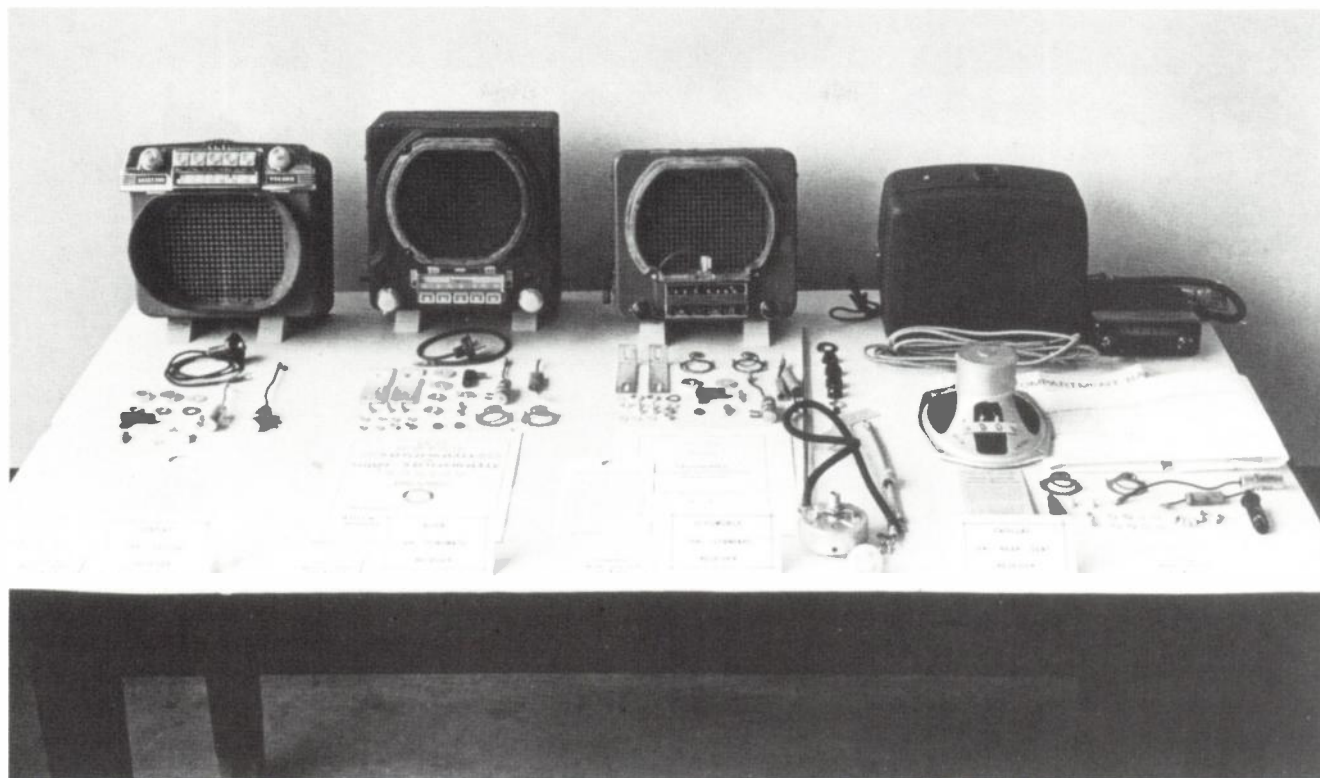
\$980

Self-installed in a jiffy! Furnished with mounting clamp for easy installation anywhere along car dash edge. Can also be had (at small extra cost—see listing at left) with special clamps for mounting on the steering column of both old and new cars.

VALUES IN AUTO RADIOS!



A page from the Allied Radio catalog for 1941. The company offered excellent mail order service.



Delco Radio models and
accessories for 1941.

1942

War intensifies on every front. In his annual message to Congress broadcast, President Roosevelt calls for planes, tanks and billions of dollars to carry the war to the foe.

The War Production Board orders radio manufacturers to halt production of radios and phonographs after April 22. The industry must change over to 100 percent war work. Automobile production gradually ceases, factories turning out electrical appliances convert to munitions work. All critical materials, men and machines are committed to the war effort, and defense work continues on a seven day week in round-the-clock shifts.

Patriotism is a high priority for everyone. An increasing number of women go to work in the bomber plants. Movie stars attract huge crowds at bond rallies. Young and old knit warm socks, scarves, mittens, helmets and sweaters for the boys in service.

Vast educational resources are set in motion to train civilians and recruits in defense skills. On January 23, NBC-RCA initiates the first mass education program by television to train thousands of air raid workers in the New York area.

Gasoline rationing is put into effect on May 15. Each American responds in his/her own way to the all-out war effort and continue to prove wrong the prognosticators who say it is impossible to arm America's war machine at such a late moment.

The popular song hits of the year reflect the sadness of separation and a yearning for life to be normal once again—"Don't Get Around Much Anymore," "I Don't Want to Walk Without You," "Don't Sit Under the Apple Tree," "When the Lights Go on Again (All Over the World)".

RADIO'S GOLDEN YEARS

In the early fall of nineteen forty-one, despite rumors of curtailment and a government edict to cut production back 26.5 per cent because of defense essential materials, the annual automobile unveilings appeared on schedule with a dazzling array of new models. The styling theme seemed to be one of broad sweeping, horizontal flourishes of body metal and chrome—some pleasing, some not so pleasing.

The effect was a massive appearance from the radio speaker grille to the radiator grille. Huge bumpers and bumper guards added to the heavy appearance. This was apparently part of the move toward eliminating the fenders as appendages and integrating them into the body a la the bathtub effect. Save Willys and Crosley, car makers including even the traditionally conservative Packard, followed in Pied Piper fashion.

The 1942 Buick Super Sedanet was one of the better designs, massive but well balanced: essentially a new car. The front fenders streamed back across the sides of the car until they met the rear fenders. The latter day expression "far out" would have aptly described it. To see it in two-tone, metallic finish driving down the street in Small Town USA back in 1942, was to experience a breathtaking scene from a science fiction movie.

Option-wise, nearly everyone had some form of automatic transmission available. Lincoln offered the Liqua-matic, Packard the Electro-matic, while Studebaker furnished the Turbo-matic and Oldsmobile the Hydramatic. Other options included convenience items such as direction indicators, windshield washers, push-button doors, power windows, vacuum-operated radio antennas, and many forms of automatic tuning radios: Buick's Sonomatic, Firestone's Monomatic, Motorola's Electric Motor Drive, Ford's Adjust-O-Matic and others. As a safety measure, Studebaker provided the finger control radio tuning lever. This was located on the steering column near the turn signal lever.

Studebaker also featured a telescoping cowl antenna which was manually adjustable from the driving compartment. Also available to Studebaker buyers this year, were four Philco-made radios and three types of antennas. Philco also made sets for Chrysler, Ford and Packard in addition to their distributor line of sets. In 1942 Philco claimed that they were the world's largest manufacturer of automobile radios.

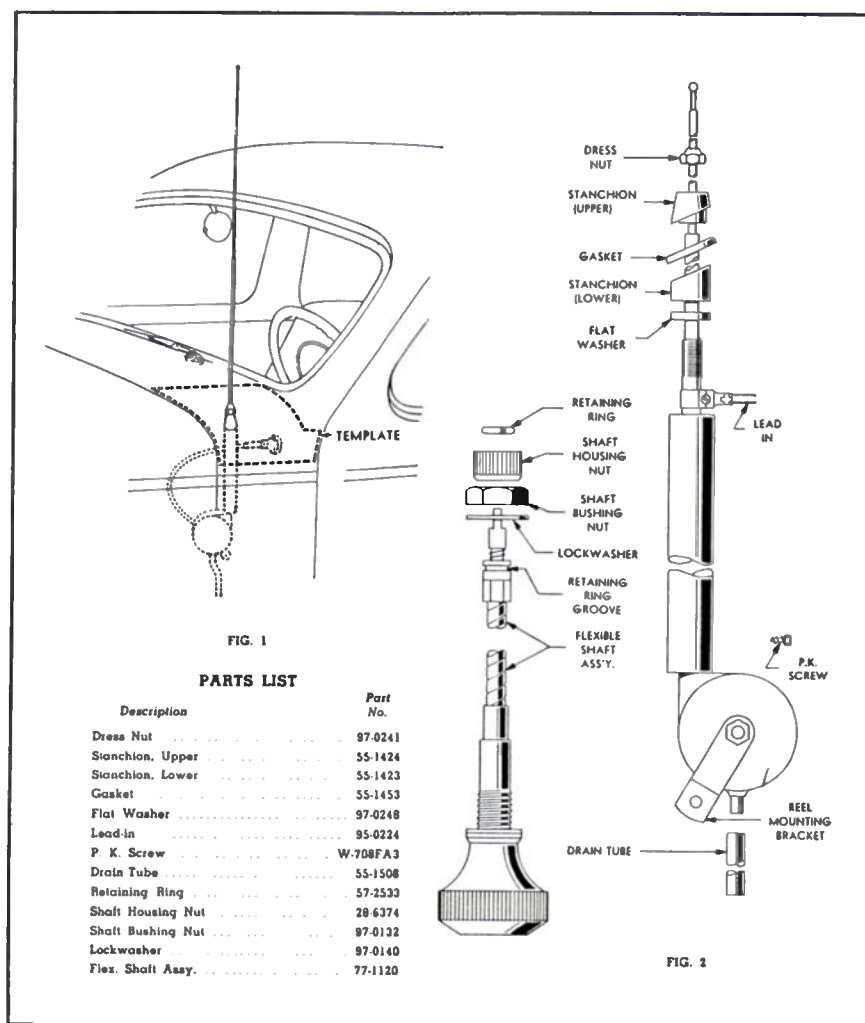
Studebaker's finger control tuning lever was located just above the turn signal lever.



STUDEBAKER A.C.-1344

INTERNALLY CONTROLLED COWL ANTENNA

INSTALLATION INSTRUCTIONS



Another convenient Studebaker accessory was this remote-controlled telescoping cowl antenna.

Most of these sets incorporated some form of inductive tuning, utilizing permeability cores because of the higher efficiency.

A unique and recent development in permeability tuning was used in the sets made for the Ford Motor Company by Philco, Sparton and Zenith. This was the Adjust-O-Matic radio with foot control and touch-bar tuning. The radio was a new package, back to two units; one, the compact main chassis; and two, the new elliptical 6 in. x 9 in. speaker which was installed behind the speaker grille above the radio. The heart of the receiver was the revolving turret tuner with six positions (five for pre-setting and one for dial).



Instrument panel of a deluxe Ford V-8 showing the Adjust-O-Matic radio. This was Henry Ford's personal car which was also fitted with a two-way communication system. (Note the microphone.)

Installation details and discussion of the muting circuit.

SERVICE MANUAL

Built for
FORD MOTOR CO.
Detroit, Mich.



Model
6MF690

Made by ZENITH RADIO CORPORATION, Chicago, Ill., U.S.A.

RECEIVER INSTALLATION:

Figures 1 and 2, illustrating the escutcheon plate, control knobs and the installed receiver are given here to facilitate removal and reinstallation of the receiver when service or repairs are necessary.

Remove the Link "B" and loosen the hook bolts "D" to remove the receiver from the car.

NOTE: To set up a station on any automatic position, pull the tuning knob out and tune the receiver as in manual tuning. Press the tuning knob in to its original position after the station has been accurately tuned in.

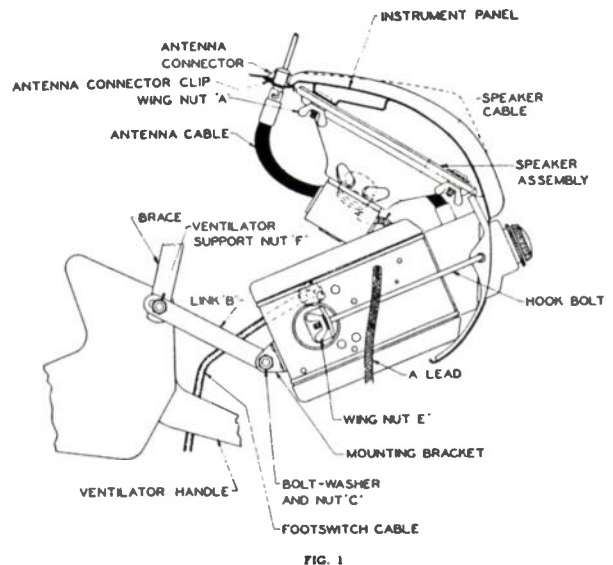


FIG. 1

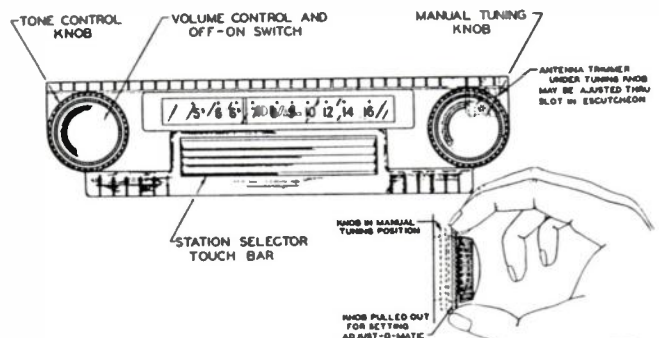


FIG. 2

DELAYED AUTOMATIC MUTING CIRCUIT

Pressing either the Touch-bar or the foot control switch automatically mutes the receiver for the duration of the change cycle. This action is accomplished by applying 6 volts negative to the 7B6 first audio grid through the 1 megohm resistor R-25. (See schematic diagram.) This negative voltage blocks the grid of the 7B6 until the voltage bleeds off through the 15 megohm resistor R-12, when the receiver will again operate normally. NOTE: The storage battery in the car must be properly polarized to apply the negative muting voltage to the receiver. If the battery polarity is reversed the receiver will not mute and it may become distorted during the change cycle. Always connect the positive (+) terminal of the storage battery or power supply to the receiver case when checking the receiver.

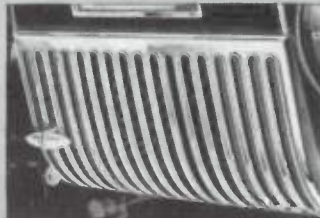
MOTOROLA CUSTOM BUILT SPEAKERS DESIGNED FOR INSTRUMENT PANELS OF 1940 TO 1942 CARS

Motorola "Golden Voice" Model 705 and Model 810 and 910 have connections for Separate External Speakers either for Instrument Panel or Bulkhead Installation. Either type External Speaker is included with Models 505, 605 and 705. Order by Number when Instrument Panel Speaker is desired. Order M-361 when Bulkhead Speaker is wanted.



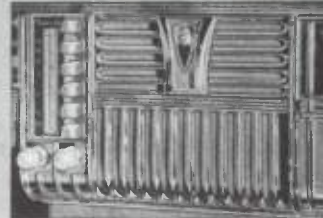
FORD 1942 Dash M-356
FORD 1941 Dash M-296
FORD 1940 Dash M-266

MERCURY 1942 Dash M-356
MERCURY 1941 Dash M-296
MERCURY 1940 Dash M-266



CADILLAC 1942 Dash M-358
CADILLAC 1941 Dash M-298
CADILLAC 1940 Dash M-268

LA SALLE 1940 Dash M-261



PLYMOUTH 1942 Dash M-352
PLYMOUTH 1941 Dash M-292
PLYMOUTH 1940 Dash M-262

DODGE 1942 Dash M-352
DODGE 1941 Dash M-292
DODGE 1940 Dash M-262

CHRYSLER 1942 Dash M-352
CHRYSLER 1941 Dash M-292
CHRYSLER 1940 Dash M-262

DE SOTO 1942 Dash M-352
DE SOTO 1941 Dash M-292
DE SOTO 1940 Dash M-266

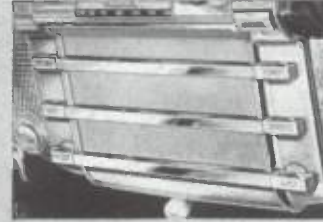
SEPARATE 6" ELECTRO DYNAMIC BULKHEAD SPEAKER . . . M-361



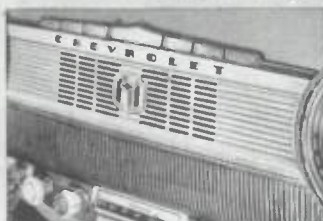
OLDSMOBILE 1942 Dash M-349
OLDSMOBILE 1941 Dash M-289
OLDSMOBILE 1940 Dash M-259



PONTIAC 1942 Dash M-354
PONTIAC 1941 Dash M-294
PONTIAC 1940 Dash M-264



BUICK 1942 Dash M-348
BUICK 1941 Dash M-288
BUICK 1940 Dash M-258



CHEVROLET 1942 Dash M-357
CHEVROLET 1941 Dash M-297
CHEVROLET 1940 Dash M-267



HUDSON 1942 Dash M-361
HUDSON 1941 Dash M-281
HUDSON 1940 Dash M-261



PACKARD CLIPPER 1942 Dash M-301
PACKARD 1941 Dash M-293



STUDEBAKER 1942 Dash M-359
STUDEBAKER 1941 Dash M-299
STUDEBAKER Champion 1940 Dash M-252
STUDEBAKER Com. 1940 Dash M-269
STUDEBAKER President 1940 Dash M-269



NASH 1942 Dash M-360
NASH 1941 Dash M-280
NASH 1940 Dash M-260



LINCOLN ZEPHYR 1942 Dash M-360
LINCOLN ZEPHYR 1941 Dash M-302
LINCOLN ZEPHYR 1940 Dash M-302

Prices and Specifications Subject to Change Without Notice

To set the stops, it was only a matter of pulling out the manual tuning knob and tuning in a station, pressing in the knob, pushing the touch bar for the next stop and repeating the process until all five automatic positions were set.

Similar radios were made exclusively by Zenith for Hudson, Nash and Willys. These had different physical dimensions and minor variations in layout of knobs and indicators as determined by the individual car makers. A model made for Lincoln used the same tuning principle but it had an eight tube circuit rather than the six tube used in the others. The set was wider owing to the extra components and was installed behind an incredibly broad Lincoln speaker grille. This was the year that Zenith seemed to be concentrating on the O.E.M. business and they were apparently more than willing to meet the varying mechanical requirements of the car makers.

Motorola still seemed to be doing well without the O.E.M. activity but they did not make their "Specifically Designed" series sets for as many of the 1942 cars as they had in 1941. In view of the way the car production evolved, it was no doubt a wise decision.

Delco Radio Division restyled their line for the General Motors Cars this year; however, the electronic circuits were basically the same. Buick retained the mechanical push-button tuning with the electric clutch for disengaging the manual tuning function while in push-button mode. These were six tube sets with synchronous vibrators. Oldsmobile used the non-synchronous vibrator with a rectifier tube as did Pontiac. The Cadillac seven tube unit was worthy of its name.

Opposite: A page from Motorola catalog showing radio speaker grilles for 1942 cars.

Sears Roebuck catalog page announcing the close-out of auto radios for the duration.



Final Clearance of Silverstone de luxe Auto Radio

With matching dash plates for Ford, Chevrolet, Buick, Dodge, Pontiac, and many others

Circuit Patent for 1941 Ford

- 6 tubes including power rectifier—six full watts of power
- 7-inch dynamic speaker gives superb tone quality

Speaker and controls designed to fit in the dash of your car just like custom-built models selling for as much as \$50 or \$60. For cars without speaker grill, speaker may be left in radio case.

Push Button Tuning—each time a button is pressed a new station is tuned. Easily set for 5 stations. Station call letter tabs provided. Manual tuning from dash for stations from 540 to 1600 K.C.

Powerful Superheterodyne Circuit, 3-stage tuning for better station selection. Automatic volume control. Built-in noise filters. Automatic bass boost produces rich natural tone. Push button Tone Control from dash. Battery drain only 6.9 amps.

When ordering, state make, year and model of car, and whether standard or deluxe. Proper panel to fit your dash furnished. Entire control panel fits in dash of most '39, '40, '41, '42 cars. **Special Under-dash Control** fits cars not having "in-dash" provision for radio controls. Ten finished radio unit requires space on fire wall size, 7 7/8-in. high, 8 1/4-in. wide, 7 1/4-in. deep. Mailable. In a few cases control panel may be shipped separately from radio.

57 J 07094—Auto Radio, less Aerial. Shpg. wt., 23 lbs. **\$32.95**



\$32.95

Cash

Available on Easy
Terms, See Page 120

Was

\$35.75

Last Fall's corrected
selling price

DeLuxe Auto Aerial to fit all cars

3-section whip style; mounts on side cowl. Triple plated telescoping rod, extends from 28 to 65 in. 36-in. shielded lead-in. Adjustable insulated mountings. Designed to improve the selectivity and reception of any make radio.

57 J 04508—Shipping weight, 2 pounds **\$2.29**

The major mail order houses: Montgomery Ward, Sears, Roebuck and Spiegel; and auto accessory stores: Firestone, Gamble and Western Auto continued to list car radios in their 1942 catalogs. The line offering seemed to be more limited than before and contained a greater concentration on the five and six tube universal radios for under-dash mounting. The latter were becoming easier to order, stock, and sell in these outlets than a complex array of sets, speaker cables, and matching plates for custom installation. In their midsummer sale catalog, Sears, Roebuck and Co. advertised a final clearance of their six tube Silvertone deluxe Auto Radio with matching dash plates for a cash price of \$32.95. The deluxe aerial was only \$2.29. Indications were that these radios were left over from the previous fall.

The Chevrolet Dealer Magazine displayed the three genuine 1942 Chevrolet radios: the nine tube short-wave and standard broadcast set, the six tube single unit and the five tube universal receiver well into 1943 long after the automobiles were out of stock. Radio production had ceased also but they were easier to stockpile than automobiles.

This is the way that it was—automobile production was phased out beginning about the end of January 1942. Shortly, the only thing left on the dealers' floors were a few accessories for the cars that customers could not purchase.

Industry had thought that they perhaps could play a dual role of running limited production of their civilian products and meet their defense commitments as well, but Pearl Harbor had changed all of that. When war was declared, every facility and every skilled person were badly needed for victory. The automobile industry that had honed their collective talents on beautiful objects of steel, glass, rubber and fabric found that they were equally well suited for production of the heavy, ugly and complex machines of war.

The radio industry had already gone through the metamorphosis of making long wooden boxes with a few dials on the front to more exotic, integrated radio receivers. They found that they could easily convert to the manufacture of communication equipment for the armed forces. The challenges of the remote controls and automatic tuning systems, designed under the pressure of stiff competition, had kept the minds of their best engineers in fine trim. The only hope was that they could train new people to replace those who were called into active duty.

In the last few years of peacetime, the field of some seventy radio manufacturers, who had at one time or another had been involved with the car radio, had dwindled to about a dozen serious contenders. Many had either quietly faded away, gone bankrupt with a

flourish or had found other related fields to pursue. That was about the same number who had started during 1930, although only about half of those were connected with the original firms. Among the survivors were: Automatic Radio Manufacturing Co., Philco (successor to Automobile Radio Corporation), Crosley Radio Corporation, Delco (successor to General Motors Radio Corporation), Galvin Mfg. Corporation (Motorola), and Sparks-Withington Company (Sparton).

Beyond this however, there was a healthy support industry manufacturing tubes and component parts as well as accessories such as antennas, controls, and interference suppressors. In many ways, this was a

Radiart, a major manufacturer of auto radio antennas, could no longer guarantee the use of non-ferrous metals in their construction due to the exigencies of national defense.



RADIART AERIALS for 1942

ADVANCED STYLING and ENGINEERING produce a line of aerials that fully meets to-day's needs. Radiart quality is expressed in precise fit, anti-rattling construction, high grade finish.

Materials used are either Admiralty or Radiart Ferrite, and designs indicated here are subject to change, as exigencies of national defense dictate.

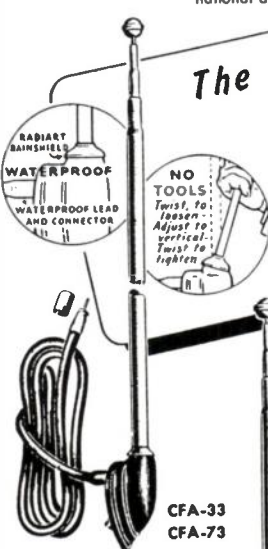
The NEW ALL-ANGLE

COWL or FENDER

A MODERN RADIART DEVELOPMENT that fits all body contours, straight or curved, cowl or fender. The 3-section rod is easily adjusted to vertical without tools. The Radiart "Rainshield" keeps the aerial waterproof; and the lead, too, is waterproof.

CFA-33	3-section	24-63"
CFA-73	3-section	37-92"

WATERPROOF SHIELDED LEAD INCLUDED

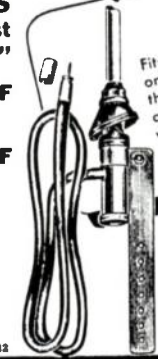


NO TOOLS
needed to adjust
"ALL-ANGLE"
WATERPROOF
AERIAL
WATERPROOF
LEAD



RADIART Passenger Car AERIALS
have **STATIC-MUFFLER MAGIC RING**

"FIT-ALL" Cowl-Fender TYPES
CV-33 and CC-33 have a plastic ball-and-socket connection which makes it easy to adjust the rod to vertical on curved body surfaces.

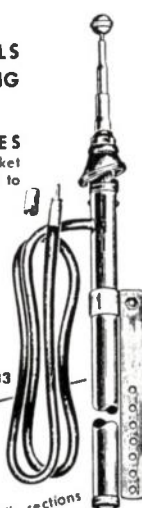


VERTICAL TYPE
Cowl or Fender Mount

Fits curved surfaces perfectly. Mounts on fender or on cowl, just in front of the windshield. One section projects above surface, the others telescope within.

CV-33	3-section	19-53"
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WATERPROOF SHIELDED LEAD INCLUDED



CONCEALED TYPE
Cowl or Fender Mount

Similar to CV-33, but all sections collapse below mounting surface within a special shielding tube.

CC-33	3-section	4-55"
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WATERPROOF SHIELDED LEAD INCLUDED



Form 642

THE RADIART CORPORATION • CLEVELAND, OHIO

NOTE: Ferrous metals used in these aerials cannot be guaranteed against rust.

Stewart AUTO RADIO REMOTE CONTROLS

TUNING UNITS



Standard universal tuning unit, for use with all Stewart custom built panel plates from 1934 to date.

No. 5500B Standard tuning unit with pilot light (25" lead).

List Price \$2.65
Furnished in gear ratios of 6:1, 8:1, 10:1, 12:1, 16:1, 20:1, and 21:1.

No. 5500S Standard tuning unit, with tuning stop and pilot light (25" lead)

List Price \$2.65
Furnished in gear ratios of 12:1, 16:1, and 20:1.

Specify gear ratio.

Deluxe universal tuning unit, for use with all Stewart custom built panel plates from 1934 to date. This unit has a local distance switch incorporated in it which is operated by a secondary wing knob.

No. 5653 Deluxe tuning unit, with pilot light (4 1/2" lead).

List Price \$3.85
Furnished in gear ratios of 6:1, 8:1, 10:1, 12:1, 16:1, 20:1, and 21:1.

No. 5653S Deluxe tuning unit with tuning stop and pilot light (4 1/2" lead)

List Price \$3.85
Furnished in gear ratios of 12:1, 16:1, and 20:1.

Specify gear ratio.

PILOT LIGHTS

No. 5426-6 Pilot light with 6 inch lead wire (not shielded).

List Price \$0.40

No. 5426-25 Pilot light with 25 inch lead wire (shielded).

List Price \$0.50

GEAR ASSEMBLIES

For changing the gear ratio of any Stewart tuning unit.

No. 5423 Gear Assembly (no slip gear) furnished in gear ratios of 6:1, 8:1, 10:1, 12:1, 16:1, 20:1, and 21:1.

List Price \$0.40
No. 5423-A Gear Assembly (Slip Gear) furnished in gear ratios of 12:1, 16:1, 20:1, and 21:1.

List Price \$0.55

Specify ratio when ordering.

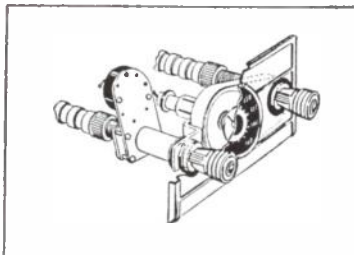
UNIVERSAL APPLICATION

One single control unit for practically all auto radio receivers furnished in any gear ratio, with other optional features such as on and off switch, local distance switch, volume control and variable tone control. One control unit allows either peep-hole, slide rule or airplane dial installation—resulting in complete market coverage for practically all auto radio receivers with a small inventory—less investment.

INDIVIDUAL CAR STYLING

Custom Built Panel Plates styled to harmonize with the instrument panel and its fittings—giving individual instrument panel installation for all popular cars from 1934 to 1940 inclusive. One single control unit for all Stewart custom built panel plates.

EASY INSTALLATION

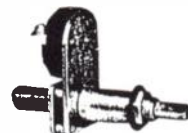


The Stewart auto radio remote control consists of two separate mechanisms, tuning unit and volume control unit. This construction permits on-the-panel installations with any Stewart panel kit, easily and quickly.

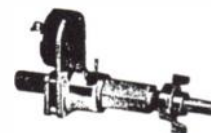
VOLUME CONTROLS



No. 5501 Standard Volume Control Shaft. .. List Price \$0.40

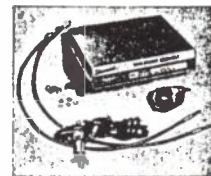


No. 5659 Volume Control with on and off switch. List Price \$1.25



No. 5661 Volume Control with on and off switch and variable tone control. Tone control being operated by a secondary wing knob. List Price \$2.90

INSTALLATION & CONVERSION ASSEMBLIES



For Arvin, Delco and Philco manual control auto radios; adapt any of the above auto radios to all popular cars when the correct Stewart panel kit is added.

No. 6992—For all Arvin models from 1935 to and including 1941.

List Price \$6.75

No. 6990—For all Delco models from 1935 to and including 1941.

List Price \$7.50

No. 6991—Same as above, less tone control. List Price \$6.75

No. 5886—For Philco models CT2, G142, 805, 806, 816, 826, 827, 827K, 828, 828K, 829.

List Price \$6.35

No. 6985—For Philco models 926, 927, 928K, 926, 927, 928K.

List Price \$4.00

Even as production of automobiles and radios ceased, there was still a market for remote controls to update existing sets.

Opposite: Many a young man traded a career in the radio industry for "heroic" service in the U.S. Army Signal Corps.

more stable business than building the complete radio.

Those thirteen years were the "Golden Years." The car radio began without a place of its own and finished behind a large chrome plated grille in the center of the instrument panel where its presence was demanded. Those years will never be repeated on the tablet of history. They were not only romantic and full of intrigue but they prepared us well for the years to come.

In the few weeks of nineteen forty-two before the switch to full time war production U.S. industry produced 350,000 auto radio sets. By that time there were approximately 9,000,000 automobiles so equipped.



**YOU'RE WAY AHEAD OF THE ACTION
IN THE U.S. ARMY SIGNAL CORPS**

• Some day American voices will rock the Imperial Palace in Tokyo and cause the defenses of Berlin to tremble. They will be the voices of U. S. Army radio men, relaying commands for the final attack. Will yours be one of them?

IN THIS fast-moving war, words are weapons. Split-second communications are vital to the timing and teamwork that win battles. As one of Uncle Sam's radio soldiers, you not only see action—you help to guide and direct it!

In Army communications, your opportunities for heroic service are limitless. At the same time, you receive training and experience that will be invaluable for a successful after-the-war career. You learn how to assemble, install and operate the most modern radio transmitters, receivers, "Walkie-Talkies," "Electronic Sentries" and scores of other closely guarded secret devices—pioneers of future industries—which combine today to knit the whole Army into one hard-fighting unit.

Any man, physically fit, from 18 to 44, inclusive, may enlist. Licensed radio operators and radio, telegraph and telephone workers may enlist for active duty at once. They may advance rapidly up to \$138 a month, plus board, shelter and uniforms, as they earn higher technical ratings.

Men of 18 and 19 may choose enlistment in the Signal Corps without any previous training or experience.

Those without qualifying experience, who enroll full time, may enter the Signal Corps Enlisted Reserve for training with pay. Graduate Electrical Engineers may apply for immediate commissions in the Signal Corps.

Civilians over 16 years of age may attend a Signal Corps School, and will be paid not less than \$1020 per year for full-time training and future service with the Signal Corps. Apply U. S. Employment Bureau or U. S. Civil Service.

"KEEP 'EM FLYING!"



U.S. ARMY RECRUITING AND INDUCTION SERVICE
Visit or write the nearest U. S. Army Recruiting and Induction Station or write to: "The Commanding General," of the Service Command nearest you, or Procurement Branch, AH-2, A.G.O., Washington, D. C.

Radio Service-Dealer, November, 1942

Postwar Years

Post World War II

At the end of the hostilities in Europe and Asia, the future of radio never looked brighter. Radio broadcasting had brought news from around the world; it had entertained soldiers and civilians with the sounds of the big bands remoted from military bases and ballrooms across the country; lifted spirits and added a touch of romance to life. This music had helped establish radio as a viable medium and in turn radio had contributed greatly to the success of the music makers. Returning military servicemen and women, others displaced during the War, and the loyal home front were anxious to embrace freedom. The radio broadcasting industry again took up the challenge and offered full schedules of news, weather, sports, home-making advice, daytime serials (soaps), variety shows, comedy, mystery, and in the evening, the dance bands. Radio receivers in the cars and homes unlocked this vast treasure chest of programming. When they had the opportunity, the young at heart visited the theaters and ballrooms to see and hear in person the name bands and stars whom they felt they knew through the magic of radio.

Many who had spent their money with reckless abandon in the pursuit of pleasure now faced the realities of buying cars, homes and appliances that had been unavailable during the war. Returning veterans, after their initial fling, signed up for college or many other educational programs available, including the many fields of radio and television training. All of this meant some financial sacrifice so one night out a week or a month was considered a luxury especially with the cover charge at many places of entertainment. The latter was in part due to the 20% cabaret tax, and the increased cost of the performers.

As people's living and entertainment patterns changed, ballroom operators could no longer afford to book the dance bands on a weekly basis. Hotel management, looking for ways to trim costs, found that the association with name bands had not necessarily been profitable after all. Many of these performances had been remoted for broadcasting over the major networks and formed part of the live nightly airings from nine

p.m. to midnight. As schedules were trimmed, regular broadcasts were curtailed.

Where a need for music existed, there was increased reliance on local, less expensive entertainers and jukeboxes. Continuous "piped" music was also available from commercial firms. In the later forties, disk jockeys began appearing in most every city for the pleasure of the all-night radio listener. The record spinners were choosing and playing the recordings that would become the top hits and many of those were from the vocalists rather than the bands. Also during this time, the American Federation of Musicians (AFM) and the American Society of Composers, Authors and Publishers (ASCAP) were making demands that in the end turned out to be counterproductive to their own welfare. While negotiations went on, new unknown talent was busily making recordings which were grist for the disk jockey's turntable, thus further supplanting the name bands. The ultimate result was gradual disbandment of many of the big names.

During the war in Korea from 1950 to 1953, a noticeable change occurred in the nature of the traveling entertainers: fewer bands and more emphasis on vocalists, movie actors and specialists visiting the troops overseas. The U.S. Armed Forces Network still offered excellent programming like music, comedy and the news. Radio was not quite dead, yet as early as 1948 the new media—television—had begun to cut into radio's faithful audience and advertisers. This started in the large cities where strong television reception was possible and then crept out into the fringe areas as the broadcasting station license freeze was lifted in 1952. At this point, major radio advertisers began to jump over to television and with them went the stars. One by one, the top rated entertainers either made the move or failed to adapt. The ranks of the daytime serials (soaps) began to thin out although a few continued until 1960.

The home listener/watcher enjoyed television with occasional AM radio and a new medium—FM radio. For the car radio listener who previously boasted that he would drive from sea to shining sea anytime as long as he had his radio for live bands, drama and network shows, a problem arose. Gone were the big

bands broadcasting live from such favorite spots as the Cocoanut Grove, Roseland Ballroom, Roosevelt Grille, Glen Island Casino, Avalon and many others. Missed were the tag lines like—"The Sweetest Music this Side of Heaven," "The Idol of the Air Lanes," or "Swing and Sway." There had been the opening themes: "Smoke Rings," "Getting Sentimental Over You" and most of all the closings: "From the Rendezvous, Famed Cradle of Name Bands on the Shore of the Blue Pacific at Balboa..." What romantic wouldn't wilt at these words? Network radio's prime-time shows were gone: "Mr. Keene, Tracer of Lost Persons," "Casey, Crime Photographer" and "The Shadow." In many areas "the auto radio traveler" was reduced to listening to some small town station's neophyte announcer read the news from the teletype machine or the local disk jockey dropping his records. "The Golden Age" of Radio was dead, a victim of "progress," yet it could not have continued indefinitely because of changing tastes and values. It was a nostalgic period of history and it's pleasurable to reminisce.

When all appeared hopeless for AM radio, NBC inaugurated a new week-end show called "Monitor" which had some interesting programming. Some stations began what was referred to as formatting, which meant they would feature music of local interest that ranged from beautiful music to hard rock. Often one could scan the dial for music of one's choosing, a godsend to the auto radio fan as it helped one to keep awake on those lonesome drives through middle America. In spite of all of the blows which were dealt, radio broadcasting helped by the car radio audience, survived. It is alive and well today thanks to some wonderful programming by stations like CKLW Windsor, Ontario, which features continuous music entitled "Music of Your Life." Between the AM radio, FM stereo, and either stereo or quadrasonic tape players, entertainment is in abundance. It is even possible to take one's best girl for a moonlight ride in a new limited production convertible while listening to the recorded sounds of favorite music, thanks to good old American ingenuity.

Six

A CHRONOLOGY FROM 1946-1986

Following the war, radio plants that had been so deeply involved in producing communications gear for the military, turned again to peacetime pursuits; namely, home and auto radios with thoughts of FM and television not too remote. The first products off the assembly lines were for the most part slightly altered 1942 designs; as with the automobiles, there had been no time or need for retooling. Understandably, the demand for all makes of cars and radios was so great that the dealers had long waiting lists.

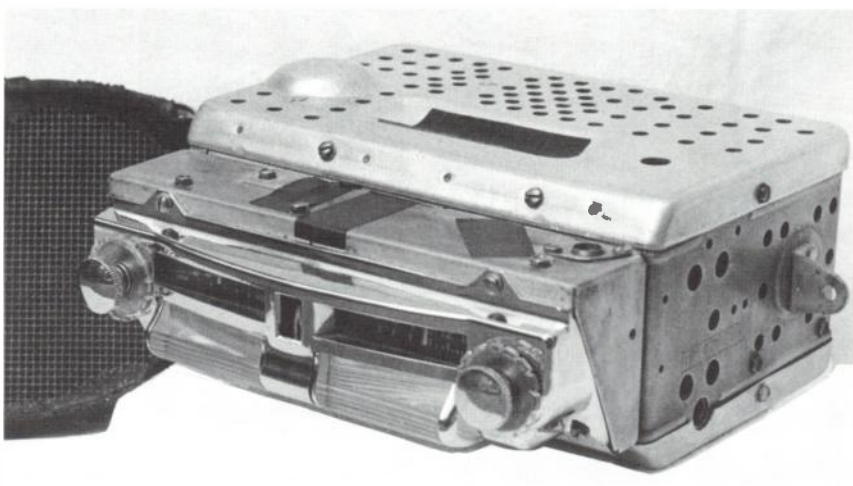
The factory installed auto radio received a real boost as a result of this strong seller's market for automobiles. It was easy for the car dealer to convince the customers to accept their new cars loaded with extras which included the radio. This pleased most everyone since the good feeling that came from having these added conveniences remained long after the extra price paid was forgotten. As more and more automobiles were sold with radios, the car makers became the largest customers of the fortunate few original equipment manufacturers.

The starting line-up of the successful bidders was similar to the 1942 model year except that Philco, for the first time since 1934, did not have a contract to supply domestic car radios to the Ford Motor Company. They were, however, still supplying Chrysler Mopar, Packard and Studebaker, in addition to their distributor line of radios. Zenith continued with Ford, Hudson, Nash and Willys, and added Crosley Motors to their camp. Delco Radio Division continued producing most of the General Motors car lines. For the 1947 model year, Ford added the Detrola Corporation to their supplier list, and the new Kaiser Motors selected General Electric Company.

Initially, the firms manufacturing universal type aftermarket auto radios and marketing through distributors included: Automatic, Delco (U.M.S.), Motorola, Philco and Regal. In addition to the above, private label sets were sold through auto supply store chains and mail order houses including: Coronado (Gamble Stores), Air Chief (Firestone), Silvertone (Sears Roebuck) and Truetone (Western Auto). Except for the one piece underdash radios, the universal sets required controls and cables for adapting to the particular car model. The dealers and service technicians kept busy during this time installing sets in new and used automobiles. This activity was reflected in the following report: On January 1, 1947, the National Association of Broadcasters reported that there were 7,000,000 auto radios in use. The industry

had come a long way since 1930 when only 34,000 sets had been sold.

Later in 1947 an unusual saga took place involving two prominent auto radio manufactures and a major auto maker. The Ford Motor Company auto radio procurement was split between the Detrola Company in Detroit and the Zenith Corporation in Chicago. Detrola was experiencing serious production problems causing them to fall behind in deliveries. When Paul Galvin and Elmer Wavering of Motorola learned of this, they made the Detroit radio firm an offer to purchase the facilities "lock, stock, and barrel." Upon acceptance, with Ford Motor Company's approval, they moved the production to Chicago over one week-end and picked up the schedule without delay.



First postwar radio for Ford and Mercury was a glamourized refinement of the 1942 model. This one was a Zenith. Later Detrola entered the arena with a non-foot-controlled version.

Motorola immediately became a major O.E.M. supplier. The firm had already been making a line of custom and universal sets which they marketed through their dealer and distributor network. The custom line included those designed for Buick, Chevrolet, Chrysler cars, Ford, Hudson, Nash, Oldsmobile, Pontiac and Studebaker. In a few years, Motorola was supplying one-half of the original equipment radios for Ford and Chrysler and all of the radios for American Motors Corporation.

Leading into the fifties, Ford Motor Company added Bendix, Colonial, and Sylvania to their supplier roster. These were later joined by Philco and briefly by Automatic and Stromberg-Carlson (collectively, these firms at various times produced radios for Ford, Mercury, Lincoln and Edsel). Chrysler Corporation purchased from Colonial and Philco as well as Motorola. General Motors car divisions procured from Delco (the latter greatly expanded their production capability by purchasing the RCA Chicago plant in 1947). Delco also designed the Packard radios, including the search-tuned models. The diminu-

tive Crosleys used both Philco and Zenith engineered sets, while Kaiser-Frazer chose General Electric, to be followed by a Delco unit.



FOOT-CONTROL AUTO RADIO

ENABLES THE DRIVER TO SELECT STATIONS
BY TIP-TOE WITHOUT REMOVING EYES FROM
THE ROAD OR HANDS FROM THE WHEEL...



You Will Tune It Auto- matically By TIP-TOE

Press the foot button all the way down—and the station changes automatically. It is instantaneous, convenient and safe.

Silence It For Conversation Or Safety By TIP-TOE

Press the foot knob lightly—and radio is hushed so that you may talk to passengers or listen at rail crossings, etc. Release pressure—and the program goes on again instantly without annoying "warm-up" wait.

From the November 1946 issue of *Motor*. Among the auto makers using the Zenith foot-control auto radio were: Ford, Hudson, Lincoln, Mercury, Nash and Willys.

ZENITH – America's Finest Auto Radio

JUST AS IMPORTANT as Zenith's new tuning control, are the many engineering features Zenith's auto radios offer. The Zenith is extremely accurate in rapid tuning. It brings in pre-selected stations time after time without distortion—right "on the head." Resetting of automatic tuning positions can be done in a few seconds without tools.

The tuning control has passed the most rigid temperature tests,

proving dependable and accurate at temperatures ranging from minus 20 degrees Fahrenheit to plus 130 degrees Fahrenheit. Tests equal to 20 years of normal use prove its long-lived efficiency.

NOTE TO AUTO DEALERS

The foot-control auto radio was developed by Zenith for America's car-makers. It is sold only as original equipment and through car manufacturers and their dealers exclusively.



Overleaf: A page from Motorola's 1946 catalog indicates that the company was stressing dealer participation.

Motorola **AUTO** Radio

DEMONSTRATION DISPLAY BOARDS

IT'S EASY TO SELL MOTOROLA IF YOU'LL DEMONSTRATE IT!

The value of proper demonstration cannot be measured in dollars and cents. Expose Motorola to the buying public . . . and DEMONSTRATE. To demonstrate Motorola is to sell it. Let your customers twirl the tuning knobs or push the buttons. Actual demonstration has proved its selling worth time and time again. For bigger sales *demonstrate in your store*—and outside in your car, too. Keep this complete "Auto Radio Department" well up in front of your store and enjoy easy Motorola Radio sales.



MOTOROLA 2-SET DEMONSTRATOR

Same general design and coloring as the large Display Board. Displays any two Motorola Standard Models. Here's the display you need to attract favorable attention inside and outside your store. Invites immediate demonstration. Size 26" wide by 41" high. Sturdily made of plywood and masonite, with easily cleaned lacquer finish. Easy rolling casters. Space in rear for battery or power unit.

*Order D-1011 Two-Set Display
Drop Shipped F.O.B. Chicago*



MOTOROLA 4-SET DEMONSTRATOR

Here's all you need to *display, demonstrate and sell* America's Finest Auto Radio. This Demonstrator displays four popular selling Motorolas and four Aerials. Size 42" wide by 54" high. Modern in design with attractive light background with red and dark brown trim. Strongly made of plywood and masonite, with easily cleaned lacquer finish. Easy rolling casters. Shelf in back for battery or power unit.

*Order D-1010 Four-Set Display for Standard Models
Drop Shipped F.O.B. Chicago*

IMPROVED HEAVY-DUTY "A" POWER SUPPLY

Delivers 15 amperes at 5.7 volts for quick action push buttons. Thermo-relay kickout switch prevents damage should two sets be turned on at same time. 105 to 120 volts A.C. 50 to 60 cycles.

*D-1012 "A" Power Supply
Shipped F.O.B. St. Louis, Mo.*



ORDER DIRECT FROM YOUR DISTRIBUTOR

CREATED A SENSATION

at the New York Show!

★ Enthusiasm
and BUYING response
WAS TERRIFIC!



UNIVERSAL MOUNT
AUTO RADIOS



Model X-50
LIST PRICE \$29.95



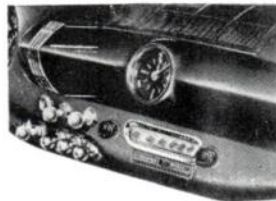
Model M-90
LIST PRICE \$36.95



Model M-92C
with battery charger
LIST PRICE \$45.95



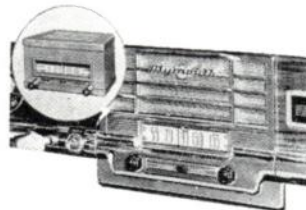
1949 and 1950 FORD AUTO RADIOS



Six-tube superheterodyne. Six volt storage battery operation. Two dual purpose tubes. Eight tube performance. Specifically designed to fit all 1949 and 1950 Ford cars. Features two unit construction. No hole drilling required for mounting. Installation in a few minutes. Three-gang tuning condenser and tuned R. F. stage for extreme sensitivity. Permanent magnet dynamic speaker with powerful Alnico #5 magnet. Low battery drain. Weight 10 lbs.

LIST PRICE \$49.95

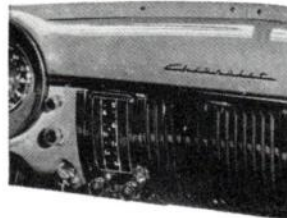
1949 and 1950 PLYMOUTH and DODGE AUTO RADIOS



Six-tube superheterodyne. Six volt storage battery operation. Two dual purpose tubes. Eight tube performance. Specifically designed to fit 1949 and 1950 Plymouth and Dodge cars. Single unit construction. Very simple installation. Three-gang tuning condenser and tuned R. F. stage for extreme sensitivity. Permanent magnet dynamic speaker with powerful Alnico #5 magnet. Low battery drain. Weight 10 lbs.

LIST PRICE \$49.95

1949 and 1950 CHEVROLET AUTO RADIOS



Six-tube superheterodyne. Six volt storage battery operation. Two dual purpose tubes. Eight tube performance. Specifically designed to fit 1949 and 1950 Chevrolet cars. Features two unit construction. No hole drilling required for mounting. Installation in a few minutes. Three-gang tuning condenser and tuned R. F. stage for extreme sensitivity. Permanent magnet dynamic speaker with powerful Alnico #5 magnet. Low battery drain. Weight 10 lbs.

LIST PRICE \$49.95

"AUTOMATIC" MEANS TOP PERFORMANCE

Matteson Electronic Service
3146 Francis St. - Phone 42554
Jackson, Michigan

AUTOMATIC RADIO MFG. CO., INC.

Automatic
Radio

122 Brookline Ave.,
BOSTON 16, MASS.

THE AUTO RADIO

Overleaf: Automatic's lineup of aftermarket sets.

Automatic Radio Manufacturing Company introduced a line of custom sets for Ford, Chevrolet, Plymouth and Dodge which retailed at \$49.95. These, and their universal radios ranging in price from \$29.95 to \$45.95, were distributed through radio and television parts jobbers as well as certain catalog houses under a private label. These reasonable prices generated a great deal of sales activity.

In the meantime, however, some of the technological advancements made during the War were being planned for incorporation into future products. In 1947, Delco Radio introduced the revolutionary Signal Seeking Radio Model R-705 with steering column mounted remote control. Beginning in 1950 this concept was followed by custom versions for Buick, Olds, Cadillac, Packard and others.



The set that pioneered the development of automatic, station-seeking auto radios known by a host of trade names.

Paradoxically, other receivers featured simplified mechanical push-button tuners in both six and eight tube versions of improved circuit design. These were generally compact, lightweight and easy to install. An example of this was the radio for the all-new 1949 Ford, a greatly simplified set with manually operated mechanical push-button tuning. This was quite a contrast from the complex tuners of previous sets. Actually, it was the first Ford radio with individual push buttons. Other car makers had used a similar system off and on since prewar days. Some were known as the Push-Pull-Lock-Up tuners. The stations could be easily reset mechanically by the driver, a practice that continues in part to the present. By the early 1950s most auto radio manufacturers began to adopt the miniature seven pin, glass tubes such as 6BA6, 6BE6 and 6AV6. These were used in conjunction with octal base tubes, e.g. 6V6GT which comprised the output stage. The miniature tubes offered lower interelectrode capacitance as well as space conservation. Other miniature components were developed: coils, capacitors and resistors. This practice led to more compact and lighter weight pack-

aging. The case was assembled from separate, lightweight steel stampings with little or no surface coating. It was no longer a thing of beauty except for the dial, trim plate and controls which were visible from the interior of the car.

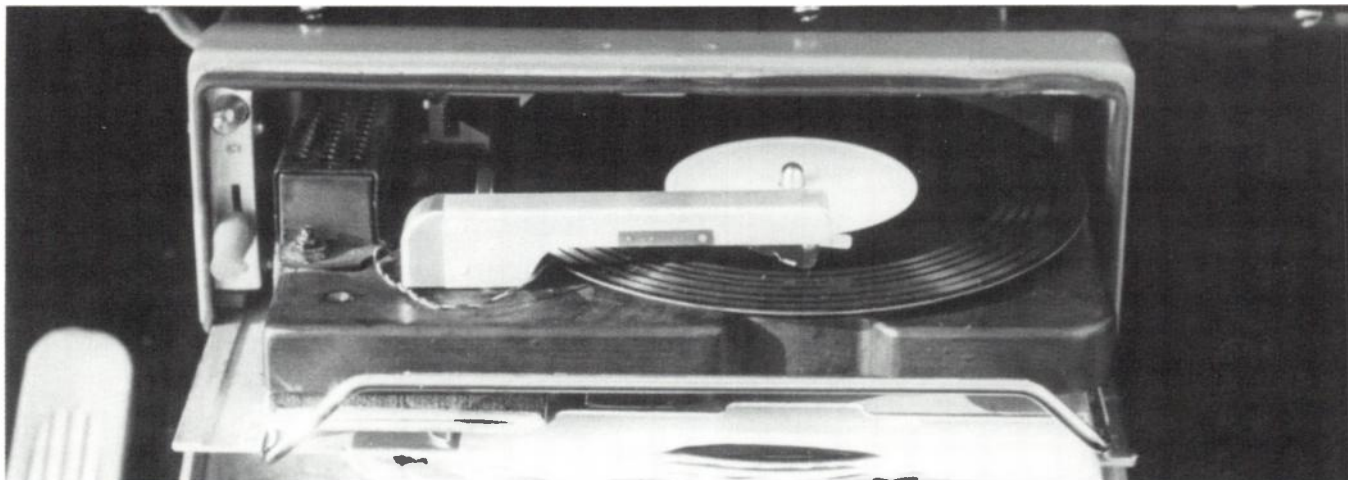
As engines grew and more demands were made on the starting, lighting and accessory systems, there began a shift to 12 volt electrical systems in the automobile. By the 1956 model year, most, if not all, had been converted from 6 to 12 volts. For the car radio, the 12 volt electrical system precipitated the design of a new series of tubes that could operate on 12 volts (or less) plate voltage. The use of these tubes in conjunction with the newly developed power transistor for the audio output stage, eliminated the need for the vibrator "B" supply. These sets were called "hybrids," since they used both tubes and transistors. This was the first step toward a complete revolution in auto radio design.

The transistor had been invented in 1948 at Bell Telephone Laboratories by William Shockley, J. Bardeen, and W.H. Brattain and was ready for limited applications in a remarkably short period of time. During 1954, Regency Electronics in cooperation with Texas Instruments developed the first practical transistor radio. Production began immediately and it was on the market in time for the Christmas season. The effect upon the world of communications was immediate and far reaching. By the early 1960s, nearly all radios and many television receivers would be fully transistorized, employing mass-produced printed circuitry with miniature components.

At what seemed to be the height of radio development, having achieved the great strides of automatic tuning, solid state circuitry, instant warm-up and all of the other driver and passenger conveniences, a major programming problem was developing. Some of the romance had gone out of those moonlight rides and the very thing that had made radio so popular, was slipping away.

As television relegated the home radio to second class status, the car radio audience became radio broadcasting's biggest booster, but it wasn't enough to support the great programming of the 40s. This no doubt led to the interesting alternatives of FM reception and recorded music to broaden the scope of the car radio and offer a wider range of entertainment.

For the 1956 model year, Chrysler offered a novel 16 2/3 RPM record player. Called the "Highway Hi Fi," the unit featured a seven-inch, extra long playing record which provided up to forty-five minutes of music on each side. It is likely that the lack of compatibility with the then currently available records and the fact that magnetic tape recording was advancing rapidly, somewhat limited interest in this



Chrysler's Highway Hi-Fi record player was short-lived.

valiant attempt to put an additional choice of music in the car.

Another attempt at an automobile record player was made by RCA in 1959, this one based on the popular 45 RPM records. Designated the AP-1, it was designed to play automatically a stack of up to fourteen, seven-inch records. The turntable and stylus were inverted to facilitate the storage of records after they were played. The advantage of this player was the unlimited access to recordings. Again, Chrysler was involved in the marketing, featuring it as an option on their 1960 model cars, but it too met with little favor.



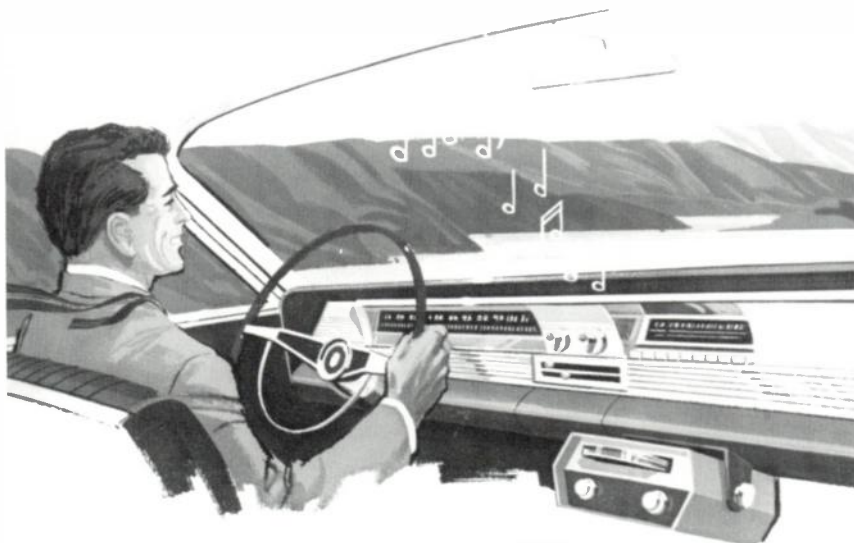
Gonset FM tuner could be quickly installed and attached to any broadcast band auto radio.

The advent of FM for the automobile was another story. This mode of broadcasting had long been limited to home installations because the reception characteristics demanded an extensive antenna system similar to that of television. Continual improvements in the receivers and an expanded number of transmitting stations finally led to an acceptable, though limited, range of reception. The initial sets came in the form of add-on tuners for use in conjunction with the standard radio. Examples of these were the 1957 Mercury and Lincoln FM Tuners made by Bendix, and the Gonset FM tuner, along with others, for the aftermarket trade. Fine programming featuring continuous music and the inherent characteristic of immunity to atmospheric and man-made static, meant a welcome addition to car radio listening. Soon AM-FM and later AM-FM stereo radios were optional equipment offerings from most of the car makers.

In the early 1950s, both Bernard Cousino and George Eash were working independently on continuous play, endless-loop tape cartridges. The former's issue became popular as a "point of sale" and an educational tool, while the latter's was named the Fidelipac and became the National Association of Broadcasters (NAB) standard for station use in playing

NOW! HI-WAY HI-FI!

an entirely
new concept
in automobile entertainment



ORRTRONIC
AutoMate™
TAPETTE PLAYER

The AutoMate accessory used an endless-loop tape cartridge.

"shorts" and commercials. Still another style of tape cartridge was the "Tapette," introduced in 1963 by Orrtronic of Opelika, Alabama, for their "AutoMate," an add-on unit for playing tapes through the car radio. In 1964 Autostereo Inc. of Van Nuys, California, introduced a high quality 4-track stereo tape player with a wide selection of pre-recorded cartridge tapes. These were the Fidelipac cartridges which were available in three sizes: half-hour, one-hour and two-hour playing times. (Earl "mad man" Muntz is also given credit for promoting a 4-track tape cartridge system.) Before this system had gained momentum, William P. Lear, long time Avionics manufacturer and builder of the Lear Jet aircraft, (the same man who assisted Paul Galvin in developing the first Motorola radio), designed an eight-track stereo tape cartridge. This culminated in a joint effort involving Ford Motor Company, Lear, Motorola and RCA in producing a stereo

"Autostereo" was a complete high fidelity system, which used a standard N.A.B. (National Association of Broadcasters) tape cartridge.

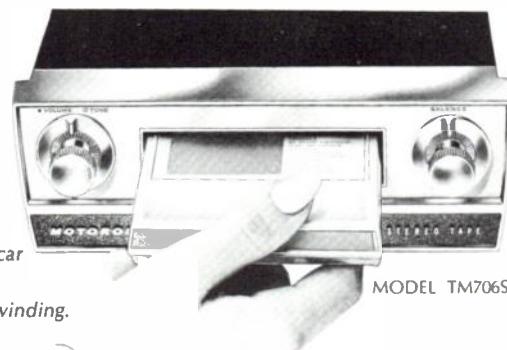


tape player and an extensive library of pre-recorded tapes for the automobile.

The system featured four channels of stereo sound on a single endless-loop cartridge, and became the standard bearer for several years, first appearing on the 1966 Ford cars. Most auto makers soon offered eight-track stereo tape players either as separate units or in conjunction with the car radio. Motorola built O.E.M tape players as well as marketing the product under their own name. Lear Jet Stereo Division marketed their units under the name of Lear Jet Stereo 8 as well as supplying private label sets.

MOTOROLA SOLID STATE

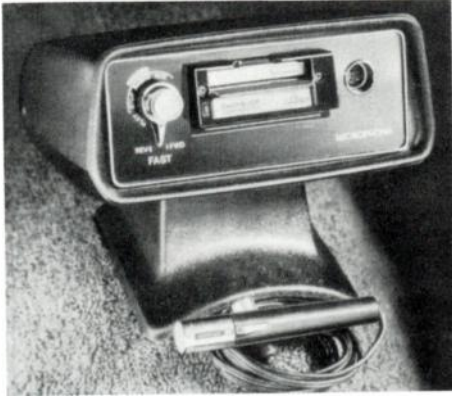
8 TRACK
CAR STEREO
TAPE CARTRIDGE
PLAYER



*Installs in minutes...in most any car
Tapes play continuously...never
require threading, winding or rewinding.*

Motorola's aftermarket version of the eight-track stereo tape system.

The Philips Compact Cassette was introduced to the European Trade in 1964, and in the United States at the Consumer Electronic Show in New York in 1967 by North American Philips. Its first application was in portable hand held tape recorders. The small, lightweight cassettes rapidly gained popularity for home recording because of the ease of handling and the wide selection of pre-recorded cassettes that were



An early compact cassette stereo system for automobiles. This Chrysler Corporation unit was also a recorder.

soon made available. In 1971 Plymouth offered a Compact Cassette Stereo System that mounted on the hump, convenient to the driver. A real plus feature was the optional microphone for recording favorite programs and business memos. For several years the stereo 8-track cartridge remained the favorite but in the late 70s the cassette began to win out.

While all of this activity was taking place, the automobile radio was becoming still more compact and lighter weight as a result of the solid state devices (transistors and micro-circuits) and associated components. The units were not much larger than the remote control heads of earlier days with just enough height, width, and depth to accommodate the tuning mechanism, controls, and a printed circuit board. The speaker of course was separate and this meant that universal radios could be designed with matching plates and mounting hardware to fit almost any car. This invited tough competition for the factory-installed original equipment radios since one set could fit all. In fact, it ultimately helped seal the doom of nearly every radio manufacturer in the United States. Some dealers began to install cheap foreign made look-a-likes in place of the factory name-brand sets. Many people began ordering their new cars without radios and installing bargain sets purchased from discount stores. Youthful owners of older cars replaced the standard AM radios with imported AM-FM stereo radios with multiple speaker systems at considerable cost savings.

A disappointment to the sporty set was the demise of the convertible during the mid 70s. The factors of government imposed safety standards, buyer resistance, in-car air conditioning and production losses finally brought down the mass-produced convertible. The gasoline panic of the late 70s hastened the death of the large car; the days of the gas guzzling behemoths were numbered. With few exceptions, the automobiles of the postwar era had become larger and more powerful with each new model year as gasoline economy had not been high on the priority list. Now, a final insult: imports were threatening to replace the American car.

The golden days were surely over: gone were the big bands, broadcasting from places with romantic sounding names; gone were the thousands of workers in the radio plants turning out hefty sets for the home and automobile; gone were the convertibles including the Chrysler Town and Country, the big Oldsmobile 98, the massive Cadillac El Dorado, the 1958-60 Lincoln Continental, with the reverse slanting electric rear window and the 1961-67 Lincoln Continental four-door convertibles with the completely automatic disappearing top, weighting in at 5600 pounds. These and

THE AUTO RADIO

dozens of other makes and models with every imaginable creature comfort, are now collectors' items.

The onetime auto radio leader, Motorola Inc., disposed of the once profitable distributor line of set manufacturing in 1980 and was completely out of the domestic O.E.M. broadcast radio business by the end of 1984. At this writing, that leaves Chrysler, Ford and General Motors, through their far-flung facilities, as major manufacturers of original equipment radios for domestic automobiles.

This is not the end, however: the auto radio has survived and so has much of American industry. The sound system has reached the point of development where it has become an integral part of the automobile, thus giving new life to an old American industry now concentrating on high quality audio systems. New production methods are making it more feasible to manufacture sets in this country. Installations are again more complex and are dictating the interior features of the car. In many cases it will cost less to order the system with the car rather than to strip the interior for an aftermarket installation.

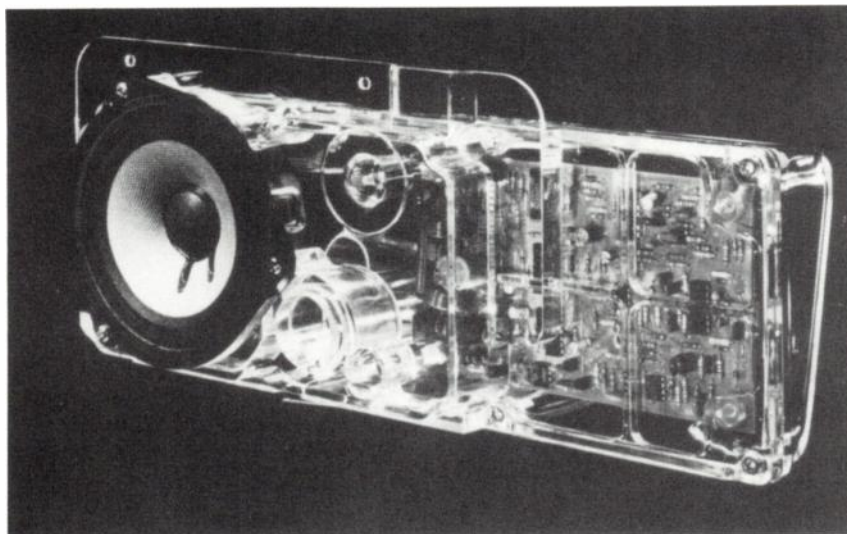
The AM/FM/Stereo with electronic memory tuning and the stereo cassette tape player with noise reduction systems are just the beginning. Disk players are back but they aren't phonographs: they are lasers. Auto makers are now beginning to consider the audio system as they would the hydraulic system or the electrical system—an essential part of the car. Long live the auto radio!

Delco electronically tuned radio
part of a new sound system.

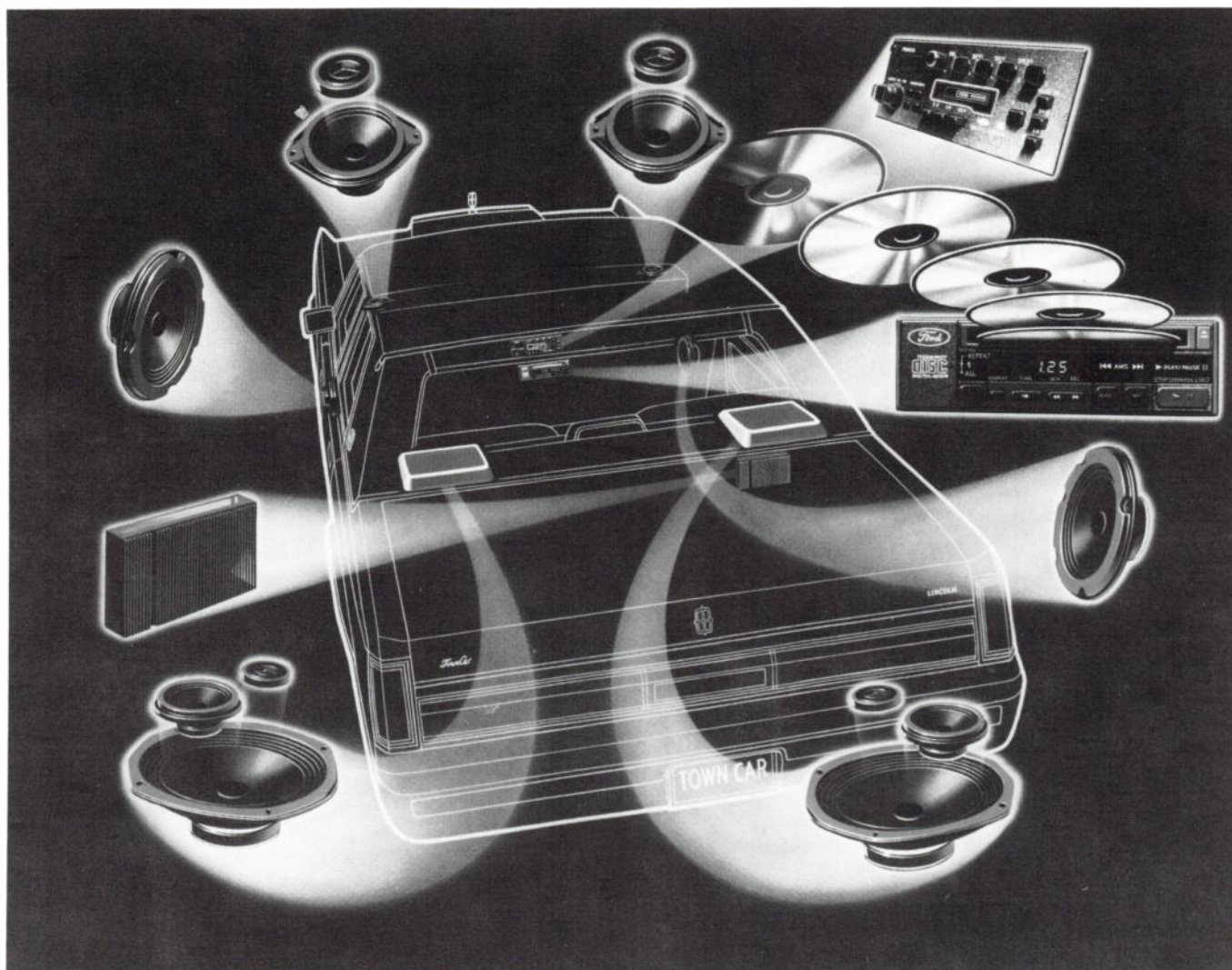




This young lady is showing the contrast between the conventional linear dialing and the new electronic digital tuning receivers.



Delco-GM/Bose speakers have individual amplifiers.



The FORD JBL Audio System—
Compact Disc, twelve speakers
and 140 watts of power. Where
do we go from here?

Appendix

Prewar

Automobile Radio Makes and Manufacturers (USA) *

ABC (ABC Radio Laboratories, Indianapolis, Ind.)
Acratone (Federated Purchaser, Inc., New York, N.Y.)
Admiral (Continental Radio & Television Corp.,
Chicago, Illinois)
Aircastle (Radio Products Corp.; also Spiegel, May,
Stern Co., Chicago, Illinois)
Air Chief (see Firestone, also a Pontiac trade name)
Air King (Air King Products Co.)
Airline (Montgomery Ward & Co., Chicago, Illinois)
Air Mate (B-O-P by U.S. Radio & Television Corpora-
tion, Marion, Indiana)
All American Mohawk (Rudolph Wurlitzer & Co., North
Tonawanda, New York)
Allied (Allied Radio Corporation, Chicago, Illinois)
American Bosch (United American Bosch Corp.,
Springfield, Mass.)
Arvin (Noblitt-Sparks Industries, Columbus, Ind.)
ATR (American Television & Radio Co., St. Paul, Minn.)
Atwater Kent (Atwater Kent Mfg. Co., Philadelphia,
Pennsylvania)
Audiola (Audiola Radio Co., Chicago, Illinois)
Autocrat (Autocrat Radio Co., Chicago, Illinois)
Autodyne Radio Co.
Auto-Lite (Electric Auto-Lite Co., Toledo, Ohio)
Automaster (Automatic Radio Mfg. Co., Boston, Mass.)
Automatic (see above)
Automobile Radio Corp., Long Island, New York
Auto Pal (Premier Electric Co.)
Autophone (Calvert Motors Assn., Baltimore, Md.)
Auto-Pilot (Pilot Radio and Tube Corporation,
Lawrence, Massachusetts)
Auto Road King (Federated Purchaser, Inc.)
Auto-Rola (see Automatic)
Auto Tone (see Warwick)
Auto-Vox (Auto-Vox Radio Co., Los Angeles, Calif.)
Belmont (Belmont Radio Corp., Chicago, Illinois)
Best Manufacturing Co.
Blackhawk
Bonded Motortone (Motorphone Radio Corp. of America,
New York, New York)
B-O-P (United Motors Service, Detroit, Michigan)
Bosch (see American Bosch)
Burd-Ring Co.
Carteret (Carteret Radio Labs, Inc., New York, N.Y.)
Car'uso (Laurehk Radio Mfg.Co., Adrian, Mich.)
Century (Century Radio Products Co.)
Champion (Champion Radio, Lakewood, Ohio)
Clarion (Transformer Corp. of America)
Clinton (Clinton Mfg. Co., Chicago, Illinois)

Colonial (Colonial Radio Corp., Buffalo, New York)
Columbia Radio Corp., Chicago, Illinois
Continental Radio & Telev. Corp., Chicago, Illinois
Continental Wireless Supply Co.
Corona (Corona Radio & Telev. Corp., Chicago, Ill.)
Coronado (Gamble-Skogmo, Inc., Minneapolis, Minnesota)
Crosley (Crosley Radio Corp., Cincinnati, Ohio)
Delco (see Delco-Remy, General Motors Radio, United
Motors Service, and Delco Radio Div.)
Delco Radio Div., General Motors Corp. Kokomo, Indiana
Delco-Remy, Anderson, Indiana
Detrola (Detrola Radio Corp., Detroit, Michigan)
DeWald Motortone (Pierce-Airo, Inc., New York, N.Y.)
Dow (Dow Radio Co., Pasadena, California)
El Rey (El Rey Radio Mfg. Co., Los Angeles, Calif.)
Emerson (Emerson Radio & Phono Corp., New York, N.Y.)
Empire Electrical Products Co., New York, N.Y.
Erla (Electrical Research Labs., Evanston, Illinois)
Fada Motoiset (Fada Radio & Electric Company, Long
Island City, New York)
Fairbanks-Morse (Fairbanks-Morse Home Appliances,
Chicago Illinois)
Federated Purchaser (see Acratone)
Firestone (Firestone Tire & Rubber Co., Akron, Ohio)
Fischer-Smith (Fischer & Smith, West Englewood, N.J.)
Franklin (The Franklin Radio Corp., Dayton, Ohio)
Freed-Eisemann (Freed Television & Radio Corp., Long
Island, New York)
Freshman (Freshman Products Co.)
Garod (Garod Radio Corp., New York, N.Y.)
GE (General Electric Corp., Bridgeport, Conn.)
General Household Utilities Co., Chicago, Illinois
General Motors Radio Corporation, Dayton, Ohio
Gilfillan (Gilfillan Bros., Inc., Los Angeles, Calif.)
Grebe (Grebe Mfg. Co., New York, New York)
Grigsby-Grunow (see Majestic)
Grunow (see General Household Utilities Co.)
Gulbranson (Gulbranson Co., Chicago, Illinois)
Gypsy (see Kingston products)
Halsen (Halsen Radio Mfg. Co., New York, New York)
Harold Bell (Harold Bell Radio Co., Los Angeles,
California)
Heinaphone (Heina Radio Corp., New York, New York)
Hoodwin (Charles Hoodwin Co., Chicago, Illinois)
Horn (see Tiffany Tone)
Howard (Howard Radio Co., South Haven, Michigan)
Kadette (International Radio Corp., Ann Arbor, Mich.)
Karadio (Karadio Corp., Minneapolis, Minnesota)
Kayo (Kayo Mfg. Co., Wilmar, California)
K-B Motoradio, Inc.
Keller Fuller (Keller Fuller Mfg. Co., Los Angeles,
California)
Kennedy (Colin B. Kennedy Co., St. Louis, Missouri)
Kingston Products Corp., Kokomo, Indiana
Knight (see Allied Radio Corporation)

Lafayette (Radio Wire & Television, Inc.; also
Wholesale Radio Service Co., Inc., New York, N.Y.)
Larkin (Larkin Co., Buffalo, New York)
Lewol (Lewol Mfg. Corp., Chicago, Illinois)
Lyric (see Wurlitzer)
Majestic (Grigsby-Grunow Company, Chicago, Illinois;
later Majestic Radio & Television Corp.)
Midwest (Midwest Radio Corp., Cincinnati, Ohio)
Melburn (Melburn Radio Mfg. Co., Los Angeles, Calif.)
Mell-O-Tone (Mell-O-Tone Radio Corporation, Pasadena,
California)
Mission-Bell (Mission-Bell Radio Manufacturing. Co.,
Los Angeles, California)
Mobilette (Calvert Motors Associates, Ltd., Baltimore,
Maryland)
Mohawk (see All American Mohawk)
Monarch
Montgomery Ward (See Airline)
Motomaster (Motomaster Radio Co., Chicago, Illinois)
Moto-Master (see Warwick)
Moto-Midget (Acme Mfg. Co., Miamisburg, Ohio)
Motoradio (Earle C. Anthony, Inc., Los Angeles,
California)
Motorola (Galvin Manufacturing Corp., Chicago, Ill.)
Motorphone (London Radio, New York, New York)
Motoset (see Fada)
Moto-Vox (Moto-Meter Gauge & Equipment Corp., Toledo,
Ohio)
National (National Co., Malden, Massachusetts)
O.E. Specialty Mfg. Co.
Packard (Packard Radio Co., Seattle, Washington)
Packard-Bell (Packard Bell Co., Los Angeles, Calif.)
Perfectone (Perfectone, Inc., Chicago, Illinois)
Philco Transitone (Philco Radio & Television
Corporation, Philadelphia, Pennsylvania)
Pilot (Pilot Radio Corp., Long Island City, N.Y.)
Postal (Postal Radio Corp., New York, New York)
Port-O-Matic (Lehman Radio Salon, Inc., New York, New
York.)
Powertone (Try-Mo Radio Co., New York, New York)
Radolek (Radolek Company, Chicago, Illinois)
RCA (RCA Victor Company, Inc., Camden, New Jersey)
RCI (Radio Chassis Mfg. Co., New York, New York)
Remler (Remler Co., Ltd., San Francisco, California)
Roadmaster (see Halson)
Roamer (Manhart Radio Mfg. Co., Los Angeles, Calif.)
Roamio (see Crosley)
Roots (Roots Auto Radio Mfg. Co., Chicago, Illinois)
Roth-Downs Manufacturing. Co.
Sears (see Silvertone)
Sentinel (Sentinel Radio Corp., Evanston, Illinois;
also see Erla)
Sheldon (Sheldon Radio Co., Los Angeles, California)
Silver-Marshall (Silver-Marshall Mfg. Co., Chicago,
Illinois)

Silvertone (Sears, Roebuck and Co., Chicago, Illinois)
Simplex (Simplex Radio Co., Sandusky, Ohio)
Solar (see Warwick)
Sparton (Sparks-Withington Co., Jackson, Mich.)
Star
Sterling Manufacturing. Co.
Stewart (Stewart Radio & Telev. Corp., Chicago, Ill.)
Stewart-Warner (Stewart-Warner Corp., Chicago, Ill.)
St. Regis (see Kadette)
Stromberg-Carlson Telev. Mfg. Co., Rochester, N.Y.
Tiffany Tone (Herbert H. Horn Mfg. Co., Los Angeles, California)
Tom Thumb (see Automatic)
Tilton Manufacturing. Co.
Transitone (see Philco Transitone)
Trav-ler (Trav-ler Radio & Television Corp., Chicago, Illinois)
Tropic-Aire
Troy (Troy Radio Mfg. Co., Los Angeles, California)
Truetone (see Western Auto)
Tru-Value
Truman (Truman Radio Shop, Orlando, Florida)
United Motors Service, Inc., Detroit, Michigan
U.S. Radio & Television Corporation, Marion, Indiana
Universal
Van Sicklen
Warner Hanson (Warner Hanson Co.)
Warwick (Warwick Mfg. Co., Chicago, Illinois)
Wells-Gardner (Wells-Gardner & Co., Chicago, Illinois)
Western Auto Supply Company, Kansas City, Missouri
Westinghouse (Westinghouse Electric Supply Co., New York, New York)
Wilcox-Gay (Wilcox-Gay Corp., Charlotte, Michigan.
Wonder Tone (Wandrie Mfg. Co., Inc., Chicago, Ill.)
Wurlitzer (Rudolph Wurlitzer & Co., North Tonawanda, New York)
Zenith (Zenith Radio Corp., Chicago, Illinois)
Zephyr (Zephyr Radio Co., Detroit, Michigan)

* Notes

This cross-referenced compilation is arranged alphabetically according to trade names or sources. In most instances the major merchandisers had radios made for them under their label by either outside firms or name-brand manufacturers.

No attempt has been made here to correlate all of the above data nor to list the many automobile makers and their radio suppliers, since many changes took place throughout the golden years of radio. For that information consult the index and text.

Glossary

A

"A" BATTERY: A power source for vacuum tube filaments or heaters.

AC: The abbreviation for alternating current.

AC RECEIVER: One designed for operating from an AC outlet.

AFM: American Federation of Musicians.

ALTERNATING CURRENT: An electrical current flow which reaches a maximum value in one direction, decreases to zero, then reverses itself and reaches a maximum value in the opposite direction.

ALTERNATOR: A device for converting mechanical energy into electrical energy in the form of alternating current.

AMPERE: A unit of electrical current or a rate of flow of electrons. A steady current of one ampere will deposit 0.001118 grams of silver per second from a solution of silver nitrate.

ANODE: The positive electrode such as the plate of a vacuum tube. The element to which a stream of electrons flow.

ANTENNA or AERIAL: A rod, wire or a combination thereof connected to a receiver or transmitter for receiving radio waves from or radiating them into space.

ANTENNA FILTER: A circuit or element used in conjunction with the antenna for the purpose of removing certain undesirable radio frequencies such as noise.

ANTENNA LEAD-IN: A conductor, generally covered by a braided wire shield, which connects the antenna to the receiver.

ANTENNA MATCHING NETWORK: An electrical circuit comprised of a network of passive components, designed to match the antenna to the receiver for maximum energy transfer.

ARC: A sustained luminous discharge of electricity across a gap between electrodes.

ARC TRANSMITTER: A transmitter which incorporates the arc as the source of electromagnetic (radio) waves.

ARMATURE: The movable part of a motor, loudspeaker or telegraph sounder when placed in the influence of a magnetic field.

ART DECO: A styling trend typified by clean-swept severe lines, geometric forms and bold colors as influenced by the L'Exposition des Arts Decoratifs et Industriels Modernes held at Paris, France, in 1925.

ASCAP: American Society of Composers, Authors and Publishers.

ASSEMBLED CARS: Production automobiles that were assembled from components purchased from specialty manufacturers including bodies, brakes, electrical systems, engines and steering gear.

AUDIO AMPLIFIER: (also called audio frequency amplifier) A device incorporating one or more vacuum tubes or transistors designed to amplify signals within a frequency range of 20 to 20,000 cycles per second (hertz or Hz).

AUDION: The name given by Lee de Forest to his three-element vacuum tube.

AUTOGRAPHIC TELEGRAPH: A self-recording instrument for receiving telegraphic signals.

AVC: Abbreviation for automatic volume control.

B

BAKELITE: The phenol-formaldehyde derived thermosetting plastic material invented by Dr. Leo Baekeland.

BATTERY: A device for converting chemical energy into electrical energy, consisting of two or more cells in combination.

"B" BATTERY: The DC voltage supply for the plate and screen grid electrodes of radio tubes used in battery sets.

B-O-P: Short for Buick-Olds-Pontiac.

BREADBOARD SET: A radio receiver that is laid out on a board with all of the components mounted topside. This method is often followed by experimenters and so named because it resembles a board on which dough is kneaded or rolled.

C

CABRIOLET: A gracefully designed, light, two-wheeled, one-horse carriage with a folding hood and a rear platform for a footman. In the age of the automobile this term has been applied to a convertible coupe.

CAPACITANCE: That property of a circuit which permits the storage of electrical charges, thus opposing any change in voltage across it. Capacity is measured in farads, microfarads and picofarads (formerly micro-microfarads).

CAPACITOR or CONDENSER: A device exhibiting the property of capacitance; two or more conductors separated by a dielectric.

CARTRIDGE: The term generally applied to a magnetic recording tape holder which features the endless or mobius loop principal, thus making rewinding unnecessary.

CASSETTE: A magnetic recording tape holder, distinguished by having two reels for forward and reverse capability.

CATALIN: A phenol-formaldehyde condensation product as in Bakelite but in a form which may vary from glass-clear water-white solids through transparent colors to mottles in all shades.

- CATHODE: The electron-emitting electrode as in a vacuum tube.
- CAT WHISKER: A fine, pointed wire used to make contact with a sensitive area on a semiconductor crystal such as galena.
- CENTERLINE RADIO: A Buick trademark.
- CHOPPER: In electrical language, an electromechanical device for interrupting the flow of current at regular intervals for purposes of deriving alternating current from direct current.
- COHERER: A type of detector which utilizes the phenomenon that certain finely divided metals will tend to cling together or cohere and therefore conduct electricity when subjected to radio waves.
- COIL: An inductance formed by winding a number of turns of wire around a suitable core.
- COUPLING: The term used to represent the means by which energy is transferred from one system to another.
- CRYSTAL DETECTOR: A mineral or crystalline material such as galena, germanium or silicon which allows a feeble current to flow more easily in one direction than in the other. In this way an alternating current radio signal can be converted to pulsating current for use with headphones or an amplifier.
- CRYSTAL SET: A radio receiver generally consisting solely of a crystal detector, a means of tuning, sensitive earphone(s), and a good antenna and ground system.

D

- DC: (direct current) A current that flows in one direction only, not necessarily constant in value.
- DECOHERER: A vibrating or tapping device for fitting to a coherer for separating the fine granules, making the system ready for receiving the next signal.
- DETECTOR: A device such as a crystal or vacuum tube that converts radio-frequency signals by stripping off the audio-frequency modulation envelope for further processing.
- DIODE: A vacuum tube containing a filament or heater-cathode and a plate; it serves as a rectifier of alternating current. Also, a two-terminal device that will conduct current more readily in one direction than in the other, as in a silicon diode rectifier.
- DX: Abbreviation for reception of distance stations.
- DYNAMOTOR: A rotary converter, a combination electric motor and a generator for changing a DC voltage to a higher value.

E

- EBONITE: An early, artificially produced material: one of the pioneer products of modern plastics.

EDISON EFFECT: Named for the discoverer Thomas A. Edison. The current that flows between one of the terminals of the filament and an electrode placed in the bulb of an electric lamp. The forerunner of the diode vacuum tube.

ELECTROMAGNET: A core of magnetic material, e.g., soft iron, surrounded in whole or in part by a coil of wire. The core is magnetized when an electric current is applied to the wire.

ELECTRON: One of the ultimate subdivisions of matter: a negative particle of an atom.

ESCUTCHEON PLATE: A trim plate as applied to a radio dial.

ETHERIC FORCE: The name Thomas Edison gave to his discovery of a mysterious spark.

F

FIDELIPAC: A trade name for the NAB standard tape cartridge. (see cartridge)

FILTER: The term applied to a device to attenuate or suppress a specific band of frequencies, e.g., radio interference from ignition systems.

FIREWALL: In an automobile, the bulkhead or insulated metal wall between the engine "room" and the passenger compartment.

FM: (frequency modulation) A system of radio broadcasting perfected by Major E.H. Armstrong, in which the amount of deviation above and below the resting frequency is proportional to the amplitude of the sound wave being transmitted.

G

GALENA: Lead sulphide crystal, a shiny bluish-gray mineral often used as a detector in crystal sets.

GALVANOMETER: An instrument used to indicate and measure small electric currents.

GENERATOR: A machine that converts mechanical energy into electrical energy.

GILSONITE: A natural product derived from bituminous material used for molding before the availability of modern plastics.

GRID: A metal wire mesh placed between the filament and plate of a triode vacuum tube.

H

HEADER: An upholstered panel used as a trim piece placed in the space above the windshield of earlier automobiles.

HENRY: A practical unit of inductance named in honor of Joseph Henry.

"HOME BREW": A term used by radio buffs to describe a home-built piece of apparatus.

HYBRID: Auto radio jargon for a set that incorporates both vacuum tubes and transistors.

I

IF: (intermediate frequency) In a superheterodyne receiver, the frequency to which all incoming carrier signals are converted before being fed into the intermediate frequency amplifier.

IMAGE FREQUENCY: A frequency that is as much above the oscillator frequency as the desired frequency is below that of the oscillator. Thus, the signals from two different stations may be fed into the intermediate-frequency amplifier at the same time. (see superheterodyne)

IMPEDANCE: The total opposition that a circuit offers to the flow of alternating current.

INDUCTANCE: That property of a coil or other radio part which tends to prevent any change in current flow. The unit of inductance is the henry.

INTERELECTRODE CAPACITANCE: The capacitance between certain electrodes of a radio tube.

INTERNAL COMBUSTION ENGINE: An engine in which the power stroke is obtained from combustion within the cylinder as opposed to a steam engine or turbine.

J

JACK: A socket to which the wires of a circuit are connected at one end, and into which a plug is inserted at the other end.

K

KINETOPHONE: The name for Edison's talking picture machine which combined his kinoscope and phonograph.

KINETOSCOPE: Edison's motion picture machine.

L

LANTERN SLIDES: Photographic transparencies for projection by a machine in which the light source is provided by a kerosene or other type lantern.

LASER: An acronym for Light Amplification by Stimulated Emission of Radiation.

LOFT OPERATION: So named to indicate a rather hastily set-up manufacturing facility in the upper story of a building, generally in the heart of large city.

LOKTAL TUBE: A vacuum tube with a locking type base designed for insertion into a special eight-pin socket fitted with a spring loaded ring.

LOUDSPEAKER: A device for converting audio-frequency signals into sound waves.

LUCITE: Trademark for a transparent plastic material used for radio knobs and trim.

M

MAGMOTOR: A trade name for a dynamotor.

MAGNETO: An alternating current generator in which the field is supplied by a permanent magnet. Applications include automobiles, aircraft and telephones.

MODULATION: The process of varying the frequency or the amplitude of a radio-frequency carrier signal in accordance with the wave form of the intelligence signal being transmitted.

MUTUAL INDUCTION: The phenomenon by which electrical energy from one circuit is transferred to another by means of a changing magnetic field.

N

NAB: Abbreviation for National Association of Broadcasters.

NIPKOW SCANNING DISK: A large diameter, thin metal disk with small holes arranged in a spiral pattern for the purpose of mechanically scanning a subject. Through this rotating disk, a light source activates a photo cell and relays pictures to a remote point. Named for the inventor Paul Nipkow.

NOISE FILTER: (see filter)

O

OEM: Abbreviation for original equipment manufacturer.

OHM: A unit for the measurement of resistance. Named in honor of Georg Simon Ohm.

OSCILLATOR: An electronic circuit which generates an alternating current at a frequency determined by the values of certain of its components.

OSCILLION: The trade name used by De Forest Radio Telephone and Telegraph Company for its line of radio transmitting tubes.

OUTPUT STAGES: Referring to the audio amplifier section of a radio receiver.

P

PENTAGRID CONVERTER: A vacuum tube containing five grids in addition to the plate and cathode. This tube is used in a superheterodyne receiver to perform the functions of the local oscillator, mixer and often the first IF amplifier.

PENTODE: A five-element tube incorporating a cathode, plate, control grid, screen grid, and suppressor grid.

- PERMANENT MAGNET DYNAMIC SPEAKER: A dynamic speaker that uses a permanent magnet to produce the fixed magnetic field.
- PERMEABILITY TUNING: The tuning of radio by means of adjustable iron-core inductance in place of a tuning condenser.
- PHANTOM FILTER: Arvin's trademark for an antenna filter.
- PHENOL-FORMALDEHYDE: A main constituent of a family of synthetic resins, e.g., Bakelite.
- PIGGYBACK SPEAKER: A speaker assembly attached to the exterior case of an auto radio to serve a specialized need, e.g., an engineering change or an afterthought.
- POULSEN ARC: A significant step in the development of arc generators for producing electromagnetic waves. Also called the singing arc, the invention of Valdemar Poulsen.
- PRIVATE LABEL: A term that applies to a class of goods such as radios that is manufactured by a speciality firm for a large merchandiser to which the latter's trademark or label is attached.
- PYRALIN: A trade name for one of a family of nitrocellulose based plastics.

Q

- QUADRASONIC: The name applied to a four-channel sound system.

R

- RADIO: A means of communication employing the radiation of electromagnetic waves through space. Also a term widely used when referring to a radio receiving instrument.
- RADIO FREQUENCY: Generally, that part of the frequency spectrum falling between audio frequencies and infrared frequencies used in radio and television transmission.
- RADIO FREQUENCY AMPLIFIER: A vacuum tube or transistor amplifier stage to provide amplification at radio frequencies.
- RADIOTELEGRAPH: A system for carrying on telegraphy with the aid of radio waves and without connecting wires. Also called wireless telegraphy or just wireless.
- RADIOTELEPHONE: A system for wireless telephony by means similar to that used in wireless telegraphy, except requiring voice modulation and demodulation techniques.
- RECTIFIER: A device which changes an alternating current into a pulsating direct current.

REGENERATION: A method of securing increased output from an amplifier by feeding a part of the output back to the input.

RESISTANCE: The opposition to current flow offered by a device or conductor. Resistance is measured in ohms.

RHEOSTAT: A variable resistance for limiting current in a circuit.

S

SCANNING DISK: (see Nipkow scanning disk)

SCREEN GRID: A second grid placed between the control grid and the plate of a tetrode vacuum tube to reduce interelectrode capacitance.

SELF-INDUCTION: The ability of a conductor or a coil to induce voltage in itself when the current changes.

SHIELD: A metal can or housing placed around a radio part to prevent its electric and magnetic fields from affecting nearby parts or to prevent other fields from affecting it.

SOLENOID: A coil of wire used to produce a magnetic field.

SOLID-STATE CIRCUITRY: Circuits using solid-state devices, i.e., transistors rather than vacuum tubes.

SPARK: An abrupt, luminous phenomenon associated with a disruptive discharge.

SPEAKER: (see loudspeaker)

SUPERHETERODYNE: (sometimes called superhet) A receiver in which the tuned incoming signal is beat against a variable local oscillator to obtain a fixed intermediate frequency which is then highly amplified and demodulated to extract the wanted audio signal.

SUPPRESSOR: A resistor inserted in series with a spark plug or distributor lead of an automobile engine to suppress the radio interference associated with the ignition.

SUPPRESSOR GRID: The third grid in a pentode tube usually placed between the screen grid and the plate primarily to reduce secondary emission.

T

TETRODE: A four-element vacuum tube.

TRANSFORMER: A device that, without moving parts, transfers electrical energy from one circuit to another circuit by the aid of electromagnetic induction.

TRANSISTOR: An electronic device similar in use to the vacuum tube consisting of a small slice of a semiconductor (as silicon) material to which is attached a base, emitter and collector.

TRF: Abbreviation for tuned radio frequency.

- TRIODE: A three-element vacuum tube, usually having a cathode, control grid and anode.
- TUNED CIRCUIT: A circuit consisting of a coil and capacitor which is preset or adjustable to resonate at a desired frequency.
- TWEETER: A type of loud speaker which accentuates the higher audio frequencies.

U

- UNDER-DASH RADIO: One which is mounted under the instrument panel (often called dashboard) of an automobile.
- UNIVERSAL SET: A radio of such design and dimensions that permits installation in the majority of automobiles.

V

- VACUUM TUBE: A device consisting of a number of electrodes mounted in an envelope or housing from which practically all air has been evacuated. Also called an electron or radio tube.
- VARIABLE CONDENSER: A capacitor whose plates can be moved so that its electrical value can be changed as required, e.g., a tuning condenser.
- VARIABLE INDUCTANCE: A coil of which the inductance can generally be varied by adjustment of the core.
- VARIOMETER: A variable inductor in which the electrical value is changed by the relative position of two or more coils.
- VIBRATOR: An electromechanical chopper which converts a DC voltage to pulsating DC or AC.
- VULCANITE: An early, artificially produced plastic material derived from residual pitches, e.g., coal-tar, petroleum, and fatty acids.

W

- WAVE: A physical activity that rises, falls, advances or retreats, periodically as it travels through a medium, e.g., a sound wave or a radio wave.
- WAVELENGTH: The distance traveled in one cycle of a radio wave or sound wave. Wavelength is generally measured in meters and varies inversely with the frequency.
- WIRELESS: (see radiotelegraph) Also used as a British term for radio.

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