

Proceedings of The Radio Club of America, Inc.

Volume 52, Number 2



October, 1978

Founded 1909

Tribute to Bill Lear (Fred M. Link)	2
Fessenden, "Builder of Tomorrows" (E.J. Quinby)	3
Washington Meeting Hears Judge	8
Citations to New Fellows	10
Armstrong, Sarnoff Awards	12
Clement, Kelley, Stantley Awards	14
Big Turnout at Denver Meeting	16
Address Changes	18
Obituaries	20
Fortyfive New Members	22
Professional Listings	26

CONSTITUTION AND BY-LAWS OF THE RADIO CLUB OF AMERICA

(Page 23)

THE RADIO CLUB OF AMERICA, INC.
P.O. Box 2112, Grand Central Station, New York, N.Y. 10017

Organized for the interchange of knowledge of the radio art, the promotion of good fellowship among the members thereof, and the advancement of public interest in radio.

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BILL LEAR 1902-1978

Three sleek Learjets swooped low over the Mormon church of Reno, Nevada, dipping wings in a final salute to their creator: William Powell Lear, Sr.

Bill Lear died of leukemia May 14; he would have been 76 on June 26. The "flyby" May 17 concluded Reno funeral services for the founder of the predecessor company of Gates Learjet.

Born in Hannibal, Missouri in 1902, Bill Lear held over 150 patents. Today he is best known for the Jet that bears his name: "Perhaps the most successful executive airplane in the world," stated *The Washington Post* May 15.

"Bill Lear was truly one of aviation's greats," said president Harry Combs of Gates Learjet. "He made many contributions to aviation, particularly in the field of communications and navigation systems." But his greatest achievement came when he had the courage and vision to develop and build—with his own funds—a corporate jet that revolutionized business transportation."

A creative designer and incessant innovator, Bill Lear worked far ahead of the state-of-the-art. His inventions will stand forever as a permanent monument to his memory.

Certainly the hundreds of Learjets flying today (over 800) and the thousands joining them tomorrow will serve as living tributes to Bill Lear's genius. A uniquely fitting memorial is the second Learjet ever built, N802L. A model 23, it now hangs with other classics in the Smithsonian Institution's National Air and Space Museum.

"Bill Lear left school in the eighth grade, served a Navy hitch, immersed himself in electronics and learned to fly.

"His development of the first car radio possibly led to the founding of Motorola," quotes the aviation industry publication *Contrails*.

His awards were many—and a summary of key honors was listed in detail in the *Proceedings* issue of March 1978, in conjunction with our story on the honoring of Bill with the Sarnoff Citation at the annual banquet last November. His contributions to the radio and communications industry match his more publicized impact on aviation—and his invention of the eight-track stereo cartridge probably has reached everyone's home and life.

Speaking at the services in Reno, J. Sheldon "Torch" Lewis, LearAvia Vice President, said: "Bill Lear was a man of vastly different perceptions than most men. He had an uncanny sense of what the aviation market wanted and needed, and acted accordingly."

Perhaps news commentator Paul Harvey summed it up best when he told his audience: "Bill Lear was that rare combination of dreamer and doer of whom any industry is fortunate to have even one."

Bill was not only a personal friend of mine, but was also my business associate and partner in the 1930 era. His influence on me certainly had no small part in whatever success I personally achieved in the field of communications. There will never be another like him—the mold has been lost. As Bill would say: "YOU MUST HAVE A DREAM; IF YOU DON'T HAVE A DREAM, HOW WILL YOU EVER HAVE A DREAM COME TRUE"

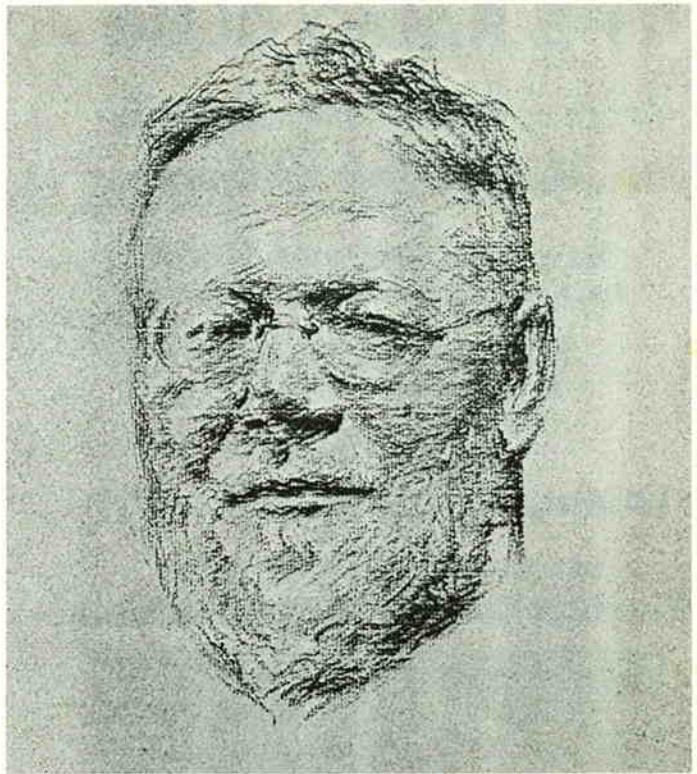
Good Bye Bill!!



“Builder of Tomorrows”

*Reginald A. Fessenden, who
led the way to our present
continuous-wave approach
to radio communication*

By E.J. Quinby



Reginald Aubrey Fessenden

Part I—The Shattered Dream

One of Radio's most important pioneers is often overlooked and frequently forgotten. Few of our leading radio and electronics executives are familiar with the name and fame of Canadian-born Professor Reginald Aubrey Fessenden, the genius who blazed the trail toward our modern techniques through a wilderness of ignorance.

Early in the effort to improve wireless communication above the level of the spark-coil transmitter and coherer combination, Fessenden gave us the synchronous rotary spark-gap with the clear musical voice that could drill through both natural static barrages and man-made interference, and the liquid barreter detector whose efficiency and sensitivity suddenly extended the range of wireless telegraph transmitters. His heterodyne principle solved the problem of receiving the continuous waves from his later radio frequency alternator, opening up a new era.

Although this young Purdue University professor early recognized the logic of Nikola Tesla's advice on the superiority of continuous waves over the damped waves everybody struggled with in the pioneer days, no continuous-wave generators available were capable of producing radio frequency. So he proceeded first to improve the damped-wave transmitter equipment. His first step in that direction was his synchronous rotary spark-gap.

Tesla had declared that the spark transmitter was an absurdity and abomination, and that the simplest principle for an efficient radio transmitter would be a high-frequency alternator, with one terminal connected to the antenna, the other connected to the ground, and tuned to resonance. But others claimed that it would be impossible

to build a radio-frequency alternator. Nevertheless, Tesla proceeded to build one. His laboratory model produced 20 kc (20 kHz). He placed an order with Westinghouse for a powerful radio-frequency alternator following his design, and proceeded with the construction of his lofty mushroom shaped tower at Wardencliffe, Long Island for his projected World Wide Wireless station.

But when J. P. Morgan withdrew his financial support for that fantastic venture, Westinghouse failed to deliver the alternator and the project stalled. Despite Tesla's success with his alternating-current power distribution system and his harnessing of Niagara Falls, many who should have known better declared that the man was mentally unbalanced. But not Fessenden—he remained fascinated with the idea of a radio-frequency alternator.

His early successful experiments with wireless at Roanoke Island attracted the attention of two Pittsburgh investors named Thomas H. Given and Hay Walker, Jr., whom he had met while he was Professor of Electrical Engineering at the University of Pittsburgh. They asked Fessenden if he could extend the range of his system, and he assured them he could—but it would take money. Accordingly they offered to invest the necessary \$30,000, and proceeded to form the National Electric Signaling Company. At the start, he signed over his 32 patents to the company, and during his affiliation with N.E.S. Co., he signed over 150 more patents.

Fessenden became a prolific inventor who was eventually granted more than 500 patents. His early patents became the chief asset of the newly formed company, headed by

THE RADIO CLUB

69th Anniversary Awards Meeting and Banquet

New York Sheraton Hotel
7th Avenue at 56th St., New York City

Friday, Nov. 17, 1978
Assemble 5:30 Dinner at 7

Keynote Speaker

SAMUEL L. GRAVELY, Jr., USN

Director
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Given and Walker the financiers, and Fessenden with his patent attorney Darwin S. Wolcott. In the agreement signed by these four, Fessenden was boxed into a corner without access to his own patents, to which title and control was taken over by Given and Walker. And Wolcott was assigned half of Fessenden's interest in the new company.

With their eyes fixed on the prospect of selling Fessenden's patents and his whole wireless system for a sizable lump sum in a complete package deal, Given and Walker steadfastly refused to permit the manufacture and sale of apparatus under the Fessenden patents, despite the increasing recognition of the superiority of Fessenden's system made evident by his demonstrations of extended communication range. Prospective customers clamored for his equipment. These included the U.S. Navy, the U.S. Army and the operators of various fleets of the Merchant Marine.

Given and Walker could afford to wait for the envisioned millions. But Fessenden, depending upon a \$300 per month expense account, needed the income which apparatus sales could bring in the meantime. Given and Walker refused to become involved in the manufacture and sale of equipment, and Fessenden was not permitted a license under his own patents. An unhappy deadlock resulted.

Fessenden agreed with his financiers on one important policy: there would be no sales of stock in the National Electric Signaling Company to outsiders. The mushrooming wireless industry was fraught with stock-jobbing by unprincipled promoters who launched fraudulent companies, made fraudulent claims, and who disappeared overnight, giving the whole business a bad name. But encouraged by the increasingly successful demonstrations and expanding range of Fessenden's experimental stations up and down the Atlantic Coast, Given and Walker inquired about the possibility of extending the range to 3000 miles. In his enthusiasm, Fessenden assured them that it could be done—but that it would require considerable additional investment.

"How much?" they asked him.

A transatlantic system

Fessenden sharpened his pencil and came up with the answer: *One Million Dollars*. Given and Walker had their sights set on transatlantic communication. They agreed to put up the necessary funds, and Fessenden launched the project with boyish eagerness. That was in 1903, when Fessenden was 37 years old. He designed the two experimental stations to be erected on opposite sides of the Atlantic Ocean. A site was selected and purchased for the Western station at Brant Rock, Massachusetts, near Cape Cod, and the other at Machrihanish on the Scottish coast. Having already established wireless telegraph communication between Boston and New Orleans, 1600 miles *overland*, Fessenden felt confident that he could design stations that would meet the new 3000-mile requirement.

In the early years of the 20th century, tall antennae were considered essential for long-distance communication via Hertzian waves. Fessenden designed his antenna to be a

420-foot tubular steel mast, guyed by galvanized steel cables. The mast rested on a massive ball-and-socket pedestal, which rested on a heavy insulated base. Four sets of four guys, 90 degrees apart in the horizontal plane, secured the mast at 100-foot vertical intervals. Each was insulated at 50-foot intervals, anchored to massive concrete "dead-men". The calculated stresses were:

100 ft. elevation 12,800 lbs.	200 ft. elevation 13,200
300 ft. elevation 14,750 lbs.	400 ft. elevation 18,400 lbs.

The insulators were designed for 500,000 volts, and each was provided with a 500,000-volt safety gap. A 20-foot extension above the 400-foot level supported the Fessenden patented "Umbrella Capacity" perched at the top. The whole tower was designed to withstand a wind pressure of 50 pounds per square foot of flat surface even if one set of guys should suffer a fracture. Access to the inside of the vertical tube was through a hatch near the base, and ladder rungs were riveted inside, extending to the top.

Early in 1905 these two structures were begun. Near the base of each was located the laboratory building with research and development facilities, and the powerful transmitter and sensitive receiver equipment. The Eastern and Western establishments were duplicates throughout. The station at Brant Rock adopted the call letters BO and the one at Machrihanish was MA. At that time, the rotary spark-gap was the latest improvement in transmitter equipment, but Fessenden's development of this innovation was the *synchronous* rotary spark-gap, which was driven by the alternator that powered the transmitter. The energy waves were discharged precisely at their peaks, producing maximum efficiency, along with a characteristic musical tone in the phones at the receiving end of the circuit, which was conducive to clear reception despite man-made interference or nature's static.

Coupled to the 125-cycle 35 KVA alternator, the rotary gap at BO measured 6 feet in diameter at the stator, 5 feet in diameter at the rotor, setting a new record in both size and performance. Its rotor had 50 electrodes (poles) and its stator had 4. It was the "big daddy" of its species, at which the visitors marvelled.

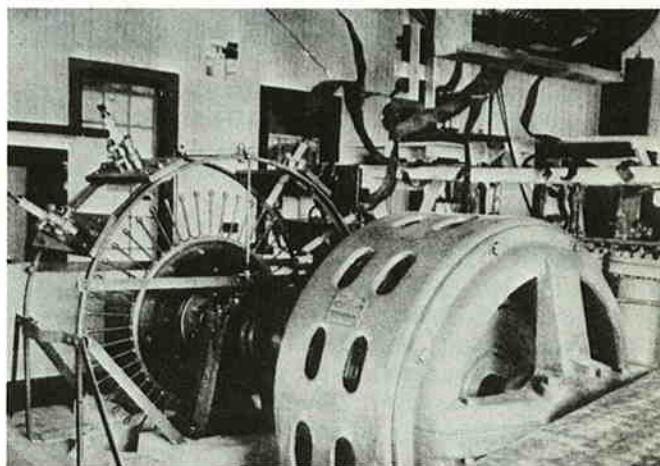
Spectacular as this development was, it reigned supreme in Fessenden's active mind for only a brief period. Within a year, he was devoting his attention to a newer and better development—the radio frequency alternator!

The prime mover at each of the two big stations was a 40 horsepower reciprocating steam engine belted to the alternator. The original oil-insulated condensers at each of the two stations were soon replaced by Fessenden's patented compressed air condensers, which stood up admirably under the electrical impact.

The Brant Rock antenna mast was completed December 28, 1905, and tests were immediately begun with the station at Macrihanish on a prearranged schedule. Although the Scottish station's transmitter was not yet "on the air", confirmation was received by cable during the first few days of January 1906, that the transmissions from BO were coming in "loud and clear". On January 10, 1906 the first two-way trans-Atlantic wireless telegraph messages were exchanged, setting off an enthusiastic celebration on both sides of the ocean. James C. Armor, Fessenden's chief assistant, was the operator at Macrihanish, and Fessenden himself was the operator at Brant Rock.

It was on that occasion that he raised his glass to the happy group and proposed a toast "To Trans-Atlantic Telephony", which startled all those present. Up until that moment they were unaware of Fessenden's planned development of the radio-frequency alternator, which to his mind would make radio telephony practical. He was already convinced that the annoying background noise of the arc or spark carriers, with which others were experimenting, could be successfully eliminated by the continuous waves emitted by the radio-frequency alternator, which Tesla had proposed. Fessenden had felt obligated to Given and Walker to build and demonstrate the Trans-Atlantic spark transmitter for wireless telegraphy. Now that this had been accomplished and demonstrated, he was anxious to get on with the development of speech and other sound transmission via Hertzian waves.

Fessenden surrounded himself with a blue-ribbon staff of assistants, including experienced telegraph operators, technicians and engineers, many of whom were to later achieve fame in their own right. They were loyal and enthusiastic over the projects their Chief undertook. Each was assigned his call or "sign", by which they became identified in communications via wire or wireless.



Fessenden's station BO at Brant Rock. The synchronous rotary spark gap at left is direct-coupled to the 125-hertz, 35-kilowatt alternator in the foreground. The oscillation transformer is overhead at right; compressed-air capacitors can be seen at far right.

Edward Bennett (B) Chief of R. & D.
 James G. Armor (A) Assistant in R. & D.
 Adam Stein (S) Chief Engineer
 Glaubitz (G) Mechanical Eng.
 Arthur F. Van Dyck (V) Technician
 LeConte Davis (L) Technician
 Pannill (CN) Operator
 Lee (MW) Operator
 W. E. Beakes (KS) Operator
 Wescoe (WS) Operator
 Campbell (PB) Operator
 Isbell (BL) Operator
 Hadfield (HD) Operator
 H. G. Gawler (W) Operator
 S. M. Kintner (K) Assist. Eng.

The "boys" assigned the call Z to Fessenden, which he adopted officially to the extent of signing his numerous directives Z.



The 420-foot mast of station BO at Brant Rock, Mass., photographed immediately after it was deliberately toppled by order of the U.S. Navy in December, 1917.

Work at Brant Rock

During the busy year of 1906 at Station BO, much research and development work was frequently interrupted by important visitors, invited or uninvited, including executives from such organizations as American Telephone and Telegraph Company, Western Electric, Western Union, General Electric, Postal Telegraph and a host of others. In the effort to accommodate them and make them comfortable, Mrs. Fessenden freely opened their small cottage on the grounds and often fed them from her not-too-well stocked cupboard. The cottage, like the laboratory, was heated by a typical New England wood-burning stove and cooking was done on another wood-burner. There were times when their diminutive bathroom was overtaxed, and Fessenden resorted to bathing in the laboratory's zinc-lined blueprint washing tank, which he found better accommodated his big frame.

Tempted by the glowing reports about the breath-taking view from the top of the 420 foot mast, even from his wife Helen and his young son, he decided to view the scene himself. Without announcing his intention to anyone, he undertook to squeeze through the small port at the base of the mast, only to become hopelessly wedged inside. Some of his assistants, searching in vain for their Chief, eventually heard him bellowing from his prison. Efforts to release him proved futile until his clothing was carefully cut away and the station's supply of butter was completely depleted in lubricating his ample person. Later, when a bosun's chair was rigged outside the mast, he had himself hauled aloft so that he, too, could admire the vista.

Three different frequencies were employed in the experimental communication between Brant Rock and Machrihanish, identified as Tune A, Tune B and Tune C. The results were carefully recorded and compared at various times of day and night. Atmospheric conditions were included in the records. The encouraging results of these tests and the reaction of those listening in, far and wide, precipitated urgent clamor for Fessenden equipment. Fessenden needed the income that sales of equipment built to his design would bring in, but despite his urging, Given and Walker declined to relax their restrictions, on the assumption that such sales would jeopardize their ultimate chances of selling the whole system in a package deal. Fessenden was helpless in remedying this stalemate, for his financiers refused to let him have a license to use his own patents, for which he had never received a penny.

Then, at the height of the excitement over the success in spanning the Atlantic with two-way communication, devastating news reached Brant Rock by cable. The Macrihanish tower had crashed to the ground in a winter storm December 5, 1906!

The subsequent investigation that revealed the cause—faulty installation work rather than any design defect—was small consolation but it relieved fears concerning the safety of the tower at Brant Rock. Workmen on the tower job at Machrihanish had not properly followed the specifications and instructions, resulting in faulty securing of the guy-cable sections. At the end of each section, the strands of the galvanized cable were supposed to have been “unlaid” and fanned out within the cone-shaped terminal sleeve. This assembly was to have been properly heated and filled throughout the vacant spaces with molten zinc. In the bitter cold at the time, insufficient heat was applied, resulting in a typical “cold solder” job. The shoddy terminals allowed the strain of the gale winds to collapse the fanned out cluster of strands and permitted them to pull out of the sleeve. One after the other had pulled out in a chain reaction, throwing accumulated strain on the remaining guys, which gave way in turn.

The collapsing tower smashed much of the equipment in the station building beneath, but fortunately none of the personnel were casualties. In contrast, the tower at Brant Rock was properly installed, and it successfully withstood the repeated assaults of the New England coast gales even through ten years of neglect after the project was abandoned. But the station remained active in tests between Brant Rock and Plymouth as well as other points through the succeeding few years.

Continuous-wave transmission

The first radio-frequency alternator built by G. E. according to Fessenden's improved design failed to meet the specifications for 20 kHz output frequency. The best that could be offered was 10 kHz, which disappointed Fessenden. He took the machine apart and rebuilt it for 20 kHz, and started experiments on the air with it. Although its output was a mere 3/4 kW, the important thing was that it *worked*. With it Fessenden was able to transmit voice to the experimental station at Plymouth, and later to other points—and the voice was not burdened by the growling uproar so characteristic of the primitive arc and spark telephone transmitters of other experimenters. Again ex-

cutives from the big communications organizations descended on Brant Rock to witness demonstrations.

On Christmas Eve, 1906, Fessenden staged a history-making broadcast from Station BO at Brant Rock over his radio telephone transmitter. First he announced the forthcoming program of music and voice. Then he played a phonograph recording of Handel's Largo. This was followed by Christmas carols, which he played on the violin. When the vocalist he had engaged for the occasion failed to reach the station because of a wintry storm, Fessenden sang a verse of O, HOLY NIGHT, accompanying himself on the violin, and then terminated the presentation by wishing all listeners a Merry Christmas, with the announcement that another program would be broadcast on New Year's Eve.

Fessenden requested any and all listeners to please write to him and confirm their reception of the program. As a result he was deluged with confirmation reports from listeners far and wide, and as far down the coast as Norfolk, Virginia. The New Year's Eve program was acknowledged from points as remote as ships in the West Indies area. It is interesting to note that operators on vessels of the United Fruit Company were receiving Fessenden's broadcast with his liquid barreter detector, and operators aboard other ships were employing bootleg copies of that invention. Later word was received from the Machrihanish station that before the tower had crashed at that location, the operator on watch had distinctly heard a voice from Brant Rock's transmitter which he recognized as that of Adam Stein. A check of the records revealed that at that time Adam Stein was testing with the station at Plymouth by radio telegraph. It was deduced that he probably was standing close to the high-frequency rotary spark-gap, and that his voice had inadvertently modulated the carrier of the high-frequency synchronous rotary spark-gap!

Fessenden, encouraged by the spectacular results of his Christmas Eve and New Year's Eve broadcasts, hastened to file appropriate patent applications. This expense added to others led him to again approach Given and Walker on the subject of relaxing their restrictions and permitting the manufacture and sale of apparatus under the Fessenden patents which constituted the main assets of the National Electric Signaling Company, and for which he had never received any payment. The early agreement he had signed still barred him from access to his own patents. His friend Col. John Firth offered his talents to promote and sell equipment if its manufacture could be arranged for under the Fessenden patents. He had prospective customers waiting to sign purchase contracts, including the U.S. Navy and The Tropical Radio Telegraph Company, subsidiary of the United Fruit Company.

At last, in 1908, Given and Walker relented to the extent of permitting sales to these two customers only. Through Fessenden's friend Dr. Greenleaf Pickard arrangements were made for the manufacture of Fessenden equipment by the Wireless Specialty Apparatus Company of Boston, to whom a patent license was issued. Two scout cruisers,

the USS *Salem* and the USS *Birmingham*, were equipped, with outstanding success. Tests revealed that their two-way radio telegraph ranges were 1000 miles in daylight and 3000 miles at night. Several ships of the United Fruit Company were equipped, plus several shore stations, including those at Boston, New Orleans and Swan Island in the Caribbean Sea. Communication was established between Boston and New Orleans, a distance of 1600 miles *overland*. Fessenden naturally anticipated some royalties from these sales and, according to the new agreement, a license to use his own patents—neither of which he got! In the process of the resultant negotiations, relations became strained between Fessenden and the two financiers.

Returning from England where he went to negotiate licenses to operate his system, he was lured to Pittsburgh to attend "an urgent conference" with Given and Walker. This was the point at which cloak and dagger elements enter the historic story. While Fessenden was in Pittsburgh, a team of huskies descended on the establishment at Brant Rock to seize the station. Exhibiting credentials from Given and Walker and their lawyers, these two yeggs began moving out Fessenden's personal files and loading them onto a truck. Helen Fessenden frantically tried to reach her husband by phone at the address he had given her, but Given and Walker had succeeded in closeting him so closely, that she was unable to get him on the line.

Meanwhile she and their nine-year-old son tried their best to prevent the raiders from taking over. The station's personnel had left for the day. When the intruders were busy outside, she slammed the door shut and locked it. It wasn't until Fessenden chanced to phone *her*, that she succeeded in reaching him. He advised her to call the sheriff and get a restraining order.

This put a temporary stop to the strong-arm tactics of Fessenden's financiers. But in the end, they managed to take over legally, and Fessenden was locked out of his own establishment. Most of his loyal staff quit and sought employment elsewhere. He and Helen and their son left Brant Rock in January 1911 and took up residence in Boston. Discouraged by the deal he had been given in the radio realm, Fessenden turned his active mind to other fields, while the courts deliberated over his predicament.

The Brant Rock mast survived until December 1917, when it was deliberately destroyed, victim of the war hysteria that swept the nation. These landmarks, visible many miles at sea, were considered a menace to our national security. In this frenzy, the Navy dispatched George E. Cole with a detail to demolish the Brant Rock mast, which by then had been abandoned. A Boston junk dealer agreed to pay \$300. for the scrap metal, provided the mast was toppled for him. Cole had the foresight to alert newsreel cameramen who filmed the dramatic event. When Cole's crew released one set of guys, the great structure came crashing down. George had worked on Fessenden installations aboard steamers. To him this deliberate destruction was a melancholy task, and the episode was symbolic of Fessenden's shattered dream.

(to be continued)

Our thanks to all our advertisers, whose support makes it possible for the Club to expand its educational and scholarship activities.

Washington Meeting Hears Judge Naumowicz

On May 25, 1978, the Washington, D.C., Chapter of the Radio Club held a luncheon at which the Speaker was Chester F. Naumowicz, Jr., Chief Administrative Law Judge of the Federal Communications Commission. Judge Naumowicz's appearance was both historic and timely. It was historic because it was the first time that an Administrative Law Judge of the FCC was invited to speak at any industry-related function. It was timely because during the month of May the General Accounting Office had released its report to Congress concerning the performance and impact of the decisions of the approximately 1,000 federal government administrative law judges in 28 federal agencies.

The GAO in its Report noted that the judges' decisions often have far-reaching effects, citing, for example, the Initial Decision of an FCC judge in a largely unpublicized case more than a decade ago which led to the creation of widespread competition in the telephone industry. The GAO Report, critical of the time it generally takes for an administrative law judge to issue a decision, singled out the FCC judges as the worst offenders. The GAO felt that the government law judges had too much independence and included specific recommendations to curb some of this independence through establishment of review procedures of judges' performances and an initial three-year probationary period for new judges.

Judge Naumowicz in his speech first explained how the position of administrative law judge evolved and the precise role within the federal civil service scheme that judges fit. In response to the suggestion of the GAO Report that judges are too independent, he noted, using the FCC as an example, that the function of the FCC judges is to apply the Communications Act of 1934, as amended, under Rules & Regulations as well as policy and standards adopted by



Judge Chester Naumowicz

of the FCC, to a given situation, and that the process includes the opportunity for the parties to present their arguments based on the evidence to the judge before the judge issues an Initial Decision which is subject to review and scrutiny by the FCC Review Board, and then by the Commission itself, and ultimately by the Courts. In terms of reduction of time it takes for a judge to hold a hearing and issue an Initial Decision, Judge Naumowicz felt that due to the nature

of the process there is very little that can be done to reduce the time substantially. Judge Naumowicz had a specific recommendation for engineers in the audience who appear as witnesses or submit written testimony before FCC Judges. He stated that, in his opinion, the engineer who can explain the engineering or technical concepts and problems in a way a layman or non-engineer can readily grasp, is really serving the best interest of his client.

Attendance for the luncheon was extremely good; over 50 people were present. Sam McConoughey, Master of Ceremonies, introduced Ruth Naumowicz, wife of Judge Naumowicz, who was a guest at the head table and who is known to many of the Radio Club members because she works for the General Electric Land Mobile Radio Government Liaison Office. Fred Link and Joseph Rosenbloom came down from New York for the luncheon. The speaker attracted a large number of nonmembers, principally from the broadcast industry and legal profession. This gave Fred Link an opportunity to explain the history behind the creation and purpose of the Radio Club of America.



"The figures above" are *not* those named as such in the caption on page 34 of the *March Proceedings*. The caption should have read: "The figures above are Becky Johnson and Bill (R.W.) Johnson, W6MUR, Fellow of the Radio Club of America and consulting engineer." The other figures are correctly designated as Fred Link, Jim Lamb and Leo Sands.

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Citations to New Fellows, 1978

William M. Borman, *Technical Director, Corporate Government Relations, Motorola, Inc., Washington, DC.*

For leadership and contributions in the field of land mobile services.

Bernard J. Campbell, *Deputy Director and Chief Communications Engineer, San Bernadino County, CA.*

For accomplishments in public safety communications and activity in public safety communication organizations.

Roy T. Cushman, *Semi-retired, Los Gatos, CA.*

For contributions as designer and producer of specialized test equipment for the radio services.

William Detwiler, *President, Helper Instruments, Indialantic, FL.*

For innovation and achievement in the design and development of compact portable uhf radios.

Hugh S.B. Hamilton, *Manager in charge of two-way radio development, Pye Telecommunications Ltd, Cambridge, England.*

For scientific contributions in land-mobile communications technology and narrower channel spacing in two-way radio.

Marion J. Henson, *Telecommunications Manager, California Department of Fish and Game.*

Contributions in the fields of forestry conservation and service in public safety organizations.

Harry Kaemmerer, *Staff Supervisor, CCTV Engineering, AT&T, New York, NY.*

For contributions to concepts and designs resulting in the first digital time base corrector for helical video tape recorders.

Paul Katz, *Chief, Professional and Technology Branch, U.S. Department of State.*

Contributions to early space communications and cooperation in the development of public safety communications for more than two dozen foreign countries.

Joseph E. Keller, *Industry Attorney, Washington, DC.*

For contributions in the field of radio and communications law.

C. Raymond Kraus, *President, Consulting Communications Engineers, Inc., Villanova, PA.*

Contributions in satellite, submarine cable, microwave, over-the-horizon and coaxial cable facilities for long-distance communications.

Jack A. McCullough, *Retired (Co-founder and President, Eimac).*

For contributions to the vacuum-tube industry—design and development of power tubes.

Robert L. Mattingly, *Head, Mobile Systems Development, Bell Laboratories, Whippany, NJ.*

For developmental activities in mobile telephony, especially in connection with the cellular system.

Alfred A. Menegus, *Publisher, Electronic Technician/Dealer, New York, NY.*

For more than 30 years involvement in communications electronics and public relations.

L. Eugene Root, *Retired President, Lockheed Missiles and Space Co., Sunnyvale, CA.*

For contributions to an experimental engineering environment that included the Agena spacecraft, the Polaris missile and Project OSCAR.

Frank L. Rose, *Supervisory Electronics Engineer, FCC, Washington, DC.*

Activity in technical standards in the field of radio transmission and reception as a staff member of the Office of the Chief Engineer, FCC.

Joseph S. Rosenbloom, *Counsel to the Research and Advanced Systems Development Divisions, IBM, Armonk, NY.*

Activity and service in communications organizations.

Shalkhauser, Eric G., *W9CI, Professor Emeritus, Bradley University, Peoria, IL.*

In recognition of a lifetime of radio

activity in three fields: manufacturing, education and amateur.

Neal H. Shepherd, *Consulting Engineer, General Electric Co., Lynchburg, VA.*

For contributions in the field of vehicular communications and spectrum utilization.

Theodore A. Smith, *Retired, formerly Group Executive Vice President, RCA.*

For contributions in the field of military and commercial television and broadcast equipment.

John J. Tary, *Electronic Engineer, Institute for Telecommunications Sciences, Boulder, Co.*

For accomplishments in long-distance communication, troposcatter and theory of modulation for wideband systems.

Raymond C. Trott, *Antenna Systems Engineering Co., Dallas, TX.*

Contributions in the design of antennas and equipment for the vhf, uhf and microwave regions.

Joseph F. Walker, *Vice President, Phillips Communications Co., Bartlesville, OK.*

For contributions to communications for the petroleum industry in the field of offshore drilling and production operations.

John T. Wilner, *Director of Engineering, New Jersey Public Broadcasting Authority.*

Contributions in the development of color TV, in Public Service Broadcasting, and in the improvement of uhf systems.

Leonard T. Witt, *Consultant to the Emergency Medical Service of the New York City Health and Hospitals Corp.*

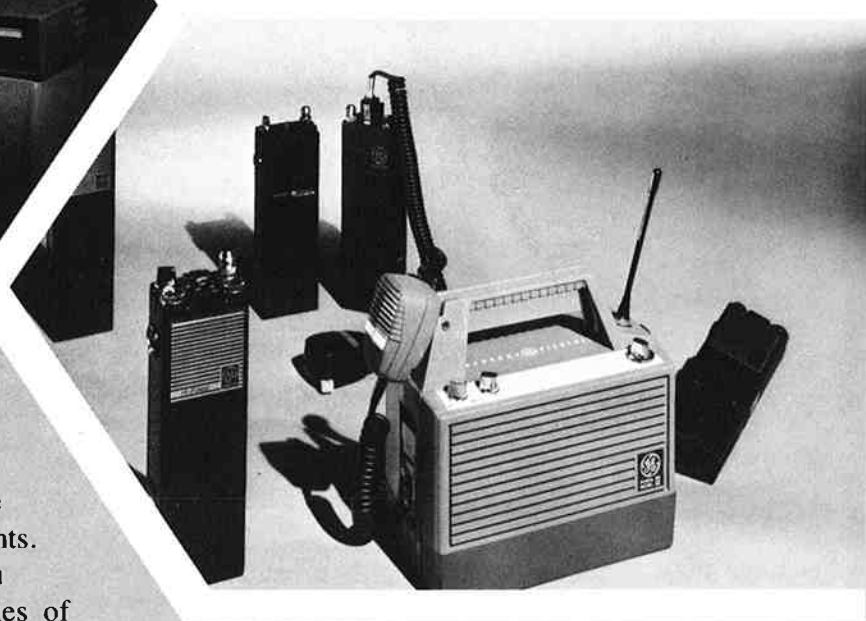
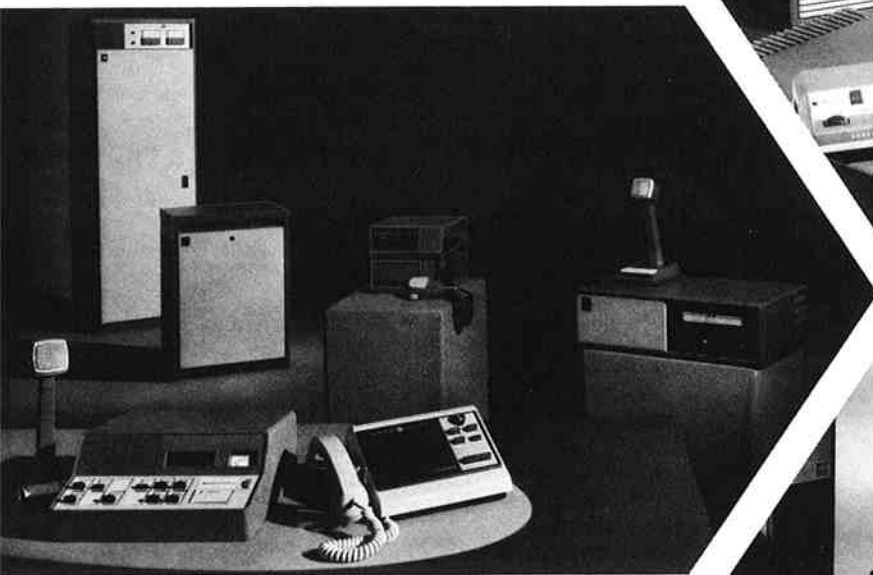
Contributions in the field of emergency medical communications.

Benjamin Wolfe, *Vice President, Engineering, Post Newsweek Stations, Inc., Washington, DC.*

For his many contributions to communications technology and television research.

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GENERAL  ELECTRIC

Armstrong, Sarnoff Awards



Murray G. Crosby

The Armstrong Medal of The Radio Club of America is awarded to Murray G. Crosby in recognition of his pioneering work in circuit technology, propagation characteristics, noise suppression theory, and multiplex frequency modulation broadcasting.

The first third of his professional career was spent with the RCA Laboratories, working on communications circuits involving frequency and phase modulation. After a short period with Press Wireless and then the Paul Godley organization, he started his own Crosby Laboratories, Inc. in Syosset, NY.

Initially, Crosby Laboratories specialized in development of single side-band receivers. Then Murray turned his attention to the problems associated with FM multiplex broadcasting. His method of multiplex FM stereo was first broadcast over station WBAI in New York City.

Murray joined the Club as a Fellow in 1939. In the course of his career, he was issued over 200 U.S. patents as a measure of his contributions to our field of radio communications. His last patent was issued a few days after his death. It dealt with a subaudible coding system for statistical verification of radio and television commercials.



Bill Eitel

William W. Eitel, who receives the Sarnoff Citation this year, was born in San Jose, California, in 1908. He received his first amateur license in 1924, in time to participate in the opening of the short waves.

After a period with Heintz and Kaufman, he formed Eimac with Jack McCullough, making tubes that were famous in amateur circles.

He achieved much of his fame in World War II, with the Eimac 50-T and 150-T. The company practically exploded during the war period, jumping from a small supplier of tubes largely to amateurs to a large mass-producer for the military. Here Eitel showed exceptional organizing ability.

At the end of the war, when the standard pre-war tubes were available in huge quantities at low prices as surplus, Eimac developed advanced types—the 4X-150A and the 4-250A, which were not competitive with the older tubes.

Later he participated in moon-bounce activity and satellite projects, working with Project OSCAR as chairman. He joined the Club in 1974, becoming a Fellow and Life Member that next year. Bill Eitel is receiving the Citation for his service to the country and to the amateur fraternity, from the days of EIMAC to those of OSCAR.

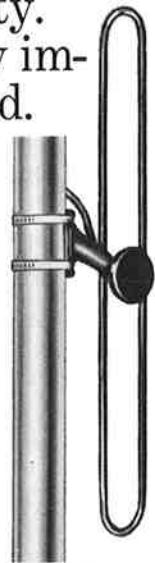
Bill Bryson for Phelps Dodge: one way to fight rising base station antenna costs is to spend more money on base station antennas.

A contradiction? Not at all. As I see it, if you're about to specify a new base station antenna, you must consider the total cost of the system. Add up the cost of the antenna, the tower and the cable, plus the time necessary for installation. Then anticipate the number of maintenance-free years you can count on. Some antennas will last a year or two. In ten's of thousands of installations ours have performed for more than ten years and many for over twenty. That's a really impressive record.



Some antennas will last a year or two. In ten's of thousands of installations ours have performed for more than ten years and many for over twenty. That's a really impressive record.

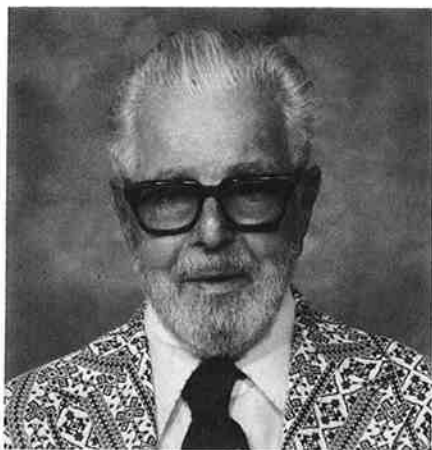
Here at Phelps Dodge we have lived with the total cost concept for a long time. We're committed to producing the finest base station antennas. We're involved in product improvement programs. We don't compromise on our very high material standards. We don't compromise on performance. We test to a degree that's almost out of style. This may all cost more, but the result is what you expect; the finest base station antennas you can buy. We build broadband, coaxial, cardioid, ground plane, yagi, corner reflector, parabolic, and other base station antennas to the same precision standards as our well known Stationmasters and Super Stationmasters. I'd like to tell



you more. Just call or write me: William B. Bryson, Manager of Engineering, Phelps Dodge Communications Company, Rt. 79, Marlboro, N.J. 07746. 201 462-1880

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Communications Company

Three 1978 Awards



Lewis M. Clement

Lewis M. Clement, who will receive the Pioneer Award this year, was born in Oakland, California, in 1892. He was an amateur from 1905 to 1914, when he became a Marconi operator, working at stations in Hawaii and California. He joined the Club in 1919 and became a Fellow in 1926. He was a Director of the Club from 1920 to 1930, Recording Secretary in 1921, Vice President in 1928 and President in 1929.

Active in a number of fields and with several companies, he was a pioneer in aircraft electronic development and in reliability. He was Chairman of the Department of Defense Advisory Group on the reliability of electronic equipment.

Besides being a Life Member and Fellow of the Club, Mr. Clement is a member of the American Ordnance Association, the Armed Forces Communications and Electronics Association (AFCEA) and other groups in the electronics field. He has received numerous honors, including two Pioneer awards, that of the National Association of Manufacturers (1954) and the Pioneer Award of the Professional Group on Aeronautical and Navigational Electronics (IRE, 1951).

Mr. Clement is receiving the Award for long and distinguished service to industry and government in such widely separated fields as electronic reliability and development of color television standards.



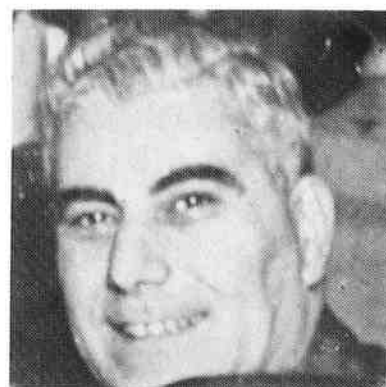
Bruce L. Kelley

Bruce Kelley, recipient of the Ralph Batcher Memorial Award for the preservation of the history of electronic communication, is well known to many members of the Club as the active spirit of the Antique Wireless Association and the Curator of its Museum. The museum developed from his own extensive personal collection, and Bruce worked many years to enlarge it.

Born in Oneida County, NY, in 1914, Bruce has spent most of his life in upstate New York, and is now an engineer with the Eastman Kodak Co. He became a member of the Club in 1965 and a Fellow in 1972.

The objective of the Antique Wireless Association is to develop the history of radio and give it wide circulation. In this work, Mr. Kelley has prepared and presented numerous film and tape and slide programs, talks and articles on radio history and the lives and accomplishments of not only such well known figures as Marconi and Armstrong, but also of less known pioneers as Paul Godley and Elmo Pickerill. He has worked in the preparation of or chaired national historical conferences at the Ford Science Museum, the Franklin Institute and the Smithsonian, and has provided material for other organizations, ranging from the Department of the Interior Park Service to educational television stations.

A special award, for dedication



Joseph J. Stantley

and service to the Club, will be made to Joseph Stantley. (It will be known as the Presidents Award, and will be awarded when circumstances render it appropriate.) Born in 1891, he became interested in radio in 1906, and was 2SC until 1912.

Not quite a charter member, Joseph J. Stantley joined the Club in 1912. He was made a Fellow of the Club in 1920, and an Honorary Member in 1967. He was a Director in 1926, and served with extreme efficiency as Treasurer from 1927 until 1966. He was also Treasurer of the Armstrong Memorial Research Foundation for a number of years.

MEMBERSHIP NEWS

Harold Wheeler, Chairman of the Board of Hazeltine Corp. and Fellow of the Club since 1935, has written a biography of Professor Alan Hazeltine, inventor of the Neutrodyne, famous circuit of the 1920's.

Edgar F. Johnson, Fellow of the Club and recipient of the Sarnoff Award in 1975, has retired from the E.F. Johnson Co., which he and his wife founded in 1923. He will retain a seat on the Board of Directors.

Loren McQueen, President of Communication and Control (Campbell, CA) and a Fellow and Director of the Club, has been elected a commissioner of the San Jose, CA, Airport Commission.

The many applications of the CE-15 Spectrum Monitor could fill a book

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Table of Contents

Chapter 1. Seeing is believing
What the instrument does
How it works
Interpreting the display
Effects of modulation
Signal resolution
Off-the-air signals

Chapter 2. Transmission
Troubleshooting
output
Remote
Signal
Probe
Trans
Meas
Che
Ch

Chapter 3. Troubleshooting
Signal tracing
L.O. injection levels
Checking the 455-kHz IF
IF alignment
Changing receiver frequencies
Spurious radiation

Chasing interference
versus the new
spurious
ation products
frequency measurement
modulation in the receiver
mitter intermodulation
spectrum monitor input level
creasing dynamic range

Antenna system applications
Duplexer techniques
Antenna resonance
VSWR measurements
Measuring insertion loss
Resonant frequencies
tuned circuits
Field strength mea
Identifying unkno

Chapter 6. What to look for
spectrum analyzer
Frequen
Frequen
Frequen
Se

Page
75

Big Turnout at Denver

More than 400 persons attended the Radio Club of America banquet held in conjunction with the IEEE Denver Section during Land Mobile Radio Week in Denver March 22.

A highlight of the banquet was the presentation by President Fred Link of the Radio Club of the Fellow awards to *John Tary*, U.S. Department of Commerce, Office of Telecommunications, Institute of Telecommunication Sciences, Boulder, Colorado; *Joseph Rosenbloom*, IBM Research and Development, Armonk, New York; and *Hugh Hamilton*. Engineering Manager Pye Electronics, Cambridge, England.

James Barnes of the Time and Frequency Division of the National Bureau of Standards, Boulder, Colorado, was announced as a Fellow of the IEEE. Dr. R. M. Saunders, Past President of the IEEE, made the award to Barnes.

Guest speaker Charles Higginbotham, chief of the Safety and Special Radio Services Bureau of the FCC, addressed the group on "A Look to the Future." Higginbotham was introduced by President Fred Link, who noted that Higginbotham had served the FCC for more than 30 years and was announcing his retirement at the banquet.

Higginbotham said the land mobile industry experienced a "long, bitter and hard-fought struggle at 800 MHz," which is now being proposed for use by CB, amateurs, aviation, marine and land mobile paging. "Somehow we have used up all the space and we're just getting off the ground," he continued. "Some requirements are going to have to be met in another area of the spectrum."

Higginbotham said that when work on the Texas Instruments UHF receiver is completed, "the Commission will have to make some hard-nosed decisions. This is why we have been advocating a position of flexibility at the World Administrative Radio Conference."

Higginbotham said the point is not to "take frequencies away from broadcasting," but to "preserve for future Commissions the option of reducing or increasing channels available" for broadcasting.

The FCC official said that the single sideband system proposed for land mobile by the UHF Task Force at the FCC was a "setback" to land mobile's position at WARC.

"Frequency stability, receiver selectivity, and adjacent

R. M. Saunders
Past President
IEEE



channel problems must be evaluated and field tested thoroughly. My reaction is one of cautious optimism. For those of you in broadcast I ask you to bear with us. SSB will not be brushed away for the sole purpose of maintaining the status quo. The Land mobile community is anxious for a thorough evaluation."

A cocktail party preceded the evening dinner, and Stuart Meyer of E. F. Johnson Co. served as master of ceremonies for the evening.

Contributing to the large attendance was the fact that participants in the National Business Radio Dealers Conference and the IEEE Vehicular Technology Society, along with other groups, joined in the evening's activities.



Charles Higginbotham and Stuart Meyer



New Fellows Joseph Rosenbloom, John Tary and Hugh S.B. Hamilton get their plaques from Fred Link.

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ADDRESS CHANGES

(Since the November, 1977, Directory)

A number of our members have changed their addresses, clarified them, or called attention to errors in their previous listings. The changes are printed below:

Alf, Edward A. 400 S. Flower, No. 84 Orange, CA 92668.

Alexander, Bob Box 26370, Dallas, TX 75226.

Bach, Norman C. 2116 F St., N.W. Apt 301, Washington, DC 20037

Bailey, H. E. Repco, Inc., 1940 Lockwood Way, Orlando, FL 32854.

Bourne, Kenneth M. 1923 E. Palm Ave., Orange, CA 92666.

Bose, John H. Masquam Shore, Swanton, VT 05488.

Brizzolari, Anthony. 5648 N.E. Ave F, Fort Lauderdale, FL 33334.

Campobasso, Thomas A. Rockwell International, MS 407-225, Dallas, TX 75207.

Chittick, Kenneth A. 8020 College Ave., Indianapolis, IN 46240.

Chupp, James W. 178 Styvesant Dr., Selden, NY 11784.

Copson, J. M. 101 Rampton Rd., Cottenham, Cambridge, ENGLAND CB4 4TJ.

Crabb, Robert C. 3780 S. Hill St., Los Angeles, CA 90007

Cramer, Bruce G. 511 Cheltena Ave., Jenkintown, PA 19046

Cressman, Charles. 3637 Suoma Ave., Apt. 119, Santa Rosa, CA 95405

Cushman, Roy T. 4301 Rancho Rd., Shingle Springs, CA 95682

Daniel, Jack. 1549 Tam O'Shanter, Ontario, CA 91761.

Dawes, Paul K. 434 Hoffman Lane, Hauppauge, NY 11787.

DeZonia, William. 1116 E. 6th Ave., Tallahassee, FL 32303.

DiBlasi, John. 320 E. Shore Road, Apt. 6A, Great Neck, NY 11023.

Dirman, John F. 10197 Farragit Ct., Manassas, VA 22110.

Dow, Wm. B., Jr. 3414 Fallen Leaf, San Antonio, TX 78230.

Evans, Henry W. Phelps Dodge Comms. Co., 1430 Monterey Pass Rd., Monterey, CA 91754.

Evans, R. James. 2803 Southwood Dr., East Lansing, MI 48823.

Freeman, E. W. Box 57, Yankton, SD 57078.

Freer, F. S. III. 3041 Fairfax Rd., Cleveland Heights, OH 44118.

Friedberg, Randall J. Antenna Inc., 26301 Richmond Rd., Cleveland OH 44146.

Ganzenhuber, John H. 4255 Encinas Dr., La Canada, CA 91011.

Geils, John W. PO Box 432, Basking Ridge, NJ 07920.

Grebe, Alfred H. 1219-J Gaskins Rd., Richmond, VA 23233.

Gross, Al. 6717 St. Clair Ave., Cleveland, OH 44103.

Henson, Marion. 6028 Hollyhurst Way, Sacramento, CA 95823.

Herlihy, Warren W. P.O. Box 4088, Santa Rosa, CA 95402

Herrin, Charles W. 730 Loma Ct., Redwood City, CA 94062.

Hively, Robert H. 4633 Baxter Ct., San Diego, CA 92117.

Hollingsworth, L. M. 9434 Cloverdale Ct., Burke, VA 22015.

Inglis, Andrew F., RCA Americom, AS-1, 201 Centennial Ave., Piscataway, NJ 08854.

Johnson, Gustave A. 7 Raccoon Dr. "F," Hazlet, NJ 07730.

Johnson, J. Kelly. c/o Marise Johnson, 11 E. 88th St., New York, NY 10028.

Jumper, Bill. 4400 Spring Valley, No. 101, Dallas, TX 75240.

Kahn, Bernard. 1401 Burr Oak Rd., 107-C, Hinsdale, IL 60521.

Kaye, Robert K. Urban Sciences, 5434 King Ave., Pennsauken, NJ 08109.

Kitchen, Jay. 1808 Narrows Lane, Silver Springs, MD 20904.

Klusacek, Emil R. 26 Locust Lane, Clifton Park, NY 12065.

Kunik, I. Jordan. 420 Lexington Ave., New York, NY 10017.

Lee, Robert L. 13 Crystal Ct., Pontiac, IL 61764.

Lindberg, C. Edward. Lindberg Co., 6140 E. Evans, Denver, CO 80222.

Lockwood, Judy. Titsch Pub. Co., 1139 Delaware Plaza, Denver, CO 80204.

McKay, George E. PO Box 5000, Claremont, CA 91711.

McLean, James D. Teletronics United, Inc., 2910 Rubidoux Rd., Riverside, CA 92509.

McQueen, Scott R. 2605 Hocking Way, San Jose, CA 95124.

Nathieu, Edward. 1845 King Arthur Ct., Maitland, FL 32751.

Menegus, Alfred A. 38 Linden Ct., Old Bridge, NJ 08857.

Metzger, Sidney. 9505 Barrel Lane, Kensington, MD 20795.

Miller, C. C. 1137 B Oakhurst, Cambria, CA 93428.

Minichiello, Ray. 61 Perry Ave., Lynnfield, MA 01940.

Mitchell, George J. 9611 Fox Shores Dr., Algonquin, IL 60102.

Mitchell, Robert H. Rt. 1, Box 300 A, Allen, TX 75002.

Myers, Robert O. 914 S. W. Cromey Rd., Plam Bay, FL 32905

Nicol, William. *Mistylawn*, Valley Way, Gerard's Cross, Buckinghamshire, ENGLAND.

Niles, Clayton E. Comms. Inds. Inc., 1100 Frito-Lay Tower, Dallas, TX 75235.

Parker, John F. 9 Wawapek Rd., Cold Spring Harbor, New York, NY 11724.

Patterson, Allan C. 14428 S.E. 49th St., Bellevue, WA 98006.

Peretto, Armand. 23 Sunnyslans Ct., Little Silver, NJ 07739.

Place, Roy E. c/o Repco, Inc., Box 7065, Orlando, FL 32804.

Puett, J. F. W. 2779 Beechmont Dr., Dallas, TX 75228.

Reinhardt, Nicholas J. RD No. 2, Box 220 D, Catskill, NY 12412.

Reiser, John W. Box 19424, Washington, DC 20036.

Ryals, Byron G. 442 Madera No. 3, Sunnyvale, CA 94086.

Schermerhorn, Romaine W. 830 Grandview Ave. F2, Altamonte Springs, FL 32701.

Selenius, Dr. O. Eric. Box 909, Apple Valley, CA 92307.

Shaw, Willard K. RCA Mobile Comms. Div., Meadowlands, PA 15347.

Siegel, Hyman L. Radio Shack, 1400 One Tandy Center, Fort Worth, TX 76102.

Simmons, A. C. 6342 Eldergrove, Dallas, TX 75232.

Stokes, Dr. Houston H. Apt. 2007, 1700 E. 56 St., Chicago, IL 60637.

Stilgenbauer, Shirley. 4 Briggs Lane, Armonk, NY 10504.

Stoddart, T. W. Hartley. 5 Lynhaven Crescent, Ottawa, CANADA K2E 5K3.

Stodola, E. K. PO Box 534, Eatontown, NJ 07724.

Swigart, James F. PO Box 3332, Anaheim, CA 92803.

Tarbell, Harry. 3619 S. W. 50, Portland, OR 97221.

Thompson, Owen E. PO Box 63, Belmont, CA 94002.

Thompson, Robert. 14703 Eastview Dr., Los Gatos, CA 95030.

Trott, Raymond C. Antenna Systems Eng. Co., 2639 Walnut Hill Lane, Dallas, TX 75229.

Trueman, A. W. 836 Hadrian Ave., Collingswood, NJ 08021.

Vorporian, Harry. 60-20 B 194th St., Flushing, NY 11365.

Waite, Amory E., Jr. 505 Mendes St., Venice, FL 33595.

Walker, A. Prose, 1087 Tung Hill Dr., Talahassee, FL 32301.

Wand, Hal F. 2626 Lakeview Ave., No. 607, Chicago, IL 60614.

Williams, Col. G. A. 119-P Via Estrada, Laguna Hills, CA 92653.

Witt, Leonard T. Box 890, Amagansett, NY 11930.

Woodin, R. H. RCA Alascom, Pouch 6-607, Anchorage, AK 99502.

Zaret, Benjamin E. 511 Benjamin, Ann Arbor, MI 48104.

Zauderer, Jerome. 70-01 113th St., Forest Hills, NY 11375.

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Standard Communications

Obituaries



William P. Lear

William Powell Lear died May 14, 1978, in Reno, Nevada, aged 75 years (see tribute on page 2). He left six children and seven grandchildren.

A two-thirds page chronological history of Bill Lear appeared on page 12 of the March 1978 issue of the Proceedings, and an account of his achievements was published on page 17 of the last Fall's issue, when he was awarded the Club's Sarnoff Citation.

Quinten G. Cumeralto, (M 1970) died February 27, 1978. At the time he joined the Club he was owner of the Communications Engineering Co. of Mt. Clemens, MI, and had been Chief Engineer of WRZE, York, PA.

Nils Erik Lindenblad, retired RCA research scientist, died February 18, 1978, aged 82. Among his 314 patents were a number of advances in antenna design, including the slot antenna designed to reduce aircraft drag. Transferring to the RCA laboratory in Princeton after 30 years at Rocky Point, NY, he received in 1958 the David Sarnoff Outstanding Achievement Award for "his invention and pioneering development of many important electronic devices and his research on thermoelectric cooling apparatus." Perhaps his most important achievement was the basic patent on the traveling wave tube.

John W. Wilson, K2BW (M 1972) died May 17, 1977, but news of his death reached the Club only recently. At the time of his death he was territorial manager of the Metropolitan NYC sales area for E. F. Johnson Co, for whom he had worked for the last ten years.

Seymour N. Siegel (M 1967, F 1969) died July 15, 1978, just before his 70th birthday. He was the moving spirit of the country's oldest municipal broadcast station, WNYC (-AM, -FM, -TV) from 1934, when he was appointed assistant program director by Fiorello LaGuardia, until his resignation in 1971 in protest over heavy budget cuts. He then became an adjunct professor in telecommunications and later Dean of Educational Technology at the City University of New York.

He left WNYC in 1941 for active duty in the Navy, and was discharged in 1946 as a commander. Then appointed director of New York radio communications in charge of municipal stations WNYC and WNYC-FM, he pushed for a television station. A license was granted for a UHF station on Channel 31 in 1954, but the city approved its funding only in 1961. He continued to battle forces of "economy" in New York City administration (resigning once in 1966) until his resignation in 1971.

Mr. Siegel was internationally famous as a pioneer educational broadcaster and was a former president of the National Association of Educational Broadcasters.

Arthur F. Van Dyck, we are informed by E. J. Quinby, died June 21, 1978, in Statsford, CT, at the age of 88. An early member and Fellow of the Radio Club, he resigned in April, 1954. A wireless operator on the Royal Mail Steam Packet *Clyde* in 1910, he served the U.S. Navy in World War I as Expert Radio Aide, afterward heading the License Laboratory of the Radio Corporation of America, until again called to active duty with the Navy in World War II, during which he rose to the rank of Captain. He was a member of several radio societies and a Past President of the IRE.

Fred D. Rowe, W6FK (M 1969) died March 1978, after a long period of illness.

His wife informs us that he was on the air frequently until the very last days of his illness.

Maxims of Bill Lear

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Don't tell me it can't be done!

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Enough said. As this actual quote (from state government specifications) confirms, Aerotron is a standard.

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This method of design means Aerotron radio equipment is tougher, more durable, more dependable. And that equipment downtime is reduced substantially. For it's easy—and fast—to locate a faulty module and drop in a new one. In fact, you won't even have to remove the unit from the vehicle in most cases.

Modular construction. A design principle that results in better equipment.

And that's why the mobile radio industry is going modular.

It's also the reason Aerotron went 100% modular construction a decade



ago. Today, Aerotron has more experience in modular construction than any other mobile radio manufacturer. And that's why Aerotron offers you mobile radio systems that meet and exceed even the toughest specifications.

Take, for example, the contract specifications quoted above.

The bid went to Aerotron.

Aerotron. The leader in modular construction.

And the name to specify when you're buying mobile radio equipment.

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Forty-Five New Members

Since the last issue of the Proceedings was printed, 45 new members have joined:

- Albers, Ralph H.** Manager, Federal Gov't Agency Sales, General Electric Co., Mobile Radio Dept., 101 South Whiting St., Alexandria, VA 22304.
- Anderson, Donald T.** President, Anderson Associates, Hurst TX. 641 Circleview Drive South, Hurst, TX 76053.
- Austin, Richard T.** Director Telecommunication Management, Commonwealth of PA, Harrisburg, PA. 245 Winding Way, Camp Hill, PA 17011.
- Belock, Dr. Harry D. W2JSW.** Consulting Engineer. 21 Chapel Place, Great Neck, NY 11021.
- Bhagat, Jai P.** Director Technical Operations, Airsignal International, Inc., New York, NY. 140 Redwood Avenue, Wayne, NJ. 07470.
- Black, John C.** President and General Manager, Radio Systems Inc., Seattle, WA. 14312 NE 16th Place, Bellevue, WA 98007.
- Campbell, James W.** Sales Mgr., Mechanical Filter Div., Rockwell Int'l, Collins Div. Newport Beach, CA. 18121 Blue Ridge Drive, Santa Ana, CA 92705.
- Champ, Johnny L.** Owner, Champ Communications, 1373 Old Bayshore, San Jose, CA 95112.
- Chan, Elliott K.** Telecommunication Specialist. U.S. Dept of State. Washington, DC. 2117 E St., N.W., No. 309, Washington, DC 20037.
- Coltri, Norman R., WA2UUP.** Police frequency coordinator for NJ, Trenton, NJ. Deer Trail, RD No. 1, Tabernacle, NJ 08088.
- Crady, Tony O.** President, Automated Ind. Elecs. Corp., 10 Granite St., Batesburg, SC 29006.
- Domer, David J. W8GSK.** President and Owner, Domer Communication Inc., 7080 Whipple Ave., N.W. North Canton, OH 44720.
- Estes, Thomas D.** Radio Comms. Rep., Phillips Petroleum Co., 601 Armstrong, Bartlesville, OK 74004.
- Fountain, Daniel F.** District Sales Mgr., Fed. Gov't, Mktg., Motorola Inc., Comms & Elecs, 1170 Chess Drive, Foster City, CA 94404.
- Gronert, Frank L.** President, Gronert Electronics Corp., 4507 Forest Avenue, Des Moines, IA 50311
- Golding, Malcolm F.** Manager, Engineering and Technical Services, Pye Electronics Ltd., 8580 Darnley Road, Montreal, CANADA H4T 1M6,
- Gurka, Michael C. K2UGH.** President and Chief Engineer, Atlantis Electronics, 34 Hershey Road, E. Brunswick, NJ 0816
- Harter, Stanley A.E.** Chief of Telecommunications, State of Hawaii, 3949 Diamond Head Road, Honolulu, HI 96816.
- Heithecker, Leland,** Consulting Engineer. P.O. Box 7004, Dallas TX 75209.
- Jones, Leo H.** Owner, Fargo Co., 1162 Bryant St., San Francisco, CA 94103
- Karlin, Michael D.** National Account Executive, Motorola, 85 Harristown Road, Glen Rock, NJ 07452.
- Kobold, Reno A.** Eastern Regional Mgr., Land Mobile Div., Standard Communications, Carson, CA. 155 Sunrise Ave., Satellite Beach, FL 32927.
- Leavitt, Philip C.** Leavitt Communications, 2722 West Fargo Ave., Chicago, IL 60645.
- Lehman, O.M.** District Sales Mgr., RCA, Denver, CO. 5010 McIntyre St., Golden, CO 80401.
- Lepczyk, Warren W.** President, Maryland Communications Inc., 8641 Loch Raven Blvd., Baltimore, MD 21204.
- Lester, Howard L.** Electronics Development Engineer, General Electric Res. & Dev. Center, Schenectady, NY. 8 Bath St., Alplaus, NY 12008.
- McClure, George F.** Member Technical Staff to Chief Engineer, Martin Marietta Aerospace, Orlando, FL. 1730 Shiloh Lane, Winter Park, FL 32789.
- MacCoun, Townsend D.** Development & research, DAQ Electronics, Middlesex, NJ. 911 Leland Ave., Plainfield, NJ 07062.
- McCullough, Jack A.** Retired (from Varian/Eimac) 12950 Robleda Rd., Los Altos Hills, CA 94022
- Madden, Roger D.** Ass't Chief, Land Mobile Spectrum Management Div., FCC, Washington, DC. 9514 Baccarat Drive, Fairfax, VA 22030.
- Markowitz, Herman, W5ABR.** Mfrs Rep Systems Consultant, DBM, 419 Balboa Road, El Paso, TX 79912.
- Melzig, Alfred F.** Chief Eng., WGCH, Greenwich, CN. 2339 High Ridge Road, Stamford, CN 06903.
- Nattboy, Stuart, K2MSO.** Partner, ACS Comms. Inc. Brooklyn, NY. 216 Greencroft Ave., Staten Island, NY 10308.
- Nelson, Randy Wayne,** National Sales Mgr., Repco, Inc. 1940 Lockwood Way, Orlando, FL 32854.
- Novak, Bernard R.** Area Systems Engineer, Motorola Comms, San Mateo, CA. 1619 Hopkins St., Redwood City, CA 94062.
- Obradovich, John W. W3IS.** Communications Specialist, Commonwealth of PA, Harrisburg, PA. 12 Hickory Place, Camp Hill, PA 17011.
- O'Malley, Martin T.** 5514 Ryland Avenue, Temple City, CA 91780.
- Pomeroy, Thomas P.** Supervisor, Dade County Telecommunications, Miami, FL. 14104 SW 42nd Terrace Miami, FL 33175.
- Quiat, Marshall, WB0HWQ.** Lawyer, Quiat & O'Fallon 1624 Market, Denver, CO 80202.
- Sawvel, John Jr.** Supervisor, System Comms. Operations, Ohio Edison Co., 76 South Main St., Akron, OH 44308.
- Seitz, Frank A.** General Manager, Radio WFUV, Bronx, NY. 20 Peters Road, Riverside, CN 06878.
- Shaw, Willard K.** Field Operations Manager, Western Area, RCA Corp. Mobile Communications, 1651 4th St., Santa Ana, CA 92701
- Small, John,** Regulatory Assistant Personal Radio Div., FCC., Washington, DC. 3100 Conn. Ave., Washington, DC 20008.
- Suffield, Frederick G.** Staff to V.P., Cubic Corp. Defense Systems Div., San Diego, CA. 5875 Overlake Ave., San Diego, CA 92120.
- Sutter, Walter L.** Div. Vice President, Marketing; The Western Union Telegraph Co., 7916 Westpark Drive, McLean, VA 22101.
- Torbick, William,** Manager, National Marketing, General Electric Mobile Radio, Lynchburg, VA 24502.
- Viele, James H., W1BRG.** President, Vermont Hardware Co., Burlington, VT. 101 Henry St. Burlington, VT 05401.
- Wilford, Cleates (Cliff) L.** Communications Supervisor, Fire Dept., Houston TX. P.O. Box 8903, Houston, TX 77009.
- Williams, Ralph O.** Electronics/Radio Engineer, G.E. Co., Philadelphia, 371 King of Prussia Rd., Wayne, PA 19087.
- Wiskoff, Marc B., WA2JDK.** Account Rep., Motorola Comms. & Elecs., Jericho, NY. 3090 Voorhies Ave., Brooklyn, NY 11235.

Book by Club Member

Saga of the Vacuum Tube, Gerald F. J. Tyne (M 1966, F 1974). Howard W. Sams & Co., 4300 West 62nd St., Indianapolis, IN 46268. 6 x 9 inches, 494 pages. \$19.95.

This history of the tube from before 1880 to 1930, written by the man who "knows more about the history of tubes than anyone else in the world," is the authoritative work on vacuum tubes.

Much of the material, bringing the history of the tube up to 1920, appeared in the magazine *Radio News* between 1943 and 1946. After World War II Mr. Tyne toured Europe to obtain information not hitherto published (and much of which would never have been published) on European developments. Thus the work is international, and the period covered is extended to 1930.

Not only are the tubes described, but much of the byplay due to competition and legalities (sometimes leading to such absurdities as Marconi selling tubes as the "sole agent for the de Forest Tube Co.") are detailed and one learns facts about some of the figures in tube history that have never been heard before. The efforts of Western Electric, de Forest, General Electric, and the independents, for example, are presented in separate chapters.

CONSTITUTION OF THE RADIO CLUB OF AMERICA, INC.

ARTICLE I—NAME AND PURPOSE

Sec. 1. The name of this organization shall be THE RADIO CLUB OF AMERICA, Inc.

Sec. 2. Its purpose shall be:

a. To operate exclusively for charitable, educational and scientific purposes, entitling the corporation to exemption under the provisions of section 501 (c) (3) of the Internal Revenue Code of 1954, and more specifically to study and contribute to the development of radio communication programs and provide a scholarship fund for needy and worthy students for the study of radio communication.

b. In furtherance of its corporate purposes, the corporation shall have all general powers enumerated in section 202 N-PCL together with the power to solicit grants and contributions for corporate purposes.

c. Nothing herein shall authorize this corporation, directly or indirectly, to engage in or include among its purposes, any of the activities mentioned in Not-For-Profit Corporation Law, Section 404 (b) - (p) or Executive Law, Section 757.

d. No part of the income of the corporation shall inure to the benefit of any member, trustee, director, officer of the corporation, or any private individual (except that reasonable compensation may be paid for services rendered to or for the corporation affecting one or more of its purposes) and no member, trustee, officer of the corporation or any private individual shall be entitled to share in the distribution of any of the corporate assets on dissolution of the corporation.

e. No part of the activities of the corporation shall be carrying on propaganda, or otherwise attempting to influence legislation, or participating in, or intervening in (including the publication or distribution of statements) any political campaign on behalf of any candidate for public office.

f. In the event of dissolution, all the remaining assets and property of the corporation shall after necessary expenses thereof be distributed to such organizations as shall qualify under section 501 (c) (3) of the Internal Revenue Code of 1954, as amended, subject to an order of a Justice of the Supreme Court of the State of New York.

g. The corporation shall distribute its income for each taxable year at such time and in such manner as not to subject it to tax under Section 4942 of the Internal Revenue Code of 1954, as amended; and the corporation shall not (a) engage in any act of self-dealing as defined in Section

4941 (d) of the code; (b) retain any excess business holdings as defined in Section 4943 (c) of the Code; (c) make any investments in such manner as to subject the corporation to tax under section 4944 of the Code; or (d) make any taxable expenditures as defined in Section 4945 (d) of the Code.

ARTICLE II—MEMBERSHIP

Sec. 1. The membership of the Club shall consist of those persons who have signed the Certificate of Incorporation together with all persons who are hereafter received in or elected to membership as herein provided.

Sec. 2. Any person is eligible for membership who has been interested in the investigation of the principles of radio communication and in radio operation for at least one year.

Sec. 3. The classes of membership and the fees therefor will be prescribed in the By-Laws.

Sec. 4. Any member may withdraw from the Club by presenting to the Secretary a written statement of resignation.

Sec. 5. A member may be expelled for violation of the By-Laws of the Club or for other cause prejudicial to the best interest of the Club. Such expulsion may be effected by a two-thirds vote of the Board of Directors at a duly called meeting.

Any resigned or expelled member forfeits all rights and privileges of the Club.

ARTICLE III—GOVERNMENT

Sec. 1. The general management of the affairs of the Club shall be vested in the Board of Directors who shall be elected as provided in the By-Laws.

Sec. 2. The governing body of the Club shall be the Board of Directors comprising the Officers and fourteen Directors.

Sec. 3. The officers of the Club shall consist of a President, Vice President, Secretary and Treasurer, and such other Officers as the Board from time to time may designate.

Sec. 4. The Board of Directors shall meet at least once each year and at the call of the President. At least one-half of the Board members shall be present to constitute a quorum.

Sec. 5. If a vacancy occurs among the Officers or in the Board of Directors, such vacancy shall be filled for the unexpired term by the Board of Directors.



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Sec. 6. The President shall be a member ex-officio of all Committees.

ARTICLE IV—MEETINGS

Sec. 1. The Club shall hold an Annual Meeting before the end of each calendar year at a time and place to be designated by the Board of Directors.

Sec. 2. Other meetings of the Club may be held throughout the year, the time and place to be designated by the Board of Directors.

ARTICLE V—FINANCIAL OBLIGATIONS

Sec. 1. No financial obligation shall be incurred on behalf of the Club except by the approval of the Board of Directors as covered in the By-Laws.

Sec. 2. All obligations incurred by the Club shall be solely corporate obligations and no personal liability whatsoever shall attach to, or be incurred by any member, Officer or Director of the Club by reason of any such corporate obligation.

ARTICLE VI—AMENDMENTS

Sec. 1. Proposed amendments to this Constitution must be reduced to writing and signed by not less than twenty-five Members or Fellows and be submitted to the membership who shall vote thereupon by letter ballot. The amendment shall be adopted if seventy-five per cent of the votes received are in favor of such action, the polls having been open for at least one month after mailing to the qualified membership notices of the proposed amendments.

THE RADIO CLUB BY-LAWS

ARTICLE I—MEMBERSHIP

Sec. 1. The membership of the Club shall consist of the following grades:

a. Members; b. Fellows; c. Honorary Members

They shall be entitled to all privileges of the Club except that Honorary Members may not hold office or be elected to the Board of Directors.

Sec. 2. A Fellow shall have been a member of the Club for at least five years or one whose contributions to the Radio Art are of such a nature as to qualify him for the grade of Fellow.

Sec. 3. An Honorary Member shall be a person of high professional standing who is interested in the activities of the Club.

Sec. 4. Election or transfer to the grade of Fellow or Honorary Member shall be by a majority vote of the Board of Directors.

Sec. 5. A person eligible for membership may apply by making application, on the form prescribed by the Board of Directors, to the Executive Secretary; and submitting with the application the entrance fee and initial dues payments.

Sec. 6. Each application for membership shall be considered by the membership committee and its recommendations shall be submitted to the Board of Directors. If the applicant is approved by the Board of Directors, the Executive Secretary shall notify the applicant of his election to membership, and shall forward to him a statement of entrance fee and initial dues if not previously paid.

ARTICLE II—ENTRANCE FEE AND DUES

Sec. 1. The Entrance Fee for new Members shall be Ten Dollars (\$10.00) which includes a club pin and a membership certificate. The annual dues payable by Members and Fellows shall be Ten Dollars (\$10.00). Three years dues may be paid in advance for Twenty-Five Dollars (\$25.00). Honorary members shall be exempt from payment of any dues or fees.

Sec. 2. The annual dues shall be payable on the first day of each calendar year, in advance for the ensuing year. It shall be the duty of the Executive Secretary to notify each Member or Fellow of the amount due.

Sec. 3. All members in good standing shall be furnished with permanent membership cards bearing the signature of the Executive Secretary.

Sec. 4. Persons elected to membership after Sept. 1 of any year shall pay only half the specified dues for that year. Persons elected to membership in December shall pay dues to be credited to the following year.

Sec. 5. Any Member or Fellow whose dues become two months in arrears shall be notified by the Executive Secretary. Should his dues then become four months in arrears, he shall again be notified by the Executive Secretary. Should his dues then become six months in arrears, his name shall be submitted to the Board of Directors for further action. The Board of Directors may, however, for sufficient cause temporarily excuse from payment of annual dues any Member or Fellow or extend the time for payment.

Sec. 6. Every person admitted to the Club shall be considered as belonging thereto and liable for the payment of all dues (except as per Sec. 7. of this Article) until he shall have resigned, been expelled, or have been relieved therefrom by the Board of Directors.

Sec. 7. Any Member or Fellow not in arrears, upon payment of One Hundred Fifty Dollars (\$150.00) shall be exempt for life from the payment of annual dues. Effective January 1, 1970, any Member or Fellow not in arrears shall be exempt for life from the payment of annual dues providing that his age plus years of membership equal one hundred (100); or provided he is sixty (60) or more years of age, upon the payment of Thirty-Seven Dollars Fifty Cents (\$37.50) if he has been a member for Twenty (20) or more years or upon payment of Seventy Five Dollars (\$75) if he has been a member for ten (10) or more years.

ARTICLE III—OFFICERS AND DIRECTORS

Sec. 1. The Board of Directors shall manage the affairs of the Club in conformity with the provisions of the Constitution and the By-Laws. It shall direct the care and appropriation of the funds of the Club; act upon applications for membership as heretofore provided; recommend Honorary Members; exercise discretionary power in the election to the grade of Fellow of Members or original applicants having the qualifications therefor; take measures to advance the interests of the Club, and generally direct its business. It may appoint an Executive Secretary and fix his compensation. It may appoint an Executive Committee to carry out certain specified responsibilities in the interim period between meetings of the Board of Directors.

Sec. 2. The Officers shall consist of a President, Executive Vice-President, Vice-President, Vice-President-Counsel, Treasurer and Secretary.

Sec. 3. No Officer or Director shall receive remuneration for his services in any capacity.

Sec. 4. The Officers and Directors of the Club shall serve for a term of Two (2) Years or until their successors are duly elected, the term of each to commence on January 1st following such election. One-Half (1/2) of the Fourteen (14) Members of the Board of Directors shall be elected each year.

Sec. 5. The Executive Committee, appointed by the Board of Directors, shall consist of the President, Executive Vice-President, Vice President, Vice-President-Counsel, Treasurer, Secretary and Three (3) Members of the Board of Directors other than Officers.

Sec. 6. The Executive Committee shall carry out only the specific responsibilities that are authorized by the Board of Directors in the interim period between meetings of the Board of Directors. These responsibilities shall include approval of new applications for membership, arrangements for meetings and general direction of the Club's operations including those of the Treasurer and the Executive Secretary. The Executive Committee shall not control the care and appropriation of the funds of the Club. All actions of the Executive Committee shall be subject to approval by the Board of Directors.

ARTICLE IV—DUTIES OF OFFICERS

Sec. 1. The President shall have general supervision of the affairs of the Club. He shall preside at meetings of the Club and of the Board of Directors at which he may be present. He shall appoint such committees as he or the Board of Directors shall consider expedient or necessary.

Sec. 2. The Executive Vice-President, Vice-President, Vice-President-Counsel, in that order, shall assume all the duties of the President during the President's absence from meetings or when the President is otherwise unable to perform such duties. In the event of all the foregoing Officers' inability to perform such duties, a Chairman pro tem shall be appointed by majority vote by those members present at the meeting.

Sec. 3. The Treasurer shall be responsible for the funds of the Club and accountable to the Board of Directors. He shall make such payments for the Club as are ordered by the Board of Directors. He shall report on the Club's financial status at each meeting of the Board of Directors.

Sec. 4. The Secretary shall be responsible for the records of the Club, and shall duly record the minutes of the meetings of the Board of Directors and of the Executive Committee.

Sec. 5. The Executive Vice-President shall assist the President in the performance of the President's duties.

Sec. 6. The Executive Secretary as appointed by the Board of Directors shall conduct the administrative duties of the Club and shall be generally responsible to the Board of Directors. He shall conduct the correspondence of the Club, collect and receive all dues and fees which he

shall deposit for the account of the Club as directed by the Treasurer. He shall duly record the proceedings of all meetings of the Club. He shall have custody of all applications of persons admitted to membership and all other current records of the Club.

Sec. 7. The President, within fourteen (14) days after the conclusion of the Annual Meeting of the Club, shall appoint from the membership the following Standing Committees: **A.** Finance Committee. **b.** Papers Committee. **c.** Membership Committee. **d.** Publicity Committee. **e.** Meetings Committee. **f.** Year Book and Archives Committee. **g.** Awards Committee.

ARTICLE V—NOMINATIONS AND ELECTIONS

Sec. 1. At least sixty (60) days prior to the Annual Meeting each year, the President shall appoint a Nominating Committee subject to the approval of the Board of Directors. The report of this Committee shall be submitted to the membership at least twenty (20) days prior to the Annual Meeting in each year together with a ballot form. The Nominating Committee shall submit eligible candidates for President, Executive Vice-President, Vice-President, Vice-President-Counsel, Treasurer, Secretary and Seven (7) Directors only in each even-numbered year.

Sec. 2. Notwithstanding the foregoing, a petition signed by twenty-five (25) members in good standing may be submitted to the Secretary post-marked at least sixty (60) days prior to the Annual Meeting, nominating any eligible member in good standing for any office or directorship to be filled at the Annual Meeting.

Sec. 3. The election of the candidates shall be by written ballot vote of a majority of the members in good standing voting before closing of the polls. The polls shall close twenty-four (24) hours before the opening of the Annual Meeting.

ARTICLE VI—CLUB EMBLEM

Sec. 1. The emblem of the Club shall be that shown in the margin. This emblem shall be made in the form of a pin and may be purchased from the Executive Secretary.

Sec. 2. The emblem for Fellow shall be the reverse of that for Member, or as approved by the Board of Directors.

Sec. 3. Honorary Members shall be presented with the Club pin.

ARTICLE VII—SECTIONS AND AFFILIATED ORGANIZATIONS

Sec. 1. SECTIONS may be formed on approval of the Board of Directors. The requirements for a SECTION shall be:

a. A SECTION must have at least fifteen (15) members residing in the

same geographical area, or who are members of an organization affiliated with the Radio Club of America, Inc.

b. Each SECTION member must be a member in good standing of the Radio Club of America, Inc., and shall remit the prescribed annual dues directly to the Club.

c. SECTION members shall be governed by the Constitution and By-Laws of the Radio Club of America, Inc.

d. Each SECTION may elect its own officers and Board of Directors, which shall include a Chairman and Secretary who shall correspond with the Radio Club of America, Inc., and keep the Club currently informed of the activities of the SECTION.

e. Each SECTION must be financially self-supporting. It may have such local business and social meetings as it wishes, the purposes of which shall conform to the principles of the Radio Club of America, Inc. as expressed in the Constitution and By-Laws.

f. Each SECTION member may attend all meetings and functions of the Radio Club of America, Inc. and enjoy all its benefits and privileges.

Sec. 2. Kindred non-profit organizations may affiliate with the Radio Club of America, Inc. upon approval of the Board of Directors. The general requirements for affiliation shall be:

a. The affiliated organization must have at least twenty-five (25) members in good standing, and must agree to be bound by the Constitution and By-Laws of the Radio Club of America, Inc.

b. Each member of the affiliated organization shall qualify as a member in good standing of the Radio Club of America, Inc., and shall remit the prescribed annual dues directly to the Radio Club of America, Inc.

c. The affiliated organization may elect its own officers and Board of Directors, which shall include a President and Secretary, who shall correspond with the Radio Club of America, Inc., and keep the Club informed of the activities of the affiliated organization.


d. The affiliated organization must be financially self-supporting. It may have such local business and social meetings as it wishes, the purposes of which shall conform to the principles of the Radio Club of America, Inc. as expressed in the Constitution and By-Laws.

e. Each member of the affiliated organization may attend all meetings of the Radio Club of America, Inc., and enjoy all its benefits and privileges.

ARTICLE VIII—AMENDMENTS

Sec. 1. These By-Laws may be amended from time to time by affirmative vote of a majority of the Board of Directors at any regularly called meeting of the Board of Directors.



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Yes, it's true, according to a recent FCC Study.* The study concluded that "... three radio-equipped vehicles can do the work of four not so equipped in most situations." Two-way FM radio users further report an average annual savings of \$2,547 per mobile, based on the elimination of extra costs and increased profits.

Maybe you don't believe you could save that kind of money in your own business, but we invite you to add it up yourself. The average truck and driver is worth \$15 to \$20 an hour. If your driver stops to call in just 4 times a day, he's wasting \$350 to \$375 a month in unproductive time.

You can have Johnson FM radio for as little as 75¢ per day. We're not talking about citizens band (CB) radio now, this is FM *business* radio that operates on assigned frequencies with more power, clarity and

far less interference than the CB equipment that is so popular among the general public.

Solid-state, American-made.

Those are two very important things to look for in a radio that works for you day in and day out. Johnson radios carry a full year warranty on all parts and labor. Most radios carry only 60 or 90 day protection, and you can guess why.

The man behind the equipment. Johnson won't sell you and forget you. Our equipment is sold by over 450 authorized two-way FM radio dealers throughout the U.S. and Canada. They're not factory salesmen, they're businessmen like you, who live and work in the community. They won't turn you over to somebody else for maintenance or service either. The dealer that sells your system is the same guy that services it.

Free 16 page booklet answers your questions about two-way FM radio. Do you know the difference between citizens band (CB) and two-way FM business radio? What do you know about licensing? Do you have questions about costs? This booklet has the answers to most of the commonly-asked questions. Just mail the coupon and it's yours.



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Waseca, Minnesota 56093

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*Published by the Land Mobile Advisory Committee of the Federal Communications Commission.

563-3126.