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THE RADIO CLUB OF AMERICA, INC.
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The Radio Club of America, Inc.

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

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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.

WHAT MAKES THE RADIO CLUB of AMERICA TICK?

With nearly 1000 active members, the majority of which represents leadership positions in the Electronics-Communications industries, and with so many who are no longer with us having contributed dominant leadership in our field in the past, it follows that the Radio Club of America has every right to be proud of our position and acceptance.

In my over twelve years as President of the Club I have watched the growth of acceptance and respect for the Club and wish to call attention to the fact that the strength we have generated can be traced directly to the devoted and sometimes difficult personal contributions of a sizeable team of elected and appointed leaders.

The mass membership knows little of the special daily effort and contribution of the Executive Committee, the working body that handles the day-to-day administration of the Club's program. That group, made up of the elected officers plus a number of appointed past officers, directors and leaders, meets monthly to handle details of Club programs and policy. This is no small contribution on the part of these members, as most of them are successful business men still operating their businesses who give up valuable time at their own expense to make our Club the success it is.

No small part of this contribution is made by Director Jack Poppele, who, in addition to his important work on the Banquet Committee and other activities, has offered the Club the use of his Tele-Measurement facilities for these important meetings, and supported this with the help of Miss June Poppele, an official of Tele-Measurements Inc., by preparing and serving to our Executive Committee group a luncheon to help us make the most of our time—this as a courtesy of the Poppele's and Tele-Measurements.

Since the monthly Executive Committee sessions number between ten and fifteen sincere leaders—to have the facility offered by Jack Poppele, plus the luncheons provided by June Poppele, is in itself a tremendous asset to our effort. While I am certain the Poppele's realize that we of the Executive Committee greatly appreciate this extra contribution by Tele-Measurements Inc., I feel that it is about time that the membership is made aware of this special benefit.

The Executive Committee is made up of working leaders and everyone contributes substantially to the day-to-day working and success of the Club. The Committee reports to the Board of Directors through written minutes and monthly reports of moves made as well as in person at the two key Board of Directors meetings each year. Between Board of Directors meetings, all major decisions formulated by the Executive Committee, are cleared by telephone and/or mail vote with the full board—a system that has proven quite effective.

If you have read this far I now suggest that you take a look above at the masthead and note the make-up of the Executive Committee—these are the people who contribute much time, expertise and a lot of their own money to make it all work.

Fred Link, *President*

PROXIMITY FUZE

Secret Weapon of W.W. II

Much has been written about radar and its effect in winning World War II. Little mention has been made of the proximity fuze, which may have been equally important. In totally paralyzing the enemy air force, it made the Pacific an American instead of a Japanese lake and gave us complete superiority in that theater of war. Its effect in neutralizing the "buzz bombs" as soon as it got into action in the London area, and later at Antwerp, was decisive, and when it was released on the European front it not only wiped out opposing air forces, but destroyed the morale of ground forces to an extent that was a great factor in bringing the war to an end.

Introduction

by Jerry Minter

The Radio Club of America published two papers in the March 1946 issue of the *Proceedings.* The first was "The Radio Proximity Fuze," by Dr. L. Grant Hector; the second, "Radio Countermeasures: the Science of Immobilizing Enemy Radar," by Oswald G. Villard, Jr. These two papers summed up the two major new electronic developments that resulted from World War II. The proximity fuze paper was presented before the Radio Club at its October 1945 meeting—only two months after the end of the war! The radar paper was presented at the January 1946 meeting.

Many papers covering the subject of radar and countermeasures have since been written. Very little has ever been added to our original story about the proximity fuze.

Our former president, William H. Offenhauser, Jr., suggested several years ago that the full story of the proximity fuze (also called VT Fuze) should be told while most of the active participants were still alive to tell it. As a result of Bill's dedication and action the following group assembled on November 17, 1978, at a luncheon meeting in the Hotel Sheraton, New York City:

L.R. (Larry) Hafstad, Ralph Baldwin, Vice-Admiral George F. Hussey, Lewis M. Clement, Harold F. Schwede, A.J. Adams, John M. Pearce, Robert Sprague, William H. (Bill) Offenhauser, Dean C. Allard and Jerry Minter.

Additional comments were made available via tape recordings from Herb Trotter, Admiral Arleigh Burke and Curry Ford.

A binaural tape recording of the entire proceedings was made by Jerry Minter and transcribed by his son, Byron Minter. This transcript was reviewed by Harold Schwede, then sent to Dean Allard of the Naval Library for review and retyping for distribution. Copies are now on file in the Naval Library in Washington, DC. The Board of Directors of the Radio Club has approved publication of the Document in forthcoming issues of the *Poroceedings.* The original binaural tapes are 4.5 hours in duration.

To minimize the costs of publication, some comments not directly connected with the fuze have been omitted in this version. Persons interested in the full record may obtain a copy of the original manuscript for $10 from the Club. Address Fred Shunaman, 933 East 7th St., Plainfield, NJ 07062, and make all checks payable to The Radio Club of America.

Recently, one of our panelists, Ralph Baldwin, has published a book, *The Deadly Fuze,* containing much information about the details of the proximity fuze. It is available from the Presidio Press, Box 3515, San Rafael, CA 94902. Price $14.95.

(Story begins overleaf)

The VT (Proximity) Fuze Meeting

November 17, 1978, at the New York Sheraton Hotel, during the Annual Conference of the Radio Club of America, Inc.

LAWRENCE R. HAFSTAD

Deputy Director of the John Hopkins Applied Physics Laboratory and in charge of security, production and quality control. Background in electronics and Nuclear Physics.

I would suggest that we begin with a brief statement of what I call the research phase, which has already been written in the book, *Scientists Against Time,* which is the history of OSRD.* At the end of the war, we all felt that we had done a good job which ought to be recorded.

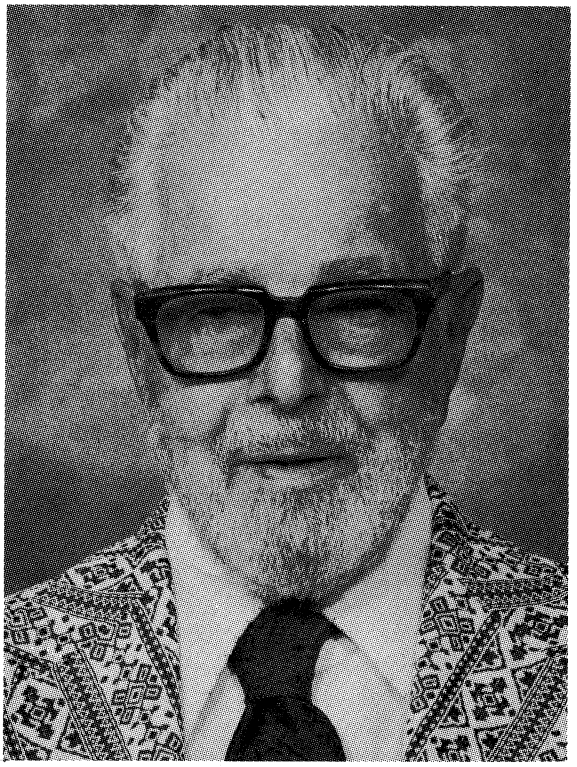
I have long been disappointed that we have never been able to tell this story in a consistent account of the whole job. Several attempts have been started at the Applied Physics Laboratory (APL), but somehow or other they all died. To date, Baldwin's is probably the best that has been provided. However, it emphasizes the Army's side and the applications. That still leaves a big gap between what I call the research phase and the very difficult and important job of getting it into quantity production, and essentially solving the Navy problem before we could come to grips with the Army problem. Offenhauser and I thought that we would take advantage of this opportunity to bring in Lew Clement representing Crosley to tell us about the difficult transition problem from research to production.

In the research phase you have great success if you can assemble devices that can be made to work. In the production phase, you have to produce devices which you can prevent from failing. That's an enormous difference, which is usually not recognized by the research and scientific people who generally collect their apparatus, tune it up, spend a lot of time working on it, take a set of readings, and get a Nobel prize. The job is done. That's just the opposite of what you do in the production cycle. So this is the reason we have tried to fill in—in the name of archives—the difficult problems that you face first in quality control, then in volume production and reliability of all the other things that are needed.

It is our hope that we can get statements here during this meeting that gradually add to it and get into the Naval archives. Then, Allard and I hope to find some graduate student in the history of science to dig through the archives, where there is an enormous amount of material—lots of statistical material. What we need are anecdotes and examples of the kinds of problems that you run into in going through this and how this particularly dedicated group somehow overcame these difficulties. I have some comments to make along this line but since we are short of time, I'll drop this here so that we can go on to the important things, which are the Crosley story and the suppliers' story. Later I can fill in gaps.

*OSRD, Office of Scientific Research and Development.

LEWIS M. CLEMENT



Vice-President of the Crosley Corporation and personally responsible for all Crosley fuze production, Crosley serving as a lead company, being the first major producer of proximity fuzes in quantity.

I think that this is the greatest example of cooperation that I have ever seen, that is, the cooperation between the technical people, manufacturing people, suppliers and users. Without this very good cooperation, the job could never have been done. As far as Crosley is concerned, we received a letter in October 1941 telling us that we would be contacted that month on a very important, Top Secret, top priority job, to determine whether or not we were capable of doing it.

On the 28th of October, Dr. Hafstad, Lieutenant Hicks and the local Inspector of Naval Material came to Crosley and asked to see the Vice President in charge of Engineering.* He told us that we had been selected because he though we had the necessary mechanical and electrical background and could undertake the job because we made electrical refrigerators, appliances and radio receivers. It was very fortunate that he came at this time because, a year earlier, the story would have been entirely different. Crosley had been completely reorganized, at least in the manufacturing side of the business, to do an excellent, high quality job. This reorganization took place over a year before Dr. Hafstad's visit to Cincinnati, which I think is important.

I think that there were many small things that happened that benefited the job. One story that I recall is that we had difficulty with a certain coil in the oscillator. It was not uniform. So we sent H.L. Brouse to Chicago to find out why. At 2:00 am—he found out—the room in which the coil was being made had opened windows near the coil forming stations. They closed the window and we had no more trouble. It's something like that that one does not understand unless one is in the business.

We undertook the job on the basis that we would first copy what they were making at section T, with the exception that all metal parts would be made from tools and all plastic parts would be made from molds. This was because we anticipated going to mass production. So, we made ten models of that type. We gave one of our research people the job of looking at the fuze, looking at all the information about the fuze, and making a comment about what he felt could be done to do a good job. The only suggestion that he made was that the antenna series capacitor should be solidly mounted. So we made ten like that. Then we made ten more using GFE** brass caps for antennas instead of the aluminum caps that we had before. We expected that we would make a change, but only if we would do at least as good a job as they did at DTM.†

The firing tests were delayed until after the first of January 1942. The first group of ten showed a ten percent score, which was about the same score that they were getting at section T. The second group, with the solidly mounted antenna, was 40 percent. The third and fourth groups gave zero percent because of tumbling and instability due to a heavier nose cone.

Another thing that we did was to figure that we must design the stuff for mass production. We had to get cooperation between engineering and manufacturing. We had to devise a system for transferring information from engineering to the factory. We set up a pilot line which was jointly run by the factory and engineering. We made things in the pilot line, and it was set up so that it would have the same operations as later on in the factory. Thus, the pilot line changed from time to time to keep up to date with the factory situation. As a result, it was very easy to transfer the stuff from the engineering phase to the production end. We used the pilot line to train operators so that, when the time came to go into quantity production, we would have several hundred operators capable of doing the job.

*They were escorted to Mr. Clement's office.
**GFE, Government Furnished Equipment.
†DTM, Department of Terrestrial Magnetism.

The most important thing I have to say is that the project required cooperation. To get that cooperation, we issued a weekly report which covered all the work that we were doing, as well as any suggestions that we had in mind. The report was given to the Navy, to section T, and to Crosley. We also had a resident engineer living at Dr. Hafstad's place who was given no instructions other than to be helpful. In other words, he understood what was going on with us and with manufacturing. We relied upon him to keep us up to date informally. As a result, I think he was valuable not only to us but to section T as well.

I feel the security was very good because I don't know of a single case of sabotage during the entire period that we worked on the fuze. We suggested a proving ground of our own in the Cincinnati area. We went to the extent of renting farms, building roads, and getting things all set. The day before we were supposed to use it, the Navy took the firing pin away. It took me 30 years to find out why. The reason was security, and I agree completely with the Navy.

Before the end of the war, we had made about five and one-quarter million fuzes. We made forty to fifty thousand fuzes on the pilot line. We made one thousand fuzes before anything went to the production side. We had a closely knit, fully cooperative company on the job—not only among ourselves but with our suppliers, the Navy and DTM as well. Thanks.

VADM GEORGE F. HUSSEY, JR.

Chief of the Bureau of Ordinance at the beginning of World War II and the officer who made the critical decision to put the proximity fuze into production.

The Admiral began by describing his activity as commander of a squadron of mine sweepers in the South Seas, being called to Pearl Harbor just after the Japanese attack, and later to Washington, where he started to work as Director, Bureau of Ordnance:

Three or four weeks later, the Director of R&D, Sam Shumaker, an old friend with whom I had taken a postgraduate course in Chicago, came in to see me. He sat on the corner of my desk and said, "George, there's something going on around here that you ought to be aware of. It'll take an afternoon to see it. Let's go this afternoon."

We drove out to Georgia Avenue and ran into the strictest security requirements I had seen since Pearl Harbor. We had to get through two sets of gates and two sets of guards. They finally let us through. I met the most dynamic man I'd ever seen. In a very quiet manner, he welcomed me to the situation and explained in a few well chosen words what it was all about, what they were doing. He brought in several of his assistants, each of whom told me about his particular part in the process.

It began to dawn on me what was going on. Like most of my contemporaries, I had at one time or another knocked a radio set off the corner of my desk. I picked up a pretty sorry mess from the floor and put it in the waste basket. Here were these eminent scientists trying to put a radio set in the nose of a projectile which they claimed would think for itself, go off and get where it should. By the time they turned on the projector, my eyes were fairly sticking out of my head. They showed me the *Cleveland* firing — one drone, one shot, no drone; second drone, one shot, no drone; third drone, one shot, exercises completed, no more drones available. I thanked them for their hospitality and all the information they had given me. Sam and I went back to the Bureau. A couple of days later, he came down and said we ought to go see where they make those things.

We went to Cincinnati to the Crosley plant, which I had never seen before. My recollection of it was of a crowded area with a great many buildings, in the middle of which were two or three relatively small buildings. They were quite undistinguished with no special markings on them at all. We were taken into the first one and shown a production line beautifully laid out and running extremely smoothly with no chatter from the operators. The supervisors exercised very close supervision, and only the people at the end of the line knew what the product of that line looked like. That went on to another line, more things were added to it. From there it went to another building where the first product was augmented by more bits and pieces until finally, at the end of the line, there stood a VT fuze.

I didn't know what it was when I first looked at it, but what intrigued me about the whole thing was the massive security—never a reference to the fuze anywhere—and the concentration by the workers and the supervisors such as I had never seen before at any production plant. Then our host at the plant, Mr. Clement, gave us more information on the troubles they had run into, how they got around those problems from a production standpoint, and how they worked together with suppliers to modify components as required to come up with a finished fuze. He gave a clear picture of how much this project meant to the company and to the country. After that, Sam and I went our separate ways.

While travel money then was relatively easy, travel time was not so easy, because you spent more time away from your desk. We always tried to get in as much travel as we could on any particular trip. It was three or four days before we were both back at the Bureau. Then Sam came by once again and said, "George, I think that project's about ready for production." I said I agreed. He said, "Okay, we're out on a limb for 85 million dollars." That how I got involved in the VT fuze business.

ROBERT SPRAGUE

President of the Sprague Electric Co., who accepted the challenge of producing by the millions the critical high-quality components that were essential to the success of the fuze.

Sometime in the Fall of 1942, I got the most unusual telephone call I have ever received. A lady, who identified herself at Lt. Sally White of the U.S. Navy Bureau of Ordinance, referred to a lot of six samples, which she identified by number, and which sometime earlier had been sent to the Applied Physics Laboratory of Johns Hopkins University. She requested that I furnish her at the earliest possible date:

1. The cost of having facilities for the manufacture of 30 million very slim, unencapsulated paper capacitors per year, which we were to call "Toothpick" capacitors. (Towards the end of the war, production of these had been built up to about two million a week.)
2. The time when we could start to manufacture and the rate at which we could build up production.
3. She also asked for similar information on a much smaller quantity of annular, (ring-shaped) capacitors to be used in the same equipment. These were to be furnished at approximately 12 percent of the "Toothpick" requirements.

Imagine my surprise! I had never heard of anybody using 30 million capacitors a year and didn't have the slightest knowledge of the particular samples to which she referred.

I called Dr. Preston Robinson, Director of our Research and Development Department, and asked him to identify the sample lot referred to by Lt. White and then to come to my office to talk about any problems we might incur in furnishing them. It turned out that the capacitors were indeed of unique design and manufacture:

1. Three types of capacitors were to be put into production. Two of these—one of which was by far the largest volume item—used processing materials never to my knowledge previously used in capacitors. The largest volume item, the "Toothpick" capacitor, was to be impregnated with a monomer of vinyl carbazole, and polymerized in situ.
2. The largest volume annular capacitor—and I believe we were the sole source of this particular unit—also used specially treated cellophane film as the dielectric, instead of thin capacitor tissue, and was also impregnated with vinyl carbazole.
3. The third unit was another annular. It used paper capacitor tissue, impregnated with a chlorinated wax, as the dielectric.

As the capacitors were required to withstand a shock of 20,000 G's, a number of dielectric systems were tried during the development, with the final results I just mentioned.

Dr. Robinson told me that he became familiar with the German development of the polymer of vinyl carbazole prior to World War II and, for reasons which I do not recall, had purchased a small supply of this material from Bayer, just prior to our entrance into the war.

One problem we were faced with immediately was that there was no American manufacturer of vinyl carbazole. It appeared that we would have to set up for its manufacture. And chemical manufacturing was a completely new undertaking for the company!

We go into chemistry

One of our chemists, I believe Dr. Lester Brooks, worked with DuPont to develop a process for its manufacture. We constructed, at the Navy's expense, a small manufacturing facility.

We had to design and erect a special building located behind our Brown Street Plant in North Adams, Massachusetts, that was required to withstand an internal explosion because of the fear that a runaway reaction might occur. The acetylene gas to be used in the process was under pressures in the neighborhood of 500 to 600 pounds per square inch! When the plant was finally ready for production, we produced only 300 pounds in the first run, which was a successful one. Then vinyl carbazole became available from the General Analine and Film Corporation. This was the new name for the Agfa-Ansco Corporation, which, like the Bayer part of the German I. G. Farben trust, had been seized by the Treasury Department and renamed. This company, which the Government sold after the war, is now known as the GAF Corporation.

The special building, however, was not a complete loss as it and much of the equipment were used to impregnate capacitors with vinyl carbazole until the time when new and special impregnating facilities were designed, developed, and installed in our Marshall Street Plant in North Adams.

Impregnating the capacitors with the monomer of vinyl carbazole posed problems that were new to Sprague Electric and to the capacitor industry. Freezing of the impregnant in our piping was one problem. In the early stages, small impregnators with a basket size of 8" x 10" were used. The impregnating temperature of 85° C. had to be very accurately controlled, and I mean *much* more accurately than other types of impregnants required. The Mayor of North Adams, Faxen Bowen, who also worked

for us during the war, was responsible for a freeze-up of an impregnating tank! There were electrical or static spark hazards, and the material was extremely toxic and caused dermatitis.

The new facilities installed in our Marshall Street Plant had even more accurate temperature and humidity controls than those just mentioned. Also I believe that for the first time we took steps to control the dust particles in the air. Periodic medical tests were required for all operators. The manufacturing area was complete with showers and locker rooms.

We also had a problem with the cellophane that was required in one of the annular capacitors. The commercially available cellophane was not a good dielectric. It contained plasticizers which impaired its electrical properties. When we developed a process to remove the plasticizers, the cellophane became brittle and could not be wound satisfactorily. Then we had to develop a supplementary process to soften the de-plasticized cellophane so that it could be wound into capacitors.

A hand-crafters triumph

As our automatic rolling machines could not handle the very small diameters of the "Toothpick" capacitors, it required an enormous number of operators to man all the hand-winding machines needed. Although I don't remember the total number of hand-winders, I am advised that Paul Netherwood, now retired but then one of our senior engineers, remembers that at A.G. Spalding in Chicopee, Massachusetts, one of our subcontractors, there were one thousand hand rollers! We had an additional subcontractor at the Rock of Ages Corporation in Barre, Vermont. However, all rolled units were returned to North Adams for impregnating with the monomer of vinyl carbazole or wax.

Our records indicate that toward the end of World War II about 4,800,000 "Toothpick" capacitors a week were shipped by seven manufacturers. Then, with the Sprague shipment of two million a week, it appears we were supplying about 42 percent of the industry's requirements, and we were the only one using polymerized vinyl carbazole as an impregnant. I believe that our product was shipped to five Navy contractors: Eastman Kodak Co., The Hoover Co., Baldwin Piano Co., McQuay-Norris Corp. and Crosley Corp., and were also probably shipped to others by our competitors.

On September 26, 1945, the company was one of 32 firms selected to receive the Bureau of Ordinance "E" Award out of some 1,000 engaged in what became the Navy's most important secret weapon, the VT fuze. At the height of our production, 2,600 of our employees and employees of our subcontractors were engaged in this program. I don't think it improper to mention that prior to this award the company had received four Army/Navy "E" Awards for excellence in war production.

After the end of World War II, our production of capacitors for the Navy VT Fuze continued for ordnance stockpiles. During this post-war period there were also some changes in the design of the units, the ultimate being small hermetically-sealed units, which were designed for not fewer than 20 years' storage before use.

It is also appropriate for the records to note the names of key Sprague personnel involved in the design and manufacture of the special capacitors. Dr. Preston Robinson, our Director of R&D at that time, made the largest initial contribution. He was assisted by two of our senior engineers: Paul Netherwood and Mark Markarian. Robert Teeple was responsible for the manufacture of both the annular and "Toothpick" capacitors. Edward Goodman and his staff developed much of the special equipment and production processes. As earlier mentioned, Dr. Lester Brooks, with the assistance of DuPont, developed the process for the manufacture of the monomer of vinyl carbazole used as an impregnant.

CURRY C. FORD

National Carbon Co. Since Mr. Ford could not attend the meeting, this recorded message was made November 16 at the home of Bill Offenhauser in New Canaan, CT.

It was only a few months ago that I learned that Bill Offenhauser knew my good friend and former business associate, Dr. Laughlin M. Currie. Dr. Currie was formerly Vice President of Research for the National Carbon Company, the developers and manufacturers of the reserve battery used on the VT Proximity Fuze. In the course of our conversation about Dr. Currie, the subject of the proximity fuze came up, and I recalled an unusual breach of security that occurred at the National Carbon battery plant in Cleveland.

It seemed that a classified part stuck to the shoe of one of our people. I believe it was Dr. Duncan Gage. It was carried out onto the street in front of the plant. Fortunately, it was found by one of the project members, and security was preserved. You can imagine my surprise when Bill Offenhauser said, "Yes, I know. I'm the one who found it."

This coincidence led to reminiscing about many of my former associates at the National Carbon Company who were very much involved in the development and production of the reserve battery. Bill invited me to attend today's historical review, but I regret that a last minute conflict prevents me from being with you. Although I was not personally involved in the proximity fuze program, I am well aware of the important part my company played in it, and know it would have been rewarding for me to attend.

Several weeks ago, Dr. H.G. McPerson, formerly Assistant Director of Research at National Carbon and retired Associate Director of the Oak Ridge National Laboratory, was my house guest. When I told him of my plans to attend this review today, he recalled an initial feasibility test that he conducted on the battery. He said that when National Carbon was asked if the battery could withstand a force of 20 G's, he placed a battery in a steel shell, packed it in sand, and dropped it down a stairwell at the laboratory. He had calculated that the resulting impact would produce the required 20 G's. The battery was not damaged, and I believe this was the origin of the sand-packed concept.

Some time after Dr. Currie retired, I became the Vice President for Technology of the Carbon Products Division of Union Carbide, the current designation of the old National Carbon Company. Several of the scientists and

engineers in my group had worked on the proximity fuze battery and often recall with pride this outstanding technological achievement and exciting experience. Most of them, like me, are now retired. However, I'm sure that all of them wish they could be here with you today and share in the recording of the historical highlights of the development of the first "smart" fuze.

A. J. ADAMS

Plant manager at National Carbon, reporting to A.V. Wilker and responsible for the production of the millions of high-precision, high-quality batteries for all the various fuzes.

In November 1940, a man walked in and said, "Gentlemen, I want a battery that I can fire out of a gun." We said we'd be glad to give him the address of a reputable battery manufacturer up the street. He didn't listen. Our President, with two projects behind us that had been completed in a matter of months, said, "Yes, sir, we will give you the battery."

Back to the mines we went. Fortunately, the second process had been developed and could again be miniaturized. We had told our own sales department, "Don't ever come back for anything smaller than this because that's out." Here we were now trying to come up with a 2-inch battery with so much voltage. Then we were told they also needed a 1.5-inch battery. Wow! We had to cut our minimum size cell in half to get two inches; then we cut it by five-eighths to get 1½-inches. That five-eighths was a trapezoid, and if you don't think it's fun to handle material in a trapezoid shape! Anyway, by the middle of 1941, we were delivering batteries to section T for their own experimental work. At once, Mr. French and the rest of us realized that this battery never could function in the field with the logistics that were involved. We knew we were having trouble with it even in radio sets.

The reserve cell breakthrough

Mr. French started thinking, and, by the early part of 1942, he came up with the reserve cell* concept. This was a brilliant development on his part because our Le Clanché experience actually had nothing to do with the development of the reserve cell. It was a completely different animal, plus the fact that the reserve cell depended upon setback and spin to activate it. How in the hell are you going to test your product in the laboratory? We couldn't set up a gun in the lab. Not only did we have to develop the battery, but we had to have some means to simulate the action of a gun. We developed very high speed spinners with methods of breaking the ampule before we could make any progress in the development work. Here we were with two pilot lines running in the development laboratory—one still running on the minimax, the other one running on the reserve cell. This was at the start of 1942.

*A cell in which the electrolyte is contained in an ampule that breaks when the gun is fired. Thus the cell remains inactive until used—has an indefinite shelf life.

By October 1942, I was sent to the Bennington plant to set up the first half line production with production equipment. We had actually started before the production contracts of late 1942 because we had to furnish the batteries for all the testing. At Bennington, we started the half line in November 1942. I can remember the day I said to Gene, "We've made 20 units the best way we know how." We sent them for testing, and I told Gene to call me as soon as he got the results. He called me. Twenty were tested—20 failures. That was our start at Bennington. Anyway, things got better; they couldn't get worse.

In the meantime, we had received our major prime contract, and the Winston Salem plant had been procured. Production equipment had all been ordered. On April 1, we moved to Winston Salem. We had trained personnel at Bennington, including the naval inspector who I insisted be trained with our own people, which was a godsend later. We opened up the Winston plant on April 1, 1943, and got going. Our battery was known as the NC2. The ABC section of that battery was called XYZ. ABC was never used anywhere in the plant or by any of our people. The X was the A, the Y was the B, and Z was the C section. As we started, it was impressed upon us: miniaturize, miniaturize! The minute the NC2 was in production, we started miniaturizing.

In 1944, Mr. French was ready with the NC6. The Navy decided we had our hands full. They brought in Eastman Kodak who took our battery design, engineered it, and put it in production while we were building an addition on our plant in Winston Salem. Actually, they swung into production ahead of us, but there was the most beautiful liaison that you could imagine among National Carbon, Eastman Kodak, section T, and the Navy. How two firms that had not worked together before could combine in a single endeavor as we did with Eastman Kodak is almost unbelievable. It went more smoothly than anybody could have imagined. In 1944, we opened the Bingham plant. As soon as the NC6 was in production, Mr. Frendh went back to work.

By early 1945, it was evident that the NC8 was really getting small and had possibilities. In January 1945, I was sent to Buffalo to open the Buffalo plant, which was going to make two lines of NC6's and one line of NC8's. We hired our first production workers on August 3, and we were terminated on August 10, not knowing the end of the war was August 15. It was an awful blow to us during those four or five days that we suffered unaware of the end of the war. It was a story of the cooperation and the adaptability of the whole radio industry. We had some training whose purpose we didn't know, but it really came in handy. Thank you.

ADMIRAL ARLEIGH A. BURKE*

The famed "Thirty-one-knot-Burke" of the Cape St. George action in the Solomon campaign. He was a user of the fuze in combat throughout the war, and rose through the ranks to become the top Admiral of the Navy, and in due course head of the Joint Chiefs of Staff.

*This presentation was made from a pre-recorded tape—Admiral Burke could not attend.

Admiral Arleigh Burke

Dean Allard has told me that all the people involved in conceiving, inventing, designing and producing that wonderful VT fuze during World War II are now gathering together to find out how they did that wonderful and magnificent job. He also told me that my good friend, Larry Hafstad, is the moderator for this interesting occasion. If Larry does as good a job on this as he did when he ran the Research and Development Board, you will all have an exhilarating time. Furthermore, it will be worthwhile.

During the Solomon campaign in the South Pacific, I was in command of various units of destroyers. It was a rapidly changing and very hectic situation. The ships that were assigned to me were frequently changed because ships were being sunk, ships were being damaged, and the crews were becoming very tired. As a result, there was a drastic shortage of those fine fighting ships in that area. Dean Allard has asked me to explain the use of those VT fuzes in action. For the life of me, I cannot now remember which outfit I had when Deke Parsons came out with boxes of VT fuzes and asked if we could use them in my outfit. Of course, we were delighted, for I knew that anything Deke Parsons recommended had to be good. I think I was in *Conway* at that time, but I know I was commander of destroyers operating in the slot or, as we called it, COMDESLOT for short.

In any case, Deke came to that outfit because we quite frequently had a lot of night action. We had had encounters with enemy aircraft, barges, destroyers, and we were always expecting larger ships at any time. We fitted one division of DESLOT with VT fuzes which were to be used on orders as directed by Deke. We went up the slot looking for plenty of action.

As you all know, that is the time that the enemy never cooperates. However, about the second or third night out, enemy aircraft snoopers were picked up. Deke said, "Now is the time. Snoopers are better than nothing."

(Continued in our next issue)

CITATIONS TO NEW FELLOWS

Niles I. Barlow, *President, Sideband Technology, Inc., Rochester, N.Y.*

For his activity in planning and merchandising private and common carrier land mobile communications systems.

William H. Chriss, W2FRD, *Bell Laboratories, Holmdel, N.J.*

For his contributions in the field of communications as a Bell Laboratory engineer, and for active participation in the Vehicular Technology Society of IEEE.

Monte Cohen, AA4MC, *General Instrument, Chicopee, MA.*

For pioneering leadership in the fields of radio inductors and instrumentation.

Robert. C. Crabb, *Officer and Major Stockholder, Mobilefone, Los Angeles, CA.*

An industry leader and pioneer in common carrier mobile telephone and paging systems.

Walter H. Edge, *Caldwell, N.J.*

Contributions in the field of instrumentation and measurement.

Thomas D. Estes, *Phillips Petroleum Co., Bartlesville, OK.*

For work in communications in the petroleum industry.

Clifford G. Fraser, *GM, Microware Associates, Sunnyvale, CA.*

Leadership in the fields of duplexers, combiners, and ferrite coupling devices in the land mobile industry.

Larry H. Kline, *the antenna specialists co., Cleveland, OH.*

For contributions during a long career in the mobile communications antenna field.

Gene S. Goebel, W9ESG, *Oak Park, IL.*

For early efforts in the field of Land Mobile Radio and leadership in setting up Civil Defense and disaster communications.

Al Gross, W8PAL, *Gross Electronics Co., Cleveland, OH.*

Early contributions in the design and development of hand-held military and Citizens Band radio. Holder of the first CB license issued.

Richard C. Kirby, WOLCT, *Director, International Radio Consultative Committee (CCIR), Geneva, Switzerland.*

Leadership in representing the USA in important international telecommunications—CCIR and early work with the National Bureau of Standards.

John B, Knight, W6YY, *La Canada, CA.*

For major contributions in development of Navy Sonar; outstanding work in TV engineering and operation.

Ernest J. Landreville, *Executive Director, APCO, New Smyrna Beach, FL.*

For contributions in the fields of law enforcement and public safety communications.

Christina Larsen, *Secretary-Treasurer, Larsen Electronics, Inc., Vancouver, WA.*

For a long career of activity in the two-way radio and related antenna fields.

James Mann, *Mann Communications & Electronics, Inc., Agoura, CA.*

Early contributions in the radio-paging field and the development of mountain-top repeater systems.

Howard H. Mehrling, *Miami Springs, FL.*

For contributions in transition from vacuum-tube to solid-state avionics for jet aircraft, and from analog to digital flight simulator computer design.

Leo I. Meyerson, WOGFQ, *Chairman of the Board, World Radio, Inc., Council Bluffs, IA.*

For a long career "devoted to serving fellow amateurs," including the field of product development.

Kenneth M. Miller, K6IR, *President, Penril Inc., Rockville, MD.*

Industry leadership in high-technology computer instrumentation and consumer electronics products.

Louise Ramsey Moreau, W3WRE, *Radio Historian, Glenolden, PA.*

For work in preserving the history of radio and radio instrumentalities.

Eleanor Sherman, *President, Cesco Communications, Elmira Heights, N.Y.*

For achievement in overcoming handicaps and her work in local and national organizations.

Sanford H. Smith, *President, APCO, Greensboro, NC.*

Leadership in public safety communications; public service in municipal and security organizations.

Harold E. Taggart, *National Bureau of Standards, Boulder, CO.*

Technical contributions in electromagnetic theory and practice.

John V. Whiting, *President, REPCO, Inc., Orlando, FL.*

For executive leadership and contributions in the field of portable and hand-held communication equipment.

Membership News

Henry L. Crutcher (M 1980) of Sacramento, CA, has been elected President of APCO.

Bruce M. Karr (M 1974), formerly Project Engineer, APCO, has become Director of Communications, County of Fresno, CA.

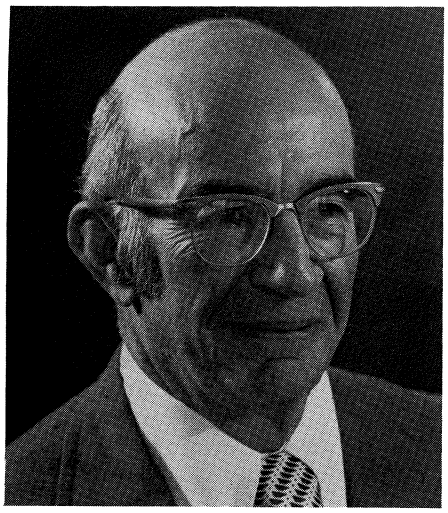
Niles I. Barlow, (M 1975, F 1980) has left Harris RF Comms., where he was Vice President, to form a new venture, Sideband Technology, Inc., of which company he will be president.

Sideband Technology will specialize in the new ACSB (amplitude campandored sideband) technology, with direct application to the land mobile radio market. Members interested in reaching Mr. Barlow for comment may call 716-586-3822, or write Sideband Technology, Inc., P.O. Box 4082, Rochester, NY 14610.

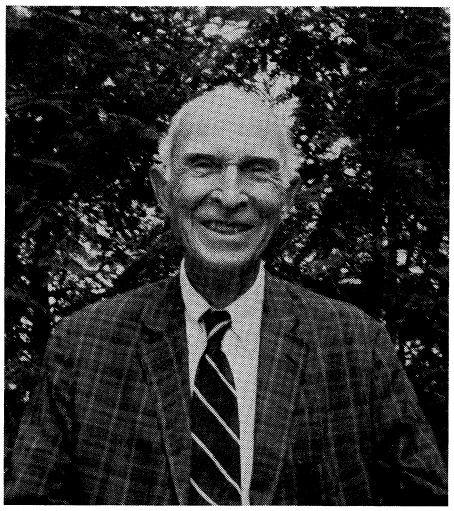
George Petrutsas (M 1977) formerly Chief of the Private Radio Bureau's Rules Division of the FCC, has retired from the FCC after 23 years of government service. He will go into private law practice in Washington, DC.

Carlos Roberts (M 1979) Chairman of the Private Radio Bureau, FCC, has been honored by President Carter with the Meritorious Executives Award, which carries with it a cash stipend of $10,000.

Recipients of Four of the Club Awards



Monte Cohen



Frank King

The award of the Sarnoff Citation to Monte Cohen, AA4MC (M 1975, F 1980) is most significant, since Monte's first boss was David Sarnoff.

Monte built his first station in 1910 at the early age of 10. He learned the code and in April, 1912, copied the famous wireless transmissions of the Titanic disaster, which made Sarnoff famous.

During World War I he served as a Marconi wireless operator on various merchant ships. RCA took over the operators, and he was transferred in 1922 to the high-power division on Broad Street. He became office technician for RCA in 1924.

In 1925 Monte moved to Worcester, MA and went to work for Standard Radio Corp. He became chief engineer and developed both TRF and superhet receivers for the company. In 1929 he joined the F.W. Sickles Co. as chief engineer and general manager. In 1945 Sickles became a division of General Instrument Corp., and in 1951 Monte became president of that company. He is now vice-chairman of the executive committee and a director of General instrument. He resides in West Palm Beach, FL.

During World War II, Monte was electronics advisor to the War Production Board. He has been awarded one of the special unrestricted licenses granted to amateurs who were active before 1917. In 1955 he received the Marconi Medal of Achievement from the VWOA. He is a life member of the IEEE, a member of VWOA, OOTC, SOWP and an active ham.

The Radio Club is proud to award the Sarnoff Citation in 1980 to Monte Cohen for "Exceptional service to the radio industry during the past half century." He is also being awarded a Fellowship in the Club.

Frank King (M 1909, F 1926, L 1926, H 1972), recipient of the Pioneer Award for 1980, started his radio career in 1907, at age 14, when he set up his first station "FK" at his home on West 107th St., NYC. A member of the Boys Aero Club, he was one of the five boys at the January 2, 1909 meeting at which the Junior Wireless Club was formed and the Aero Club abandoned. According to the old ledger, he was the first to pay his dues (of 25 cents annually) and thus became the first member of the Club.

In October 1911, the Junior Wireless Club reorganized as the Radio Club of America, and Frank became its first President. The meetings were held at his home. (The first President of the Junior Wireless Club was W.E.D. Stokes.)

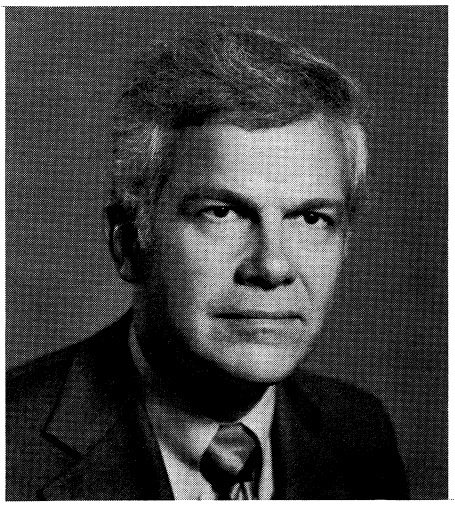
In 1911, with the help of George Eltz, he constructed and operated at his home the first amateur broadcast telephone station in the United States, using an arc transmitter. (Professor Fessenden, of arc fame, was listed as "Consulting Engineer" to the Club in the early records.)

On January 20, 1912, Frank King presented to the Club a design for a membership pin. It was adopted unanimously, and has been the Club's emblem ever since.

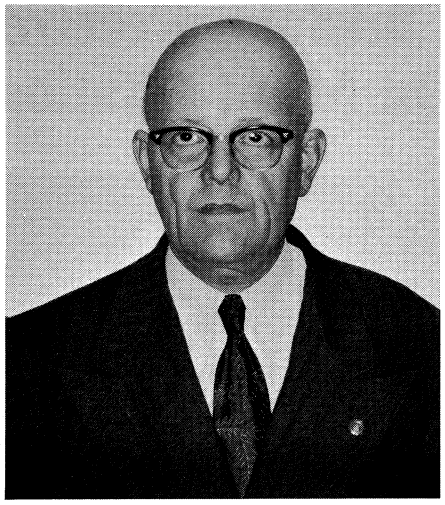
He graduated from Columbia University with an E.E. in 1917 and joined the Armed Forces in 1918. Frank organized and was Officer in Charge of the first U.S. Aircraft Naval Radio Laboratory, and later Officer in Charge of the Aircraft Radio Telephone Headquarters, Northern Bombing Group, in France. Subsequently, he moved to the U.S. Naval Headquarters in Washington, D.C.

In 1928 he joined with Ernest Amy and Julius Aceves in the engineering firm of Amy, Aceves and King. The company's office was Club headquarters for nearly 40 years.

Mr. King became an Honorary Member of the Club in 1972. He is now living in Larchmont, NY, in good health, at the age of 87, and expects to attend the Banquet to receive his award.



Leonard R. Kahn



Ed Raser

Leonard R. Kahn (M 1953, F 1961) born in New York City in 1926, where he still resides, has enjoyed an unusually productive career in electronics and communications for which he has in the past—in addition to his honors with the Radio Club of America—been elected a Fellow of IEEE, a member of Tau Beta Pi, Eta Kappa Nu and Sigma Xi fraternities, a B.E.E. Cum Laude degree from Polytechnic Institute of Brooklyn and graduate work at Brooklyn Polytech and NYU Law School. Mr. Kahn was an Adjunct Professor of Electrical Engineering at Polytechnic Institute of Brooklyn and lectured in the Graduate School. He has served as consultant or expert witness for Willys Motors, Kaiser Inds., Grumman Aircraft, Raytheon Corporation, Fairchild Engine and Airplane Corporation as well as to U.S. Govt. agencies such as FAA and USIA.

Mr. Kahn has been issued more than 60 U.S. Patents, in addition to many patents issued overseas. His developments have been licensed to major corporations such as RCA, GE, Raytheon, Northrup, Hazeltine and Western Union. In addition to his very active work in patents, Kahn has published more than 20 major papers on various phases of electronics and electrical engineering. In industry he served as a member of US CCIR Study Group, and was Chairman of the Papers Committee for IEEE PTG on Communications Systems.

Kahn was associated with Crosby Labs from 1950-52 as research engineer. From 1947-50 he was employed by RCA Communications Inc. He served in the US Army Signal Corps. from 1944-46 and since 1953 has owned and operated his very successful Kahn Research Laboratories and presently Kahn Communications, Inc.

While he has been involved in innumerable important developments, he was singled out for the Armstrong Medal award for his significant achievements in the field of AM Stereo, Time Diversity communications techniques, Single Sideband, Independent Sideband, Voice Processing, Low Distortion and High Efficiency Modulation techniques.

Leonard Kahn is a licensed amateur (W2NOW and WB2SSP), a patent agent registered to practice before the U.S. Patent Office and a Registered Professional Engineer in New York State.

Ed Raser (M 1972), recipient of the 1980 Ralph Batcher Memorial Award for preserving radio history, by 1910 had worked 10 miles with a quarter-inch spark coil, a piece of silicon and a 75-ohm telephone receiver. He was then 11 years old. In that year he joined up with Hugo Gernsback's *Wireless Association of America,* one of the world's early wireless groups. After the Radio Act of 1912 was passed, he took the examination for an Amateur First Grade license. His new call letters were 3HG. By 1915 he was working stations 400 miles away with a half-kilowatt Packard transformer and homemade rotary gap, receiving with a galena detector, loose coupler and Brandes phones.

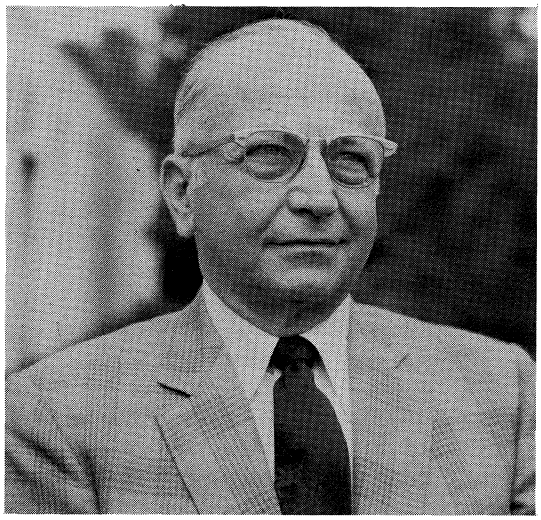
When war broke out in Europe, Ed enlisted in the Navy as wireless operator and served a three-year hitch aboard various ships and at shore stations. During this period, at the Cape May Naval Air Station, he installed and test-hopped the first E.J. Simon quarter-kilowatt 500-cycle spark set ever to go aloft in a plane. The antenna was simply a long trailing wire.

After his Navy service, he continued as a commercial operator at land and shipboard stations. In April 1915 he joined the new American Radio Relay League, and immediately became active in long-distance relay and traffic work. During his 47 years of traffic handling, Ed has held all ARRL field positions and appointments and was elected a Director of the League for a two-year term. In 1922 he received Special Amateur License No. 9, and with it the "Z-call" W2ZI.

Ed is best known for his W2ZI Historical Wireless Museum, a collection of antique radio equipment and literature dating back to 1899, when Marconi first came to America. The collection of historical books and papers numbers 250 volumes and there are more than 400 pieces of old wireless gear on display. The exhibit is open to the public by appointment, at 19 Blackwood Drive, in the Wilburtha section of West Trenton, NJ. (Please write or phone ahead for an appointment.)

Ed states that, after some 22 years in mobile radio, he is about to retire as Supervising Engineer and Technical Advisor to the New Jersey State Police radio system, where he is now employed.

Christaldi Receives Du Mont Citation



Dr. P. Samuel Christaldi, W2TF (M 1940, F 1950, L 1971) was born in Philadelphia, PA on November 26, 1914. Following graduation from Haddonfield (NJ) High School, he attended Rensselaer Polytechnic Institute, receiving an E.E. degree in 1935 and, studying under a graduate fellowship, the degree of Ph.D. (Physics) in 1938. His doctoral dissertation was on impedance matching of wave guides at 2 Gigahertz. During summers he designed and built an electronic ignition system and radio communication equipment for canal barges.

He joined the Allen B. Du Mont Laboratories, Inc., in 1938; his initial assignments include development and design of catalog and special types of cathode-ray tubes (including design of gun and bulb for the first 20-inch tube), oscillographs and other electronic devices.

In 1941 he became Chief Engineer, responsible for development and design of all products: cathode-ray tubes, oscillographs, TV receivers, TV transmitting equipment, military electronic equipment (Loran, radar, vhf radar relays, test equipment), as well as technical liaison with TV station WABD and the Du Mont Network. He represented the company on RMA, IRE, EIA committees and NTSC groups, establishing TV standards and committees establishing military specifications. He set up drafting and specifications systems and procedures, a technical library, model shop and a technical writing group.

Following company reorganization by product lines in 1947, he became Engineering Manager of the Instrument Division, responsible for commercial and military test equipment, and directed a pioneering study of guided missile test requirements and design of standardized operational test sets; in 1953 he became Division Manager. In 1955 he was appointed Manager of the Technical Products Division, responsible for sales, engineering, production, and cost accounting functions for electronic test equipment, TV studio and broadcast equipment, mobile radio communications equipment, and military R&D and production.

He joined the Curtiss-Wright Corporation in 1956 as Product Manager of Electronic and Nuclear Equipment. There he developed a substantial program in the design and production of naval reactor control and protection equipment.

In 1959 he became Engineering Manager of GV Controls, Inc., responsible for the company's lines of thermal and electronic timers, thermostats, and other control equipment.

He returned to the field of cathode-ray tubes and related devices when, in 1963, he joined CELCO, Constantine Engineering Laboratories Co., where he is Director of Research. The company's major activity is in the development and production of high resolution cathode-ray display systems, color recording systems, and the associated electronic, magnetic, and optical components, as well as for such image tube devices as vidicons, image dissectors, and electrical storage tubes—including airborne, satellite, and space probe applications.

He is a Life Fellow and past Director of the Radio Club of America, a Life Fellow of the IEEE and Past Chairman of the Northern New Jersey Section, a member of Sigma Xi, a member of the ARRL and the American Vacuum Society, and a Life Member and Past President of the Montclair Society of Engineers. He contributed the chapter on Oscilloscopes and Electronic Switches in the McGraw-Hill *Industrial Electronics Handbook.*

SCHOLARSHIP NEWS

The Club has just received the following from the Foundation for Amateur Radio:

Foundation For Amateur Radio, Inc.

Washington, D. C.

ADDRESS REPLY TO:
6903 Rhode Island Avenue
College Park, Md. 20740
August 16, 1980

Mr. Joseph F. Walker, Chairman
Scholarship and Research Committee
Radio Club of America, Inc.
Phillips Communications Inc.
Bartlesville, Oklahoma 74004

Dear Mr. Walker:

At the August 13th meeting of the FOUNDATION FOR AMATEUR RADIO the trustees accepted the recommendation of the scholarship committee to award the fourth Radio Club of America Shcolarship to Brian D. Miller, KA@DGT, 3314 S. Clarkson, Englewood CO. 80110. Brian is 17 years old and an honor student who plans to study computer science and technology at the Midland Lutheran College in Fremont, Nebraska.

His application indicated a genuine need for financial support in addition to that received from his family and by working himself. His academic record is excellent, graduating eighth in his high school class of 281. He is a member of the National Honor Society with a 3.9 grade point average.

This year the Foundation awarded seven scholarships. There were 94 applicants from 31 states. Approximately 75% were eligible for the Club's scholarship award. About one half of those eligible were judged to have a high degree of need. The selection process continues of help because of the escalating costs of education.

An attractive certificate has been prepared for the signatures of the Foundation and Radio Club. Presidents for delivery to Mr. Miller at a later date. The Foundation is pleased to cooperate with the Club in assisting this worthy candidate.

Sincerely,

Hugh A. Turnbull W3ABC
FOUNDATION FOR AMATEUR RADIO
Scholarship Committee

Why the smallest digital scanner is also one of the smartest.

We started with very fast, sophisticated microprocessors. Then we made some highly complex circuitry very simple to operate. Just one touch tells the new M400 to monitor any active police, fire, weather and emergency frequency in your area. That's a lot of return for practically no effort. And it makes the M400 perfect for your home or car.

scan modes — whichever is best for you. We've also set aside a priority channel so you can monitor your favorite frequency every second. There's even a digital quartz clock and elapsed timer. And the control panel is backlighted for the best possible visibility — day or night.

575 Channels, No crystals.

We've preprogrammed 545 channels with commonly used public service frequencies. Then we coded the touch sensitive keyboard with symbols for police, fire, marine, mobile telephone and weather. So all you have to do is touch the symbol for the type of activity and band you want to monitor. The M400 does the rest. If you want to search for unknown frequencies, the M400 lets you do that, too. And for those channels you want to store and hear again, you have 30 programmable channels to use. Plus you can use either manual or

Take all the action with you.

With the new Regency Touch M400, you can have all the action, no matter where you are. It's the most complete scanner made primarily for mobile* use. And it works just great at home. So get the small scanner that's very smart. At your Authorized Regency Scanner Dealer.

Regency®

Regency Electronics, Inc.
7707 Records Street
Indianapolis, Indiana 46226

*Use of mobile scanners prohibited in certain locales.

The Club Reviews Two Books

***The Shortwave Propagation Handbook,* edited by George Jacobs (F 1977) and Theodore J. Cohen (M 1979). Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, NY 11050. Flexible cover, 6x9 inches, 155 pages, $7.50.**

This book is based on a series of articles published in *CQ Magazine* over a number of years. These "have been updated and expanded to reflect the availability of new material, to stress simplified explanations of the phenomena, and to present do-it-yourself forecasting techniques."

Chapter 1, on the ionosphere, explains the way of long-distance shortwave propagation and shows how propagation paths can be calculated.

Chapter 2, on sunspots, shows their effect on the ionosphere and therefore on propagation. We find out just what a "sun-spot number" actually counts, and there is a six-page monthly table of sunspot numbers from 1749 to 1978, which the authors believe to be the first published in popular technical literature.

Chapter 3 shows how predictions based on sun-spot activity are made; Chapter 4 departs from theory and shows the reader—in a detail series of charts—what conditions he may expect in the ranges 20 to 80 meters at different seasons of the year and various phases of sunspot activity, and the times of day or night when propagation should be best.

Chapter 5 shows the reader how he can use long-term predictions plus currently available data to make his own short-range forecasts and Chapter 6 notes unusual types of propagation conditions.

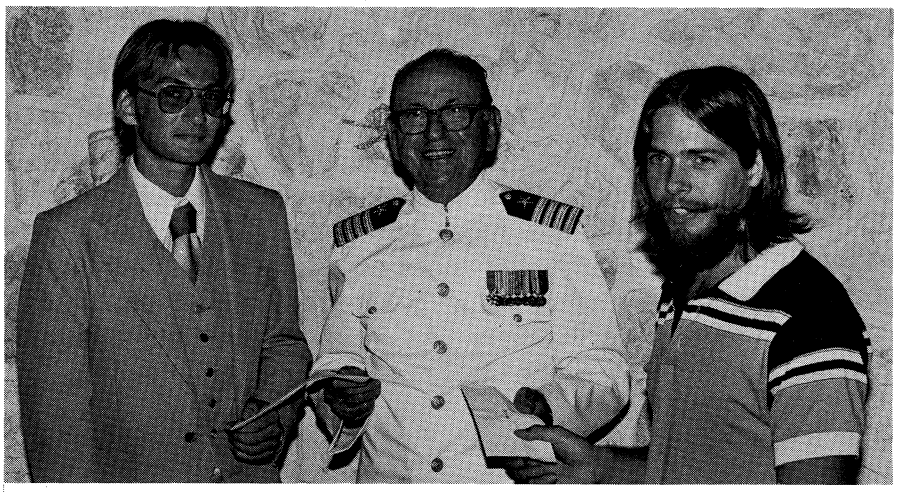
***The Deadly Fuze,* by Ralph B. Baldwin. Presidio Press, Box 3515, San Rafael, CA 94902. 6 x 9 inches, 332 pages. Hard cover. $14.95.**

Dr. Baldwin, like Bill Offenhauser, felt that far too little had been said about the importance of the proximity fuze in winning World War II. The twin results were this book and the Proximity Fuze Conference, the story of which begins in this issue.

Dr. Baldwin made a special effort to dig out the British part in the invention and use of the fuze. He covers that early work and the fuze's role in the defense of London, and later of Antwerp, which was probably in greater peril from the buzz-bomb that was London. He describes the destruction of the German air power on the western European front, and the collapse of the morale of the ground forces more completely than in his discussion at the Conference, which will be printed in the next issue.

At times the book reads almost like a novel, with its elements of suspense and conflict, especially in detailing the testing procedures and the demonstrations necesary to persuade the higher brass that the fuze would work and work well enough to commit enormous facilities to its production.

Possibly the most interesting chapter is "How to Lose a War," which shows how the German psychology, organization and approach to the subject gave the looser and much less authoritarian American group what proved to be a decisive advantage.



Captain W.G.H. Finch, Director Emeritus of the Radio Club and founder of the Finch Scholarship Fund, presents two $500 scholarships to Edward Slattery, left; and David M. Roberts, right. The occasion was the commencement exercises of the Florida Institute of Technology's Applied Science School last Spring.

ADM. GRAVELY RETIRES

Vice Admiral Samuel L. Gravely (M 1972, F 1972) Director of the Defense Communications Agency of the combined Army, Navy and Air Force systems of the United States, retired July 31. He was honored at a special ceremony in Washington, in which the chief speakers were Gerald P. Dineen, Assistant Secretary of Defense Communications, Command, Control and Intelligence, and Admiral Thomas B. Hayward, Chief of Naval Communications, after which Admiral Gravely replied.

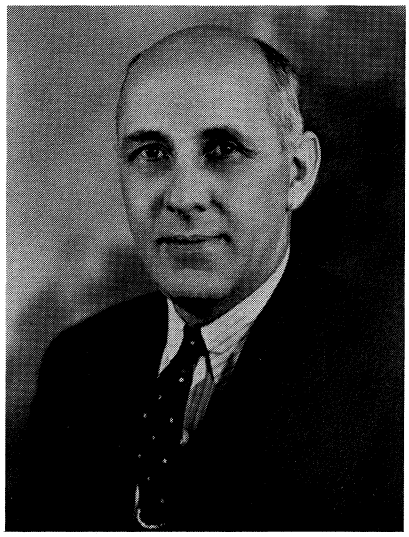
Admiral Gravely was the chief speaker at the 69th Annual Banquet of the Club on November 17, 1978. At that time he discussed the economics of defense communications.

Robert D. Mignault (M 1970, F 1976) has left Pye Electronics Ltd. of Montreal, Canada, after some 18 years as President of the company. He has recently formed Nobel-Teck, Inc., 6600 Trans-Canada Highway, Suite 750, Pointe Claire, P.Q., Canada H9R 4S2. Nobel-Teck is engaged in repping and distributing electronic components and instruments.

Captain Charles Dorian, W3JPT (M 1971, F 1973) received from the National Marine Electronics Association (NEMA) the Reginald A. Fessenden Award, for a career devoted to the improvement of marine communications. Among the numerous other awards he has received are the Legion of Merit, for exceptionally meritorious achievement in conducting international negotiations for the improvement of maritime safety through radio communications.

It's a mobile radio world
Talk this way about the future~today
POCKETFONE
Pocketfone 5002
The New Universal Communicator
A go anywhere rugged portable two-way radio. Body-worn, hand held or vehicle plug in.
Mascot 1000
The World's leading radio control system
gives you all the options
A time division multiplex electronic exchange, specifically designed for radio control. A fraction the size of conventional equipments, yet allows from 1 to 99 operators access up to 99 channels. The M1000 system incorporates C-MOS integrated circuit logic switching with dual in-line audio gates allowing access to all control functions from any operator position.
M206 VHF FM Mobile
The multi option, international high spec mobile
Exceeding today's world wide specifications. Precision built to cope with spectrum congestions of tomorrow.
The Pye M206 is a rugged-ised VHF FM mobile designed to present world markets with new standards of performance. Easy to install, easy to maintain and compatible with today's and tomorrow's selective call and data systems. Single and twin head options for duplex and simplex working. The M206 provides supreme flexibility for international communications needs.
Now youre talking
Use this coupon. We'll send you the complete run down.
To: Pye Telecommunications Ltd.,
St. Andrews Road, Cambridge CB4 1DW England
Please post full technical information on
P5000 Mascot 1000 M206 Mobile
(Tick as appropriate)
Name Position
Company
Address
Postal Code Telephone

Six Members Have Passed On



Ralph M. Heintz

Ralph M. Heintz, W6RH (M 1972, F 1973) radio inventor, manufacturer and amateur, died last May at the age of 88.

A founder of Heintz & Kaufman in the early 1920's and of Jack and Heintz in 1940, he developed numerous innovations in the tube industry.

Heintz's inventions were not limited to the radio field. In 1948 he retired from Jack & Heintz and went into private research, and many of his more than 200 patents were granted after that time.

One patent for an aircraft starter brought $287 million to Jack & Heintz during World War II. Another patent, for a stratified charge gas engine, was turned over with the rest of his patents to Stanford University in 1970. Two years later, Honda came out with an engine using the same principles.

He enrolled in the California School of Mechanical Arts in San Francisco in 1909. In 1913, at the age of 21, he enrolled in the University of California, Berkeley campus, becoming the oldest freshman in his class.

His education was interrupted by World War I, when he joined the Signal Corps. He worked on early radio direction-finders and radio navigation equipment, returning to Stanford after the war and graduating in 1920.

Arthur H. Lynch, W4DKJ, W2USA (M 1921, F 1926, L 1970) passed away in Cape Coral, FL, in May 1980, at the age of 86.

Arthur started his radio career as a ship operator in 1912. A few days after leaving port on his first ship, the Standard Oil Co. *Astral,* the vessel went aground off Florida and Arthur send his first SOS. Later, when serving on the yacht *Wakiva* in Mexican waters, he handled all the traffic between the American Consulate in Tampico and the Embassy in Mexico City during a revolution.

During World War I, Arthur was an instructor in the Army Officers Training School in Tours, France. Returning to New York after the war, he became associated with A.H. Grebe Co., and wrote their first catalog. He became Director of Publicity for RCA in 1920, and wrote some of their earliest broadcast receiver advertisements.

In the 1920's, Arthur Lynch was editor of *Radio Broadcast* magazine, and in the 1930's, of *Radio News.* In the radio field, he developed his Giant Killer Cable, an early low-loss low-impedance transmission line. His amateur station W2DKJ was one of the first to pioneer the 5-meter band. Installed on the top of the 40-story Wall St. building, it was the most powerful 5-meter station in those days.

In 1939 Arthur was an organizer of the Worlds Fair Radio Club, which installed W2USA at the Fair. Operated by Club members and handling messages for visitors, it helped publicize Amateur Radio to the public.

Representative for a number of companies while in the North, he established the largest manufacturers representative organization in Florida on his retirement to that state in the 1950's.

Arthur continued his amateur radio activity until his death. During the past few years, an impairment of his vocal cords left him unable to speak, therefore he used cw for his ham contacts, and answered the voice calls from his many friends with his key. *—David Talley*

James P. "Jim" Hervey, (M 1969, F 1979) died Saturday, August 16, 1980 at 7:20 pm, bringing to an end a 3-year bout with cancer.

He was a native of Pasadena, CA, son of a leading motion picture studio publicity executive in Southern California for over 55 years, Andy Hervey, now retired in Oceanside, CA.

Hervey entered the fulltime communications field in 1954 with the Ralke Company of Los Angeles, serving as sales and project manager for audio visual equipment systems. During his tenure with the Ralke Company he helped design and supervise production of many of the intricate sound and projection systems used in numerous amusement features at the world famous Disneyland in Anaheim.

In 1957 Hervey joined American Electronics, Hawthorne, CA as Chief Application Engineer for the Audio Recordata Division, responsible for direct sales of Data Recorders. Promoted to Sales Manager of consumer products, he was responsible for marketing Audio Division products and Berlant Concertone. He was also in charge of product planning, sales and promotion.

Hervey also had held management and executive level positions with MacKenzie Electronics, Osborne Electronics Corporation and Standard Communications Corp. in California. He joined the E.F. Johnson Company, Waseca, MN in 1963 as Vice President for Marketing. He was serving as Manager of Distributor Sales of ITT, Raleigh, NC at the time he entered Duke Hospital for surgery several months before his death.

Competent in all phases of radio communication, land, mobile, C.B. and marine, Hervey was widely known and active in a host of industry organizations, including EIA, NABER, NARS, SIRSA, APCO, NMEA and ASIS.

(Continued on page 20)

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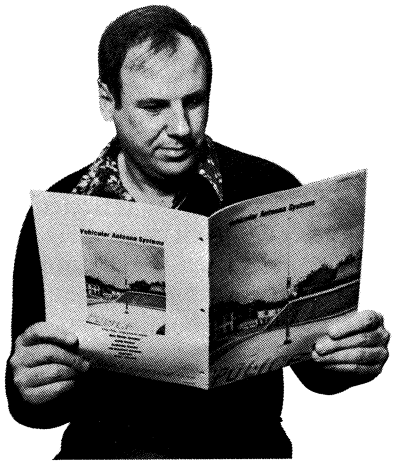
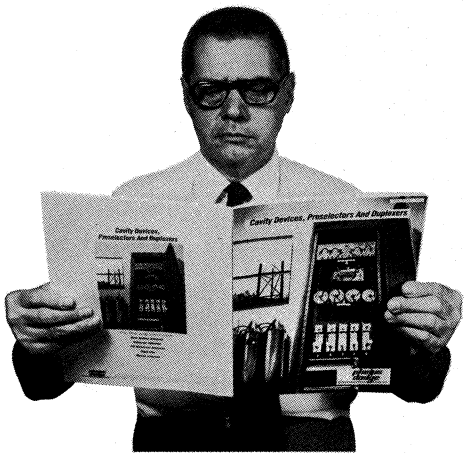


Vehicular Antennas

Our complete and rapidly expanding line of vehicular antennas is covered in this 20 page catalog. Each antenna is shown along with electrical and mechanical specifications. Accessories and mounts are also included and a section of the catalog contains engineering data and typical installation horizontal radiation patterns.



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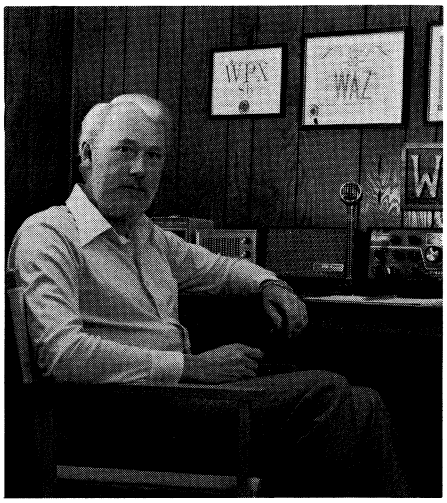
Obituaries

(Continued from page 18)



James R. Fisk

James R. (Jim) Fisk, W1HR (M 1978) died of a heart attack April 18, 1980, at age 45. He was known throughout the amateur fraternity as the founder and editor of *Ham Radio,* which, with *Ham Radio Horizons* and *HR Report,* he published at Greenville, NH.

Jim was a life member of the ARRL and of the Antique Wireless Association, and of a number of local wireless clubs. He was in the process of constructing a "superstation" at the time of his death.

The magazine is carrying on under the editorship of Alf Wilson, W6NIF.

Mail for **Roland Fennimore, WB4JAI** (M 1968) has recently been returned marked "deceased." Inquiry from Harold Voorhis, a fellow-member of the Old Old Timers' Club, reveals that he actually died October 16, 1978. The post office had apparently been notified only recently.

Mr. Fennimore was already retired when he joined the club in 1968. (He was born in 1901). He had been a high school physics teacher for 12 years and was a manufacturing planning engineer for Western Electric from 1940 to 1945. He was, as stated, a member of the Old Old Timers' Club and of the ARRL, and listed his main interest as "Amateur."

The Heliograph Operated at Higher-than-High Frequencies

by Don de Neuf, WA1SPM

The name "Heliograph" comes from the Greek words *helios* and *graphein* ("sun" and "to write"). A device for sending signals by a series of flashes of sunlight reflected in a movable mirror, it was alleged by some to have been used throughout Algeria nearly a thousand years ago. The signalling at that time was doubtless based on a simple prearranged code, since alphabetic codes do not appear in history until the early 1600's.

History reports that Xerxes, when he invaded Greece with his Persian forces in 480 BC, had his "signalmen" mount a steep hill and "flash the news" of the battle (Salamis) from their burnished shields—tilted to pick up the Sun's rays. Certainly at that time only some prearranged meanings (probably designated by a certain number of flashes) were employed.

The first European nation to take the heliograph seriously as a signalling device was Britain, in connection with her Indian army. (British history credited the English scientist Vance with inventing the heliograph in 1870.) In any event, he probably developed its use of the international alphanumerical code.

The instrument generally consisted of a circular movable mirror 10 or 12 inches in diameter, mounted on a small tripod. A sighting vane was used to direct the beam toward the distant point. The flashes were usually made by manipulating a screen device—often in the form of shutter blinds—with a key lever. In some instruments the mirror was rotated slightly out of line by the key movement, instead of using shutters.

The heliograph was employed extensively 100 years ago in Arizona and New Mexico, by U.S. troops under the command of General Nelson A. Miles. Although it was limited to daytime use, it was not vulnerable to constant interruptions, as were the telegraph lines—the Apaches chopped down the poles. The Indians presumably did not understand the "singing wires," but they quickly saw a relationship between them and the activities of the troops.

The clean dry cloudless air of the Southwest was ideally suited for heliography, using the Morse code. General Miles used it extensively for reporting the movements of Geronimo and his warriors. A network of some 50 "circuits" and "relay points," manned by telegraphers, ranged from Fort Huachuca in the South to Whipple Barracks in the North and to Fort Stanton in New Mexico on the East. Some of those legs were as much as 100 miles long.

Heliography was a unique system of communication requiring no wires nor batteries of any kind, and "transmitters" were light and easily portable. An operating station could be set up in less than a minute. The only energy required was the rays of the sun.

The simple heliograph, with its bright flashes of Morse code, brought about the end of the Apache wars, when Geronimo, Natchez and their warriors, realizing that further fighting was futile, capitulated on September 5, 1886. With sabotage of poles and wires eliminated, the wire line telegraph expanded rapidly, and almost overnight the heliograph went into oblivion.

One simple remnant remained as late as World War II, when the emergency equipment of a life raft usually included a pocket-sized miror device, with a small hole in the center for sighting or "aiming." This was often used to draw the attention of search planes or ships. (It is still available at stores supplying Boy Scout equipment.)

New Members

Since the last issue of the Proceedings was printed, 58 members have joined the Club:

John Abbott, Los Angeles Dept. of Water and Power, 1141 W. Second St., Bldg. F, Los Angeles, CA 90012

Donald B. Arnold, 1925 Maple Shade Lane, Richmond, VA 23227

George M.W. Badger, W6TC 341 La Mesa Drive, Portola Valley, CA 94025

Joseph A. Banos, WA5PHO, Wilson Electronics Inc., 4288 South Polaris, Las Vegas, NV 89119.

Edwin R. Candy, 14 Hibiscus St., Wantirna, Victoria, Australia 3152

Graham Comber, VK3ZMQ, 11 Lutana St. Frankston, Victoria, Australia 3199

Donald R. Cook, W6WYT, 2497 W. Menlo, Fresno, CA 93711

Phil D. Cook, Cardiff Industries, 3900 S. Wadsworth Blvd., Denver, CO 80235

Henry L. Crutcher, 3208 Northwood Road, Sacramento, CA 95821

Robert V.C. Dickinson, W2CEE, E-Com Corp., 320 Essex St., Stirling, NJ 07980

Richard Ehrhorn, W4ETO, Ehrhorn Technological Operations, Inc., P.O. Box 708, Canon City, CO 81212

Martin Eighenberger, WBOIKJ, Aurora Marketing 2600 S. Parker Road, 6-265, Aurora, CO 80014

Edward L. Falls, W6FTV, 3352 Cantonita Drive, Falls Brook, CA 93711

Ronald E. Giddens, KA4AUT, 200 Ohio Road, Lake Worth, FL 33463

Donald W. Goodwin, 11805 Trailridge Drive, Potomac, MD 20854

Alfons F. Goossens, Quintron Corp., 138 Commercial Drive, Quincy, IL 62301

Thomas E. Grantz, Repco, Inc., 1940 Lockwood Way, Orlando, FL 32854

George D. Graul, 250 Ogden Ave., Jersey City, NJ 07307

Homer N. Harris, Industrial Comms. Systems Inc.,1125 N. Magnolia, Anaheim, CA 92801

Norman D. Hawkins, VE3AZU, Lenbrook Industroes Ltd., 1145 Bellamy Road N., Scarborough, Ont., Canada M1H 1H5

Arthur D. Hendricks, K4CTZ, Box 2445, Dharan, Saudi Arabia

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Herbert Hoover III, W6ZH, 1520 Circle Drive, San Marino, CA 91108

Gerald M. Howard 4515 Prentice St. Room 205, Dallas, TX 75206

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Craig M. Jorgensen, 1398 Michigan Avenue, Salt Lake UT 84105

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Robert J. Lyons, Kokusai Electric Co. of America, 5422 West Rosecrans Ave., Lawndale, CA 90260

Charles L. McCorkle, Kokusai Electric Co. of America, 5422 West Rosecrans Ave., Lawndale, CA 90260

James C. McKinney. FCC, Field Operations Bureau 1919 M. St., N.W. Washington, DC 20554

Thomas F. McNulty, W3ZG, President WWIN, 2800 Mathews St., Baltimore, MD 21218

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Thorn L. Mayes, 21120 Sullivan Way, Saratoga, CA 95070

Al J. Mello, City of Providence Communications Dept., 26 Kinsley Ave., Providence, RI 02903

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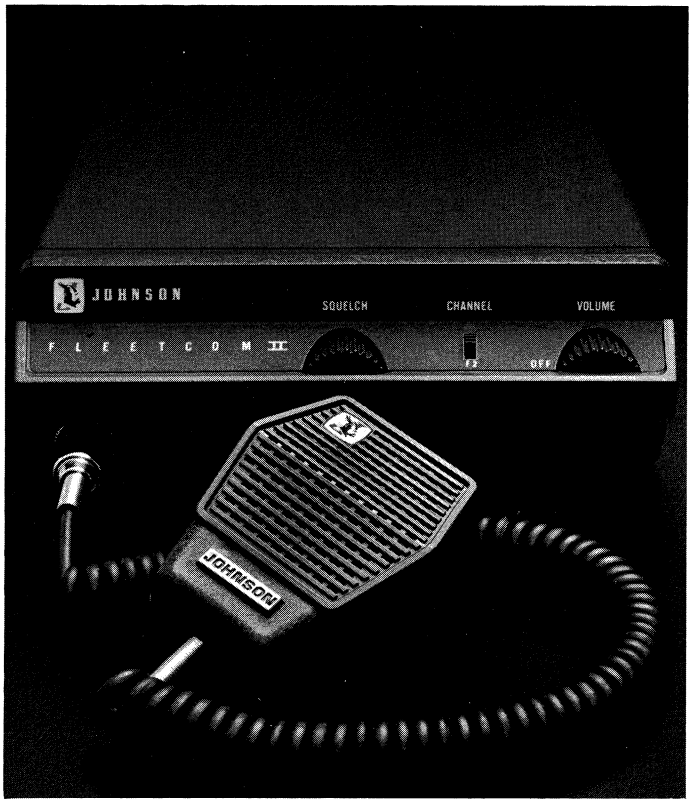

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