Your Entry to the Fascinating World of Vintage Communications

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From The Editor

In this issue, we complete our discussion of sources for radio manufacturer’s data sheets and schematics, beginning with the conclusion of our coverage of John Rider’s Perpetual Troubleshooter’s Manual and following up with introductions to the Supreme Most Often Needed and Sams Photofact collections. Other highlights of the issue include coverage of the AWA Museum’s home entertainment machines, a retrospective on the origin and evolution of radio networks, a look at radio developments of the 1930s, a review of books on the “All American Five” and vacuum tube shortwave receivers and a corporate biography of Zenith Radio.

—Marc Ellis, N9EWJ

Note: The AWA Gateway is an electronic publication of The Antique Wireless Association, downloadable without charge from the AWA website www.antiquewireless.org, to stimulate interest in vintage communications history, equipment restoration and collecting.
From The Deputy Director

Hi everyone, HERE WE GROW AGAIN! Phase II will double the size of the Antique Wireless Museum. The last few years have been a period of significant growth for the Antique Wireless Association and the Museum. As a partner with the Collins Collectors Association in Collins Radio Heritage Group alliance, the CRHG has rescued major components of the Voice of America Delano California Station from demolition and has shipped them to the Museum for display in a major new display to open in 2015. These components include a 250,000 watt Collins transmitter and the Station control room.

All this has been accomplished without debt through the many generous donations of our members and friends. Yet much remains to be done to finish our Museum so that we can leverage our tremendous collections into a beacon of learning, enlightenment, and introduction to science and technology.

Phase II of the development of the Museum will build out the next 2,800 square feet of exhibit space in the present building and will facilitate many new, exciting AWA projects, programs and initiatives — including:

• Better Utilization of our Museum building
  - Development of the magnificent Voice of America Delano Station display
  - Doubling the floor space dedicated to exhibits and displays
  - More interactive scientific displays for kids of all ages
  - A classroom area for presentations and classes
  - New displays such as telephone, Western Union telegraph station, and more

• Active participation in the CRHG to preserve Collins legacy and artifacts

• Development of STEM (Science Technology Engineering and Mathematics) classes for youth based on the rich history of the technologies preserved and shared at AWA

Imagine your life without telegraph, telephone, radio, television, cell phones, or wireless text messaging. Our lives would definitely not be the same. The ability to communicate electronically defines our society. You can support AWA’s vision to preserve and share the history of these technologies through your generous donation today. There are two ways for you to donate today—by mail or on-line by going to the donation tab at—and thanks for your generous support!

As the Museum grows, the need for volunteers grows as well. Please consider being a volunteer. Still working? No problem. The Museum needs volunteers on weekends. Join us!! It is fun and very rewarding.

Museum Store: With the holidays just around the corner, check out the many offerings at the Museum Store. There are a wide variety of AWA items offered for that perfect gift for the AWA member or pick out a gift for yourself and drop that hint to your loved ones.

—Bob Hobday N2EVG, Deputy Director, AWA Museum

AWA Gateway Columnists

JIM COOK, W00XX

Radio Reflections

The son of a radio technician, Jim became a licensed amateur radio operator at age 15 and obtained commercial radiotelephone licenses before he was 20. He worked as a transmitter operator for two radio stations while studying Electrical Engineering at the University of Kansas. After graduation he became an electronic circuit designer for Texas Instruments. Later he redirected his career into electrical power engineering and recently retired after 34 years in the facilities engineering group for Hallmark Cards.

ANDY OOMS

Enjoying Antique Radio

Andy is a retired labor relations and human resources executive who has had a lifelong interest in radio — including AM DX-ing, short wave listening, old-time radio programs and antique radios. In his varied business career, he has worked on the space shuttle project, at one of the last RCA radio production facilities in the U.S., and for the Alyeska Pipeline Service Company. Since retirement, he has done some writing, camp-hosted at various state and Federal forests and parks, and taught English, American Literature and Employment Strategy in Viet Nam and the Philippines.

ERIC P. WENAAS, PH.D.

Book Reviews

Dr. Wenaas has had a lifelong passion for antique radios. He received BS and MS degrees in Electrical Engineering at Purdue and a Ph.D. in Interdisciplinary Studies in The School of Engineering at SUNY Buffalo. He spent most of his career at Jaycor, a defense company in Southern California — eventually becoming President and Chief Executive Officer. Since his retirement in 2002, he has written numerous articles for AWA and other publications. In 2007 he published a critically acclaimed book Radiola: The Golden Age of RCA—1919-1929. For this work, he received AWA’s Houck award for documentation in 2007.

RONALD N. YEAPLE, PH.D.

Communications History at the AWA Museum

Dr. Yeaple is retired from the faculty of the Simon Business School at the University of Rochester. Prior to joining the faculty, he was Executive Vice President of the Ritter Company, a $30 million biomedical products company. Previously, he held engineering and product planning positions at Xerox Corporation and General Dynamics Corporation. He holds 7 patents in acoustics, biomedical instrumentation, and electronic publishing, and has authored four books and numerous journal articles and book chapters. Dr. Yeaple earned a Ph.D. in Electrical Engineering and an M.B.A. from the University of Rochester and Bachelor and Master’s degrees in Electrical Engineering from Cornell University.
In today’s world, we are surrounded by ingenious devices that entertain us: computers, tablets, smartphones, stereos, and above all, magnificent flat screen televisions that bring the world to our living rooms in glorious color from satellites 22,000 miles above the earth. But in the 1800s, there were only two home entertainment devices: the piano and later, the stereoscope, which offered three-dimensional viewing of photographs of far away places.

In 1877, Thomas Edison invented a new entertainment device for the home, the cylinder phonograph. His first version used tin foil wrapped around a hand-cranked cylinder, but the foil lasted for only a few playings and was impractical for a commercial product. Within a few years he switched to wax cylinders that wore out after being played a few dozen times, after which owners could smooth the surface and then record their own music. Further improvements used a harder wax and then an early hard plastic, called celluloid, that would last for thousands of playings.

The earliest cylinder recordings were made one-at-a-time, with the artist having to repeatedly sing into a large horn to record each individual cylinder. Mass-produced molded cylinders began to appear in the 1890s, and in 1902 Edison introduced his “Edison Gold Moulded Records.”

Early cylinders had a playing time of 2 minutes, which was later extended to 4 minutes by using finer grooves. Cylinder records were very popular until about 1910, after which they began to be replaced by disk recordings.

It is interesting to note that the 100-year-old Edison cylinder phonograph in the Antique Wireless Museum’s collection still works perfectly, and visitors are often surprised by the robust sound it produces. These machines were built to last. How many of today’s electronic home entertainment devices will be working 100 years from now?

Disk records had the advantages of being stackable and also less costly to manufacture. They first appeared in Europe in 1889. In the U.S., Emile Berliner introduced the lateral-cut disk record player in 1894, using the trade name “Gramophone” to distinguish it from Edison’s cylinder “Phonograph.”

In 1901 he founded the Victor Talking Machine Company, which in time developed the Victrola brand. Berliner further built his brand by acquiring trademark...
rights to the painting “His Master’s Voice,” featuring the dog Nipper listening to a Gramophone.

While Berliner was marketing the lateral-cut disk, in which the needle moves from side to side to reproduce the music, Edison was working on a disk system in which the needle moves vertically, known as “hill-and-dale” recording. Introduced in 1912, the Edison “Diamond Disc” featured much finer grooves than Berliner’s lateral records, providing considerably longer playing time. The Edison hill-and-dale disks were much thicker, perhaps to avoid “print-through” from music recorded on the other side.

Sales of Edison’s Diamond Discs peaked in 1920 but lost out to less expensive lateral-cut Victor disks by the end of the 1920s. Again, like the Edison cylinder phonograph, the Museum’s Edison hill-and-dale disk phonograph — which is at least 90 years old and was built to last — works flawlessly and is available for demonstrations to visitors.

In the 1950s, 78 rpm records made of breakable shellac gave way to 33 rpm vinyl long-playing (LP) records by Columbia and 45 rpm singles from RCA. Stereophonic LP records were introduced in 1957.

Another major innovation in consumer entertainment was launched near the end of 1929. Scheduled commercial AM radio broadcasting began on November 2 of that year. On that date, KDKA in Pittsburgh, broadcasting with a 100-watt transmitter from a shack on the roof of the Westinghouse plant, began broadcasting the Harding-Cox presidential election, with the words, “This is KDKA, of the Westinghouse Electric and Manufacturing Company, in East Pittsburgh, Pennsylvania. We shall now broadcast the election returns.”

Consumers were quick to acquire radios for home entertainment, and by the mid-1920s, more than six million radios were in use.

In Rochester, New York, commercial station WHAM went on the air in 1922. The call letters came from a suggestion by George Eastman, the founder of the Eastman Kodak Company, who helped the University of Rochester launch the station and thought that “WHAM” would have marketing impact. The station was bought by the Stromberg-Carlson Company (“There is nothing finer than a Stromberg-Carlson”) in the mid-1920s, and power was boosted to 50,000 watts in the mid-1930s.

In 1949, WHAM inaugurated the first television broadcasting in Rochester, signing on as WHAM-TV. FM stereo broadcasting, which was invented by General Electric in 1961, burgeoned in the 1960s.

And finally, in the 1990s, came the explosion of home entertainment devices and systems: the Internet, which opens the world of information to us; satellite and cable television, with hundreds of channels on every subject; and the smartphone, a computer, telephone, and radio all in our pocket. A hundred years ago, when Edison was promoting his hill-and-dale records, who could have predicted all this? And who can predict what the next hundred years will bring?

THE ANTIQUE WIRELESS MUSEUM

LOCATION: 6925 Routes 5&20, East Bloomfield, NY, 14469 (for Google Maps, search for 6925 State Route 5, East Bloomfield NY)

HOURS: Tuesday 10:00 a.m. to 3:00 p.m., Saturday and Sunday 2:00 p.m. to 5:00 p.m. Except closed on holidays.

ADMISSION: $7.00 for adults, kids and teens are free, and AWA Members are free.

WEB: www.antiquewireless.org
Zenith Radio had its beginnings right after World War I when two radio ham buddies, in anticipation of radio amateur privileges being restored, organized the Chicago Radio Laboratory to manufacture equipment for the radio amateur trade. Working out of a prefab two-car garage erected for the purpose, R.H.G. Mathews and Karl Hassel set up first to build amplifier modules and eventually (after receiving a regenerative license from inventor Armstrong) complete receivers. The building also housed Mathews’ ham station, 9ZN.

For their first receivers, which were essentially copies of the paragon RA-6, the pair cavalierly appropriated the Paragon name. However, under pressure from the Adams-Morgan Company, owners of the marque, CRL had to choose a different brand name — the “ZNith Regenerator.”

In 1921, the company was moved to the third floor of a factory building and upped its production from one to ten sets per week. About that time, CRL built a radio for Commander Eugene F. McDonald, Jr. The Commander was a wealthy man who had liquidated his business interests prior to a wartime stint with Naval Intelligence. He had become interested in radio and was looking for a new business to enter. Impressed with CRL, he was soon supplying both capital and business guidance.

McDonald brokered a deal with the QRS Music Company (the well-known manufacturers of piano rolls) to become manufacturing and sales agent for a line of broadcast radios developed by CRL. But the arrangement was not permanent. In 1923 the Zenith Radio Corp., under the firm control of Commander McDonald, was formed to replace QRS. (Legally, Zenith could not manufacture in its own right because the Armstrong regenerative license was not transferable).

In 1924, Westinghouse (which now owned the Armstrong patents) filed suit against Zenith for overstepping the conditions of CRL’s regenerative license by selling to other than radio amateurs. However, for some reason the suit was never tried and seems to have been dropped in 1927. About the same time, apparently emboldened by the disappearance of the suit, Zenith absorbed CRL and formally took over the manufacturing role.

Zenith made headlines by supplying the radio equipment for explorer Donald MacMillan’s 1923-1924 and 1925 Arctic expeditions. Commander McDonald actually participated in the 1925 expedition as captain of the second ship. A master of sales promotion, McDonald also kept Zenith in the public eye through its broadcasting activities. Station WJAZ opened for business in 1923 with studios in Chicago’s Edgewater Beach Hotel.

The Company went through a tough period in 1926, when not only were business conditions poor but also the product line was high-priced and contained little that was new. Zenith weathered this crisis with the release of the Model 27, a pioneering AC operated set that incorporated many components from the company’s large stockpile of materials for earlier battery models.

After 1927, when the company purchased a license to use RCA patents, the Zenith models lost some of their distinctiveness, becoming similar to those of other manufacturers. But, through clever advertising, consummate marketer McDonald was able to create a product differentiation that did not actually exist.

The company remained among the half-dozen industry leaders until the Depression, when it added low-cost models to its line and emulated Philco’s aggressive sales tactics. By the end of the 1930s Zenith was in the number two spot among radio manufacturers and the company has remained successful to this day.
A reader of an earlier column in this series recently wrote me about growing up on a farm in South Dakota. He had listened to many of the same stations that I did and enjoyed many of the same programs from the “good old days” of AM broadcasting. He is also a fellow-member of SCARS, the Southern California Antique Radio Club, and enjoys both vintage electronics and vintage programming.

This series is reminding some people of their own early listening days as it introduces newer collectors to the mystique of Golden Age programming. Radio programming content and technical improvements worked together to create this fascinating phenomenon, and I am glad that you and I are part of it.

Tom Watson wrote me about how many iconic radio programs are vanishing from memory, mentioning that the sounds of the “beacon” from NBC’s Monitor program of the fifties and sixties were locked into his brain. He also is interested in some exploration or discussion of vintage news programs. I plan to discuss Monitor in future articles, and I may write about radio news. But as I told Tom, I don’t feel that I know much about news programming as I misspent my youth listening to baseball, comedy and drama, and rock and roll when it came around and before it morphed into rock, acid rock, hard rock, heavy metal, punk rock and more.

Getting comments from readers of the column is appreciated, and you may see them mentioned along with your name unless you request anonymity. No two individuals have the same memories about their personal radio listening history, since no two persons have lived within the range of the same stations or tuned to the same programs at the same time. So let’s go back to my own radio story.

By 1945, there were four national radio networks, all with roots in the twenties and thirties. They are frequently described as “major,” differentiating them from various regional and event specific hook-ups. The majors were the National Broadcasting Company (NBC), the Columbia Broadcasting System (CBS), the American Broadcasting Company (ABC), and the Mutual Broadcasting System (MBS). As the number of stations proliferated, the need for programming content grew and the networks were created to meet that need.

Networking provided more advertising revenue for both stations and networks, since ads for nationally known products and businesses were significantly more profitable than those known only in the station’s listening area. Consumers and listeners also gained because much more money was available for programming, and the immediacy of hearing news from far away became extremely significant by the time the events leading to World War II occurred.

The networks contracted for air time with individual stations, since they were limited, by the Federal Communications Commission, to owning very few stations themselves (no longer true). The networks and affiliates signed contracts which controlled which programs must be carried and the amount of time to be allowed for local programming, details that were very important to the advertising agencies involved with program sponsorship.

The first network was NBC, started by David Sarnoff’s RCA organization and serving a few eastern stations. By 1930 it was a major provider of entertainment to America, eventually reaching coast to coast. NBC operated two networks, Red and Blue. It has been reported that the names were based on the color of the cables plugged into the switchboards sending signals to different sets of stations. I have heard that there were also purple and orange cables for certain stations and events, but I have not heard of NBC Orange or Purple networks.

NBC moved programs from Red to Blue and back at the will of Management, but I have never heard that they simulcast to the networks. The affiliates of the two networks were not the same, although some stations, usually in smaller markets, carried programs from more than one network. Usually NBC Red carried the higher quality, more popular, programs; NBC Blue was kind of
a “B” network. Decisions were based on ad revenue and ratings; a program doing well on Blue one season might be “promoted” to Red the next season. The network differences were never discussed on the air by NBC; ideally the public was to view them as two NBC Class A systems.

With the addition of NBC to its organization, RCA became unarguably the corporation with the greatest influence on both electronics and the programming in radio history. Being a nine year employee of its Consumer Electronics division may have affected my interest in both equipment and content; it certainly did nothing to diminish my enjoyment of the radio hobby.

Other networks had little or no electronic manufacturing or design involvement, and other major radio producers (such as Zenith, Atwater Kent and Philco) had little or no involvement with broadcasting. Some companies were involved with both aspects, but their broadcasting was limited to individual stations or smaller networks (Westinghouse, Crosley). General Electric bought RCA in the mid-eighties and was thereby deeply involved, for a short time, with both television set production and network television broadcasting. However it was too late for radio broadcasting to be a significant contributor to its business.

CBS was created by William Paley soon after the formation of NBC. Coincidentally, or maybe not, both RCA and CBS had some roots in the phonograph and record industries, Victor and Columbia respectively. Although they were major influences in recorded music for decades, their radio networks did everything possible to allow people to have listening alternatives other than records. They resisted the unstoppable trend toward recorded music broadcasting which dominates today, and they were not alone. Musician’s unions and artist/composer organizations resisted as well, at least until appropriate remuneration was negotiated.

Bill Paley created and dominated the CBS mystique in radio and television for many decades. CBS was known by some as the “Tiffany Network” because of its willingness and ability to hire its talent from Hollywood, Broadway, and sometimes NBC. However, CBS and NBC did not differ substantially in content and style as far as I know; they carried the same types of programs and sold time to many of the same sponsors. Both had celebrity stars and guests, daytime serials (soap operas), comedies, dramas, classical and popular musicians, quiz shows, discussion programs and, as World War II loomed, news.

Next up for our attention: ABC. In the early forties, the FCC decreed that NBC would not be allowed to operate two networks. So NBC Blue became the Blue Network under new ownership (for a while it was owned by the company that made Life Savers) and eventually was named the American Broadcasting Company. It had major affiliates in large cities and was definitely a viable operation, but seemed to be in a constant struggle for recognition behind CBS and NBC.

Mutual was not so much a top-down operation, as it was a coalition of individual stations who created and shared programming, at least when it originated. Its big four stations in Detroit, Cincinnati, Chicago, and New York had a few hits, but as a rule did not attract the nationally famous and high priced stars. Eventually it became the network with the most affiliates, over 700, while the others had 200 to 400. Mutual was more affordable for station owners, and consequently became attractive to stations in small cities and towns who wanted national programming.

Back then, Mutual and ABC were not in the NBC and CBS class, but had much of the same types of programs. They had a few soap operas, although not nearly as many as CBS and NBC. All four networks had some excellent news operations and commentators by the end of the war. Only NBC had its own symphony orchestra with Sunday concerts every week. Only ABC carried the Metropolitan Opera for decades of Saturdays. CBS and Mutual also had some unique characters and characteristics.

Time moved on. NBC now exists as a television network, owned by Universal. Vestiges of NBC radio remain in the guise of some small news or sports talk networks. CBS remains a major player in television, and has maintained a healthy radio network, mostly for news and special events. But is no longer the provider of 18 hours per day of varied programming. ABC entered the TV arena and over the years it has been owned by Time Warner and Disney. It maintains a viable radio network, primarily for news.

Mutual never became involved in TV. It continued as a news and sports provider, with some overnight talk shows such as Larry King’s program. One of its many owners was 3M. I believe that Mutual is now totally silent, although some company owns its name so it may reappear in some form.

Next up, what did those networks mean to me as a young not-so-informed listener? Stay tuned.
In the last issue, we kicked off our new series, Collecting Radio Peripherals, with a first installment on radio service literature. It featured the well-known and eminently useful Perpetual Troubleshooter’s Manuals published by John F. Rider. Before we move on to other sources of service information, there are a few more points to be made about the Rider series.

ROADMAPS TO RIDER’S

Over the years, Rider published indexes to various individual volumes and groups of volumes in the Perpetual Troubleshooters series. But these don’t seem to turn up as often as the books themselves. Without an index, you are reduced to a trial-and-error search for your radio of interest. The sets are alphabetized by manufacturer in each book and, by guessing the year of manufacture of your set, you can estimate the correct volume from its copyright date. However, this is a ponderous, and not always successful, procedure.

Reproduction Rider’s “Complete Indexes” have been offered by antique radio book dealers over the years. Google “Riders’ Index” to search for a copy. As this is written, a version of the index for use online is available at www.myvintagetv.com/riders.htm free of charge.

Alternatively, if you can get your hands on a copy of The P.R. Mallory Radio Service Encyclopedia, Sixth Edition (1948), you’ll have a very useful substitute for the official Rider indexes. This publication provides a very complete alphabetical listing of the radio receivers produced up to its publication date. A recommendation is provided for the correct replacement Mallory controls, capacitors and/or vibrator to be used with each one.

The proper Rider’s reference is also shown for each set, as are two pieces of information not included in the official Rider’s index: the i.f. peak — if the receiver is a superheterodyne — and the tube complement. The latter is very useful in tracking down receivers with missing model number identification. I suspect that the Rider’s references are from the Rider index to Volumes 1-15, which appeared in 1947.

Some time after purchasing the Mallory book, I acquired a serviceman’s assortment of Mallory controls housed in a special metal storage cabinet. The cabinet has a rear compartment just the right size to accept the 6th Edition, which must have been included with the control deal. By the way, the Rider’s Manual references may not be included in all editions of the Encyclopedia. A 1937 First Edition in my possession does not have them.

EARLY RIDER’S: CAVEAT EMPTOR

Before moving on to other sources of service data, I’d like to pass on some very interesting, and not commonly known, information about early Rider’s manuals. It’s quoted almost verbatim from a letter I received several years ago from A.G. Tannenbaum, who, as a commercial provider of service data, was in a position to speak with authority:

“…The original Rider’s manual was sold as the 1931 Troubleshooter’s Manual. At some point in 1931, the manual cover was marked “Perpetual.” Updates to the “Perpetual” manual were sent out to monthly subscribers. To quote John Rider directly from the September, 1931 Service Digest: “There shall be no announcements of yearly editions of the Perpetual Trouble Shooter’s Manual by John F. Rider. The manual shall be the basic book for YEARS to come and will be kept up to date by means of the Monthly Supplementary Service.” Apparently this policy lasted only two years. In 1933, the material was reorganized for publication via periodically-released volumes.

“The pages in the 1931 edition were numbered consecutively from 1 to 804. The first supplement of about 50 pages was included with the manual. These pages had to be numbered 2-A, 24-A etc. for insertion into their appropriate locations in the book. Some time later, Rider abandoned this clumsy consecutive numbering scheme. Instead, service data was grouped by manufacturer and assigned a composite number consisting of a volume number and a sequential document...
number. This method was used right up to the end of the service.

“Additions to the 1931 manual continued monthly for at least a year. Ultimately, more than 700 pages were added. Since it was up to the “troubleshooter” to insert the pages in the manual, and the binder did not have the capacity for the additional pages, updates were rarely entered.

“During 1933, Rider went back and reorganized the original “Perpetual” manual for periodic release in volumes. Some of the data from that manual was put into Volume I and some was put into Volume II along with newly released material. According to information published in Volume V, a complete Volume I should have at least 1000 pages. Volume II should have 800 pages and Volume III should have 1185. A complete 1931 Perpetual Troubleshooter’s Manual with all updates will have approximately 1600 pages.

“The 1931 Perpetual, without updates, contains only 80% of the material in Rider’s I. If all updates are included, you will receive all of the Volume I material and 70% of that contained in Volume II. When assessing the completeness of a 1931 Perpetual, remember that the page numbers cannot be used as a guide because update pages referenced the original page number. The only way to check is through estimates based on the measured thickness of the volume.”

OTHER SOURCES OF MANUFACTURER’S DATA

Another series out there to be discovered is the “Most Often Needed” collection marketed by Supreme Publications. Supreme, like Rider, published a new volume each year. But the Supreme books don’t provide the exhaustive coverage offered by the Rider volumes. The relatively slim soft-cover Supreme books included only those sets considered by the editors to turn up most frequently on the radio serviceman’s workbench.

The first volume, Most-Often-Needed 1926-1938 Radio Diagrams and Servicing Information, bears a 1941 copyright date. After that, a new manual was published every year, at least into the late 1960s, with a gap during World War II. Volume I was reprinted several times over the years and is not hard to find at antique radio meets. It is certainly a good starter book for the newcomer, but will soon be found wanting once its purchaser becomes a serious collector. To visualize how much Volume I doesn’t contain, keep in mind that this half-inch-thick book covers a time span represented by several feet of Rider volumes.

Another well-known information source of at least occasional interest to the antique radio collector is the Sams Photofact collection, a service that went into operation in 1946. When first introduced, data was released in folders, each containing information for a small group of unrelated radios or TVs. To identify the proper folder, you needed a copy of the annual index.

Collecting these folders really isn’t practical today, if it ever was, but information on specific radios is now available online directly from the company at www.samsite.com. The pages for many models are available for instant download after paying the fee, which is often over $20.00. For most of us this would be a service of last resort, since schematics and service data are usually available for much less from other sources.
As the 1930s began, radio development continued despite the massive economic impact of the Great Depression. Not only was radio innovation thriving, but other applications of electronics were also being rapidly developed. In this article, I will focus on the ongoing development of radios for consumer use in the home, but there are other related topics that I plan to discuss in future articles, including the developments in radio broadcasting, automobile radio, police radio, and audio systems.

Although the stock market crashed in October, 1929, the real effects of the Great Depression didn’t hit most Americans until the early 1930s. Many American workers lost their jobs, and those who had been careful to save money for “rainy days” sometimes lost their savings when banks failed. Nationwide unemployment reached 25% with some industrial cities experiencing unemployment rates of more than 75%.

American farmers, especially those in the central part of the United States, faced the additional challenge of a prolonged drought that caused crops to wither in the hot sun and dry winds. The few crops they could take to market brought low prices at harvest time. This area of the central United States became known as the “Dust Bowl.”

These extreme economic conditions had both positive and negative effects on the radio business. The economic conditions were difficult for radio manufacturers, and many companies closed their doors in the 1930s. But for those that did survive, innovation provided an opportunity to provide customers with better radios at more competitive prices. Moreover, the economic and political events of the 1930s made the public more determined than ever to have access to a radio.

The widespread development and marketing of the superheterodyne radio was the most significant technical improvement. Even though this technology had been developed by Edwin Howard Armstrong during World War I and patented in 1920, it was not generally available to the radio buyer until the 1930s. TRF receivers were still on the market, selling for slightly less than comparable superheterodynes. But the superior performance of the superheterodyne made it the dominant type.

The technical advantage of the superheterodyne came from the conversion of incoming radio signals to a fixed intermediate frequency (IF) where filtering and amplification could be accomplished more effectively. The effect is to improve both the sensitivity and the selectivity of the radio receiver.

Although the IF for AM radios was standardized at approximately 455 KHz by the 1940s, many superheterodynes manufactured in the 1930s used lower IF frequencies. This provided narrower bandwidths and excellent selectivity, but it increased the problem of “images,” a characteristic of superheterodynes that causes radio stations to be received at more than one place on the dial.

To lower the cost of basic radios so that they were affordable for people on tight budgets, most manufacturers introduced a line of “midget” radios. These were physically smaller that earlier radios and used simpler circuitry that reduced manufacturing costs while still providing adequate performance. These designs eliminated the power transformer and connected the heaters of the tubes in series. A series voltage-dropping resistor was used so that the heaters could be powered directly from household power.

The January 1931 issue of Radio News carried a major feature on the new midget radios.
vacuum tube replacement, the labor cost for making repairs could easily exceed the purchase price of a new radio.

For radio customers who were not suffering financially from the Great Depression, radio manufacturers offered excellent high performance receivers with high quality cabinets. These sets were typically superheterodynes with one or more short wave bands. In addition, a better audio amplifier design often including elaborate tone controls, provided enough power to drive larger electrodynamic speakers.

In this era, station selector dials no longer had 0-100 logging scales but were calibrated in frequencies and sometimes wavelengths. Often, the call letters of popular radio stations would be shown at their appropriate places on the dial. The short wave dials were labeled to indicate where to tune for police radio calls, amateur radio stations, and for short wave broadcasts from various countries. Phonographs with electric pick-ups were sometimes included to form radio-phonograph combinations that took advantage of the radio’s audio amplifier and speaker. Many of these radios are very collectible today.

in the early 1930s, there was compelling news to listen to on the radio. President Herbert Hoover was no stranger to radio, having provided regulatory oversight as Secretary of Commerce before he became president. However, his successor, Franklin D. Roosevelt, quickly became a master of the medium, using his famous “Fireside Chats” to communicate directly with the American people.

In his book, *The Worst Hard Times*, author Timothy Egan commented that it seemed unlikely that President Roosevelt, who came from a society of wealth and privilege, would be so highly regarded by those who were suffering in the Dust Bowl. FDR certainly didn’t talk like an Oklahoma farmer, but he was able to express his empathy for their problems. The American people were suffering, they were desperate for good news, and many formed the impression that FDR really wanted to help them.

FDR was willing to try new programs to help the economy. Some were successful, some were not, and some were judged unconstitutional by the Supreme Court. But the public appreciated his efforts. Through it all, FDR communicated frequently with the American people using the radio. People who did not own radios would visit those who did to listen to these important broadcasts.

Radios also became important because they were a free source of entertainment. The 1930s have been known as the “Golden Age of Broadcasting” because many of the famous serial radio programs that were broadcast live originated during this decade. Each program built upon the one before it and no one wanted to miss a single episode if he or she could avoid it.

Radio networks were formed so that a live broadcast in one city could be shared with listeners across the country. The best known of these were CBS, NBC, MBS (Mutual Broadcasting System) and the BLUE network, an affiliate of NBC which became ABC in the 1940s. Radio networks leased special telephone lines to carry the audio signal to broadcasting stations across the country.

Meanwhile, international broadcasts were becoming more common and more relevant to listeners throughout the world. When FDR was beginning his “New Deal” programs in the United States, Adolph Hitler was taking over control of Germany. The names of prominent radio broadcasters, such as Lowell Thomas, became well known as they made live reports from locations around the world.

The radio listening experience also improved because more radio stations were in operation and trans-
mitter power was typically higher than it had been in the 1920s. One station, WLW in Cincinnati, received an experimental license from the FCC to increase its power from 50,000 watts to 500,000 watts. WLW was owned by Powel Crosley, Jr., the man who manufactured Crosley radios. He wanted a powerful station so that salesmen could easily demonstrate his radios to customers anywhere in the country. He called WLW “The Nation’s Station.” The call letters were said to be an abbreviation for “What a Lot of Watts.”

By 1935, many new vacuum tubes had been introduced, including those with an eight-pin (octal) base. These new tubes would be used in even better radio designs that would dominate the rest of this decade, and radio manufacturers would enhance their products even more by installing tuning indicators, impressive illuminated color-coded dials, and even remote controls. We will explore some of those in my next article.


Richard McWhorter says he wrote this book specifically for people who are interested in acquiring some knowledge of basic radio circuits and for those who want to locate parts by using schematic diagrams. The “All-American Five” transformerless superheterodyne is a good choice for such a study because these sets were manufactured by virtually all major manufacturers in the period of the 1940s through the 1960s.

Additionally, all models have five stages and the stages in all have similar functions and circuit designs. The author chose RCA’s model 9X561 (or 9X562 in ivory) with the classic octal-based tube lineup: 12SA7, 12SK7, 12SQ7, 50L6GT, and 35Z5GT. Similar sets were also manufactured using 7-pin miniature tubes with the following classic lineup: 12BE6, 12BA6, 12AV6 or 12AT6, 50CS, and 35W4.

The author assumes the reader has no prior knowledge of schematic diagrams, and so he provides all the basic information needed to learn what the symbols mean and how to read a schematic. There is also a chapter on the basics of how transformers, coils and triodes operate. However, do not be fooled into thinking the book holds nothing for the more experienced radio collector or repairman.

Detailed descriptions are presented for the function of each of the five stages: power supply, converter-mixer, I-F amplifier, detector, and audio amplifier. The schematic diagrams, expected waveforms and voltages at key operating points in the circuits of each stage are presented and explained. In many cases, the descriptions are accompanied by photographs of the parts and wiring diagrams as they might appear in repair manuals such as Sam’s Photofacts folders, which are generally available on the Internet.

The order of presentation of the five functional circuits is just the opposite of what you might expect. Instead of beginning with the converter-mixer and ending with the audio output stage, the order is just reversed. The author’s logic, which is to begin with the simplest circuits and progress to those that are more complex, definitely has merit. The author says that by the time the reader finishes the book he/she should be able to understand all of the electronic symbols and the electrical...
functionality of each radio circuit in the schematic diagram of the RCA radio selected for the case study. Fortunately, most of the other All-American Five radios manufactured during this period are very similar.

Understanding the functional operation of the superheterodyne, how to read schematic diagrams, and the voltages and waveforms to be expected at various parts of the circuit is not only valuable information in its own right, it is also a necessary skill to become an effective troubleshooter. Richard McWhorter addresses the subject of evaluating and repairing the All-American Five in the last two chapters. He also summarizes some of the test equipment needed to perform these tasks. Unfortunately, there are too few pages allocated to this subject to do an effective job of explaining it. He does, however, provide examples of how the information presented in the earlier text — such as voltages and resistance values at critical test points — can be used to aid in the troubleshooting process.

McWhorter begins the first of these two chapters with the following somewhat astonishing statement: “All repairs must be completed before any antique radio is connected to a power source.” He follows this statement with one in the next chapter saying “When all the coils and transformers have been tested, and all the wax and electrolytic capacitors and any bad tubes have been replaced, it is time to test the radio.” I cannot imagine repairing any radio, even an antique radio, without first testing it to see if it even needs repairing.

However, the author’s approach does follow one school of thought, which says that all capacitors in antique radios should be replaced. This may be a good idea for relatively inexpensive or common radios, but before pursuing this strategy for rare or valuable radios such as certain Catalin, art deco and other specialty sets, one should consider the impact of a wholesale replacement of old parts on the value of the radio — especially when replacing original parts with modern ones.

The last chapter summarizes the test equipment deemed necessary to pursue the recommended repair strategies and techniques. McWhorter starts out by saying that few tools are required to repair simple AM radios of the All-American type — that a wooden workbench, an assortment of common screwdrivers, and a pair of needle nose pliers should suffice.

While that may be true, he does not explain how to proceed with those minimal tools. Instead, he provides a list of additional test equipment needed to pursue some of the more advanced strategies he has outlined — an isolation transformer for safety, a multimeter to measure voltages and resistances at key test points, a tube tester to test for tube emission and shorts, and a 0–120 VAC variable transformer (e.g. a Variac) in conjunction with an ammeter and voltmeter to avoid damage from undetected short circuits.

I commend him for suggesting this list of test equipment because much of the equipment it is necessary to implement strategies he has presented. After all, the whole point of the book is to learn how a radio works, how to read schematics, how to measure and interpret voltages and resistances at key test points, and how to use this information for troubleshooting.

This book is somewhat short on information about repairing radios, and so I would recommend reading McWhorter’s more advanced book entitled Vacuum Tube Shortwave Radio: Understanding and Troubleshooting, which is briefly noted below. A brief bio for McWhorter excerpted from that book is also given.


Richard McWhorter followed his first book featuring the RCA Model 9X561 superheterodyne broadcast receiver with this book featuring the RCA 8Q2 shortwave radio. Since it was written for people who have some basic knowledge of electronics and a desire to learn about vacuum tube shortwave radio circuits, it is an ideal book to read after *The All-American Five Radio*. McWhorter says he chose this radio because the vacuum tube circuits of the 8Q2 are representative of a very popular architectural design dating from the late 1930s through the early 1960s.

The book begins with several chapters on the preparation and cleaning of the radio and a review of how vacuum tubes function. Then, following the outline for *The All-American Five Radio*, there is one chapter devoted to each circuit in the set — of which there are six.

In a marked departure from *The All-American Five Radio*, the last half of the book is devoted to repairing the set in four chapters covering continuity testing, parts replacement, safety, test and alignment, and a troubleshooting guide with scenarios covering some of the more common problems that occur. The author covers troubleshooting in much greater detail than he did in his first book, and it is definitely worth reading. The book can be downloaded in a PDF format from his website free of charge at the address listed in the heading.

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**Richard McWhorter entered the Air Force after college and received training in electronic circuit design and troubleshooting. After obtaining an FCC First Class Radio Telephone Operator License, with a Ship Radar Endorsement, he entered the telephony industry where he spent 30 years as a Test and Acceptance Engineer and later as a Software Engineer. Since leaving that industry, he has been working as a broadcast engineer and writing books.**
Clubs That Will Welcome You

- The Antique Radio Club of Illinois (ARCI) — Meets bi-monthly. Meets generally held at the American Legion Hall, Carol Stream IL but meets in June in conjunction with the 6-Meter Club of Illinois at the DuPage County Fairgrounds and once per year for Radiofest at the Willowbrook Illinois Holiday Inn. Check website for schedules, details and maps.) Contacts: President, Olin Schuler oshuler@comcast.net; Club Public Contact, Art Bilski, 630-739-1060, clubinfo@antique-radios.org. Website www.antique-radios.org.

- Antique Radio Collectors of Ohio — meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLRAD@GEMAIR.COM.

- California Historical Radio Society — For info on current meetings, call the CHRS hotline: (415) 821-9800.

- CARS, the Cincinnati Antique Radio Society — Meets on the third Wednesday of each month at Gray’s History of Wireless Museum, which is part of The National Voice of America Museum of Broadcasting, Inc., located in a building that is now on the National Historic Register at 8070 Tylersville Road, Westchester, Ohio. 45069. For more information contact Bob Sands at (513) 858-1755.

- Carolinas Chapter of the AWA — Hosts four “mini-swap-meets” each year (in January, May, July and October) plus an annual conference, “Antique Radio Charlotte,” on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the website at CC-AWA.ORG or contact Ron Lawrence, W4RON, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail W4RON@carolina.rr.com.

- Central Ohio Antique Radio Assn. – Meets on the third Wednesday of March, June and September at 7:30 p.m. Swap meets: “Cabin Fever” in January and outdoor tailgate in July. December Christmas party. For more info contact Barry Gould at 614-442-1518 or Dave Poland at 614-890-5422 or http://coara.org/.

- Delaware Valley Historic Radio Club — Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club’s monthly newsletter The Oscillator. For more info contact Delaware Valley Historic Radio Club, P.O. Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

- Houston Vintage Radio Association (HVRA) meets the fourth Saturday (January thru October) at Bayland Park 6400 Bissonnet, 9 a.m. in SW Houston. Each meeting includes an auction and program. Annual two-day convention held in February includes three auctions, old equipment contest, technical talks, swap meet, and awards banquet. One day MEGA auctions held in the spring and fall. A newsletter, The Grid Leak, is published bi-monthly. Event postings, announcements, photos and other features are available on HVRA website: www.hvra.org. Membership is $20/yr. Address: HVRA, P.O. Box 31276, Houston TX 77231-1276 or call Bill Werzner, 713-721-2242; email: werz1943@gmail.com.

- Hudson Valley Antique Radio and Phono Society [HARPS] meets the 3rd Friday of the month 7:30PM at the Episcopal Church of Suffern Annex, 65 Washington Ave., Suffern N.Y. 10901 for info contact Rev. Dale Cranston at (845) 357-1615 or dale.cranston@gmail.com.

- Indiana Historical Radio Society — Active since 1971. Meets in Feb. (Lawrence), May (2-days, Kokomo) and Oct. (Greenfield). Flea market, old equipment contest, and auction at all events. Meet details and club info at website www.indianahistoricalradio.org. $15.00 annual dues includes the IHRS Bulletin published quarterly. Contact Herman Gross, W9ITT, 1705 Gordon Dr., Kokomo, IN 46902, 765-459-8308, email w9itt@comcast.net.


- Mid-Atlantic Antique Radio Club (MAARC) — Meets monthly, usually on the third Sunday of the month at the Davidsonville Family Recreation Center in Davidsonville, MD. (But meets once or twice a year in Northern Virginia—check website for schedules, details and maps.) Contacts: President, Steve Hansman, 855 Arundel Drive, Arnold, MD 21012, (410) 974-0561, email: shans01a@comcast.net; Membership Chair, Geoff Shearer, (703) 818-2686, email: gshearer2@verizon.net. Website www.maarc.org.

- The New Jersey Antique Radio Club — Meets the 2nd Friday of the month at 7:30 p.m. at either Info Age 2201 Marconi Rd. Wall Township N.J. 07719 or Bowen Hall, Princeton University. We hold three annual swap meets and four seasonal repair clinics. Visit the club’s website for details www.njarc.org or contact NJARC President Richard Lee (914) 589-3751 or president@njarc.org.

- Northland Antique Radio Club (Minneapolis/St. Paul) — hosts four events with swap meets each year (in February, May, September and November) includ-
ing an annual conference, “Radio Daze,” for two days in mid-May. Annual dues are $12.00, which includes a subscription to the club’s quarterly newsletter. For more info, visit our website at www.northlandantiquerradioclub.com.

- Northwest Vintage Radio Society — Meets the second Saturday of each month at Abernethy Grange Hall, 15745 S. Harley Ave. Oregon City, OR. Meeting starts at 10:00 a.m. Membership $25.00 per year. Guests welcome at all meetings and functions except board meetings. Spring show, the second Saturday in May. For more information, contact Mike McCrow 503-730-4639; e-mail: tranny53@comcast.net.
- Oklahoma Vintage Radio Collectors — Meets second Saturday of each month, (except for April, October, and December), at Hometown Buffet, 3900 NW 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/Socializing, 6 p.m., meeting, 7 p.m. Swap meets on second Saturday in April and October at 8 a.m., Midwest City Community Center, 100 N. Midwest Blvd., Midwest City, OK. Membership $15/year including monthly Broadcast News. Info: contact Jim Collins at (405) 755-4139 or jrcradio@cox.net. Website: www.okvrc.org.

- The Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea markets, contests and clinics held at least four times yearly. A fall auction is included in September and our annual luncheon program is on the first Saturday in December. An annual Tri-State Radio Fest is held in April. Our journal, The Pittsburgh Oscillator, is mailed quarterly. For more information visit us at http://www.pittantiquerradios.org, email President Chris Wells at radioactive55man@comcast.net, or phone Treasurer Tom Dixon at 412-343-5326.
- Society for Preservation of Antique Radio Knowledge (SPARK) — Meets monthly at Donato’s Pizzeria, 7912 Paragon Rd., Centerville, OH. Annual swap meet. Membership $15/yr. Write SPARK Inc., c/o Dan Casey, 10075 Morrow-Rossburg Rd., Pleasant Plain, OH 45162 or call Dan Casey at (513) 265-8466 or e-mail dansradioland@gmail.com
- Texas Antique Radio Club — Meets alternate months in Kyle and Shertz, TX. Contact: Doug Wright, 625 Rolling Hills Dr., Canyon Lake, TX 78133. Email: dwjw@gvtc.com; website www.gvtc.com/~edengel/TARC.htm.
- Vintage Radio and Phonograph Society (VRPS) meets monthly on the third Saturday. Located in the Dallas, Fort Worth Metroplex, our current activities are annual convention, auctions, swap meets, repair training sessions and monthly programs. For details visit our website www.vrps.org, or by contacting VRPS President Jim Sargent at (817) 573-3546 or bsargent@swbell.net.

Members’ Corner
News of Particular Interest to the AWA Membership

FROM THE MEMBERSHIP SERVICES COMMITTEE CHAIRMAN

As the holiday season approaches, members should remember that the AWA Museum is now open on Tuesdays, Saturdays and Sundays year round. So if you are traveling to western New York state, plan on a visit to the facilities. Details at http://www.antiquewireless.org/museum-hours.html. If you are not a member, stop by and visit us anyway, you might be surprised by what you see.

This winter season will see much activity around the AWA Museum. Phase Two building expansion is now being initiated. This will involve significant expansion of display spaces, including the Voice of America transmitter. See “From the Deputy director” in the previous issue of The AWA Gateway (Vol. 4, Issue 2, Summer 2014 — available at http://www.antiquewireless.org/awa-gateway.html) for details of that effort.

Whether you are a member or not, please consider making a donation to the expansion effort in the form of time or cash. Tax deductible donations are now being accepted on the AWA website at http://www.antiquewireless.org/donate.html.

—Richard Neidich
The Antique Wireless Association is an organization of about 2000 international members linked by a common interest in the history of electrical and electronic communications. AWA members come from all walks of life and our ranks include teenagers, octogenarians, and beyond in both directions. At one of our meets, you might find yourself shaking hands with a retired broadcast executive or military electronics specialist, an engineer in a high-tech electronics firm, or an eager young person looking for advice on restoring his or her first radio.

The organization was started in 1952 by Bruce Kelley, George Batterson, and Linc Cundall—amateur radio operators and radio collectors from upstate New York. Their initial goal was to establish a museum where they could collect and preserve early wireless and radio equipment and historical information before it was lost to future generations. Decades later, their legacy continues to motivate our members.

Some of us are most interested in the technical background behind the epoch-making discoveries that now make it as easy to communicate across the globe as around the corner. Others enjoy the romance surrounding the men and institutions that put these discoveries to work: the maritime radio operators who averted disasters with their alert ears and quick thinking; the short-wave stations that radiated glimpses of exotic cultures and mindsets; the giant radio networks that delivered unparalleled entertainment and timely news to our homes while hawking toothpaste, cigarettes and soap flakes.

Though AWA members share this common interest, which many can trace back to early childhood, they express it in different ways. Some of us collect radio-related literature and manuals. Others collect and restore hardware: Morse keys and sounders, battery radios of the 1920s, telephones, advertising signs, cathedral and console radios—you name it! Collections can become very specialized, restricted to such things as radio components crafted of shiny Bakelite and gleaming brass or perhaps the fragile and intricate vacuum tubes that made the communications miracles possible.

Among our members are meticulous craftsmen who enjoy replicating vintage receivers and/or transmitters. Those who are licensed amateurs frequently operate such equipment in special communications events sponsored by the AWA.

In addition to the commitment to the preservation of historical artifacts and background materials at our Museum, AWA also publishes The AWA Journal and The AWA Review. The Journal is a quarterly publication that gives our multi-talented members an outlet to share their historical research, equipment restorations, troubleshooting and servicing tips and other information of common interest. The AWA Review, which also publishes member contributions, contains more extensive and scholarly papers. It is published once a year.

The AWA Gateway is the latest addition to the AWA family of publications. It’s delivered electronically and free of charge—downloadable from our website www.antiquewireless.org.

Our content is targeted at those who may not be familiar with the AWA and who perhaps are just becoming interested in the history, collecting or restoration of vintage communications gear. For that reason, our technical articles are more basic than those in our other publications and our articles about AWA generally do not assume knowledge that that only those familiar with our organization might have.

The AWA also sponsors a four day annual convention in August featuring technical presentations and forums, a large auction, an awards banquet, an equipment and artifact competition, a book sale, and an active flea market. The convention affords attendees plenty of time to renew and make friendships, time to engage in long conversations on collection, preservation and all other aspects of the hobby.

The AWA Museum campus is located in Bloomfield, New York. Membership in the AWA includes free admission to the world famous facility. It is crammed with too many treasures to describe here, but you can see some of the exhibits on our website www.awawireless.org.

The AWA is chartered as a non-profit organization in New York State, an IRS 501(c)(3) tax-exempt corporation, and is a member of the American Association of Museums. To learn more about AWA or to join our organization, visit the AWA website.

DONATING ARTIFACTS TO THE AWA

You may have artifacts that you are interested in donating to the AWA. We would be pleased to discuss any possible donation. Please call us at (585) 257-5119.

ABOUT THE ANTIQUE WIRELESS ASSOCIATION