Proceedings of

The Radio Club of America, Inc.

Volume 44, No. 3 Third Quarter 1968

Founded 1909

NIGHT VISION

THE WIRELESS PIANO

THE RADIO CLUB OF AMERICA, INC.

250 Park Avenue, Room 319, New York City

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

The Radio Club of America, Inc.

250 Park Avenue, Room 319, New York City

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.

1968
Officers

President
William Offenhauser, Jr.

Vice President
Jack R. Poppele

Treasurer
John Finlay

Corresponding Secretary
Bernard Osbahr

Recording Secretary
Leo G. Sands

Directors

Ernest V. Amy
Ralph R. Batcher
John H. Bose
William G. H. Finch
Samuel N. Harmatuk
Harry W. Houck
Fred M. Link
Jerry B. Minter
Walter Lyons
Nicholas J. Rheinhardt
Frank H. Shepard, Jr.
Julian Sienkiewicz
David Talley
Lincoln Walsh
W. Walter Watts

Committee Chairmen

Affiliations
David Talley

Archives
Ralph R. Batcher

Awards
John H. Bose

Banquet
Julian Sienkiewicz

Budget
Harry Houck

Constitution
John H. Bose

Publicity
Jack R. Poppele

Meetings
Samuel N. Harmatuk

Membership
Julian Sienkiewicz

Publications
Leo G. Sands

PROCEEDINGS OF THE RADIO CLUB OF AMERICA

PUBLICATION BOARD

Editor — **Leo G. Sands**
Technical Editor — **Elmer C. Carlson**
Associate Editor — **Joseph A. Risse**
Advertising Manager — **Julian Sienkiewicz**

(212) 986-6596

FOUNDED 1909

The Radio Club of America, Inc.

250 Park Avenue, Room 604
New York, N.Y. 10017

APPLICATION FOR MEMBERSHIP

TO THE BOARD OF DIRECTORS: .....19.....

I hereby make application for membership in THE RADIO CLUB OF AMERICA, and agree, if elected, that I will be governed by the Constitution as long as I continue a member, and refer to the sponsors named who are personally known to me.

(Please type or letter all information and read extracts from the Constitution on the back of this blank.)

FULL NAME (Family Name First) (Given Names)

BIRTHPLACE (State or Country) DATE OF BIRTH AGE YEARS

NATIONALITY (Of what country is applicant a citizen?)

Address—

* Home ☐

* Business ☐

** Indicate by X address to which notices should be sent.*

EDUCATION

SECONDARY SCHOOL DATES

to

COLLEGE OR UNIVERSITY (1) ATTENDED

DEGREES RECEIVED DATE

to

COLLEGE OR UNIVERSITY (2) ATTENDED

DEGREES RECEIVED DATE

OTHER SCHOOLS (Names and Dates)

NAMES OF SPONSORS

1.....

2.....

3.....

MEMBERSHIP IN OTHER CLUBS OR SOCIETIES

(Technical or Radio)

SIGN FULL NAME WITH PEN

Do not fill in below this line (see other side)

Receipt acknowledged..... Letters to Sponsors 1 ..... Sponsors Letters 1.....

Deferred..... Elected..... " " " 2 ..... " " 2.....

Advised of election ..... " " " 3 ..... " " 3.....

What particular branch of the radio art are you most interested in? .....

.....

DETAILS OF PRESENT OCCUPATION

(General Nature of Work Done by Your Firm [or Department] and Nature of Your Own Duties)

DATES From	
To Present Date	

PREVIOUS EXPERIENCE

(Prior to Present Occupation—Most Recent First)

DATE	TYPE OF WORK

EXTRACTS FROM THE CONSTITUTION

ART. I SEC. 2. Its object shall be the promotion of co-operation among those interested in scientific investigation and amateur operation in the art of radio communication.

ART. II SEC. 1. The membership shall consist of:

(a) Members
(b) Fellows
(c) Honorary Members

Members, Fellows, or Honorary Members shall be entitled to all privilges of the Club except that Fellows only may hold office or be elected to the Board of Directors.

SEC. 2. A Member shall be a male or female person, not less than seventeen years of age, who has been interested in the investigation of the principles of radio communication and in radio operation, either in its commercial or amateur aspects, for a period of at least one year.

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

SEC. 4. A Fellow shall have been a member in the Club for five years or one whose contributions to the Radio Art are of such a nature as to qualify him.

ART. III ADMISSIONS, EXPULSIONS AND RESIGNATIONS

SEC. 1. An applicant for admission to membership shall present the prescribed application, properly filled out, to the Corresponding Secretary. The application shall contain the names of three Fellows or Members to whom the applicant is personally known.

SEC. 2. Applications for membership shall be acted upon at the discretion of the Board of Directors.

SEC. 3. The Corresponding Secretary shall notify an elected candidate of his election and forward to him a statement of entrance fee and initial dues.

SEC. 4. Members found delinquent in their duties may be tried by the Board of Directors, and upon decision of the Board their names shall be submitted to the Club to determine their suspension or expulsion. A three-quarters vote of the Club will be necessary to ratify such action of the Board.

SEC. 5. A member may resign his membership by a written communication to the Corresponding Secretary, who shall present the same to the Board of Directors; when, if all his dues have been paid, his resignation shall be accepted.

ART. IV ENTRANCE FEE AND DUES

SEC. 1. The annual dues payable by Members shall be Three Dollars; for Fellows, Five Dollars. The entrance fee payable by Members on election to membership shall be One Dollar. Honorary Members shall be exempt from payment of any dues or fees.

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

SEC. 3. Every Member or Fellow, upon payment of his annual dues, shall be furnished with a membership card bearing the signature of the Treasurer.

SEC. 4. Persons elected to membership after July 1st of any year shall pay only one-half of the dues for that year.

SEC. 5. Any Member or Fellow whose dues become two months in arrears shall be notified by the Treasurer. Should his dues then become four months in arrears, he shall again be notified by the Treasurer. Should his dues then become six months in arrears he shall forfeit his connection with the Club. The Board of Directors may, however, for sufficient cause temporarily excuse from payment of annual dues any Member or Fellow or extend the time for payment.

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

SEC. 7. Any Member or Fellow not in arrears upon payment of One Hundred Dollars shall be exempt for life from the payment of Annual Dues.

PROCEEDINGS OF THE RADIO CLUB OF AMERICA

Volume 44 Third Quarter 1968 No. 3

NIGHT VISION

The latest tactical night vision devices, which have enabled U. S. fighting men in Vietnam to draw a clear, bright bead on the enemy in the dark of night, using the faint glow of starlight have been made public by the U. S. Army. The devices, which range from hand-held starlight scopes to larger night vision sights for crew served weapons and more distant viewing, were developed by the Night Vision Laboratory of the Army Materiel Command, and many of them are now in use in South Vietnam. In fact, ECOM Commander, Major General W. B. Latta, calls the vital advantages of these equipments "the greatest untold story of the Vietnam War."

Essentially, the new generation of night vision items differs from its predecessors in that the older equipment depended on an infrared source to bathe a target area in low frequency light, imperceptible to the naked eye but viewable with special goggles. The new system amplifies the dim glow of the moon, stars, or even faint skyglow and intensifies it within the target area of the scope. Since the soldier using it does not generate a light source, he does not risk giving away his position to an enemy using a near infrared viewer.

The fact that the Army was working on this new system was revealed four years ago. Today, the starlight scopes and sights have gained widespread use and acceptance.

So far, thousands of these night vision devices have been dispatched to tactical units in the field. Highest priority, of course, has gone to Southeast Asia, where these electronic viewers have enabled our soldiers to spot enemy troop movements in the dark of night on countless occasions. In fact, the devices have been so successful that night patrols in Vietnam are now being deployed with lighter ammunition loads. The proficiency of the rifleman at night has been enhanced by this development to the point where he needs to carry only a fraction of the ammunition burden he had to tote before.

Work is progressing rapidly at ECOM's Night Vision Laboratory to expand the capabilities of the Army's night sights and to advance the state-of-the-art of seeing in the dark. Dr. Robert Wiseman, director of ECOM's Combat Surveillance, Night Vision and Target Acquisition Laboratories complex, noted that the development of the technology of night vision is one of the fastest growing of all the Army's tactical applications of electronics. "Taking the night away from Charlie," Dr. Wiseman said, "has deprived the enemy of one of his greatest advantages and helped save the lives of many of our combat men."

A SPOT OF DAYLIGHT IN THE DARK—Looking at this scene at night, you could see as much with your eyes shut as open. But seen through the starlight scope, a soldier and a tank stand out clearly from the wooded background. In Vietnam, these night vision devices have "taken the night away from Charlie."

From the Mekong Delta to the DMZ, reports continue to flow back through channels of combat successes directly credited to the new family of night vision devices. In one instance, a U. S. Infantry ambush patrol, using a small starlight scope, detected a company-sized VC force moving toward their position. As the Americans prepared to open fire, the patrol leader with the scope spotted a second company-size VC force a short distance behind the first. He ordered his team to let the first unit pass through, and ambushed the second. In the confusion, the two VC groups fired on each other, while the U. S. patrol withdrew and called in artillery fire support.

An aircraft gunship equipped with a starlight scope was able to detect and identify a force of about 200 VC in a rice paddy at night. The VC were about to attack a nearby town and the gunship zeroed-in on them, firing several thousand rounds of 7.62mm ammunition. The following morning, forward air controllers confirmed heavy damage to the VC force, whose attack was aborted.

A radar sweep of a strategic road in South Vietnam detected activity one night, and a crew-served weapon sight was employed to see what was going on. It showed a VC road mining operation in progress. Artillery fire ended the operation and virtually wiped out the VC unit.

A U. S. Army Artillery Aerial observer conducting fire on targets of opportunity with a new night vision device one night, spotted a large 50-man motorized VC junk on the Saigon River. A 175-mm gun was zeroed-in on the junk and destroyed it with a first round direct hit. A second junk was sighted with the scope and sunk a few minutes later.

These are but a few of the numerous incidents where ECOM's image intensification devices have been employed successfully by American forces to erase the cover of darkness which until recently has given the VC guerilla fighters the edge in night fighting.

Throughout the history of armed conflict, the cover of darkness has always provided a tactical advantage for one side or the other, and the earliest efforts on record to remove this cover were through the use of flares and rockets. As far back as World War I, formal research work was initiated in the realm of night vision, but until the 1930s, it was confined to searchlight illumination.

In the 1930s, early television research by RCA led to the development of an image tube which could be used to convert infrared images to visible displays. The military significance of this was quickly recognized by the Army, where further development resulted in the now-famous Sniperscope of World War II. During the war, the Army's night vision program was expanded to include not only battlefield illumination (mainly searchlights) and near infrared, but far infrared as well.

A natural outgrowth of near infrared research was exploratory work on a cascade image intensifier tube and other viewer components for low light level image intensification. Experimental efforts along these lines were also being made by the Germans during the war; but actual development of the tube did not come to pass for another 15 years.

In 1955, the Army's Warfare Vision personnel, a staff of about 30 Army scientists and engineers who had been responsible for development of a family of infrared night vision devices, set about to develop the light amplifying tubes toward use in devices which would no longer need the cumbersome power-consuming infrared lights, would enable soldiers to fight more effectively at night, and would be passive and not detectable by the enemy.

This small group, working in makeshift laboratories and in close cooperation with a limited number of contractors, spent the next five years exploring all possible approaches, selecting the most feasible, and identifying the most severe problems to be overcome before passive night viewing systems could become a reality. In 1957, night vision scientists produced and successfully demonstrated a two-stage cascade image intensifier tube and funds were allocated to enable them to continue their efforts.

The big break in night vision research came in 1961, when a special Presidential advisory committee, headed by Dr. Louis Alvarez, identified the lack of night fighting capability as a serious drawback in the Army's preparedness for limited warfare. As a result, Lieutenant General Arthur Trudeau, then chief of Army Research and Development, visited the night vision team at Fort Belvoir, Virginia, where he was shown the work that had been accomplished and was briefed on the potential of image intensifier devices.

In 1962, the night vision program was greatly expanded, and on November 2, 1965, it was transferred from the Army Engineer Research and Development Laboratories and became a major element of ECOM's Combat Surveillance, Night Vision and Target Acquisition Laboratories complex.

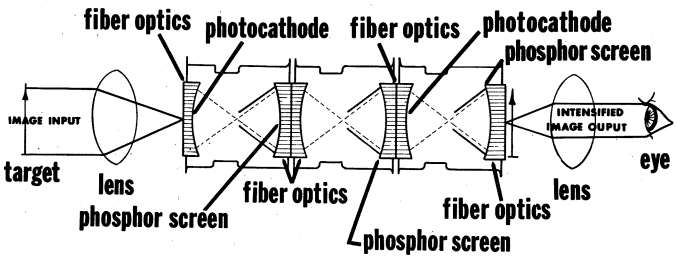
Under ECOM, the Night Vision Laboratory increased its staff to almost 300 employes in eight technical areas, and was assigned the missions of research and development of night vision equipments and systems which uitlize reflected radiations, i.e., low light level image intensification, near infrared, battlefield illumination systems and self-emitted radiation equipments and systems which can detect and image military objects by virtue of their temperature. The program of these areas is all inclusive and is based on guidance from military users and combat development personnel with whom close contact is maintained. A continuing analysis of the state-of-the-art in electronics, optics, and other scientific disciplines is maintained and studies of the individual soldier are carried on. Field measurements are conducted in the night environment to determine the factors affecting the design and use of the night vision devices. New techniques and materials resulting from the research program are incorporated as rapidly as possible into simple, rugged equipment designed to satisfy the requirements of the military user.

Once the Laboratory was established, a three-pronged approach was decided on for developing image intensification devices. A first generation of night viewing systems based on the state-of-the-art as it existed at that time, which although it would only permit a few devices such as rifle scopes and observation devices to be built, would provide the Army with basic night fighting hardware in three short years. The second generation, to be based on a much improved light intensification principle still in the research stage, would follow, but would necessitate an expedited program to develop improved basic components such as tubes, lenses and power supplies for a family of cheaper, smaller and more versatile systems designed to outfit the entire Army.

With necessary resources provided, an extremely accelerated pace was maintained over the next four years. Critical problems in materials and fabrication techniques were concentrated on. Five parallel approaches for an image intensifier tube were begun

from which the present three stage cascade image tube emerged. This tube, the PIP-1, (**P**hotocathode, **I**nternally **P**rocessed) is now in full scale production.

Intensifier Tube



NIGHT VISION TUBE—Internal system of the image intensification tube used in night vision devices.

Some of the key personnel who are responsible for implementing and directing the new techniques and materials during the initial expansion of the R & D night vision image intensifier equipments program are: Dr. R. S. Wiseman, Benjamin Goldberg, Myron Klein, Charles Freeman and John Johnson.

The first generation image intensifier tube consists of three modular sections which are mechanically and optically coupled together to form a three stage intensifier. The three modules with the multiplier sections of the high voltage power supply are completely encapsulated; a recessed connector is for plug-in of the power supply oscillator assembly. The 25mm image intensifier tube is approximately 7 inches in length and 2¾ inches in diameter; it is used in the Small Starlight Scope and the Crew Served Weapon Sight. The 40mm image intensifier tube which is similar to the 25mm tube has an overall length of 11 inches and a three inch diameter; it is used in the Night Observation Device. This system employs a much larger optical system than the other two devices.

The Small Starlight Scope is a small, lightweight, passive night vision image intensifier system for visual observation and aimed fire of weapons at night, under amibent night sky light, with maximum security from detection.

The Crew Served Weapons System Night Vision Sight is one item of a family of equipment that was developed to provide the U. S. forces with a high degree of night vision capability. This weapon sight provides the night capability for battlefield surveillance, target acquisition and delivery of aimed fire with security from enemy detection. This passive sight utilizes only moonlight and starlight from the night ambient sky. It consists of a sight housing, an eyepiece, and image intensifier tube and reticle projector, an objective lens and associated battery operated high voltage power supply.

NIGHT TO DAY—This new Starlight Scope does not require the rifleman to generate an infrared light source, as the old Sniperscope did. This image intensification night vision scope intensifies fain moonlight, starlight or skyglow in the observer's target area.

The Night Observation Device provides the U. S. forces with a high degree of night vision capability. Using image intensification techniques, the low light level illumination of the night sky reflected from the object and its background from an erect clearly defined image to the observer. The device is tripod mounted and/or vehicle mounted. The modules that make up the device are the objective lens, image intensifier tube, eyepiece, reticle projector and power supply.

MRS. SADENWATER DIES

Grace Sadenwater, widow of the late Harry Sadenwater, died October 6 in Palo Alto, Calif. Mr. Sadenwater, who was assistant to the vice president of Radio Engineering Laboratories, died August 29, 1961. He was a former president of the Club.

OUR GOOD NAME IS BEING USED

The 1968 edition of Communications Handbook lists the "International **Radio Club of America**" and gives its headquarters address as P.O. Box 548, Riverside, Calif. 92502.

MEMBERSHIP DRIVE

Mailed with this issue is a Club membership application form. Every member is urged to sponsor a qualified friend or associate for membership. Let's get these membership applications sent to the Club office in time for consideration at the next board meeting.

Don't ask what the Radio Club can do for you—ask what you can do for the Radio Club. The Club is old, but it can be "young" in spirit. The Club needs new members and the help of existing members. Here's what you can do to help:

1. Sponsor a new member (membership application enclosed with this issue of the Proceedings).*
2. Send in news about your activities for publication in the Proceedings.
3. Write a paper for the Proceedings.
4. Attend the Club meetings.
5. MOST IMPORTANT—attend the annual banquet on December 10 and bring guests.

*Additional membership applications can be obtained from the Club office.

1968 BANQUET DATE SET

The 59th Anniversary Celebration Banquet of The Radio Club of America, Inc. is to be held Tuesday, December 10, 1968 at the Seventh Regiment Armory in New York City. Remember the date and do plan to attend.

THE WIRELESS PIANO

by

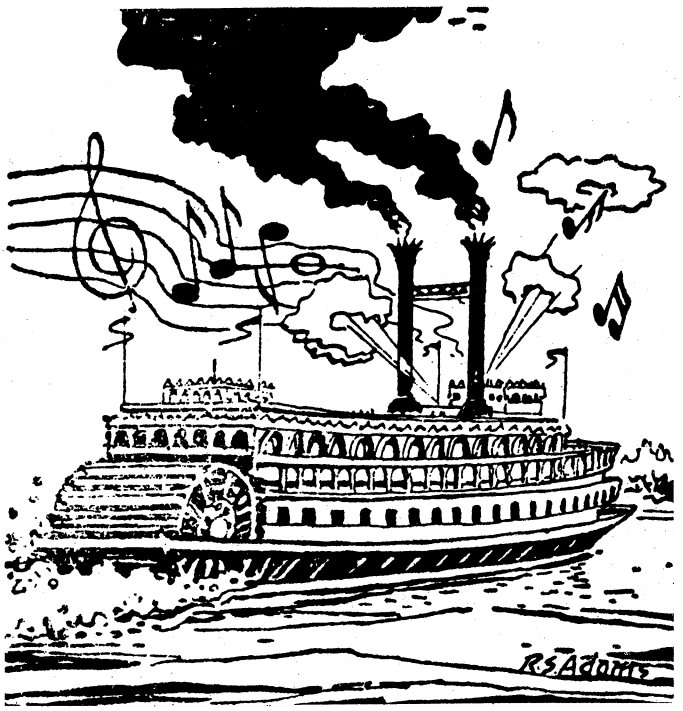
Commander E. J. Quinby, USNR (Ret.)

The year was 1910. New York had a thing going called the HUDSON-FULTON Celebration. The U.S. Navy fleet was moored in the Hudson River and there was to be a parade of hundreds of steamboats passing in review, with replicas of the HALF MOON and the CLEREMONT included. Some of the old boys still around will recall what fun we were having on the ether waves at the time, thanks to the absence of federal or international regulations. The amateurs were having a field day. For what a lad could earn in a few weeks delivering groceries, he could buy enough wireless equipment from Hugo Gernback's Electro Importing Company at 69 West Broadway to cause a real disturbance on the air. After hooking up the rig, if it chanced to radiate best on 600 meters, that's where it stayed tuned. The fact that it caused some interference with traffic from ships or the Navy Yard at Brooklyn was incidental. Those operators could always ask us to please stand by while they cleared their important business.

Wireless stations were not so numerous then. A ham who spotted an antenna on the roof of a house knocked on the door and introduced himself as a fellow member of the fraternity. Call letters were simple two-letter combinations, like NY for Jack Duffy's United Wireless station at 42 Broadway, WA for Elmo Pickerill's post at the Waldorf-Astoria, then at 34th Street, AX for "Rummy" Wren on the Steel Pier at Atlantic City, and HA for the lonely storm-swept Cape Hatteras outpost. Appropriately, the Eiffel Tower in Paris was FL, but only the enviable operators on Trans-Atlantic ships ever got to hear it in those days. And OA was my diminutive sugar steamer OLINDA flying the Cuban flag. She always brought us into New York Harbor listed over on her beam ends after shifting her bulk cargo of unrefined brown sugar as she rounded that hazardous HA corner.

The night we first heard those wierd and wonderful strains of music over the air, we couldn't imagine how it was being accomplished or by whom. We all "stood by" to listen. The Navy radioman on watch at the Brooklyn Navy Yard called in the commandant—and the Admiral shared the headphones with him. The ship news radio operator of OHX on the South Ferry rack at the Battery tried to keep his galena crystal detector in adjustment as the boats jarred his little shack. He called up the night editor of the New York Herald and held one of the headphones to the telephone transmitter. The morning edition reported the strange phenomenon that had us all in a dither, GHOSTLY MUSIC ON THE AIR!

Not until after midnight did we learn that the musician was the Prince of Monaco who had just arrived aboard his palatial steam yacht to participate in the



aquatic parade up the Hudson. He had devised a trick musical transmitter somewhat on the principle of the later Hammond organ. With a series of tone wheels on the extended shaft of his motor-generator—actually rotary spark gaps with different numbers of electrodes or teeth—he could select or combine musical pitches in a chromatic scale of about two octaves. Instead of telegraph keys, he had a black-and-white keyboard with silver contacts beneath. Exhibiting his sense of humor, he interspersed his repertoire with Morse code messages, sometimes on one note or another, sometimes with pleasing chords and tuneful sequences. That well-born and well-heeled nobleman finally signed off after midnight and we looked up the call. It was the S. Y. HIRONDEL, hailing from Monte Carlo.

Later came the international conference and the regulations which put a damper on a lot of the fun that had been enjoyed by prince and pauper alike. Regulations confined the amateurs to the "short wave" realm which they proceeded to develop into a superior medium. The "wireless piano" devised by the Prince of Monaco was superseded by a versatile medium we call "brodacasting" today. And we radiate music directly by steam calliope over a five-mile area from the paddlewheel steam DELTA QUEEN as she cruises the Mississippi, Ohio, Tennessee and Cumberland Rivers.

A Finn, newly arrived in America, remarked: "You Americans sure use the same word for many things. You wear beets, you eat beets, you go to the beets, and when you don't like someone you call him a son of a beets."

WELCOME, NEW MEMBERS

At its October 24 meeting, the Board of Directors elected the following to membership in the Radio Club of America:

John Oliver Ashton of Santa Cruz, California. Known as "JO" in the early days of wireless telegraphy, John is a pioneer in radio communications. He earned degrees at Columbia, Massachusetts Institute of Technology and the University of California. He also attended the United States Navy Radio School, where he was also an instructor, and the United Wireless/Marconi/Telefunken School. He was a member of the Wireless Association of America, International Wireless Institute (1910), and the Institute of Radio Engineers (No. 212, which he joined in 1912 at the very beginning).

Hugh M. Baker of Silver Spring, Maryland. Hugh is president of H B Engineering Corp. and was educated at the Baltimore Polytechnic Institute and John Hopkins University. He is also a member of the IEEE and the ISA.

Roland M. Fennimore of Naples, Fla. He was educated at Rudgers University, Gettysburg College and the Neptune School in Ocean Grove, New Jersey. He is a member of the American Radio Relay League and the Old, Old Timer's Club. He was a physics teacher in high school and a planning engineer for Western Electric Company.

Oliver Perry Ferrell of Partridge, New Jersey. Perry is well known as the editor of Popular Electronics Magazine, the magazine in the electronics field which has the largest circulation of all. Previously he had been editor of CQ Magazine and Hi-Fi/Stereo Review and was a researcher performing under a United States Air Force contract. He is also a member of the IEEE.

George J. (Jack) Gray of Mason, Ohio. Jack studied at the University of Cincinnati and the Ohio Mechanics Institute as well as at the United YMCA Radio Engineering School and the Harvard Naval Radio School. He also has taken a Capitol Radio Engineering Institute course. Jack is a member of the ARRL, QCWA, OOTC and AWA. He worked for Crosley Radio from 1927 to 1936 and later with the Voice of America. He is particularly interested in amateur radio and collecting old radio gear as well as writing a history of radio.

James M. Kenney of Brooklyn, New York. Jim earned his bachelor's degree at the City College of New York and his master's degree at Columbia. He is a member of the IEEE and the Antique Wireless Association. He is employed as a senior task leader in charge of the semiconductor group of the Electronic Devices Branch of the Naval Applied Science Laboratory. He is particularly interested in the history of radio and the preservation of early equipment.

Andre Marcel Maillard of Palisades, New York. Andre is director of training for the Telecommunications Training Division of Leo G. Sands Associates, Inc., in New York City. He is a graduate of the University of Paris and has attended numerous other colleges as well as the French Military Academy. Before coming to the United States from France, Andre had considerable experience in electronic engineering, management and training.

Herbert J. Alsow of Flushing, New York City. Herb studied at New York University and is a member of the New York Advertising Club. He is advertising manager for Hi-Fi Trade News and the Sound Industry Directory. Previously he was advertising manager for Electronics World and advertising sales representative for John Rider Publications.

Fred Shunaman of Plainfield, New Jersey. Fred is well known all over the world as the managing editor of Radio-Electronics for some 20 years (Gernsback publication). Fred has attended Brooklyn College, Columbia University, City College of New York and Rutgers University. He is a member of the ARRL and the UIPRE.

Philip Weingarten of Forest Hills, New York City. Phil studied at City College of New York and is a graduate of New York's famous Stuyvesant High School. He has also taken a course from National Radio Institute. Phil is a member of the ARRL, Antique Wireless Association and the Bronx Radio Club. For 25 years he was with the Central Radio Laboratories. He is now engaged as a distributor of Pepperidge Farm products.

To all of the above, welcome to the Radio Club of America.

TECHNICAL MEETINGS

On June 20, our president, William Offenhauser, Jr., presented a paper about the early history of sound film recording at the club's meeting which was held in the Johnny Victor Theater in the RCA Exhibition Hall. Bill gave a most interesting talk and demonstrated sound film recordings that were made 39 years ago. All agreed that the quality was truly surprising.

On September 20, Harold Schwede, of Schlumberger Doll Research Center, gave a paper on oil well logging and gave some statistics on world oil consumption. Mr. Schwede pointed out that U.S. oil reserves would keep our cars going for only another 11 years and that the world oil reserves would last only about 33 years. He also talked about the hazards of prospecting for oil in Africa where there are still many Nazi land mines that have not been removed.

On October 24, Peter De Bruyn of the National Bureau of Standards presented a paper about the "New Look at NBS." The technical meeting was preceded by a meeting of the board of directors at 4:30 P.M., followed by a pre-meeting dinner at the Berkeley Room on 44th Street.

RAMBLING WITH GAMBLING

It has been 43 years since the first John Gambling joined the staff of WOR whose listening audience is said to be the largest of any single radio station in the world. Today, John "A." Gambling broadcasts over WOR every morning except when on vacation and Peter Roberts takes over. But, until recently, it was John "B." Gambling, father of "A", who was a WOR favorite broadcaster whose voice was heard from Montreal to North Carolina. Since John "A" is now carrying on the program his father started, let's read below about what John "B" told your Proceedings editor in a letter sent in response to a query about his background.

"I was born and raised in Cambridge, England, left school at 13 and entered my father's nursery to learn that business with the idea of subsequently taking it over. However, in the fall of 1913, when I was 16 years of age, I got bitten by the "wireless bug" and persuaded my father to send me to the British School of Telegraphy in London to learn the then infant business of wireless telegraphy. In July 1914, I passed the necessary exams and was made a duly qualified first class wireless operator by the British Postmaster General. I was also examined and passed for service by the Marconi Company in London.

"On August 4, 1914, Britain declared war on Germany, and on August 10, I enlisted in the British Navy as Chief Petty Officer Telegraphist by upping my age one year. My first assignment, which was to last nearly three years, was a pretty tough one for a boy just going to sea. I was sent to a fishing trawler converted to a mine sweeper and, until the end of 1916, was sweeping mines in the North Sea, mostly off the mouth of the Thames and off the Belgium coast. Following that, I was sent out to the east coast of Africa to join a converted merchant ship, the cruiser "Lunka". Our station was along the east African coast, what was then German East Africa, with occasional trips to India. This went on until the Armistice was signed in 1918, after which I returned to London and was demobilized. Then I joined the British Merchant Marine and was sent to a freighter which plied out of New York to near and far east ports with case oil. After about a year, I obtained an American radio operator's license in New York and transferred to United States flag ships, subsequently becoming a United States citizen. After a few years on various freighters and tankers, I was made chief operator on the old passenger ship "SS Creole" of the now defunct Morgan Line, plying between New York and New Orleans. It was during this assignment that I met the lady whom I married in February 1925 who also persuaded me to swallow the anchor" (quit the sea). A few weeks later in March of 1925, I was hired by WOR as a radio engineer when they opened their first studio in New York City. A few months later I took over the early morning program of setting-up exercises and continued there for the next 34 years until I retired in last October 1965, and my son, John "A" took over the program. I sometimes return to the program when my son goes on vacation and of course, keep in constant touch with the broadcasting business.

"We have a home in Old Field on the north shore of Long Island where we spend our summers and where I occupy myself around the place and with the affairs of my nearby nursery which I started several years ago with the object of having something to occupy my time during my retirement. We spend our winters at our cottage at Palm Beach and up to now, we find retirement a very pleasant and rewarding experience."

THEUERER AWARDED LONGSTRETH MEDAL

For his contributions of significant new ideas to solid state science and technology, Henry C. Theuerer of Bell Telephone Laboratories, was honored by The Franklin Institute. Dr. Wynn Laurence LePage, the Institute's chairman of the board, announced that Theuerer had been named the recipient of the Edward Longstreth Medal of 1968. The Bell Labs scientist and other honored guests received their awards at Medal Day ceremonies on October 16.

Prominent among Theuerer's many innovations is the conception and development of the floating zone process, which has been utilized to attain ultrapure samples of a number of materials in single crystal form. In the floating zone process a vertical rod of material to be purified, for example silicon, is melted in one narrow region. The molten region is held in place by its own surface tension, and by moving the molten region from one end of the rod to the other, impurities may be moved toward the end of the rod. This process may be repeated as many times as desired. The impure end may be discarded leaving a rod of purified material.

Theuerer's technique makes it possible to purify silicon over 100 fold—from 3 parts of impurities in 10 billion to 3 parts in 1 trillion. Control of purity of the raw mtaerials is a vital step in the successful manufacture of reliable and high quality transistors and diodes.

The technique has been extensively applied in manufacture as well as in laboratory research. For example, a large fraction of all single crystal silicon sold is produced by floating zone refining. Purities achieved by this unique method are an absolute requirement for the preparation of high voltage silicon rectifiers wherein more than 1000 volts can be sustained across a single rectifier, a truly remarkable achievement.

Following the use of the float zone procedure for purifying silicon Theuerer's method was applied to the ultrapurification of a number of high melting point

materials and to the preparation of pure single crystals. A few examples are beryllium, iron, rhenium, nickel, molybdenum, niobium and ruthenium. All of these have been prepared in a state of purity unachievable before floating zone refining.

In addition to the floating zone process, Theuerer's varied contributions include processes for producing epitaxial lawyers on silicon which made the epitaxial transistor possible, many chemical means for preparing semicodnuctor raw materials, and an ingenious process for controlling the composition of a gas phase from a liquid solution having components of widely differing volatilities. The latter is of unusual significance in many chemical processes. More recently Theuerer has developed a new technique known as getter sputtering for the preparation of high purity thin metallic films. Both superconducting and magnetic alloy films of unusual properties have been prepared by this method.

Theuerer joined Bell Telephone Laboratories in 1928 and began his specialization in metals and materials research which has been unbroken for 40 years. He received a bachelor's degree in chemical engineering from Cooper Union in 1933 and a master's degree in chemistry from Columbia University in 1939. Theuerer has been granted 23 patents, wtih two pending.

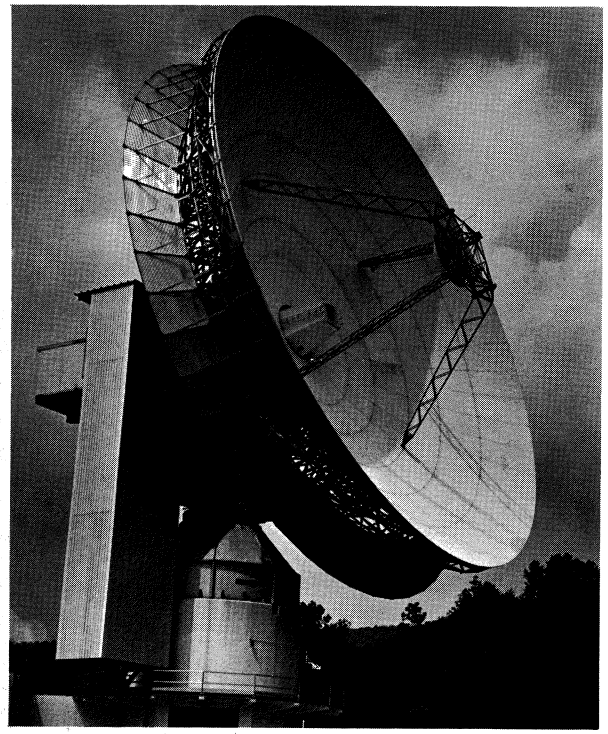
PHILCO CHANGES LEADERS AGAIN

Robert E. Hunter has replaced **Robert O. Fickes** as president of Philco-Ford Corporation. Hunter came to Philco from General Motors. In 1964, Fickes replaced **Charles Beck** who succeeded **James Skinner, Jr.** when Ford acquired Philco in 1962. Once the world's largest radio and television manufacturer, Philco has had its ups and downs since 1950. Sales rose to around $450-million annually under the old Philco management and are now said to be approaching one billion. At one time Philco was the largest industrial employer in Philadelphia and was "famous for quality the world over." Now its operations are located in several areas and emphasis is on aerospace instead of consumer electronics.

ANTENNAS GET HEAVIER—470 TONS

The Communications Satellite Corporation, when dedicating an earth station in a picturesque West Virginia mountain valley, demonstrated one of the world's largest movable dish antennas. Built by Philco-Ford, the antenna is 97 feet in diameter, 11 stories high, and weighs about 470 tons. The new ground terminal in this rural area some 50 miles south of Morgantown is part of a global commercial system. To be dedicated later are 97-foot systems at Cayey, Puerto Rico, Jamesburg, California, and Paumalu, Oahu, Hawaii.

The antennas, transmitting on the 6 GHz band and receiving on 4 GHz, provide international satellite communications links with the Intelsat series of satellites and are designed to operate with orbiting satellites from 5,000 miles to synchronous altitude of 22,300 statute miles. Their sensitivity is such that they could point to a star many light years away and receive from that particular star while excluding signals from nearby stars.



Each COMSAT antenna is capable of simultaneously transmitting and receiving up to 5,000 channels of teletype, telephone and television in each direction. Telphone and teletype require one channel each while television requires 10 channels per transmission. Any combination of television, telephone, or teletype may be transmitted or received as long as it is not in excess of the 5,000-channel station capacity.

The antenna structures are composed of a concrete tower and a steel pedestal upon which the 97-foot reflector and feed are mounted. When the reflector is in the zenith position the structure is equivalent in height to an 11-story building.

An aluminum frame and aluminum sheet panels make up the reflector. The contour of the thin reflector surface is so critical that when manufactured an average deviation of not more than .025 of an inch of the ideal reflector surface must be maintained. The 45,000-pound reflector can travel from —2 degrees to 92 degrees in elevation and ±170 degrees in azimuth at velocities of up to 1 degree per second while tracking and accelerate at a rate of 3 degrees per second squared.

The feed is an extremely efficient means of gathering and/or dispersing microwave energy from or to the reflector while communicating with the satellite.

Housed in the antenna is autotrack equipment designed to compute magnitude and direction of the azimuth and elevation of the satellite from the reference axis, then point the antenna at the satellite.

In operation the antenna transmits a signal originating from a television, telephone or teletype transmitter which is amplified and sent up through microwave lines to the feed. The feed, in turn, disperses the energy to the reflector, which reflects and focuses this energy through the specially-shaped antenna to the satellite. When receiving a signal the reflector gathers the energy and focuses it into the feed which sends it down through the microwave line to the receiver.

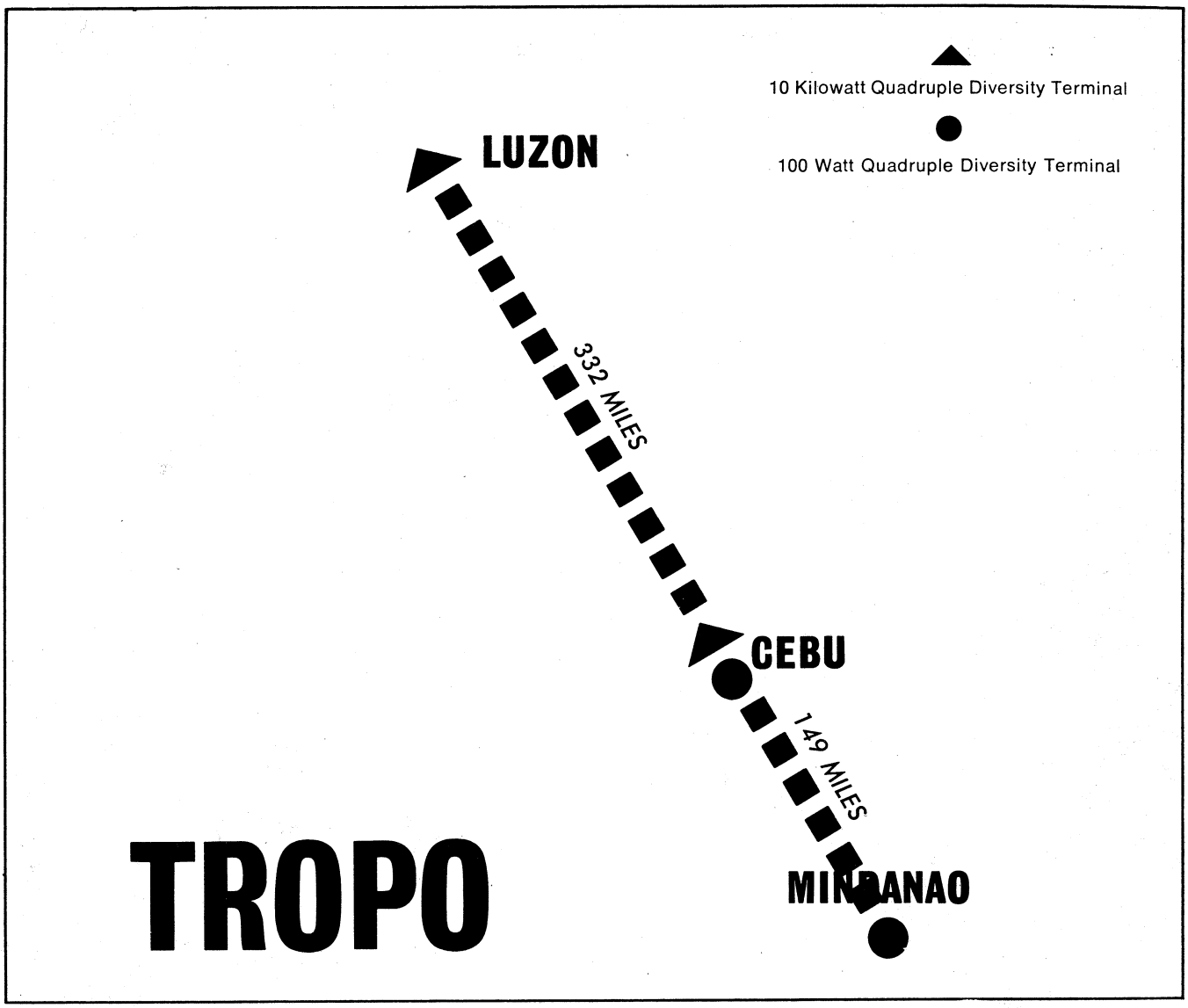
The new COMSAT stations embody a novel, antenna-mounted equipment room. A low-noise receiver amplifier is housed in an equipment shelter located immediately behind the fuel system. The shelter area is completely air-conditioned and does not change its position or attitude (except in azimuth) despite changes in antenna positions.

Each of the powerful transmitting and receiving antennas is mounted on a concrete tower weighing 450,000 pounds and is purposely located at lower elevation than surrounding terrain to minimize interference from other electromagnetic signals.

Last year Philco-Ford supplied a 90-foot antenna system to Telespazio, the Italian satellite communications organization. The station is located in the Fucino Valley 80 miles east of Rome.

Since the inauguration of the United States' first aerospace program, Discoverer, 11 years ago, Philco-Ford's WDL Division has designed and activated 38 tracking antennas for the U.S. Air Force, the National Aeronautics and Space Administration and other governmental agencies, and has operated six such stations. The nation's first active repeater communications satellite, Courier, and 27 satellites for the U.S. Defense Satellite Communications System were also built bf Philco-Ford.

Ralph R. Batcher (center) chats with Fred M. Link (left) and Andre M. Maillard about radio communications in the "old days". The picture was taken by Jacques Saphier in one of the lecture halls of the Mechanics Institute during Link's visit to the Telecommunications Training center, operated by Leo G. Sands Associates, Inc. for the Agency for International Development, where 36 police communications officers from 14 countries are being trained in maintenance, installation, planning and operation of two-way radio systems. Batcher, Link and Sands are directors of the Club. Maillard is director of training of the police communications school.



...in the Philippines

Added communications capability for the Philippines, again provided by Radio Engineering Laboratories (REL).

For over a decade, in fact, REL has played a major role in providing improved commercial and military communications for the Philippines.

Now, The Clavecilla Telecommunications Corporation has selected REL tropo scatter equipment for a nationwide quadruple diversity system linking the Islands of Luzon, Cebu, and Mindanao. Spanning some 481 miles in two giant over-the-water leaps, the system will operate in the 1700 to 2400 MHz range, with an immediate 60 channel capacity.

When installation is completed with technical assistance from REL, terminals for the new commercial system will be located at Tagaytay, Luzon; at Cagayan De Oro, Mindanao; and at the repeater site on the Island of Cebu.

Yes, REL means experience *and* performance that gives an added measure of assurance for every assignment . . . *every time.*

REL will welcome an opportunity to discuss your present and potential multichannel requirements. We will also be pleased to send you technical data plus the current issue of REL's "Credentials in Tropo Scatter". Please write:

RADIO ENGINEERING LABORATORIES DIVISION
Dynamics Corporation of America
Long Island City, New York, 11101

DCA