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

Founded 1909, New York, U.S.A.

The Radio Club of America, Inc.

BOX 2112, GRAND CENTRAL STATION, NEW YORK, N.Y. 10017

Price $2.50

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.

TREASURER'S REPORT FOR 1978

INCOME	Receipts	1978 Budget
New Members (78)	$ 234.00	$ 198.
Members Dues for '78	4,786.38	4,702.
Members Dues for '79	1,099.15	
Members Dues for '80	987.14	
Members Dues for '81, etc.	40.33	
Life Membership	350.00	150.
Pins, Certificates, Plaques	995.87	800.
Proceedings Ads	3,761.73	4,500.
Interest & Dividends	1,313.13	1,000.
Contributions Received	571.00	500.
Misc.	—	25.
Banquet Surplus	—	150.
TOTAL INCOME:	$14,138.73	$12,025.

EXPENSES	Expenditures	1978 Budget
Rent	500.04	500.
Stationery & Print.	347.05	150.
Office Supplies	175.93	175.
Telephone	160.58	125.
General Postage	627.96	350.
Meeting Expenses	1,092.88	850.
Proceedings	*7,999.75	4,700.
Awards Pins, Plaques	2,183.23	1950.
Insurance, Acctg., Legal	40.56	200.
Newsletter, Ballots	174.71	300.
Exec. Secretary Fees	2,100.00	2,100.
Misc.	6.60	25.
Outgoing Contributions	750.00	1,000.
TOTAL EXPENSES:	$16,159.29	$12,425.

Status Of Cash & Trust Funds as of Dec. 31, 1978

Irving Trust Checking	$ 2,661.52
Irving Trust Savings	$11,269.69
Emigrant Savings (life memb.)	$ 3,768.81
Emigrant Time Dep. (Finch Fund)	$10,608.86

*Note: Invoice for Oct. '77 *Proceedings* included with March and Oct. '78 issues. ($2302.54)

The High Cost of Communications

by Samuel L. Gravely, Jr.
(Fellow, 1972)

Director, Defense Communications Agency

Vice Admiral Samuel L. Gravely, Jr., USN

I welcome this opportunity to talk to you this evening. I am sure you are aware of the increased attention being given to the Federal Bureaucracy these days including civil service reform, the increased cost of operating the military establishment, etc. In a recent article concerning these kinds of issues it said that if you're important enough to be "singled out," you've become an important part of American society. Recent Congressional focus on the Defense telecommunications budget leads me to believe that as communicators—we have "arrived."

We in the communications business are also very conscious of the cost of operations, inflation, as well as the views of the Congress with respect to communications. My topic for this evening, "The High Cost of Communications," is one that will undoubtedly offer me many challenges in my new role as Director of the Defense Communications Agency.

But first, let me briefly acquaint you with the background and mission of the Defense Communications Agency.

Former Secretary of Defense, Thomas B. Gates, gave birth to DCA on 12 May 1960, and with it the responsibility for evolving a "Defense Communications System" or "DCS." Over the past 18 years, I believe one can conclude that the Defense Communications Agency (DCA) has been very successful in reaching this objective. The separate point-to-point communications systems of the military departments with little or no switching or inter-operability have been replaced for the most part with the Global Automatic Voice Network (AUTOVON), Automatic Digital Network (AUTODIN) and Automatic Secure Voice Network (AUTOSEVOCOM). The Defense Communications System today is an esential ingredient of our national defense.

In my role as Director of the Defense Communications Agency, I have responsibilities other than that of manager of the defense communications. These include systems architect for defense military satellite programs, Director, Systems Engineering for the Department of Defense Worldwide Military Command and Control System (WWMCCS) and providing technical support to the joint Chiefs of Staff for the National Military Command System. I am also designated the Manager of the National Communications System, which is a confederation of Federal agencies who deal with emergencies on a Federal Government level ranging from national disasters to full scale war.

With that brief summary of DCA and its missions, I would like to focus this evening on the Defense Communications System, its costs, and some of the contributions this global system makes to national defense.

The cost of communications

The Department of Defense FY 1979 budget for telecommunications, command and control is more than four billion dollars. About one fourth of this amount, or $1 billion, is required to support the Defense Communications System. The remainder provides for tactical communications, local communications for department of defense posts, camps, and stations around the world, and for requirements of the Worldwide Military Command and Control System.

Just a few years ago, in fiscal year 1974, the Defense telecommunications budget was about $2½ billion compared to the more than $4 billion today, and the DCS share of the budget amounted to about two thirds of a billion compared to about $1 billion today. It therefore comes as

no great surprise that OSD and the Office of Management and budget officials are taking a more careful look at communication costs, and that the communicators popularity with Congress is on the rise.

What are we buying for almost a billion dollars of the taxpayers' money? Why do we need a Defense Communications System? Why are costs increasing at such a rapid rate, and what are we doing about it?

The Defense Communications System is the single Department of Defense long distance communications system. It embraces all long haul point-to-point assets of the Army, Navy and Air Force as well as certain other agencies. The DCS provides communications via satellite, terrestrial, and underseas cable to some 75 countries and islands around the world, and is the principal long distance system for connecting our global military forces to the National Command authorities. The plant value of the Governmment-owned portion of the system in 1978 dollars is on the order of $2.5 billion (excluding crypto equipment). In addition, we lease from commercial sources an additional $300 million in facilities, services and equipment as an alternative to Government purchase. Consistent with Government policy, we lease rather than buy wherever it is more cost-effective for the Government to do so. About 75% of the DCS transmission media is leased and 25%, mostly overseas, is Government-owned.

Because of the many unique requirements placed on communications in support of national defense, the Defense Communications System has assumed a critical role in the defense mission. The growing threat of the Soviet forces, the Middle East situation, reduction of U.S. forces in Korea, and a declining defense budget all reinforce the need for rapid, reliable, secure and survivable communications. Our communications systems must also be capable of interoperability with our allies. The Defense Communications System has these capabilities. And yes, they are expensive to maintain and improve. But can we afford not to have such a system? I think not. History has proven that the outcome of conflicts has been determined as much by the collection and proper use of good information to control forces, as it has been by the quality of weaponry.

Having briefly touched on what the DCS budget buys and why we have a DCS, let me now turn to the cost of the system, and our efforts to control these costs.

The effect of inflation

One of the most frustrating issues to deal with as citizens, is inflation. It is that unseen force that nibbles away at our purchasing power. The same holds true for the Government and our telecommunications resources. Let me give you some examples from my area of responsibility:

—Our Defense Commercial Communications Office (DECCO) at Scott Air Force Base, Illinois, a field activity of DCA, centrally procures leased communications services for DOD and other Federal agencies. In 1966, this office was staffed with 188 civilian personnel and handled about 48,000 contracts. Today, 12 years later, this office is staffed with 200 civilians, a modest growth of 12 people, that handles more than 70,000 contracts. Yet our payroll cost for these people has almost tripled in this timeframe, primarily as a result of inflation. Despite our best management efforts, and while absorbing a significant increase in workload, our costs have continued to rise.

—In 1966, the Department of Defense paid 28.2 cents per voice mile of communications services leased by our DECCO activity. Today, that same mile of circuitry costs .56.8 cents per mile. And to further complicate matters, there is now underway a move to eliminate a leasing arrangement known as Telpak which has saved millions of DOD communications dollars over the past several years. If Telpak is eliminated as proposed, another $70 million or more will be added to the Department of Defense communications bill with no increase in capability.

—With the advent of satellites in the last decade, we have seen a significant decrease in the cost of transoceanic cable. We haved taken full advantage of these reductions by carefully engineering our system, resulting in sizeable savings to the taxpayer. For example, during the period 1968-1978, the cable cost from the Continental U.S. to Hawaii decreased from $9,000 to $2,735 per month; Hawaii to the Phillipines, $18,000 to $13,400; the U.S. to the United Kingdom, $13,700 to $9,000; etc. However, we are now seeing many of these savings disappear as a result of the decline in the value of the dollar, particularly for communications to Japan and to West Germany. Recent statistics show for example, that U.S. defense costs for Japan have increased by 30% or more, directly attributable to the dollar's decline.

—The Federal Communications Commission recently approved a tariff increase in Alaska amounting to 80%. The result—a $3.0 million increase in the cost of defense communications.

—Another tariff increase, the Scan 260, added $8.5 million to our annual communications bill.

There are also less significant items that do their part in pushing the cost of communications higher. For example in 1978; the price of solder increased 78% in six months, a box of 100 machine screws up from 80 cents to $1.70; the price of paper, paper clips, etc., are all on the rise.

I could cite many other examples where inflation has contributed to the high cost of communications. I don't, however, want to leave you with the impression that inflation is the only reason for high communications costs. The fact is that communications facilities, equipment, research and development, engineering and operations are expensive. For example, a satellite for our defense communications system is expected to cost $42.0 million by FY 1981; an AN/MSC 61 antenna $1.0 million; an AN/GSC 24 time division multiplexer $51,000.

What is to be done?

Recognizing that defense communications are costly, and that inflation further aggravates an already expensive service, what are we in the defense communications business doing to help hold the line, and reduce costs?

To make the best use of our communications dollar we must focus not only on the operating system of today but also the future defense communications system to engineer it in the most cost-effective manner possible. We are working hard on both counts. Let me again cite just a few examples:

—By the end of fiscal year 1980 we plan to close several of our AUTOVON and AUTODIN switching centers, with

(continued on page 7)

"Builder of Tomorrows"

By E.J. Quinby, Fellow, 1963

His non-radio inventions included the electronic depth sounder and turbo-electric transmission of power for ocean liners

Part II—The Dream Pays Off

Reginald Aubrey Fessenden

The first part of this story, published in the October 1978 issue, tells of Fessenden's early work with continuous-wave transmission, the first broadcast, and the business problems that ended in the cessation of commercial radio operation and Fessenden being shut out of his own company.

Dismissed from his National Electric Signaling Company, Fessenden now found time to devote his attention and efforts to several projects he had shelved in the back of his mind because he had given priority to the interests of N.E.S.Co. Back in 1900 Fessenden had begun urging Westinghouse and General Electric to consider his carefully worked-out figures and plans for turbo-electric marine propulsion, to take better advantage of the steam turbine's necessary high speed of rotation. In contrast to the steam turbine, the propellor is a relatively slow speed device. The gear train adopted to connect the two introduced losses.

The turbo-electric drive

Fessenden proposed to eliminate the reduction gears. Furthermore, the turbine is not reversible. Consequently a smaller turbine was employed to provide some "backing down" power, but in the interest of economy this device was barely powerful enough to provide manoeverability during docking and undocking under the most favorable conditions. Accordingly, tugs were depended upon to assist when conditions were less than ideal. In the Fessenden system, the maximum power of the main turbine is available for backing down as well as for full speed ahead. The turbine is directly coupled to an electric generator, whose output is delivered to the reversible electric motor coupled to the propellor, with speed and direction of rotation conveniently controlled through electric switching. Fessenden knocked on the doors of the General Electric Company at Schenectady. His reception was cool. Upon his repeated urging, G.E. consulted the Fore River Shipyard authorities. Their report was unfavorable, claiming that the rig would be impractical. When G.E. relayed this report to Fessenden, he requested the opportunity to look over the figures submitted by the Fore River Shipyard. He found that errors had crept into their calculations and that they were thus misleading. G.E. checked, and found that Fessenden was correct. They then invited him for a conference. Fessenden submitted his figures to the Navy Department—and the Board reported unfavorably on them. But the Naval authorities advised Fessenden that if he could get a *reliable* organization such as General Electric to submit a proposal on the turbo-electric drive, they would take it into consideration for some future construction then still on the drawing board.

Then the General Electric executives began to take Fessenden seriously. By 1910, work was going ahead full speed at the General Electric plant on the turbo-electric drive for the Navy's newest vessels. The ultimate improvement in speed and efficiency accomplished by this improvement in naval vessels attracted the attention of the U.S. Merchant Marine. Among the luxury liners to be equipped with this new drive were the Ward Line's new T.E.L.*Oriente* and their T.E.L. *Morro Castle.* The T.E.L. prefix indicated Turbo-Electric Liner. Although the *Morro Castle* met a tragic end at the hands of an arsonist when she was only four years old, the *Orient* lasted until she was torpedoed as a transport in World War II. Both hung up enviable records for speed and efficiency and served as models for many other big ships, which took advantage of the improved drive **designed by the General Electric Company.** Significantly Fessenden's name was also missing on the nameplates of radio communication equipment and important aids to navigation aboard these ships and their successors.

In 1912, Fessenden's active mind led him into research and development in many directions. Witness his internal combustion engine with pistons *outside* the cylinders, operating without any ignition system, on the diesel principle. He built working models, from 40 to 500 hp, which provided more power for their weight than former internal combustion engines. Offhand, it seems that the resultant accessibility of the moving parts would alone constitute a great improvement, considering the usual wear and tear internal combustion engines inflict upon themselves.

Among Fessenden's other interests and developments was his unique design to solve the problem of power storage in hydro-electric plants so that excess power available during light load periods could be made available during peak load periods. In today's increasingly serious energy crises, the solution to this problem looms more important than ever. We may yet find it advisable to resort to his system.

Fessenden's familiarity with oscillations in space was valuable in his efforts in sub-surface signaling in the sea. His development work for the Submarine Signaling Company produced the Fathometer. An oscillator and receiver mounted in the ship's hull transmitted sound waves vertically downward and received the reflections or "echoes" from the bottom. Timing the interval between the transmission and reception measured the depth or "sounding" accurately. Utilizing the same technique in a horizontal plane (scanning through a given arc,) the bearing and range of rocks, shoals or other menaces to navigation, such as unseen vessels or icebergs, could be detected. From this technique was later developed the sonar system of submarine detection and tracking. Had it not been for delays encountered through interference by official committees, sonar might have been developed during World War I, in time to save lives and ships that were destroyed by enemy submarines. However, the sonar equipment successfully developed and produced for the U.S. Navy became invaluable during World War II, turning the tide of the U-boat menace for the Allies.

Doubtless it was gratifying to Fessenden in October 1914 to observe that the Marconi Company applied to the National Electric Signaling Company for license to use the Fessenden patents, both U.S. and foreign. He probably was anticipating compensation in the form of royalties which, however, he was never to get.

Fessenden finally collects

Meanwhile, Fessenden's suit to recover some compensation from the National Electric Signaling Company rocked along through alternate victories and defeats until a jury finally awarded him a judgement of $406,000. But rather than settle for this amount, N.E.S.Co. chose to go into receivership. The urgency and confusion of World War I brought extensive infringements on his patents after the government took control of all radio communication and placed orders for Fessenden type equipment with various manufacturers, holding them blameless for any infringement.

It was during this period that Dr. E. F.W. Alexanderson of the General Electric Company succeeded in scaling up the 50-kW radio frequency alternator originally conceived by Tesla and developed by Fessenden. The improved design increased the output to 200-kW and incorporated various patentable ideas of both Fessenden and Alexanderson to make it practical for quantity production and commercial service. The first of these 200-kW mammoths was installed at the New Brunswick, N.J. transatlantic station of the Marconi "World Wide Wireless Chain", each of which was being equipped with powerful but undependable spark transmitters. Taking over this station, WII, the Navy changed its call to NFF and initiated trans-ocean radio telephone experiments, using the carrier of the new Alexanderson Alternator. Indeed, it was via this experimental circuit that President Wilson forwarded his startling message to the Kaiser via the big German radio station at Nauen, dictating the terms of the armistice and promptly bringing an end to the terrible conflict. The alternator was subsequently substituted for spark transmitters throughout the entire World Wide Wireless chain.

Having so successfully solved the problem of long distance radio communication, this new device attracted the attention of the British (parent) Marconi Wireless Telegraph Company, whose agents quickly offered $5 million to the General Electric Company for an *exclusive* license under the patents covering it. Actually, the Marconi interests loomed as the only potential customer for this costly development at the time. General Electric was about to accept the offer when the United States Navy, backed by the nation's President, urged the American radio industry to try and find a way to keep this valuable development from falling into foreign hands. The British had already gained control of the world's cable network, and now it appeared that they were about to take the world's radio communications under their control. In response, Owen D. Young, General Electric's Chairman of the Board, invited representatives from each of the major companies involved in radio communication or radio equipment manufacture, to attend a conference on the subject.

Admiral Bullard, the U.S. Navy representative, suggested at this gathering that they terminated the ruinous litigation over each other's patents, which had dogged the industry from the start, by pooling all their patents in a new American company to be formed for the purpose. They would each share in this and enjoy patent licenses without conflict. The important radio frequency alternator patents would be included. A valuation of $3 million was placed on that invention.

Thus was born the Radio Corporation of America, and those sharing in the new venture were General Electric, American Telephone and Telegraph Company, Western Electric, Westinghouse (which acquired the National Electric Signaling Company) and Wireless Specialty Apparatus Company (which had acquired a license from N.E.S.Co.). The whole deal revolved around the Marconi Wireless Telegraph Company of America, which was owned and controlled by its parent, the British Marconi Company. The World Wide Wireless chain of powerful radio stations built and owned by the American Marconi organization was an important consideration, so it was arranged to purchase it outright from the English owners.

One can well imagine the frustration and disappointment suffered by Reginald Fessenden as he observed all this wheeling and dealing. Assets and securities worth millions were being negotiated and exchanged, including those of the National Electric Signaling Company whose

chief assets were his patents, while he was being left out in the cold without consideration. Never having received a cent for his patents, his patience became exhausted, so he engaged expert legal representation and brought suit against the combination for $60,000,000.

The magnitude of this action attracted widespread attention in the press, with banner headlines, and caused considerable concern among the executives of the defendant RCA. Conferences were promptly arranged to bring both sides together in an attempt to settle out of court. Neither side was too enthusiastic about going to trial, with the attendant unfavorable publicity. Negotiations rocked along. The conferences were often attended by both Owen D. Young and David Sarnoff, who were most familiar with the history, the facts and the technical terms involved—some of which baffled the legal talents of both sides. The man who had been consistently ignored and neglected suddenly stepped into the limelight as the most important character in the whole drama.

Finally, at a conference on March 31, 1928, Fessenden became exasperated by the continued haggling over what appeared to him to be unimportant details. He jumped up, retrieved his hat and coat, and started to stamp out of the room. But the gathering appealed to him to return. The settlement agreement was quickly signed, and David Sarnoff handed the towering Fessenden RCA's check for one million dollars. The shattered dream had at last paid off!

Fessenden was by that time 62 years of age and not in the best of health. The big man had developed some heart trouble. On the advice of his physician, he decided to seek rest and relaxation in Bermuda, where he and Helen had enjoyed vacations. There they purchased the cottage by the sea that they had had their eyes on. They were occasionally visited by some of the former Fessenden associates, many of whom had achieved fame and fortune in the radio realm. Their son joined them for visits. Fessenden enjoyed discussing some of his theories with his visitors and continued mentally active, but his heart condition did not improve as much as hoped for. In February he suffered another heart attack, from which he appeared to be recovering until complications set in, and in May 1933 this great man slipped away into eternity.

It is gratifying to know that he had at least five comfortable years in which to enjoy some of the fruits the vitally important work for which he was awarded more than 500 patents.

Acknowledgment

The writer is particularly grateful to Helen Fessenden who, in her biography of her husband, reveals astounding familiarity with his work and his struggles as well as with the early development of radio in general, as set forth in her *FESSENDEN, Builder of Tomorrows.* (Coward-McCann, Inc. New York 1940)

The High Cost of Communications *(continued from page 4)*

an estimated annual savings of $12 million annually, and by careful engineering maintain present capability.

—Our central leasing office at Scott Air Force Base, Illinois, continues to obtain the best price possible for leased communications through negotiation with commercial carriers and by cost-effective arrangement of circuitry through Telpak.

—We are hard at work on alternative arrangements should interstate Telpak be eliminated to minimize the impact of the $70 million or more cost increase that I mentioned earlier.

—We have recently introduced a 1.544 megabit program where we derive 24 voice channels after having bulk encrypted the 1.544 megabit data stream. This program has already produced savings of about $2.6 million, and even greater savings are anticipated.

—Our planning is focusing more on the digital communications world, and less on analog—and a major reason is cost. The Canadians estimate that over a 20-year period they will save about a quarter of a billion dollars in capital investment, and about a third of a billion dollars in operating costs by going digital. AT&T has found it economical to replace older style analog switches with its new No. 4ESS. Digital systems perform better, are more flexible; and—an important factor to cost—they are easier to maintain. For example, our analysis shows that about 11 manhours per DCS station per day is currently required for routine tests and analysis to insure acceptable performance of the analog DCS. Experience with a European test bed has shown that all of these tests and analyses can be eliminated with digital communications.

—We are in the initial stages of building a much improved and more cost-effective AUTODIN system which will employ "packet switching." The Advanced Research Project Agency Network (ARPANET) uses packet switching and its customers have realized several million dollars in savings. Our "AUTODIN II" network is expected to be similary cost-effective.

Yes, communications costs are high, but I believe we must view these costs from two perspectives.

In my area of responsibility, the cost to operate, maintain, and improve the defense communications system is on the order of $1.0 billion, as I have mentioned. Let me impress upon you just how much money this is. I have made some quick calculations and find that: one billion dollars in one dollar bills laid end to end would circle the globe four times; or if a billion dollars were stacked in one dollar bills, one on top of the other, that the stack would be 68 miles high, or if you are a football fan, you could cover a football field with one dollar bills a foot deep. The magnitude of dealing with a billion dollars of taxpayers' money provides a constant challenge for all of us at the Agency to strive for maximum efficiency.

On the other hand, when I consider the vital role of communications to our national defense in this age of modern warfare, when a war could be decided in 20 minutes, I must ask myself—is the cost really so high? Is the four billion dollars that the Department of Defense spends for telecommunications command and control, representing about three-tenths of one percent of the defense budget, such a high price to pay? I think not. Reflect for a moment on the story of the message sent to Pearl Harbor through Western Union as routine traffic to warn of the Japanese attack—and the fact that the word arrived too late. In retrospect, what price would we have paid to insure the delivery of such messages?

A Word to June Poppele

The Executive Committee's "Den Mother"

Many of our membership have heard of the special personal assistance accorded us by Jack Poppele, his Tele-Measurements Corporation, and his staff, in providing for our committee meetings a home, feeding and care that would be hard to match or even evaluate. Let us simply say that without this support your Board and its Executive Committee might have some problems getting together almost every month to take care of the affairs of your Club.

Let us go on record to try to thank Jack for his volunteered costly help, provided to us at the Club at his expense. The Committee also wishes to take this opportunity to give added personal thanks to Jack's charming daughter, June, for unusual and meritorious service in seeing that we get a delicious lunch and for caring for all our special needs every time we go to Clifton and Tele-Measurements to hold our meetings.

We Luv you, June—and Many, Many Thanks . . .

The Executive Committee

June Poppele

The Executive Committee, which carries out the wishes of the Board of Directors between Board meetings and whose members often do much of the actual leg-work required to keep an organization going. It is composed of the Officers of the Club—plus three Directors not officers—who work with the heads of standing committees to carry on the day-to-day work of the Club. Standing, left to right: Mal Gurian, head of the Meetings Committee; Samuel Harmatuk, Vice President: George Apfel, Club Historian; Fred Shunaman, Executive Secretary; James Morelock, a Director and head of the Publications Committee; Joseph Rosenbloom, Vice-President—Counsel; Nathan Schnoll, Treasurer. Seated: Fred Link, President; Jerry Minter, a Director; Stuart Meyer, Executive Vice President; Jack Poppele, a Director and head of the Banquet Committee; Frank Shepard, Secretary.

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

The Rural Radio Network

First Broadcast Network Sans Fil

By Don deNeuf
Fellow, 1974

World War II put pressure on farmers to increase their production greatly. New techniques were developed and others continued to be pursued at the end of the war, as in the case of the thinkers and planners of the ten farm organizations of New York State.

One important need was for a much faster method of disseminating vital information to farmers. The monthly Grange Hall meeting and even the mail was too slow to meet some of the requirements. One of these was specialized weather information, and another was market report ing—supply, demand, and prices. Both were, of course, extremely perishable forms of information.

Weather data is vital to many farming operations—plant ing, haying, spraying, irrigation and harvesting. All the weather factors—temperature, humidity, precipitation and wind—have an important bearing on efficient functioning and even preventing disaster.

The organization and birth of an FM radio broadcasting network to cover some 120,000 farms in upper New York State came about in 1948 because of this need. The farm organizations applied to the FCC for licenses covering six FM broadcast stations, each located on a mountain top, some 2,000 feet above sea level, spread across New York State, each within line of sight distance of its adjacent stations, and each operating on a different frequency. This arrangement enabled programs originating at one station to be received with perfect quality and rebroadcast by the others on a relay basis. It was named the Rural Radio Network. The stations were so remotely located geographically that they did not even have telephone service. Each of the stations and the several field vehicles were VHF radio equipped to maintain instant communication between all of them.

Through the wholehearted cooperation of the U.S. Weather Bureau in Albany a special combined weather report and forecast service called the "Weather Roundup" was developed into an extremely valuable service to farmers. Weather across the State invariably moves from west to east. A format was employed wherein each of the RRN stations would, one after another, report local weather conditions in a west-to-east direction. At the end

Donald K. deNeuf, WA1SPM, at one of the stations of the system.

of the reports, the network would switch to the Weather Bureau in Albany. Based on the information just reported by the stations, plus its own data, it would issue a detailed forecast for the areas covered by each of the stations.

The "Weather Roundup" became so popular that a network of major AM broadcast stations such as WGY Schenectady and WNBC of the National Broadcasting Company in New York City eventually hooked into the network by FM pickup and rebroadcast one or more of the programs live each day. (see Fig. 1a).

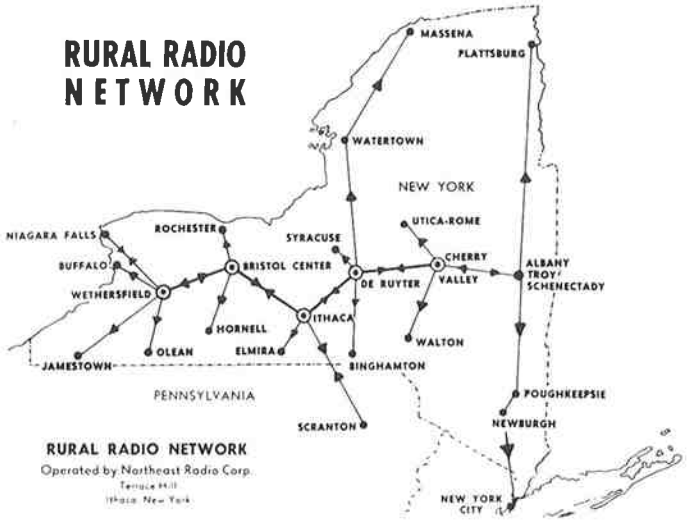
The network also looked toward the use of its facilities for additional services. First, the "good music" programs and news reports from the *New York Times* station WQXR-FM were rebroadcast over the network during the periods it was not carrying information for farms—weather, markets, advisories from the College of Agriculture at Cornell University, etc. The network in 1952 asked the FCC for authority to experiment with the Halstead-Hilferty system of multiplex superimposed on the regular audio service of the network.

Major Armstrong, the inventor of FM, was extremely interested in the network and its operations and followed its development closely. WOR-FM, under the direction of Jack Poppele, provided an FM multiplex feed to the network from the Columbia School of Journalism in New York City. It issued a miniature "Facsimile Newspaper" twice a day, transmitted through Hogan Facsimile equipment. General Electric provided facsimile receivers in console form to a number of strategic locations where the little newspaper was reproduced. The U.S. Weather Bureau also prepared special weather forecast maps each day, which

were reproduced on the facsimile receivers. The demonstration successfully showed the potential of the overall system. (The photo shows the writer at the facsimile control system at the RRN master control station).

The same mux system was also employed to put all the outlying RRN stations on a remote-control basis from the Ithaca headquarters control station. From here all elements of the individual stations could be operated, measured, and telemetered back to the master control station. All functions were continually monitored (including things like aircraft warning lights on the towers) and weather conditions could be monitored at will. This was conducted under special permission of the FCC—the first authority ever granted to any broadcast station to operate with remote control.

Two listener letters to RRN provide typical samples in two completely different veins. A poultryman in Homer wrote "Three times a day we listen anxiously to your Weather Roundup. We regulate and plan our stoves and windows in the chicken houses accordingly. The RRN egg market prices mean almost life and death to our business as chicken farmers". A housewife at the Sampson Air Base wrote "We enjoy the good music the most, but I must admit that I have learned many things about farmers I never knew before, and the programs make me appreciate some of the farmers' knowledge and needs and problems as well as his physical work necessary to produce food for the rest of us".

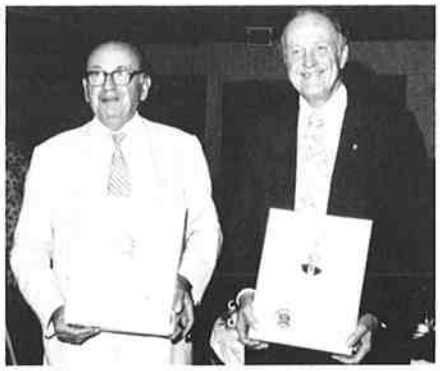


Area covered by the Rural Radio Network.

WASHINGTON SECTION HONORS "UNCLE CHARLIE"

The Washington, DC Section of the Radio Club of America honored Charlie Higginbotham, former Chief of the Special and Safety Radio Service Bureau on August 30, 1978, with a retirement luncheon at The Touchdown Club of Washington, DC. Perhaps the finest tribute paid to Mr. Higginbotham was that the luncheon was entirely sold out. It was the largest turnout for an exclusively Section event, with 65 persons attending, including the guest of honor and his wife. Fred Link, President of the Radio Club of America, Inc. attended and took part in the occasion. Fred Link, on behalf of the national organization, presented Mr. Higginbotham with a plaque in appreciation of his contribution to both the Radio Club of American and the radio communication industry during his long tenure with the FCC. Stu Meyer, a Director of the Club, was Master of Ceremonies.

The attendees included many from the FCC, including Carlos L. Roberts, who replaced Mr. Higginbotham as Chief of the S&SRS Bureau and Washington representatives from most of the manufacturers of the land mobile industry. A contingent representing the California Chapter of the Radio Club, including Loren McQueen, the Chapter Chairman, attended.



Finch and Higginbotham with their plaques.

Val Williams of NABER presented, for the benefit of the audience, the plaque given to Mr. Higginbotham at NABER's Annual Meeting just held in the latter part of July at Geneva, Wisconsin. Mr. Higginbotham spoke briefly about the satisfaction he has had in government service and his plans for the future. As a fitting ending to the luncheon, Mrs. Higginbotham was asked to draw the winning 50/50 lottery number from the hat, whereupon she randomly selected a number, which turned out to be her husband's.

Captain William G. H. Finch, U. S. Navy Retired, was awarded his Director Emeritus For Life Plaque by Fred Link, President of the Radio Club of America, Inc. at the luncheon. Captain Finch, a holder of the basic patent in facsimile, has been an active member of the Radio Club for many years. Most members know that Captain Finch has contributed $10,000 to start the Radio Club's scholarship fund. For that reason, under a technical interpretation of the tax laws, Mr. Finch had to resign as an active director of the Radio Club.

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The 69th Anniversary Annual Meeting and Awards Banquet of the Radio Club of America, held at the New York Sheraton Hotel on November 17, 1978, marked another milestone of steady growth, which has been maintained at an average upward trend of at least 10% each recent year, according to President Fred M. Link.

Even greater advances are evident in the calibre of the specialized award winners and the recipients of Fellow membership recognition. Over 230 persons witnessed the presentation of awards embodied in handsome medalions and impressive plaques at the New York Sheraton grand ball room.

Vice Admiral Samuel F. Gravely Jr., himself a Fellow (1972) Director of the Defense Communications Agency, impressively garbed in Navy uniform, was the keynote speaker of the evening. He discussed "The High Cost of Communications" as it affected the operation of the worldwide agency responsible for wire, wireless and satellite government communications. Budgeting in

esponse to cost effectiveness and its earing on tax structures was expertly efined by Vice-Admiral Gravely, vho concluded with the observation nat never again will the lack of com-nunication capability be a factor in ne defense of our country.

The Armstrong Medal, the Club's ighest award, was presented posthu-nously to Murray Crosby, Fellow 1939, and accepted by Mrs. Marie Crosby. It was in recognition of his early research in circuit technology, propagation, noise suppression and frequency modulation.

William Eitel (Fellow 1975 and Life Member), one of the founders of Eimac Co. received the Sarnoff Citation; for his services to the country in critical power tube production and his beneficial influence on the amateur fraternity, wherein he is recognized as W6UF, an outstanding champion capable of reading conversational CW code at speeds bordering 100 WPM.

In the field of historic preservation of artifacts and records of electronic Communication, the Ralph Batcher Memorial Award went to Bruce Kelly

Mrs. Crosby accepts the Armstrong Award from Jerry Minter. Crosby associate Len Feldman responded.

Bill Eitel (left) received the Sarnoff Citation from Jack Poppele.

Offenhauser accepts the President's Award for Joseph Stantley.

Bruce Kelley (left) and Frank Gunther with the Ralph Batcher Award.

Lewis Clement (left) receives the Pioneer Award from Sam Harmatuk.

Joseph Keller responding for the newly elevated Fellows.

Secretary Frank Shepard reads the results of the annual election.

(Continued from P. 13)

(Member 1965, Fellow 1972). He is the curator of the Holcomb, NY museum of the Antique Wireless Association.

A special President's Award was given to Joseph Stantley (Member 1920-Fellow 1926) who faithfully served as our treasurer from 1927 to 1966, and is applauded for his long time dedication and loyalty.

Regional presentation of Awards begun in 1978, has been implemented in the program for 1979. One of these events will be at the March 27-30th, 1979 Club sponsored Banquet at the Arlington Heights, IL Hilton Hotel (near northwest Chicago), in connection with the IEEE-VTS, Vehicular Technology Society four-day conference. The scheduled Fellow Member Award recipients will be:

1. Robert E. Lee, Dean of FCC Commissioners.
2. William Pannell, internationally noted scientist from England.
3. Emmett (Jay) Kitchen, Vice-President and Assistant Executive Director of National Association of Business and Educational Radio, Inc.
4. Roger Madden, President VTS/IEEE and key Federal Communications Commission staff official.

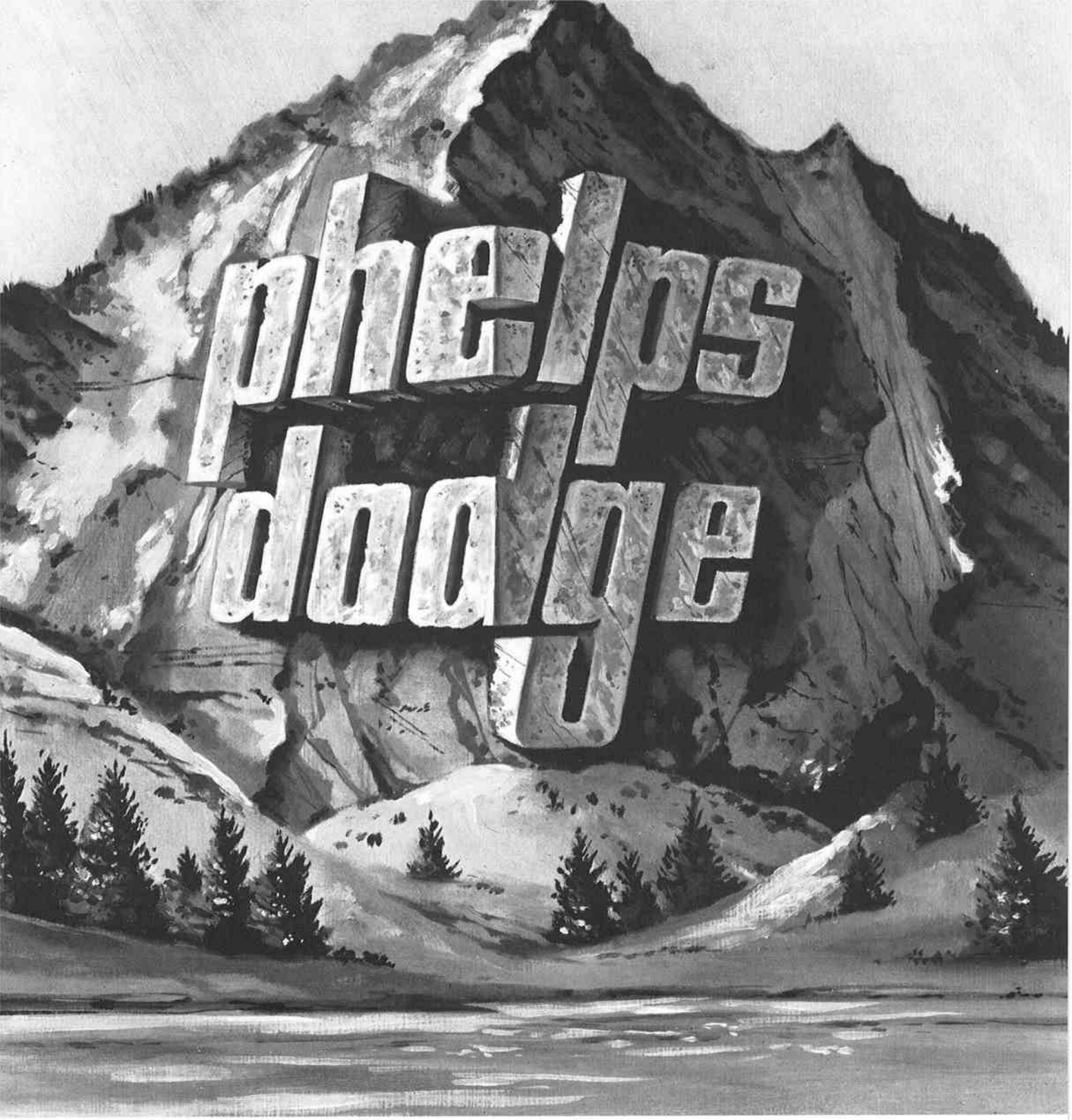
The worthy awardees have also increased at a rate of 10% indicating that our technology moves ahead at a solid uninflated rate.

Ero Erickson (Fellow 1975)

West Coast Amateurs Approve Eitel Award

A group of West Coast amateurs enthusiastically affirms the Club's selection of Bill Eitel for the David Sarnoff Award. They say in part: ". . . His accomplishments are far too numerous to mention. The most outstanding contribution has been pioneering the Amateur Satellite (OSCAR) Program. Through the far-sightedness of Mr. Eitel, who believed the future of the Amateur Radio Service was in satellite communications, he single-handed gave the world the gift of OSCAR, which paved the way for seven more OSCARS, so successful in their orbiting the earth. It again focused the eyes of the world on Amateur Radio. For this one contribution Mr. Eitel has earned the sincere gratitude and appreciation of Amateur Radio operators all over the world."

The resolution is signed by W6ZF, WB6VEC, N6XN, W6WC, K6OKO, WA6BJW, WA6VPA and WD6AYC.



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Fellows elevated at the 1978 Annual Meeting. *Standing, left to right: Neal H. Shepherd, Consulting Engineer, General Electric Co., Lynchburg, VA; Paul Katz, U.S. Department of State; Benjamin Wolfe, Vice President, Engineering, Post Newsweek Stations Inc., Washington, DC; William Detwiler, President, Helper Instruments, Indialantic, FL; Joseph E. Keller, Industry attorney, Washington, DC; John T. Wilner, Director of Engineering, New Jersey Public Broadcasting Authority; Joseph S. Rosenbloom, Counsel, Research and Advanced Systems Development, IBM, Armonk, NY; Joseph F. Walker, VP, Phillips Communications Co., Bartlesville, OK; Leonard T. Witt, consultant, Emergency Medical Service, NYC. Seated: C. Raymond Kraus, President, Consulting Communications Engineers, Villanova, PA; George J. Apfel, retired, formerly AT&T; Robert L. Mattingly, Bell Laboratories, Whippany, NJ; Harry Kaemmerer, CCTV Engineering, AT&T, NYC; Eric G. Shalkhauser, Professor Emeritus, Bradley U., Peoria, IL; Jack A. McCullough, retired from Eimac; Alfred A. Menegus, Senior Publisher, Electronic Technician/Dealer, NYC. Not in photo: William M. Borman, Motorola Inc, Washington, DC; Bernard J. Campbell, Chief Communications Engineer, San Bernardino County, CA; Roy T. Cushman, Semi-retired, Los Gatos, CA; Hugh S. B. Hamilton, Pye Telecommunications, Cambridge, England; Marion J. Henson, California Department of Fish and Game; L. Eugene Root, Retired President, Lockheed Missiles and Space Co., Sunnyvale, CA; Frank L. Rose, FCC, Washington, DC; T. A. Smith, retired, formerly RCA; John J. Tary, Institute for Telecommunications Sciences, Boulder, CO; Raymond C. Trott, Antenna Systems Engineering Co., Dallas, TX.*

NEWS OF THE MEMBERSHIP

Hugo Cohn (M 1939, F 1953, L 1971) is our oldest working member. According to *Options,* published by the New York City administration, "Hugo Cohn is a 90-year-old employee of the New York City Department for the Aging, who says that one of his main purposes in life is to serve as an inspiration for his fellow citizens." Mr. Cohn, who graduated from Columbia with an E.E. in 1909, retired from his firm, Radio Receptor Co., as president in 1958. He began his present work with New York City in 1972, after some years as consultant.

Charles A. Higginbotham ("Uncle Charlie," M 1973, F 1974, Director 1979) has opened an office as Telecommunications Consultant, specializing in land, mobile, aviation and marine communications, at 14416 Pecan Drive, Rockville, MD 20853, telephone 301-460-5144.

Paul Katz (M 1973, F 1978) has retired from his position as Chief, Professional and Technology Branch, Office of International Narcotics Control, Department of State. During his career with the Department of State and the Agency for International Development, he designed and developed low-cost Village Hamlet radio transceivers, multi-use radio transceivers for foreign police assistance programs, and has designed telecommunication systems and provided advisory services to police in no less than 30 countries.

Eric Landau, WA2KER (M 1977) has been appointed Motorola regional sales manager for special markets in the New York metropolitan area.

Renville McMann, Jr. (M 1944, F 1952) President of Thomson-CSF Laboratories, has received an Emmy for "outstanding technical achievement" in the development of a digital noise reducer designed to cut down noise and snow in home television receivers.

Al Menegus (M 1971, F 1978) has been made Senior Publisher of *Electronic Technician/Dealer.* He started his 10 years with ET/D as District Manager, and became publisher in 1971. Al will continue to work from the New York office. David J. Hagelin becomes Publisher and will be based on the Chicago office.

Kenneth M. Miller, K61R (M 1970, L 1975) has been elected President and a Director of Penril Corp., Rockville, MD, manufacturers of data communications equipment, electronic test and measuring instruments, and loudspeakers, and operating plants in five States and one in Switzerland.

Wm. B. (Bill) Morton (M 1970, F 1971) has retired from the U.S. Department of Agriculture, where he was leader of communications and electronics for the Forestry Service. He was also a member of the Interdepartment Radio Advisory Committee. Long an amateur expert in locks, he and his son expect to set up a business in that field, in addition to consulting work in communications and security.

Raymond E. Spence, W4QAW, (M 1976, F 1977) retires as chief engineer of the Federal Communications Commission at the end of April. He has been Chief Engineer since 1971. He will be succeeded by Stephen J. Lukasik, formerly chief scientist at the Rand Corp.

Frederick G. Suffield (M 1978) has been elected Vice Chairman of Region 6 of the IEEE (the eleven western states, with over 36,000 members, including many members of the Radio Club). He serves for two years. Mr. Suffield is a Senior Member of the IEEE.

Joseph J. Walker (M 1977, F 1978, Director 1978) has been appointed to the Telecommunications and Electronics Committee, The National Council for United States-China Trade. When he informed us of his appointment, he expected to be going shortly to Peking on an official visit. He looks forward to several exchange trips of the Committee traveling to China and representatives of the China telecommunications industry coming to this country.

Address Changes

Albers, Ralph. 6501 Loisdale Court, Suite 1100, Springfield, VA 22150

Bach, Norman G. 7807 Morland Lane, Bethesda, MD 20014

Bitcon, William A. 4 Garden Walk, Histon Cambridge, ENGLAND CB4 4HH

Caperton, John H. 3114 Bexhill Court, Louisville, KY 40222

Cassidy, Francis T. 1648 East 56 St., New York, NY 11234

Cervantes, Howard T. 421 47 St. No., St. Petersburg, FL 33713

Chan, Elliott K. NCU/TDX Advisor. APO San Francisco, CA 96346

Childs, Gailand 516 9th St. N.E., Waseca, MN 56093

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

Felch, Edwin P. 33 Sandy Hill Road, Chatham, NJ 07928

Hollingsworth, L.M. 2299 Winter Pky No. 225, Cuyahoga Falls, OH 44221

Guthrie, Tom F. PO Box 65, Bayside, NY 11364

Herlihy, W.W. PO Box 4088, Santa Rosa, CA 95402

Holt, Allan E. 1771 Princess Anne Rd., VA Beach, VA 23456

Houck, Harry W. 5985 8th St., Vero Beach, FL 32960

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Karr, Bruce, Box 1436, New Smyrna Beach, FL 32069

Kimmel, Robert I. 1002-A North Sixth St., Harrisburg, PA 17102

Kirby, Richard C. Int'n'l Radio Cons. Comm., c/o Case Postal 94, 1211 Geneva 20, SWITZERLAND

Kitchen, Jay VP NABER Inc., 1330 New Hampshire Ave. N.W., Washington, DC 20036

Krossa, Kenneth D. 1305 Montclair Way, Los Altos, CA 94022

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Leavitt, Philip C. 505 Ridge Ave., Evanston, IL 60202

Quintal, Richard 29 High St., Ipswich, MA 01938

Rhoades, Otto I. 150 Durkin Drive, No. 11, Springfield, IL 60202

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Schermerhorn, Romaine W. 207 Slade Drive, F 2, Longwood, FL 32750

Sutter, Walter E. Corland Corp., 1800 N. K St., Suite 920, Arlington, VA 22209

Swigart, James F. 7646 Lakeside Drive, Riverside, CA 92509

Torbick, William G.E. Mobile Radio, Lynch burg, VA 24503

Tucker, Robert A. Telecom Ventures Ltd., Des Plaines, IL 60016

Turnbull, J.C. Dynatron Radio Ltd., Ditton Walk, Cambridge, ENGLAND CB5 8QD

Van Buren, John M. 6155 Catalina St., New Orleans, LA 70124

Vette, Wm. J. K6TXR. 175 Harold Ave., San Jose, CA 95117

Wallower, Donald R. MTI, Box 735, Camp Hill, PA 17011

Worthen, K.J. 100 Jocelyn Court, Santa Cruz, CA 95060

Obituaries

Ernest V. Amy, a Founder of the Club and a member for 69 years, died February 5, 1979, just a week before his 87th birthday. Joining the Junior Wireless Club in January 1910, he became one of the Founders and Treasurer of the Radio Club of America when it superseded the Junior Wireless Club in October 1911. He was either an Officer or Director every year since, being made Director Emeritus for Life in 1976.

Graduating with an E.E. from Columbia in 1917, Amy went overseas in World War I as a First Lieutenant in the Engineering Corps, 77th Division. Later he worked with New York Edison and with Marconi. He joined RCA in 1922, first as engineer in charge of the relay station in Belfast, Maine, later in the transmitter and engineering design section of the company.

In 1928 he and two associates founded Amy, Aceeves and King, a consulting engineering firm of which he was for many years President. The company's offices became the headquarters of the Club, and for many years Board meetings were held there.

The inventor or coinventor of many electronic devices, he received more than 30 patents. In 1950 he received the Armstrong medallion for his work with Radio 1BCG in 1921. He was the last survivor of the seven Radio Club members who designed and built that station and took part in the transcontinental tests with Paul Godley in Ardrossan, Scotland.

Amy was made an Honorary member of the Club in 1964, and in 1965 received the Armstrong Medal, the Club's highest honor. He was the only person—other than Armstrong himself—to receive both the Armstrong medallion and medal.

Harold H. Buttner (Member 1928, Fellow 1940, Life Member 1971) died January 12, 1979, in Bridgeport, CT, at the age of 86.

Graduating from the University of California in 1915 with the degree of B.S. in Electrical Engineering, Mr. Buttner went to the Navy Department as a civilian engineer, planning and constructing stations on the Pacific coast and in Samoa. He then enlisted in the Navy, and worked on the construction of the Lafayette Naval transatlantic station at Bordeaux, France. After his discharge he returned to the United States as an expert radio aide at the New York Navy Yard. Later he served for a time in the engineering department of the Western Electric Co. as a radio development engineer.

Mr. Buttner joined ITT in 1926, serving that company in a number of positions until his retirement in 1957 as vice president and deputy technical director. In 1952 he became president of ITT's Federal Telecommunication Laboratories, and helped to establish ITT's microwave research laboratories in Nutley, NJ. After his retirement he served the company as consultant for many years. He was also elected to the board of directors of the Hewlett-Packard Co. He was a former director and Fellow for Life of the IEEE, and held the Italian decoration of Commendatore della Corona d'Italia.

Frank J. Hollister (Member 1968, Fellow 1973) died January 5, at the age of 66. He had retired from the Electrical Engineering Division of the American Electric Power Service Corp. in 1975. At the time of his retirement, after nearly 30 years with the company, he was a Senior Engineer in the Communications Section. Before joining American Electric Power, he had been a member of the US Army Signal Corps for six years.

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Forty-Five New Members

Forty-five new members have joined the Club since the last *Proceedings* was published. Roughly half, or 22, of them list themselves as amateurs. Others have reported amateur radio among their interests, though they have not listed calls, so the actual number of hams may be greater.

Barrett, Richard F. W6CFK. Freelance writer. 1520 Santa Maria Avenue, San Jose, CA 95125

Bates, Frank III. Owner, West Valley Electronics, 2081-M Bering Drive, San Jose, CA 95131

Booth, Robert M. Jr. Attorney, Engineer, Broadcaster. 9509 East Bexhill Drive, Kensington, MD 20795

Clement, Anthony J.F. W6KPC. Chairman of Board, Tri-Ex Tower Corp. Visalia, CA. Route 1, Box 116, McFarland, CA 93250

D'Luhy, John J. K2EXI. Investment banker. 400 East 52 St., New York, NY 10022

Doncourt, Carlton R. Captain, New York Police Department. NYC P.D., Communications Division, 50-16 59th Place, Woodside, NY 11377

Durham, Edward R. W5ATB. Owner and President, Radio, Inc., South Birmingham Place, Tulsa, OK 74114

Fisk, James R. W1HR. Editor-in-Chief *Ham Radio* and *Ham Radio Horizons.* 262 Hayden Road, Hollis, NH 03049

Fuller, Harris W. Sales Manager, communications instruments, Cushman Electronics, Inc., 2450 N. 1st St., San Jose, CA 95131

Gabriel, August F.K4BZY. President, Gabriel Communications Corp., 1400 N.W. 3rd Avenue, Ft. Lauderdale, FL 33311

Gabriel, Lawrence J. Vice-President, Gabriel Communications Corp., Address as above.

Gironda, Augustin J. W2JE. Printer, (ex-commercial and Navy operator). 1417 Stonybrook, Mamaroneck, NY 10543

Greggs, Eddie D. District Sales Manager, Motorola, Inc., Communications Group. Suite 301, 800 N.E. 63rd, Oklahoma City, OK 73105

Grogg, Burnell L. Vice-President Sales, System Engineering. 4120 E. Main, Lineboro, MD 21088

Hoovler, William S. President and Chief Engineer, Communications, Inc., Arlington, VA. Rt 2, Box 779, Stafford, VA 22554

Kelley, William C. Area Sales Manager, Motorola Communications & Electronics, 3320 Belt Line Road, Dallas, TX 75234

Klaus, Henry, W9AK. Board Chairman, Klaus Radio, Inc., 8400 Pioneer Pkwy, Peoria, IL 61614

Klepper, Irving C. W3HGD. Senior Engineer (Electronics) Consultant. 182 Grosvenor Lane, Severna Park, MD 21146

Knight, John B., W6YY, K6YY. Retired from NBC-TV. 4710 Viro Road, La Canada, CA 91011

Laida, David M. Electronic Engineer. U.S. Army Communications Command, Ft. Huachuca, AZ 85613

Lamoureux, Thomas Executive Director, Telocator Network of America, Suite 1020 N., 1800 M St. N.W., Washington, DC 20036

Lee, Robert E., Commissioner, FCC. Federal Communications Commission, Washington, DC 20554

Link, August J. Owner, Surcom Associates, 305 Wisconsin Ave., Oceanside, CA 92054

Low, Debra L. Research Engineer, Lockheed Missiles & Space Co., PO Box 504, Orgn 62-41, Bldg 104, Sunnyvale, CA 94086

McDoulett, Claude D. VP Haliburton Comms., Inc., Duncan, OK. 2108 Park Drive, Duncan, OK 73533

Marcus, Bruce S. President, Marcus Communications, Inc., 134 East Center St., Manchester, CT 06040

Mills, Owen P. WA3NKY. Owner and President, Talbot Communications, Inc., Rt. 1, Box 183C, Handley Road, Cambridge, MD 21613

Nyhen, E. MacDonald Technical Advisor, U.S. Dept. of Commerce, Washington, DC. 1637 North Greenbrier St., Arlington, VA 22205

O'Connor, James F. AVM Systems Analyst for transportation control systems. 58 Cygnet Drive, Smithtown, NY 11787

Palmer, David H. W6PHF. Senior Video Camera Engineering Technician. 638 Benvenue Avenue, Los Altos, CA 94022

Pannell, William M. Senior Systems Consultant, Pye Telecommunications Ltd., New market Road, Cambridge, ENGLAND

Pomparelli, Joseph J. Partnership/Chief Engineer, Radio Page Communications (RPC), 2 Pendleton Drive, Cherry Hill, NJ 08033

Reed, Richard E., WA6PGD. Owner Tekcom Inc., Huntington Beach, CA. 21282 Wavecrest Circle, Huntington Beach, CA 92646

Savajian, Robert L. Western Field Operations Manager, RCA Mobile Communications Div., 6739 West 44th Avenue, Wheat Ridge, CO 80033

Schmidt, Harry L. VE3BRH. Manager, Applications Engineering Dept., AEG Telefunken, Bayly Engineering Div., Ajax, Ont. 907 Vistula Drive, Pickering, Ont., Canada

Scott, William W. Eastern Sales Manager, Rydax, Inc., Raleight, NC. 3206 Plantation Road, Raleigh, NC 27609

Serniuk, Walter, K6HQE. Engineering Administrator. 7555 De Foe Drive, San Jose, CA 95129

Singer, Edward Radio Engineer, New York City Fire Dept., Fire Communications Div., 110 Church St., 7th Floor, New York, NY 10007

Taylor, Ward D. W4CTU. Territory Sales Manager, G.E. Co., Communications-Mobile, 190 Lincoln Highway, Menlo Park, NJ 08817

Thomas, Harry R., Jr. WD40ZT/MA. Communications Technician. 6377 15 Ct. South, W. Palm Beach, FL 33406

Troe, James L. W2GRX. Head, Radio and Service Test Dept., AMPS, Bell Labs, Whippany, NJ. 111 Skyline Drive, Morristown, NJ 07960

Vargas, John F. W2ULO. Retired (marine radio operator). 49 Fairview Ave., Park Ridge, NJ 07656

Vette, William J. K6TXR. Retired. 175 Harold Avenue, San Jose, CA 95117

Vrana, Othal D., WOWYP. Owner, General Communications Service, Wichita, KS. 800 Peterson St., Wichita, KS 67212

Wells, Ray G3RIN. Research Worker, Philips Research Labs, 5 Cronks Hill Road, Redhill, Surrey, ENGLAND RH1 5HA

Book by Club Member

Hazeltine the Professor, by Harold A. Wheeler (M 1936, F 1936, Life 1971.) Hazeltine Corp, Greenlawn, NY, 1978. 6 x 8½ inches, 120 pages, hard cover.

This rather unusual work contains not only a biography of Hazeltine, but a short autobiography written by the subject himself, and a partial autobiography of the author, as well as two prefaces.

The book deals, of course, at greater length with the Neutrodyne than with any of Hazeltine's other accomplishments, with three chapters on the subject. But achievements less known to the technical public are also revealed. Few know that we owe the term *mutual conductance* to him, or that he was the sole designer of the famous Navy SE-1420 radio receiver.

The connection between Hazeltine and the author is a story in itself. Wheeler's father, who worked with Hazeltine on the First National Radio Conference, had occasion to introduce his son, a college student "who was interested in radio" to the Professor. To quote Hazeltine: "Harold told me he had invented a circuit for neutralizing capacitive coupling, and to my astonishment, sketched a circuit identical to one of my own." Wheeler was disappointed to see Hazeltine's patent application, but invented an alternative circuit for the same purpose. Hazeltine was so impressed that he "proposed that we join forces, and this we did," with Wheeler receiving 10 per cent of the royalties.

There is a complete list of all Hazeltine's important papers, including the one on the neutrodyne circuit—first presented at a meeting of the Radio Club—and subject and name indexes.

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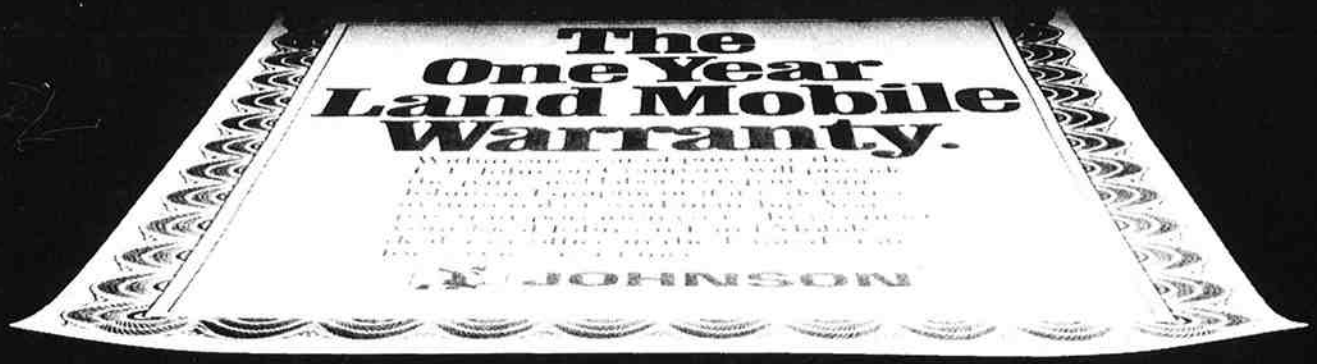

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