

THE COLLINS RADIO COMPANY INGREDIENTS OF SUCCESS

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INTRODUCTION

My compelling reason for researching and writing this paper was that I was curious as to why, of all the communication equipment designers and manufacturers, Collins rose to a level of success and eminence far exceeding any of the others. In my opinion, this success was assured as early as 1925 by the circumstances and events leading up to Collins', at the age of 15, handling the traffic for the MacMillan expedition. The paper had to go beyond that time, however, to show how the catalyst of the depression, followed by Byrd's success, pushed Collins into business and rocketed him to fame and fortune far exceeding anyone's expectations. As such, the paper is essentially limited to the period of 1920 through 1933, from Collins' boyhood days through Byrd's radio transmissions from the South Pole using Collins equipment.

PROLOGUE

Arthur Andrews Collins was born on September 9th, 1909 in Kingfisher, Oklahoma, the only child of Merle Hunter Collins and Faith Andrews Collins.

His father, M.H. Collins, was interested in improving farming techniques through specialization, combining smaller tracts into large, single crop farms and utilizing modern, high production farm equipment. Basically, his idea was to establish farm co-ops as we know them today. This idea did not sell well in Oklahoma, so the family decided to move to a more fertile and crop conscious area of the country. M.H. selected Iowa, and when Arthur was only a youngster of three the family moved to a modest two-story frame house (Figure 1) at 1725 Grande Avenue in Cedar Rapids, Iowa, only several blocks away from 1720 6th Avenue, the home of Arthur's paternal grandparents. In Iowa M.H. Collins convinced land owners that his ideas would improve profitability of their tenant farms, and the Collins Farms Company was formed. The company prospered over the years and ultimately moved the Collins family from the "modest" to the "wealthy"



Figure 1. *Arthur Collins first boyhood home at 1725 Grande Ave. SE in Cedar Rapids, IA. The family moved here from Oklahoma when Arthur was three years old. (Photo by author in 1992.)*

category. At its peak, the company managed over 60,000 acres of farmland in Iowa.

As with many young boys of that time, the radio bug bit Arthur early, at the age of eight. He and his friend, Merrill Lund, built crystal receivers at Merrill's house. Merrill's father worked for the Quaker Oats company (still located in Cedar Rapids today) and supplied the boys with cardboard tubes for coil forms. Next, the two pals got into spark transmitters using Model-T Ford ignition coils, but Mr. Lund drew the line when lightning hit their aerial and caused a small fire in the basement. M.H. was not exactly convinced that the boys should move their experiments to the Collins home, but while he was at work one day two wagon loads of radio "junk" were smuggled into Art's bedroom at 1725 Grande Avenue. At this time, young Collins was ten years old, World War I had just ended, and radio was poised for an explosive expansion.

THE INFLUENCE OF AMATEUR RADIO

To fully appreciate the Collins Radio Company success story, it is necessary at this point to divert somewhat and look at some general amateur radio history.

Marconi was successful in transmitting the first wireless signal across the Atlantic ocean from Poldhu, England to St. John's, Newfoundland in December, 1901. Suddenly, wireless became a household word, and thousands turned to more than a casual interest in radio experimentation. From this group emerged a contingent of experimenters who were referred to as "amateurs." They became proficient in Morse code, built modest stations and began to communicate with each other, albeit on a limited basis. Their primary interest was in experimentation, and it has been said that every

major development in radio can be traced in one way or another to "amateur radio." Even Marconi considered himself an amateur.

The first piece of legislation governing radio stations was signed into law by President Taft in August, 1912. To the amateur it basically meant: he was restricted to wavelengths of 200 meters and less; he could not exceed one kilowatt of transformer input; and he was required to obtain a license from the Department of Commerce. At this time radio waves were considered by experts to be effective in proportion to their length, and the general belief was that waves shorter than 250 meters were worthless, except for very limited use. In other words, this was the lawmakers' way of legislating the Radio Amateur out of existence. With only minor modifications, this law was to regulate the amateur for the next 12 years.

World War I halted all private radio communication in 1917, but the wartime need for radio engineers, instructors and operators was largely filled from the ranks of the amateur radio community.

The year 1920 was the dawning of a new age for amateur radio. Advances in vacuum-tube technology brought about during the war years were being perfected, but the price and lack of availability of suitable tubes held back wide spread interest. "King Spark" was still the predominant amateur transmitter, and 200 meters, plus or minus, the wavelength of choice. Amateurs as a group became more oriented towards operating than experimenting and a great deal of emphasis was placed on handling and relaying messages, with new transcontinental relay records being set regularly.

In February 1921, RCA announced the availability of the UV-202 and UV-203, 5-watt and 50-watt transmitting tubes. This cleared the way for full scale amateur building of low and medium-power CW transmitters. Also, in February of the same year, the first series of one-way transatlantic amateur tests were conducted. U.S. hams transmitted pre-arranged signals which were listened for by British amateurs. Although commercial high-power stations were regularly communicating across the Atlantic at this time, no amateur signal had ever been heard from across the "pond." Unfortunately, the February tests were a failure, due in part to the number of British stations with oscillating regenerative receivers interfering with each other, as well as harmonic interference from high-power commercial stations.

The tests were repeated in December, 1921, this time with great success. Paul F. Godley, 2XE, the foremost receiving expert in America, was sent over to supplement the efforts of the British listeners so that "every chance of success might be provided." The first station heard was 1AAW on 270 meters, using a 60-cycle synchronous spark. Unfortunately, on subsequent verification this station turned out to be a bootlegger and to this day the operator has elected to keep his historical triumph to himself rather than admit his mischief. The next heard, and most consistent throughout the remainder of tests, was the now famous 1BCG of Greenwich,

Connecticut. This was a station assembled especially for the transatlantic tests by a group of six prominent amateurs, notably including Edwin H. Armstrong. The transmitter consisted of a MOPA using a pair of 204s as the final amplifier and operated on a wavelength of 230 meters. The plate supply was a 2000-volt dc motor generator.

All in all, over 30 U.S. amateur stations were heard in Europe, but the most significant fact was that two thirds of them were using vacuum-tube oscillators which were running, on average, substantially less power than were the spark transmitters which got across. The superiority of continuous-wave RF energy over that produced by the damped wave of the spark set was clearly demonstrated once and for all. Another interesting point concerning these tests (which lasted for ten days) was that all listening was done in the vicinity of 200 meters. In fact, Godley's receiver was only capable of tuning down to 160 meters. The term "short wave" was still synonymous with 200 meters!

Also, in 1921 an amateur radio operator important to the Collins story began to attract considerable attention for his technical contributions. John Reinartz, 1QP-1XAM, of Manchester, CT was first recognized for his invention of an extremely simple and very effective regenerative receiver for CW. He did not stop there, however, and was ultimately credited with: first successful work below 150 meters; application of antenna theory to practical amateur antennas; first east coast station to work west coast (6TS) on 20 meters; first to recognize the involvement of the sun and ionosphere in long-haul, short-wave radio communication; first to experiment with crystal controlled oscillators, and the list goes on. One could not read many 1920s radio technical journals without stumbling over the works of John L. Reinartz over and over again.

During 1922 amateurs began building low-power CW tube transmitters, but were hampered by the high cost of transmitting tubes and the lagging technology for rectifier tubes suitable for supplying adequate DC plate current. Indeed, many CW transmitters were of the "self-rectifying" type with raw AC applied to the plates.

Many construction articles still promoted spark transmitters as the way to go, and all amateur transmissions were still taking place on "short waves" – 200 meters plus or minus 50 meters. It's no wonder that the transcontinental daylight tests continued to be dismal failures! The year 1922 did see some improvements in receiver design, including Armstrong's super-regeneration concept and Reinartz's tuner and superheterodyne refinements, and it ended with some very successful one-way transatlantic tests (in both directions), but all in all, 1922 was a rather lackluster time for amateur radio.

Following this, 1923 started off at the same sluggish pace as 1922, but was destined not to end that way. Indications began to appear that, at last,

the move to shorter wavelengths was about to begin. In the March issue of *QST*, Robert S. Kruse, technical editor, wrote an article entitled "Exploring 100 Meters" telling about a few innovative souls (led by John Reinartz) who had been experimenting with wavelengths around 100 meters with excellent results. He went on to give some ideas on how to tune down to 100 meters, and ended with an announcement of a 100-meter QSO party. Mr. Kruse followed up this article with another in the September, 1923 *QST* entitled "Getting Away from 200 Meters," which was more or less a scolding to all amateurs for dragging their feet in building new equipment and using the shorter wavelengths. In the best Amateur tradition, though, the article was quite helpful in that it summarized much of the technical information which had been written to aid hams in building equipment for the shorter wavelengths. For the first time, 200-meter operation was referred negatively to as "this long wave business." Also, very successful 105-meter tests, conducted by the National Bureau of Standards, were reported in the July, 1923 *QST*.

On November 27, 1923, at a time pre-arranged by cable agreement, both John Reinartz, 1XAM and K.B. Warner, 1MO called French amateur Leon Deloy, (f)8AB on 100 meters. Deloy promptly answered both! Asking 1XAM to QRX, (f)8AB gave the honor of the first transatlantic amateur QSO to K.B. Warner, 1MO, Secretary and Director of the ARRL. That all three stations were using transmitting circuits designed by Reinartz was certainly a tribute to his technical contribution to this great achievement. The age of amateur transcontinental communication had finally arrived! Going from sublime to ridiculous, the November *QST* reported on the negative results of the daylight transcontinental tests which had been held in September on – you guessed it – 200 meters!

As 1923 came to a close, the light was finally dawning for thousands of amateurs who had doggedly stuck on 200 meters trying to punch their high-power signals through daylight paths of atmospheric static and absorption, only to sit by and watch as a few of their more progressive fraternity received the accolades and recognition for many new international communication firsts using the "real" short waves.

Before we return to our Collins story, there is one more preface of history to relate: that of the expeditions of this era.

ARCTIC EXPLORATION

In the late 1800s and early 1900s there was a great deal of interest in global exploration. Many parties had casualties, perished, or were lost and never heard from again. The use of two-way radio communication would obviously have been of tremendous help, but was not a viable option for most expeditions until the 1920s.

One well known explorer significantly affected the destiny of the Collins Radio Company. Donald B. MacMillan was no novice; he had made eight trips above the Arctic Circle before 1923, and maintained that isolation from the rest of the world was his greatest fear. On one trip he had carried a receiver and listened to broadcast stations, amateurs, ships and government traffic, but on his next journey, he was determined to have two-way radio communication. MacMillan consulted with Hiram Percy Maxim, 1AW, the President of the ARRL, in early 1923, and by June, when his schooner *Bowdoin* sailed for a 15-month expedition to Greenland, a 200-meter amateur station was aboard along with a very capable operator, Don Mix, 1TS. Although communication during the summer months of long daylight periods was spotty, the autumn, winter and spring months allowed for reliable communication with WNP and proved to be a great comfort for the seven-man crew, who spent the winter frozen in the harbor at Etah, Greenland.

By the time *Bowdoin* returned to its home port in Wiscasset Maine, in September, 1924, plans were underway for her next trip back to Greenland in the spring of 1925. This next expedition was co-sponsored by the U.S. Navy and the National Geographic Society. Its primary purpose was to explore an unknown area of approximately one million square miles near the north pole to determine whether or not land existed there. To execute this formidable task, the Navy sent along with the USS *Peary* three Loening amphibious airplanes and a contingent of pilots and mechanics led by a young, yet-to-be famous, naval officer. The planes were to perform the exploration work from an advanced inland base while *Bowdoin* and *Peary* remained at Etah harbor in Greenland.

The Zenith company of Chicago, Ill. provided the special radio equipment for both the *Bowdoin* and the airplanes, and John Reinartz was employed by them to design and oversee the construction and testing. The expedition left Wiscasset, Maine on June 20, 1925 and was scheduled to return in about four months. Because of the time of year, the ships would be in continuous daylight once above 66 degrees North latitude.

ARTHUR COLLINS

Now, having brushed upon the historical facts most significant to our story, we may return more directly to it.

Art Collins was a studious child and devoured all the radio information he could find. He was different from the other kids, opting to experiment indoors with his radio equipment rather than play outside with the other children. It was providential that neither Art or his father was a licensed amateur prior to 1920 because as such, there was no commitment to

pre-WWI equipment and practices, thus leaving the studious young experimenter with the time and inclination to research, evaluate and experiment with the exciting new developments which were just around the corner.

Art attended the Cedar Rapids public school system for his junior and senior high school years, and is remembered to be a tall, rather quiet lad to whom school work came easily. This was fortunate in that it gave him time to pursue his interest in radio. Having digested as much basic magnetic, electric, and radio theory as he could find in the library textbooks, Art stayed current with new developments by reading such periodicals as: *QST*, *Popular Radio*, *Radio Age*, *Wireless Age*, and *Radio Mechanics*.

He was always urged by the need for improvement and could see from the literature of the time that the unexplored region of the "real" short waves would provide the most fertile territory for discovery and development. He was also, no doubt, greatly impressed by the works of John Reinartz. Pushed by the desire to expand his experimental horizons and to discuss new ideas with contemporaries, Art obtained his amateur license from the Bureau of Navigation, Department of Commerce, in early 1923, at age 13.

In the same year, when most amateurs were still on 200 meters (many using spark), he was experimenting with a short-wave CW transmitter with an electrolytic rectifier power supply! This fact is evidenced by a letter he wrote to the editor of *Popular Radio*, published in the February, 1924 edition concerning questions about a coupling method between grid and plate coils and his desire for a "pure DC note." Such notes were a rarity amongst amateur stations in 1924, and it wasn't until 1929 that any serious emphasis was placed on achieving such purity. By June of 1924, 9CXX was a well known amateur station and was regularly seen in the "Calls Heard" columns of *QST*; by early 1925, his station was being heard all over the world.

Art Collins possessed what can only be described as an exceptional knowledge and divine-given insight regarding the behavior of RF energy. Even at the age of 14, his transmitter designs and construction techniques revealed these extraordinary gifts. Within the following several years, this young genius was to set the pace for solutions to some of the most vexing problems which plagued short-wave transmitter design at the time, including:

- control of parasitic oscillations,
- control of frequency instability,
- neutralization of RF amplifiers,
- efficient coupling of antenna to transmitter,
- single antennas for multi-frequency use, and
- efficiency and quality of class B modulators.

The first ingredient in the Collins success formula, then, was this young genius' own innate knowledge and skill.

By this time, M.H.'s business, The Collins Farms Company, was doing quite well and he decided to build Faith Collins' dream house which was to be a rather large, quarried stone federal colonial (Figure 2). A pleasant knoll, rare in the flat Cedar Rapids area, was selected as the site, and by 1924 Arthur had moved his ham station into a 12' by 9' third-story attic room which had sloping ceilings and a small window facing east overlooking the back yard. Arthur's father frowned on antenna masts which he felt would distract from the beauty of the splendid new house so, for now, Art would have to be satisfied with his 50-foot aerial and 48-foot counterpoise supported by the maple trees which were growing in the back yard. M.H. did support his son's interest in radio, however, by agreeing to purchase transmitting tubes, high voltage transformers, and other parts.

Tubes such as 204As, which Arthur wanted, were not exactly cheap in those days and commanded a price between \$150 and \$200. In 1924, this was equal to 10 to 12 weeks' salary for an average working man! Serendipitous as it was, M.H. provided the second important ingredient in the success recipe for the future Collins Radio Company. So, young Collins had his components to build some effective transmitters, and he certainly did.

THE MACMILLAN EXPEDITION

In 1924, Art Collins, via ham radio, became friendly with John Reinartz who was 16 years his senior. In spite of the age difference, Reinartz had a great deal of respect for Collins and the two contacted each other often on various short-wave frequencies and exchanged ideas on transmitter, receiver and antenna design and construction. By early 1925 they were maintaining regular schedules on 20 and 40 meters. As such, the two became very familiar with each other's operating habits and other subtleties by which one Morse operator knows another. Art Collins spent the month of June, 1925 in New England visiting Reinartz and attending the sailing ceremonies of the MacMillan - Navy expedition. Certainly neither of these two fellow amateurs could know of the birth of the Collins Radio Company, still eight years in the future, yet this fellowship, spawned by nothing more than mutual respect and a common interest in radio, was to provide the third ingredient to this incredible recipe for success.

As the MacMillan expedition pushed its way towards Greenland in late June and early July, east coast amateurs and shore naval stations easily maintained radio contact with the expedition. The *Bowdoin* (WNP) primarily communicated with amateurs whereas the *Peary* (WAP) worked naval

stations. Once the expedition was above 66 degrees north latitude, however, communications became spotty, and by late July there was 24-hour daylight and no radio communication.

The ships arrived at Etah harbor on August 2nd and the task of off-loading the planes began, along with the numerous other chores involving the plans and logistics attendant to the mission of setting up inland bases and providing for the ships' stay in the harbor. As expected, a great deal of traffic for both naval authorities as well as the National Geographic Society began to accumulate for the radio operators at WNP and WAP. The latter ship station was equipped with two transmitters: a standard Navy 2-kW, 500-kc spark set and a Zenith 2-kW vacuum tube set to be used to operate only on 500 meters. These were not the best choices considering the continuous daylight conditions, and WAP was unable to make any contact whatsoever. All traffic, therefore, would all have to be handled by WNP where the transmitter was a different story. John Reinartz had designed what he knew would be needed to maintain communication; a simple, 250-watt single 204A CW short-wave transmitter capable of operating on 20, 40, 80, and 150 meters.

On August 4th, WNP fired up to unload the many messages which had accumulated, but was unable to make any contacts on 40 meters, leaving 20 meters as his next resort. While the operator changed the coils to tune up on 20, he was thinking: "Hopefully, the band will be open, but will there be anyone on to hear me?" After all, 20 meters was still sparsely populated and knowing one's own exact wavelength was an art few had mastered. He sent out a general call, signed and listened for an answer. Tuning near his own frequency, he heard a strong, steady signal with a very familiar fist pounding through and he breathed a sigh of relief. Not only was John Reinartz the designer of the *Bowdoin's* transmitter, but he was also its operator, and the answering signal was signing: "WNP WNP DE 9CXX 9CXX QRK? QTC? K."

For the next three weeks Art Collins was the only link between the Macmillan expedition and the rest of the world. He worked many hours each day copying thousands of words sent out in Morse code, letter by letter, in the form of messages to the U.S. Navy, National Geographic Society, and friends and relatives of expedition personnel. Each day he would deliver the messages to the Cedar Rapids Telegraph office for forwarding over the wire-lines as instructed. Soon news of this marvelous achievement spread throughout the country and many wondered how a 15-year old boy could accomplish a task which the Navy could not. Certainly not the least impressed by this incident was the young naval officer in charge on the *Peary*, Lieutenant Commander Richard Evelyn Byrd.

Fate arranged that Reinartz was to be the radio operator on this expedition and that Byrd (with his fame and exploits still ahead) was exposed



Figure 2. *Arthur Collins' second boyhood home at 514 Fairview Avenue in Cedar Rapids. From his attic radio room, radio amateur Arthur Collins astounded the public by contacting the 1925 MacMillan Greenland expedition (Photo by author in 1993.)*

first hand to young Collins's wireless skills. This was a decisive circumstance which would prove invaluable to Collins in the years ahead. In addition to the publicity focused on the young radio expert by many newspaper reports, there were also articles in the October, 1925 *QST* and November, 1925 *Radio Age* Magazine featuring pictures of the station at 9CXX. Arthur's mother and father were duly impressed by their son's notoriety, as evidenced by the appearance of two 30-foot antenna masts on top of the Collins residence.

So, the fourth and final ingredient of success for the Collins Radio Company had been folded into the pot and now the recipe could simmer to its full potential while the young Arthur Collins matured into manhood during the next five years.

AUTHORSHIP AND PROGRESS OF THE RADIO ART

As the year 1925 came to a close, the state of the art found wireless communication still using spark or self-excited CW oscillators with raw AC on the plates. Some more affluent amateurs were using battery packs or motor generator sets for their DC plate supply and some less fortunate but progressive souls were experimenting with electrolytic (slop jar) rectifiers and rotary synchronous rectifiers. Most realized the importance of cleaning up their signals as regards tone, stability and wavelength, but were hampered by lack of reasonably priced components.

In 1926 Arthur Collins wrote two articles for the *Radio Age* Magazine. In the April, 1926 issue, his article was titled "Getting Acquainted with the

Short Waves." Featured in the magazine's "Blueprint" section, it described the design and construction details of his receiver and included a picture and schematic. The May, 1926 article, also in the "Blueprint" section, discussed design considerations for short-wave transmitters with some pictures and schematics of the two transmitters at 9CXX. From these two articles one can easily grasp Collins' superior understanding of the behavior of RF energy, his penchant for circuit simplicity, rugged construction practices, and pleasing design appearance. His ability to express his technical ideas in clear, concise written words belied a youth of his age.

During the first part of 1926, 9CXX was quite active on 37½ meters, working New Zealand and Australia and handling traffic. The rig in use at that time was a pair of 204-A's in parallel and most probably used a mercury arc rectified DC plate supply. A brief encounter with an electrolytic plate supply had ended in frustration and the dumping of the jars out the window. Faith Collins, Arthur's mother, complained to friends years later that she was unable to grow any flowers in that area. Later, in 1926, for what reason is uncertain, 9CXX became inactive and the station address changed to 2619 Bever Avenue. This address is within a mile or so of both the Collins homes and probably was the result of understanding parents giving in to the wishes of an adolescent only child craving a degree of independence. Whatever the reason, 9CXX was officially moved back to 514 Fairview Drive by the end of 1927.

Art Collins was to have graduated from high school in June of 1927. Although he had completed the necessary prerequisites for graduation, he became bored with school and left sometime that spring and never bothered to return or graduate. No doubt the school saw fit to award a diploma at some later date.

THE 1927 INTERNATIONAL RADIOTELEGRAPH CONFERENCE

With world-wide pressure for more of the radio spectrum, an International Radiotelegraph conference was convened in Washington, DC in September, 1927 and by the end of November an international agreement among 55 countries and 23 dominions was signed. Most delegates, including those from Canada and Great Britain, were against the interests of the Amateur; however, through the efforts of K.B. Warner of the ARRL and the U.S. Military representatives to the conference, the amateur came out fairly well.

The main impact of this conference was agreement on the following points:

1. The amateur must be licensed by an agency of his government and the agency must assure themselves of the proficiency of the operator.
2. The amateur bands were now clearly defined and must be strictly adhered to.

3. The amateur must comply with all the general requirements particularly with regard to wavelength, stability and freedom from harmonics.

4. Call signs will be issued using prefixes from those assigned to each country.

5. The new law would go into effect on January 1st, 1929.

In early 1928, the ARRL initiated a technical development program funded by a cash surplus which the league had. This program investigated receivers, transmitters, and wave measuring techniques to enable all amateurs to better meet the 1929 standards. Under this program, Ross A. Hull wrote some very important articles. The two on transmitters dealt primarily with proper tuning of self-excited circuits to achieve a good note. Unfortunately, no coverage was given to DC plate supplies or crystal-controlled transmitters which were already beginning to show up quite frequently and held, of course, the immediate answer to frequency stability and clean clear notes.

The following quote is taken from the January, 1929 *QST* editorial: "It is the duty of every Amateur to prepare himself for the new life which exists on the other side of January, 1929."

THE BIRTH OF THE COLLINS RADIO COMPANY

Arthur Collins enrolled in Amherst College but it was not a rewarding experience. He was having a lot of trouble with his eyes (a familial problem) and corresponded with his father a great deal during this period. Probably due to a combination of eye trouble, boredom and homesickness, he left Amherst and returned to Cedar Rapids before his freshman year was over. As an only child Art was extremely close to his parents and called his mother from wherever he was every day of his adult life. He also observed a tradition of sending her roses on his (yes, *his*) birthday every year. After dropping out of Amherst, Collins took courses that interested him at Coe College in Cedar Rapids and also at the University of Iowa at Iowa City, but this radio wizard was never to graduate from college. Later, it was not uncommon for Arthur to have his secretary phone his high school math teacher and request an audience so Art could get help in solving a geometry or algebra problem associated with his design work.

Subsequent to becoming a nationally known teenage radio expert as a result of his accomplishment in contacting the MacMillan expedition, Arthur Collins' advice regarding high-frequency transmitter design was constantly sought by fellow hams as well as commercial and military interests. As he approached adulthood, (and with marriage in mind) it occurred to him that there must be a way in which he could make a living using his expertise.



Figure 3. *Arthur Collins' paternal grandparents home at 1720 6th Avenue SE in Cedar Rapids. In the basement, the Collins Radio Company was born in 1931 and operated there until the end of 1932. (Photo by author in 1992.)*

In 1930, Collins married his high school girlfriend, Margaret (Peggy) Van Dyke. The couple moved into Arthur's grandparent's house at 1720 6th Avenue (Figure 3) which was vacant due to the recent death of his grandmother.

In the basement of this modest house, the Collins Radio Company was born. At first, small revenues were received for consulting and design services, and a few kits and transmitters made to order for some affluent hams sustained the fledgling "one man company." By 1931, the depression which was spawned by the stock market crash of 1929 was having a disastrous effect on the economy and the Collins Farms Company. When farmers were unable to meet financial obligations, it was customary for the Farm Company to extend credit in the form of loans backed by mortgages on the farm property. In turn, when the Farm Company was pressed for payment by its creditors, it had no alternative but to begin foreclosure on some of these mortgages. This situation was extremely distasteful to M.H. Collins and he sold his business to an insurance company in 1931. At this point, Arthur Collins, no doubt, realized that without the cushion of a profitable family business, his future depended on the success of his radio company. It was then that he began to design and construct what he knew the ultimate "1929" amateur transmitter should be: crystal controlled; pure filtered DC plate supply; separate oscillator plate source; parasitic suppression; proper neutralization; rugged construction and pleasing appearance, and most of all - **HIGH QUALITY!**

EARLY COLLINS TRANSMITTERS

By the end of 1931 the prototype of the first "production" RF exciter unit - the 10A - had been built and tested (Figure 4). The unit was constructed on a polished aluminum chassis with a bakelite front panel and used a 247 crystal oscillator, 247 buffer-doubler and a 210 output. This unit performed so well that it was used in six of the eight different transmitters produced by Collins during the next two years.

In early 1932 Collins began producing and selling complete transmitters in earnest. First came the 30W (Figure 5). This was a 30-watt CW-only rig which utilized the 10A RF unit with a power supply mounted below.

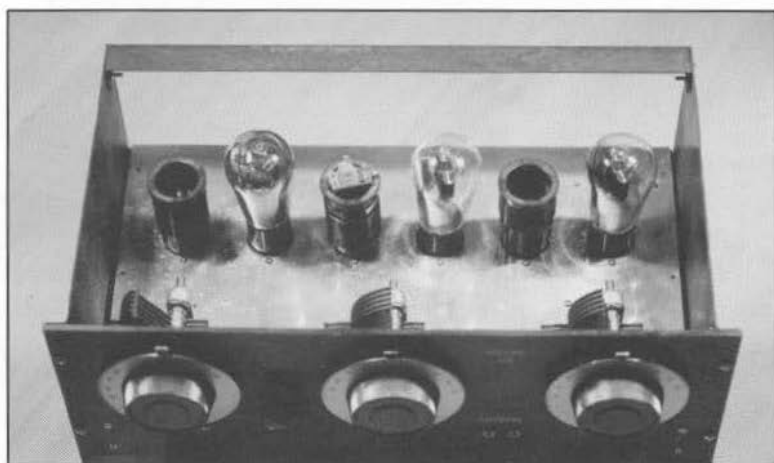


Figure 4. The Collins 10A RF deck. This was the first Collins production unit. Using a 247 crystal oscillator, a 247 buffer-doubler, and a 210 final, the design was incorporated in six of the first eight transmitter models manufactured by Collins. (From the author's collection...photo by author.)



Figure 5. The Collins 30W transmitter. A 30-watt, CW-only unit, this was the first complete transmitter marketed by Collins. It used the 10A RF deck above with a 500 AX power supply below. (From the author's collection...photo by author.)

Next was the 40B (Figure 6), a phone and CW version of the 30W using 46s as modulators.

The Collins 150B (Figure 7) was a 150-watt phone and CW transmitter which used the basic 10A exciter and a single 203A power amplifier modulated by a pair of 203As.

Toward the end of 1932, Collins designed and constructed his first "high"-power transmitter, the 20B (Figure 8). Although the creation of this transmitter was prompted by an affluent Illinois amateur who wanted a money-no-object ultimate ham transmitter, it resulted in Collins' debut into the commercial broadcast transmitter business. High-level class B modulation for low- to medium-power amateur transmitters had been pioneered by Collins. For this new transmitter extensive tests were conducted which proved that 204As and 849s were well suited to Class B higher-power circuits. The 20B utilized push-pull 204As modulated by 849s and proved to be a highly effective, low-distortion phone transmitter capable of a fully modulated carrier output of more than 750 watts. Although most transmitters could be delivered from stock, customers were advised that "20Bs are made to order and will require 30 days for delivery."

By the end of 1932, the company was rapidly outgrowing its quarters in the basement of Arthur's house and arrangements were made to lease the ground floor (actually three feet below ground) of a 1600 square-foot brick building at 2920 First Avenue (Figure 9). By January, 1933, the move was completed and operations resumed. Although there were only a few employees at that time, a newsletter was introduced to keep past and prospective new customers abreast of company progress. The first issue of the *Collins Signal* was published in February, 1933 and showed the first company trademark logo, a globe showing the western hemisphere with lines

Opposite page:

Figure 6. *The Collins 40B transmitter. Introduced in mid-1932, this was an AM and CW version of the 30W, using PP46 modulators driven by PP 245s. (From Collins Bulletin 200.)*

Figure 7. *The Collins 150B transmitter. The first group of these 100/150-watt output AM/CW transmitters was actually made in the Collins cellar "Factory." Two 150Bs were carried on Byrd's 1933 South Pole expedition. (From the author's collection...photo by author.)*

Figure 8. *The Collins 20B transmitter. The first of these 750-watt output AM/CW transmitters was built in the Collins cellar "factory" for W9BHT. A 20B was carried by Byrd to the South Pole in 1933 and used for "broadcasts" via CBS to the USA radio listening audience in 1934. (From The First 50 Years by Rockwell International.)*

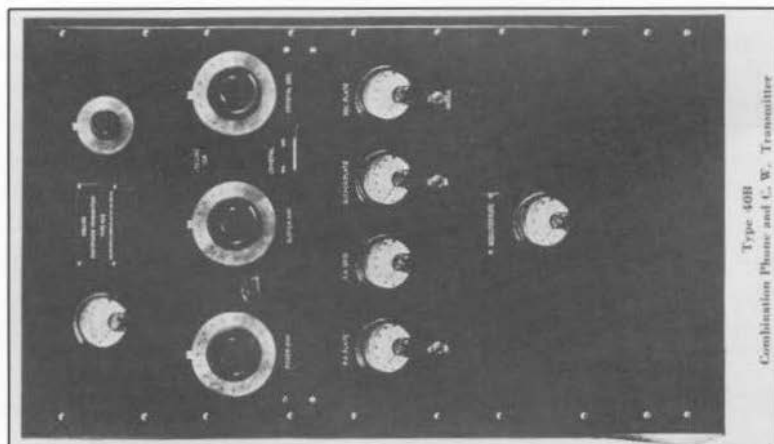


Figure 6. The Collins 40B transmitter.

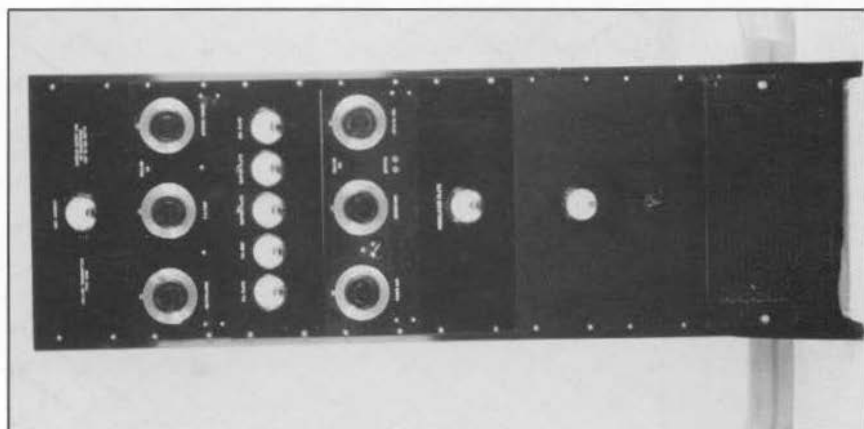


Figure 7. The Collins 150B transmitter.

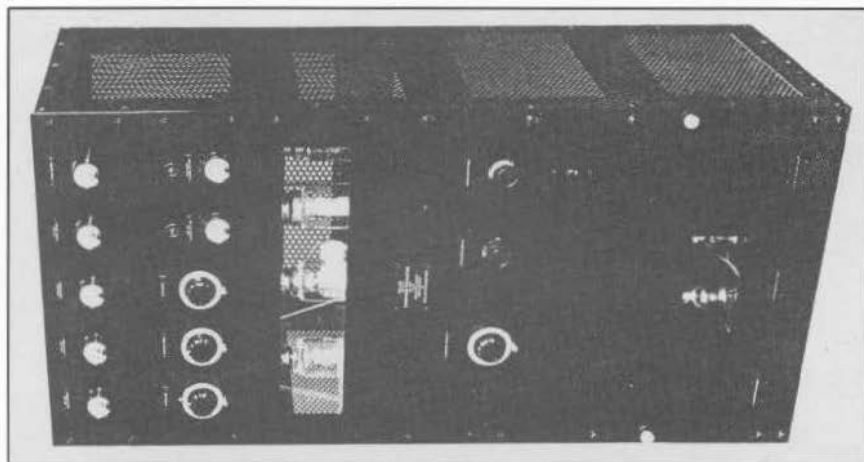


Figure 8. The Collins 20B transmitter.

Figure 9. Site of the first "real" Collins Radio Company factory, 2920 First Ave. NE, Cedar Rapids. The company had outgrown its cellar location by the end of 1932 and moved into the ground floor of this building in January, 1933. (Photo by author in 1993.)



of latitude and longitude and with long wings extending from each side (Figure 10). By mid-1933 the trademark had been modified by enlarging the globe, attempting to depict the entire world, and removing the latitude and longitude lines. The February, 1933 *Signal* was a four-page issue consisting of a detailed description of the new 20B kilowatt transmitter and showed a picture of a 150B and 20B installation at amateur radio station W9BHT. This provides important historical evidence that these relatively large transmitters were actually produced in the basement of Arthur Collins' house at 1720 Sixth Avenue.

In March of 1933 the 32A (Figure 11) and 32B transmitters were introduced. These units incorporated the 10B RF unit which utilized a pair of parallel 46s in lieu of the single 210 used in the 10A. The 32A was a CW-only unit while the 32B incorporated push-pull 46 modulators operating class B. Separate power supplies for the oscillator and final RF stages were incorporated in the lower section of each transmitter. Although these transmitters ran slightly less power (20 to 25 watts output), they were essentially lower-priced substitutes for the 30W and 40B units previously described.

In April of 1933 three new units were announced: The 300B, the 42A and 42B, and the 4A. The 300B was a higher-power (300 watts output) version of the 150B incorporating the 33A (push-pull 203As vs. single 203A) power-amplifier deck. Due to the greater size of the transformers involved, a second rack unit was utilized to house the modulator and modulator power supply decks.

The 42A and 42B units were not very well advertised and probably very few were actually manufactured. They did, however, herald a new look in RF-exciter deck design which became the Collins mainstay for the next two years. Using the same size chassis and front panel as the 10A and 10B units, the new design used a 47 crystal oscillator, parallel 46 buffer/doubler and a single 203A output tube. With 750 VDC on the 203A plate, outputs as high as 80 watts were achieved. It is not certain how many versions of this exciter deck were actually built but they were used in many of the 1934, 1935 and 1936 transmitters with known designations of 10J (Figure 12), 10K and 10M.

Figure 10. Page 1 (of 4) of the first issue of the Collins Signal, February, 1933. Only a month out of its cellar "factory," Collins published its first of many Collins Signals. This page shows the first version of the company logo and provides evidence that the relatively large transmitters pictured, the 150B and the 20B, must have been manufactured in the cellar location. (Author's collection...photo by author.)



Figure 11. The Collins 32A transmitter. Running slightly less power (25 vs. 30 watts), this transmitter was a less expensive alternative to the 30W. It used the 10B RF deck which had parallel 46 tubes in the output stage rather than a single 210. (Author's collection...photo by the author.)

The 4A transmitter (Figures 13 and 14) was Collins' first and last stab at the "extremely low priced" amateur transmitter field. This classy little table top rig used a 47 crystal oscillator and parallel 46s as the output stage and was capable of putting out a clean 20-watt CW signal on 160, 80 and 40 meters. Separate oscillator and final power supplies were self-contained and typical Collins quality is evident throughout. The selling price was about \$60, less plug in coils and tubes.

Only top quality parts were used in Collins transmitters. General radio knobs and dials, Weston and Westinghouse meters, and Hammarlund and Cardwell variable condensers were all standard.

Transformers and filter chokes were made to Collins' specifications by The Chicago Transformer Corporation, a high-quality parts manufacturer who put only the OEM part number on the unit. In its sales literature, Collins freely provided specifications, diagrams and parts and price lists for all components of each transmitter. If one was so inclined he could build a copy of any unit by purchasing only those items which he was unable to obtain elsewhere.

All transmitters introduced before 1934 left the sticky problem of effectively coupling the output stage to the antenna pretty much up to the user. In a classic paper written by Arthur Collins and published in the February, 1934 *QST*, this situation was put to bed once and for all, and subsequently all Collins transmitters were equipped with adequate antenna impedance matching networks.

ADMIRAL RICHARD BYRD AND THE SECOND ANTARCTIC EXPEDITION

Sometime in mid-1933 a remarkable and fortuitous series of events began to unfold. Rear Admiral Richard Byrd was planning to depart in late 1933 on his second expedition to the Antarctic and contacted Arthur Collins about the possibility of supplying the necessary radio transmitters. To fully appreciate this, we must take a moment to glance back in time.

In September, 1928 Commander Richard E. Byrd had departed from New York on his first expedition to Antarctica. The two main ships were the SS *Eleanor Boling*, (WFAT) and the SS *City of New York*, (WFBT). Both ships carried 2kW self-excited transmitters capable of operation on intermediate and high (up to 22 mc) frequencies. The ships arrived at Dunedin, New Zealand in late November, 1928 and by January, 1929 a base station on the polar ice barrier at the Bay of Whales had been established. Amateur as well as commercial and naval radio communication, primarily CW, was readily maintained throughout Byrd's first Antarctic expedition which returned to the U.S. in the late spring of 1930.



Figure 12. The Collins 10J RF deck. Announced in mid-1933, this RF deck was first used in the 42A and 42B lineup. (Author's collection...photo by author.)



Figure 13. The Collins 4A transmitter. This was Collins' first and last try at the "low price" amateur transmitter market. Introduced in mid-1933 with a selling price around \$60, less coils and tubes, it had 20 watts of CW output on 160/80/40 meter bands. (Author's collection...photo by author.)

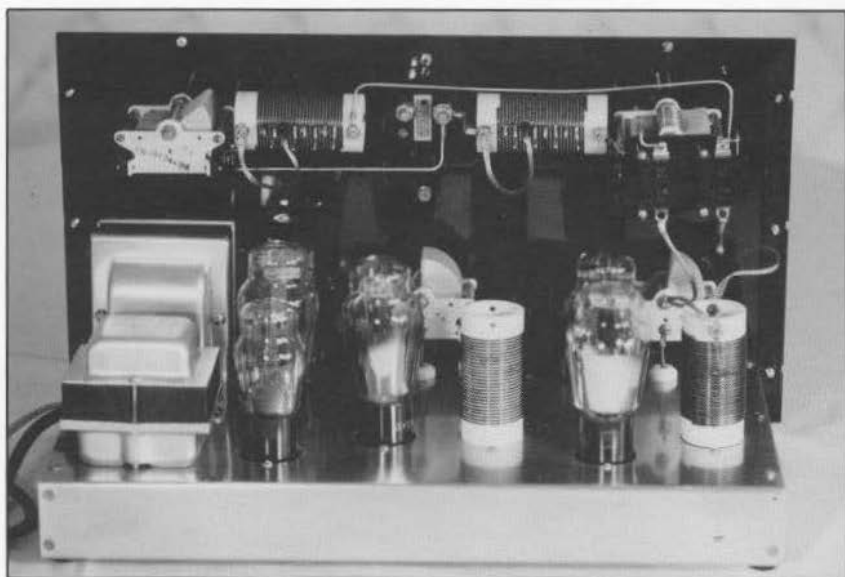


Figure 14. A rear view of the 4A. Separate oscillator and final power supplies are on the left, the crystal oscillator is in the middle, and the final pair of 46s is on the right. The 2C antenna matching network is on the top. Collins quality throughout! (Author's collection...photo by author.)

The use of short waves for long distance work together with advances in receiver and transmitter design had certainly provided the desired safety and effectiveness for the exploration work of Richard Byrd. Ironically, though, they probably allowed for a certain lack of fanfare and public acclaim for the explorer and his achievements. What Admiral Byrd wanted for his second expedition was not only dependable short-wave transmitters, but ones that would provide for reliable telephony communication between the Antarctic and major cities in the U.S.!!! Quite naturally, he turned first to the one person he knew, who as a boy of 15 had accomplished a communication feat which all others found impossible.

Commercial, trans-continental radio telephone transmitters were, of course, in use at this time but were found only with output powers in the vicinity of 50 kilowatts. Because of weight and power limitations of the polar expedition, Admiral Byrd needed reliable equipment which would be in the one kilowatt-size category, and Collins had just what he needed - the 20B, which had recently been designed and was successfully in operation at W9BHT.

Admiral Byrd fully realized that dependable CW equipment would provide adequate communication to insure the safety and success of the expedition, but he wanted more - to create public awareness and support for future polar exploration by transmitting directly to the homes of the broadcast audience from the South Pole.

After several rounds of consultations and negotiations, CBS not only agreed to underwrite the project, but was able to sell the proposed broadcasts to a prominent advertiser, General Foods Corporation. Hindsight shows that this bold proposition was an incredible gamble for all involved. Failure undoubtedly would have damaged the reputations of Byrd, Collins and CBS to say nothing of the financial repercussions. With more of this thought in mind than would probably have been admitted to, the Collins Radio Company, with eight employees and a capital of \$29,000 was incorporated on September 22, 1933. Originally, 250 shares were authorized and issued as follows: one each to Arthur A. and M.H. Collins and 124 each to Margaret and Faith Collins.

Byrd's flagship, the *Jacob Ruppert*, departed Boston harbor on October 11, 1933 bound for the South Pole. Aboard were a Collins 20B and two 150B transmitters together with countless spare tubes, parts and accessories to maintain these units for a period of two years.

The first broadcast was made from a position approximately 1600 miles south of the equator and several hundred miles west of Chile. Propagation was not the greatest and the *Jacob Ruppert* was pitching and rolling in heavy seas. Nevertheless, their transmission was received in New York and placed on the network at the announced time. Broadcast listeners all over the country were amazed and entertained with sounds of the ship's whistle and the barking of over 100 huskies as well as narratives by various crew members throughout the ship, including some words by Admiral Byrd himself. Other broadcasts were successfully made from different locations as the expedition continued on to its destination. The first radio "broadcast" from the Antarctic continent was made on February 3, 1934 from the expedition's mess hall some 15 feet below the surface. Subsequently, regularly scheduled broadcasts became routine and the Collins transmitters continued to perform with "little to be desired".

The gamble had paid off for all involved. Word of the performance of Collins equipment spread rapidly and soon orders and requests were coming in from all over the world. More importantly, the interest was coming from governments, civil agencies, companies, rulers, and affluent persons, all of whom had special or unusual requirements and could afford to pay for what they wanted.

From there the Collins Radio Company went on to become a virtual giant in the electronic communication, avionics and telecommunication fields. It ultimately rose to a peak employment of over twelve thousand people, successfully defended itself against an unfriendly takeover by a small data processing firm owned by H. Ross Perot, and negotiated an amicable merger with the North American Rockwell Corporation.

All of that, however, including the many other Collins breakthroughs such as permeability tuned oscillators, autotune transmitters, aircraft radio navigation, and others, is another story for another time.



F. PARKER HEINEMANN

Parker Heinemann became interested in amateur radio through Boy Scouting and received his FCC license at the age of 15. He graduated from King's Point in 1953 and served on active duty in the United States Navy until 1956. After 10 years of employment as a nuclear submarine design engineer with General Dynamics, he founded Custom Marine, Inc. a marine and aerospace manufacturer. He is a licensed professional engineer in the states of Florida and Connecticut, and for the past 15 years has spent most of his amateur radio time researching and collecting pre WW II amateur equipment.