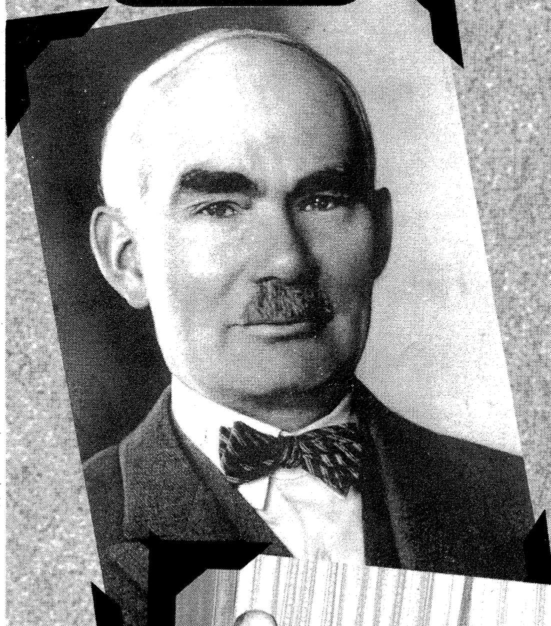
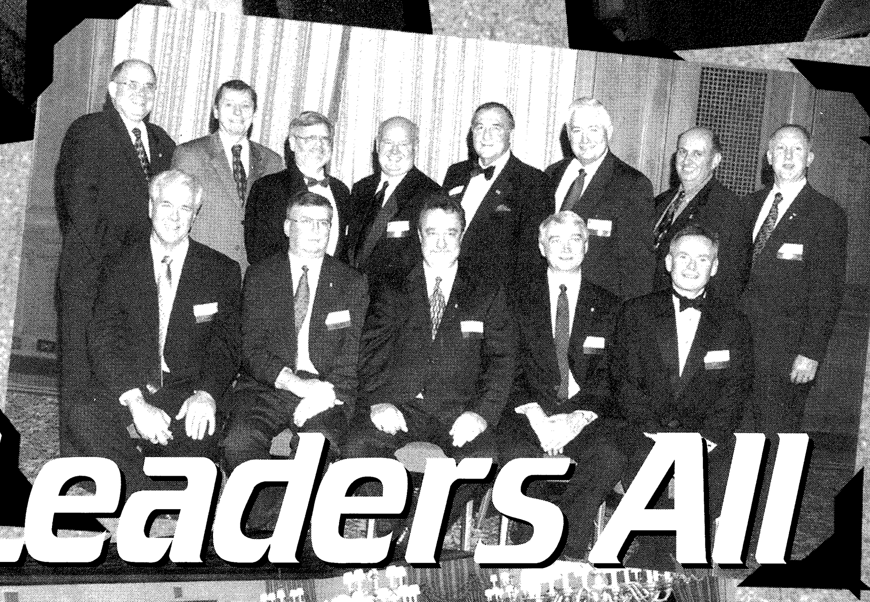
PROCEEDINGS of

THE RADIO CLUB OF AMERICA, INC.

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

SPRING 2003





Leaders All Then and Now

Volume 77, No. 1

SPRING 2003

THE RADIO CLUB OF AMERICA, INC.

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

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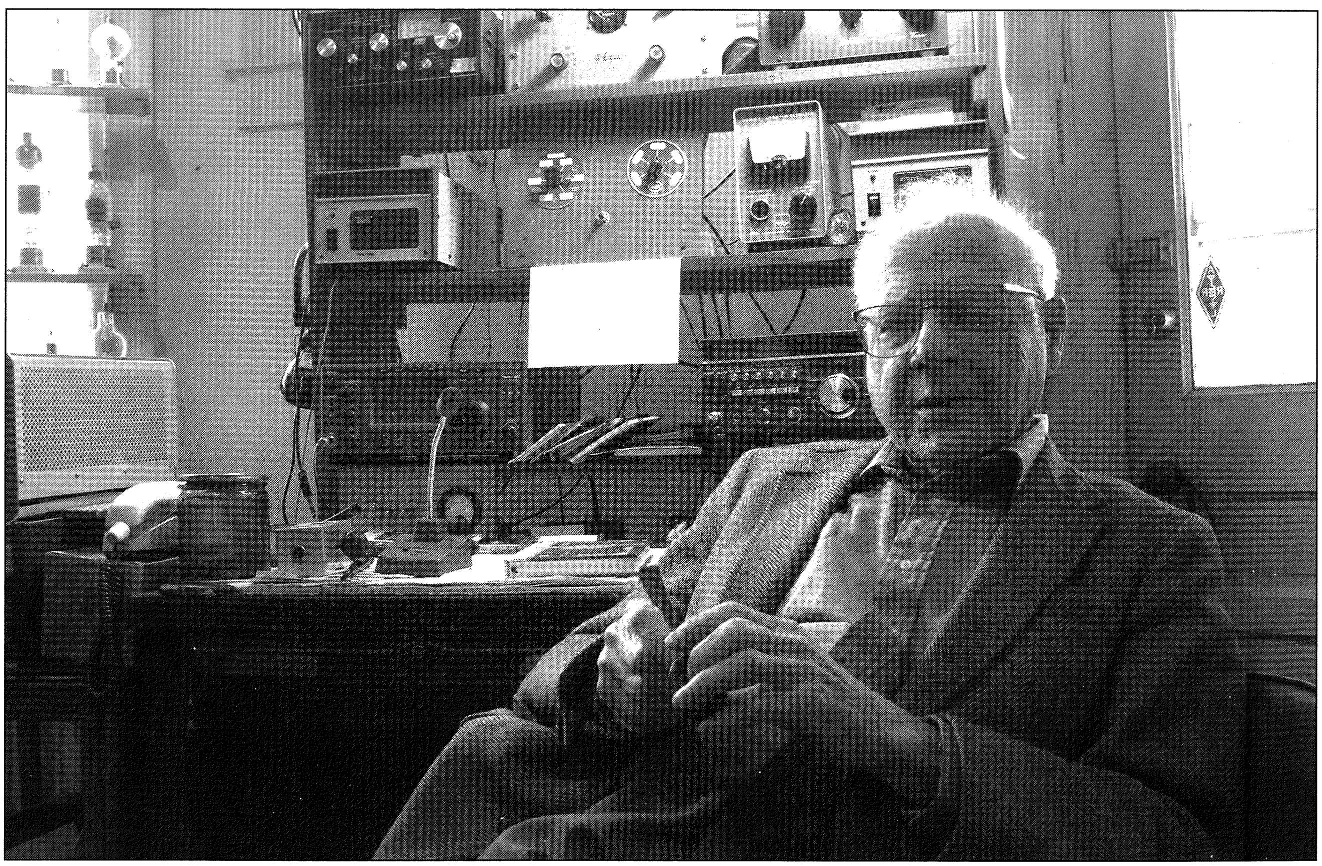
Harry Mills: A Retrospective

By Harold Kinley

"Everybody's crazy about something, I guess. And, as you can see, I've been crazy about this business for all these years." Those were Harry Mills' words during a recent conversation that I had with him at his lovely old home in Hendersonville, N.C. And, these weren't just words! The vast array of radio or "wireless" paraphernalia found in and around his home could well document the evolution of wireless. From a spark gap transmitter to a modern Ten Tec Jupiter ham radio transceiver, Harry's collection of equipment extends from the oldest to the newest and from the crudest to the most sophisticated.

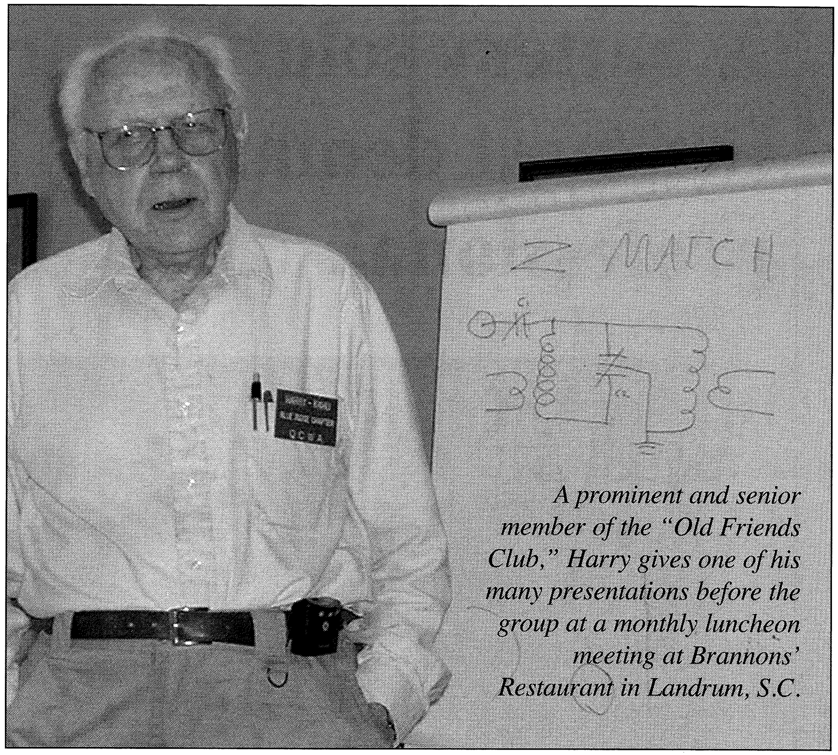
My first contact with Harry was as a guest at the "Old Friends Club." The club meets the first Friday of every month at a little restaurant north of Spartanburg, S.C., and just south of the N.C./S.C. state line. Among the membership of this group are some of the most prominent and knowledgeable hams to be found anywhere. Harry is almost always present at the meetings, and he usually brings an interesting relic or two from days gone by. Harry has also done many interesting presentations before the group.

Born in Beaver, Pa., on Sept. 19, 1907, Harry was destined to become addicted to wireless at an early age. At the age of 12, Harry joined the Boy Scouts in high school. The last chapter in the Scout handbook described a wireless station using a coil with slider and a crystal detector. Harry didn't have a crystal detector but he was able to fashion a detector out of razor blades



Sitting in his ham "shack," Harry packs his pipe while describing his early days in radio.

and carborundum. Later, he was able to find a galena crystal detector. Harry was having difficulty hearing anything in his headphones; he was using a simple 200-ohm telephone receiver. His dad sought the advice of a college professor who recommended the use of a high impedance headphone with the crystal detector. Harry was able to get a Baldwin high-impedance headset. Now he could hear several stations around the area.



A prominent and senior member of the "Old Friends Club," Harry gives one of his many presentations before the group at a monthly luncheon meeting at Brannons' Restaurant in Landrum, S.C.

Harry's interest in wireless continued to grow, and he had a voracious appetite for more knowledge on radio and wireless. During high school, Harry built and experimented with many wireless devices to further his knowledge but after high school, there was no money for college. Besides, not much was offered from colleges on the subject of wireless.

Harry says, "Getting yourself educated on wireless back in those days was no easy task." He studied various courses at different colleges during several years, trying to expand his knowledge of wireless. Later, Harry sold magazines

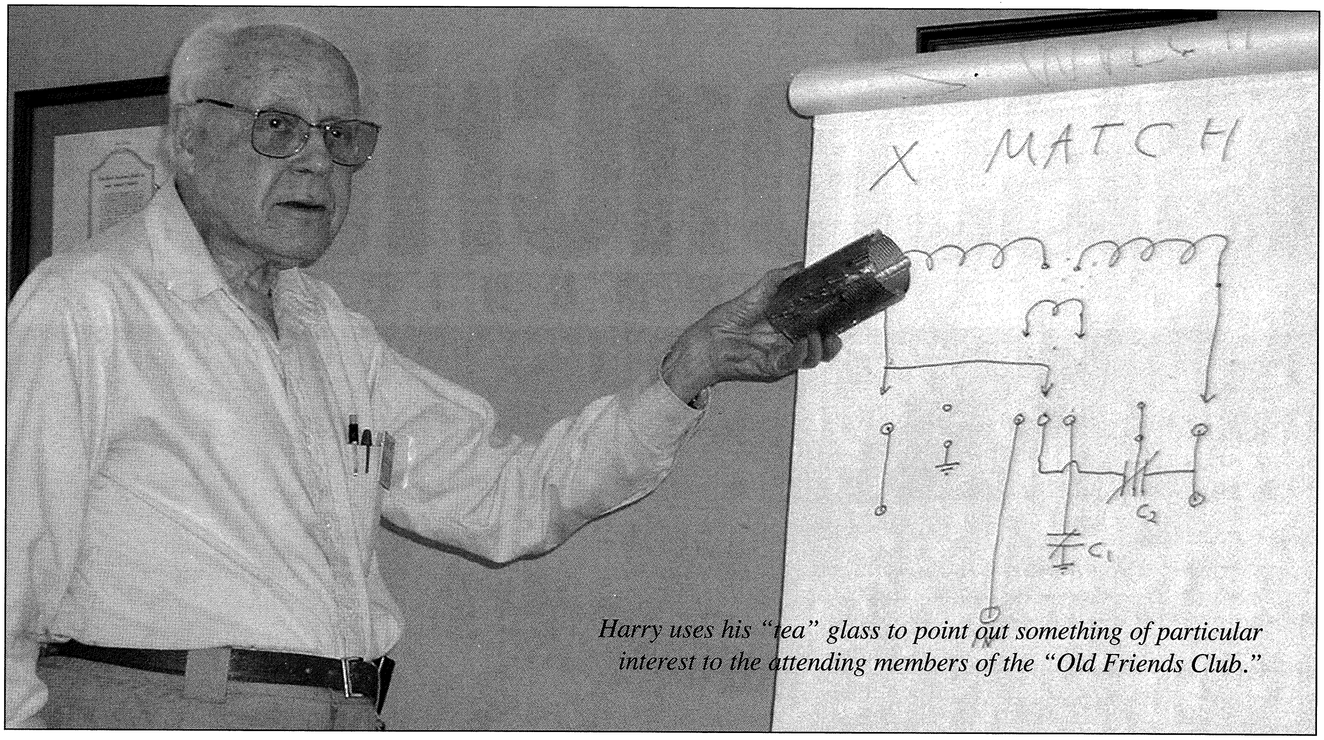
Harry says, "Getting yourself educated on wireless back in those days was no easy task." He studied various courses at different colleges during several years, trying to expand his knowledge of wireless.

for Curtis Publishing Company to earn money for college. He attended Geneva College in Beaver Falls, Pa., for two years, followed by one year at Washington and Jefferson College in Washington, Pa.

Harry then went to radio school in Pittsburgh to study for his commercial license. He also taught radio at school part time. He received 10% credit on his exam. Soon after getting his license Harry went to Philadelphia to RCA to get a job as radio operator on a ship. The ship had an arc transmitter. Harry says he knew nothing about the arc transmitter, and he had never been on a ship.

The ship was leaving at 5:30 that evening, so he borrowed a book to learn about the arc transmitter. It was a 2-kilowatt Federal transmitter. That evening Harry found himself serving as radio operator of an arc transmitter on board a ship heading down Delaware Bay. He had to do some fast learning about the arc transmitter in order to signal the Coast Guard station. The ship was named the "Bohemian Club," and its call sign was KDTB. Harry learned that an arc transmitter was good for one thing: self-destruction. Harry served as radio operator until about a year later when a ship collision in Delaware Bay took his job. Between 1929 and 1930, Harry worked as chief engineer of radio station WMBR in Tampa, Fla.

Harry got his ham radio operator's license in 1922, and there were no station licenses at that time. Then, in 1923, he was issued his first station license with the call sign 8VHX. At that time there was no Federal Communications Commission. Communications were regulated under the Department of Commerce, with Herbert Hoover as Secretary of Commerce.



Harry uses his "tea" glass to point out something of particular interest to the attending members of the "Old Friends Club."

The RCA Years

Soon, Harry returned to his hometown of Beaver to run a radio business, Mills Radio Company, where he sold and repaired radio equipment. By now, it was the late 1930s and, still seeking to further his education in radio, Harry enrolled in Tri State College and earned a degree in radio engineering.

In 1942 Harry applied for a job with RCA. He says, " They told me if I could answer one question I had the job." The question was, "How do you get a circular pattern on an oscilloscope?" Of course, Harry answered correctly and the result was a 30-year career with RCA.

Harry worked in various positions throughout his career with RCA. Early in World War II, RCA assigned Harry to the U.S. Navy to install the first submarine radars at Portsmouth and New London. Subsequently, Harry served at the submarine base at Pearl Harbor. After the war, until about 1950, Harry covered RCA distributors in the northeast and introduced TV in New York and Boston.

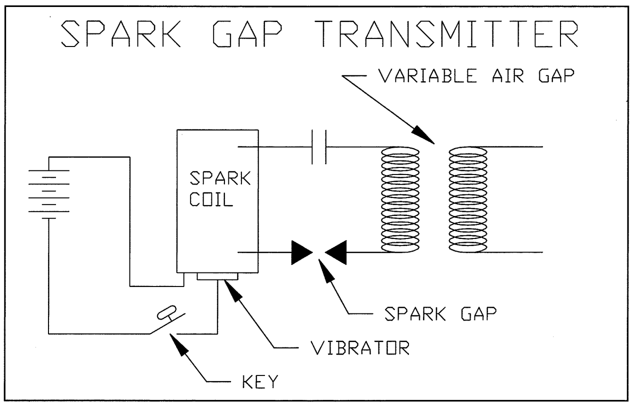
Around 1950, RCA assigned Harry to the U.S. Army. Harry was responsible for establishing schools to teach NATO countries how to use and maintain U.S.-supplied Signal Corps equipment. He supervised as many as 50 engineers in six countries from Portugal to Turkey. During this time, he even held a German amateur radio call sign — DL4TZ.

When Harry returned to the United States in 1956, he was transferred to marketing. He sold engineering services to the U.S. Air Force in Rome, N.Y., and in Sacramento, Calif. While working in California, Harry was called back by RCA headquarters, which asked him to go to Wisconsin to establish the McCoy Job Corps Center at Tomah. The University of Wisconsin was a subcontractor. So Harry left California for Wisconsin to work with a staff of 525 people. According to Harry, "This was a 24/7 job." After that Harry was assigned to the Washington, D.C., marketing office as manager for government services.

The Retirement Years

In 1971, Harry and his wife retired to Hendersonville, N.C. Though Harry's wife Peggy passed away in 1991, Harry still lives in Hendersonville with his son Richard. In 1974, Harry founded Chapter 76 (Blue Ridge Chapter) of the QCWA. Harry served as the first president of the chapter that year, and he also served as the 25th president. Harry continues to support the chapter, which meets monthly at Ryan's Steak House in Hendersonville. Harry has also been quite active over the years with the IRE/IEEE.

In the late Seventies and early Eighties, Harry and two other gentlemen — Arch Doty and John Frey — teamed to do some serious experimental antenna

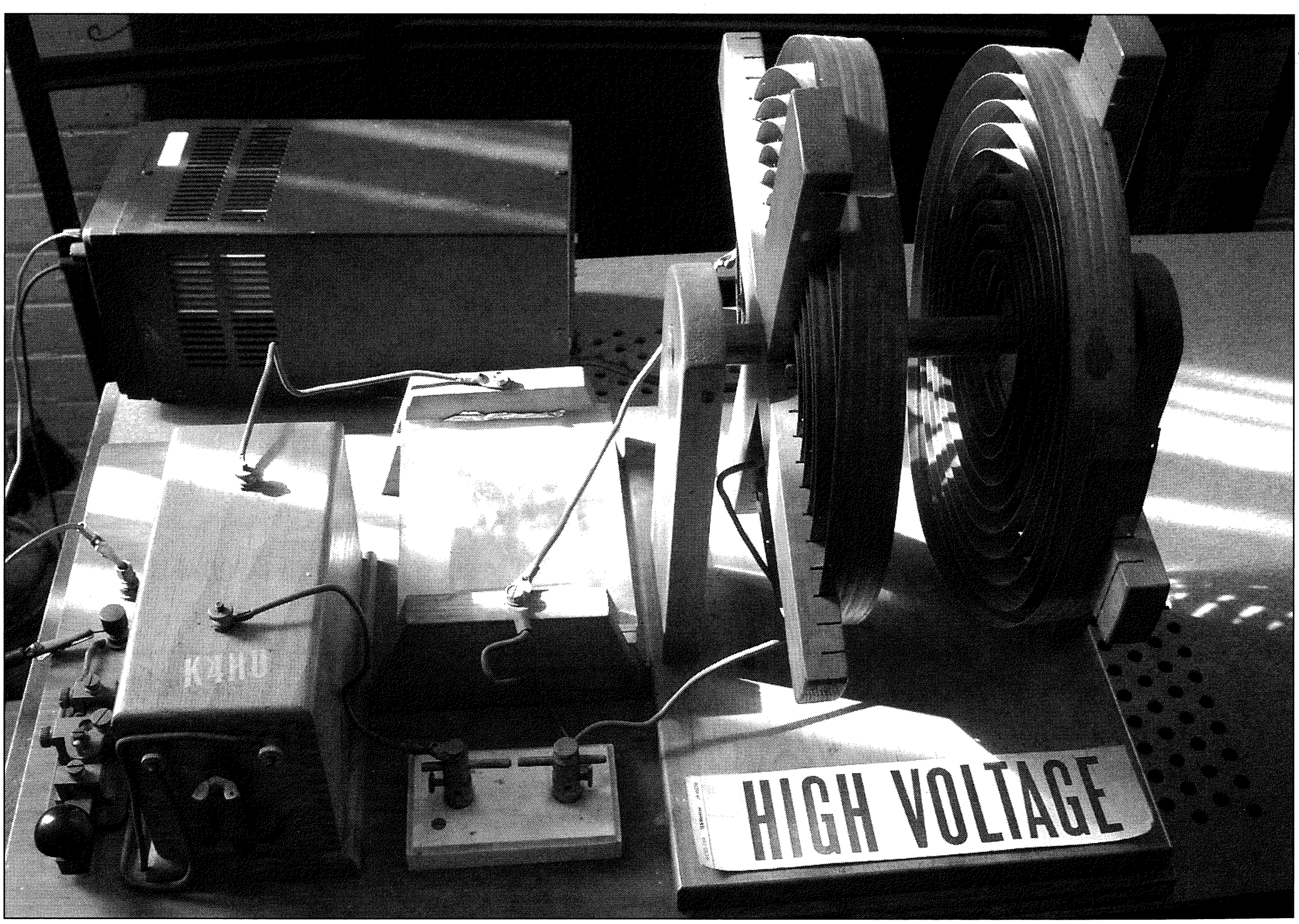


work. The object was to study the effects of ground radials on vertical antenna performance at 160 meters. The experiments were conducted on Arch Doty's property near Fletcher, N.C. The measurements were quite exhaustive, and part of the experimental program was published in QST in February 1983. These papers were also presented at the IEEE in Atlanta, and they also appeared in the Antenna Handbook.

So the crystal receiver project from the Boy Scout handbook is what sparked Harry's interest in wireless. Harry is still quite involved in radio, and he continues to help others understand, appreciate and enjoy this wonderful phenomenon. He has held nine U.S. call signs and the German call sign — 10 in all! His current call sign is K4HU.

A couple more notes of interest: Harry was interviewed on PBS and National Geographic radio and TV shows as the last living person who heard 8XK radio before it became KDKA in 1920. Recently, Harry learned his antenna experiments paper was the basis for a thesis of a student at the Democritus University of Thrace in Xanthi, Greece.

Harry is still active on the ham radio bands as well as in repairing and restoring older radios. He can be heard twice weekly checking into the AM net on 3810 kHz as well as the Chapter 76 QCWA SSB net on Saturday mornings on 3930 kHz-K4HU! Thanks, Harry, for many great years of service to the field of radio and for your mentoring to many.



This old spark gap transmitter is just one of Harry's treasured oldies. The schematic diagram appears in the drawing above.

Modernizing Airborne Communications

By Albert D. Helfrick, Ph.D., P.E.

Very early in the history of radio, the need for airborne communications was recognized as vital to the aviation industry. Long before two-way land mobile communication was common, nearly all commercial aircraft had two-way voice capability. Because of the limited technology at the time, two-way radio was being installed in aircraft; the only type of modulation that was seriously considered was amplitude modulation. Edwin Howard Armstrong was assigned the task of evaluating amplitude modulated radiotelephones while he was stationed in Paris in 1918.

One of the disadvantages of being a pioneer is being "stuck" with old technology. The first to use two-way mobile radio had to use the technology available at the time. If any sort of national or international standardization is required, the process of standardization is so long and complex it is very difficult to make any changes.

AM Forever

Every student learns that amplitude modulation (AM — meaning a full carrier and redundant sidebands) represents an ineffective use of power and spectrum. It was used at the dawn of radio broadcasting because AM was easily generated using the saturated class C vacuum tube amplifiers of the day. Most early communications systems employed amplitude modulation up until the time in the early 1950s, when narrowband frequency modulation was used widely for land mobile communications.

Amplitude modulation is nearly gone. AM broadcasting continues and analog television still uses AM but the signal is vestigial sideband, which is not so bad. In mobile voice communications, no one uses amplitude modulation...well, almost no one. At the time of this writing, there are 720 busy channels of full-carrier, double sideband amplitude modulation for aviation use.

VHF aviation communications started with 70 channels every 200 kilohertz from 118 MHz to 132 MHz shortly after World War II. The extremely wide channel was not because the bandwidth was needed but the receivers were mechanically tuned and suffered from problems of dial accuracy and drift. The demand quickly outpaced the number of available channels, and the channels was doubled in 1958 be reducing the channel to 100 kHz. In 1959, an additional 40 channels were created by adding an additional four megahertz at the top of the band extending the band to 136 MHz, bringing the number of channels to 180. In 1964, this was increased to 360 by reducing the channels to 50-kilohertz channels. In 1974, the number of channels was doubled again to 720 by reducing the channels to 25 kilohertz. Finally, in 1979, another 40 channels were added by extending the top of the band another MHz.

In spite of 760 channels spanning 19 megahertz, these channels were becoming crowded in certain parts of the world, particularly Europe. Something had to be done, and the most obvious was to split the channels again. However, the problem was more than just a problem of capacity. The AM-based communications system in use worldwide for aeronautical mobile was antiquated. The FAA and other government agencies reviewed the entire concept of voice communications. In the digital information age, communicating by voice for critical data just does not make sense.

In the United States, there was a strong desire to introduce a digital communications system with voice capability. In Europe, where the congestion problem was acute, something had to be done soon. As a stopgap measure, the VHF communications band was divided, again, but this time by a factor of three to 8.333-kilohertz channels, for a total of 2,280 voice channels. This latest division by three is only a temporary measure, and the 25-kilohertz channels remain with two added "sub-channels." The future for airborne mobile communications is digital data and voice on the existing 25-kilohertz channels.

Air Traffic Control

The concept of air traffic control is undergoing significant changes, beginning with the basic concept of air traffic control. When the first two-way radio was installed on aircraft, the purpose was to facilitate the control of aircraft. Rather than fly direct routes from

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If all aircraft were to fly a direct course from departure to destination, and each selected an altitude, which provided the smoothest ride or the best tailwind, aircraft would be spread out in the domestic airspace. There are tens of millions of cubic kilometers of airspace, and only tens of thousands of aircraft flying at one time. The airways concept takes aircraft that would be reasonably well-separated and funnels them in to narrow corridors. To prevent collisions, each aircraft's space in the airways system is assigned by a controller.

In mobile voice communications, no one uses amplitude modulation... well, almost no one. At the time of this writing, there are 720 busy channels of full-carrier, double sideband amplitude modulation for aviation use.

Air traffic control data, such as assigned altitudes, headings and reporting points, are handled by voice communications. This is a particular problem because of the international nature of air travel. English is the required language for air traffic control worldwide but the English language competency of some pilots and controllers is mediocre at best. This implies the system takes aircraft that would be well-spread out, funnels them into a narrow corridor and then controls the traffic with inefficient and error-prone voice communications.

In the decade of the 1990s, the complete concept of air traffic control was reconsidered. An air traffic system called "Free Flight" was developed, based on the concept that every aircraft fly its own desired route, which does not necessary involve an airway. Each aircraft transmits its current position, velocity and intent to nearby aircraft and ground stations. A computer system on the ground monitors all aircraft to help ensure no two aircraft in the future intend to occupy the same airspace. If a "conflict" is predicted by software called a "conflict probe," an air traffic controller (now called an air traffic "manager") contacts the aircraft involved in the conflict and affects a change. These conflicts are not for collision avoidance, which are handled by another system, but more distant conflicts that can affect the smooth flow of air traffic.

In order for this system to be effective, a capable data link from aircraft to ground is required. Furthermore, an effective computer system on the ground is needed to fuse the data from all the aircraft in the National Airspace System (NAS) to help ensure there are no predicted conflicts. For this purpose, a computer network called the aeronautical telecommunications network (ATN) is being developed.

Another problem associated with the air traffic control system was weaknesses in the air traffic control radar system used to assure safe separation. A new sophisticated secondary radar transponder was introduced in the early 1980s to replace the very old "air traffic control radar beacon system (ATCRBS)," an outgrowth of the identification friend or foe (IFF) system developed during World War II. The ATCRBS system, when operating as a secondary radar system, can provide aircraft identity and altitude, mode-A and -C respectively. The data word from an ATCRBS transponder is only 12 bits and, thus, only 4,096 different words can be sent. This implies that, at most, only 4,096 different aircraft can be uniquely identified. The actual figure is considerably less than 4,096 because many codes are generic and cannot be assigned to a specific aircraft. This requires each aircraft to be assigned a temporary identity called a "squawk," to be used while in the range of particular radar. Once the aircraft left the coverage of that radar, the squawk can be reused.

A major advantage of the new transponder system is the ability of ground interrogators to selectively interrogate aircraft, this greatly reduces the congestion on the radar frequency. The system is called mode-S, where the S represents "selective." Furthermore, the data word for the mode-S system is 24 bits, which is sufficient in that every aircraft in the world could have a unique identity or mode-S address.

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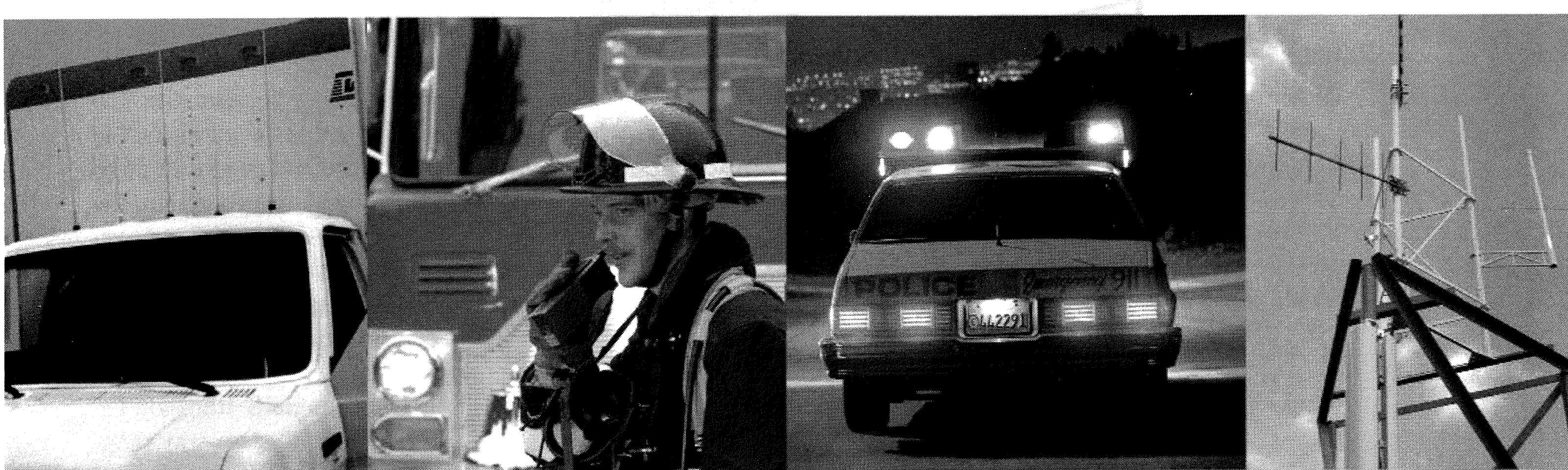

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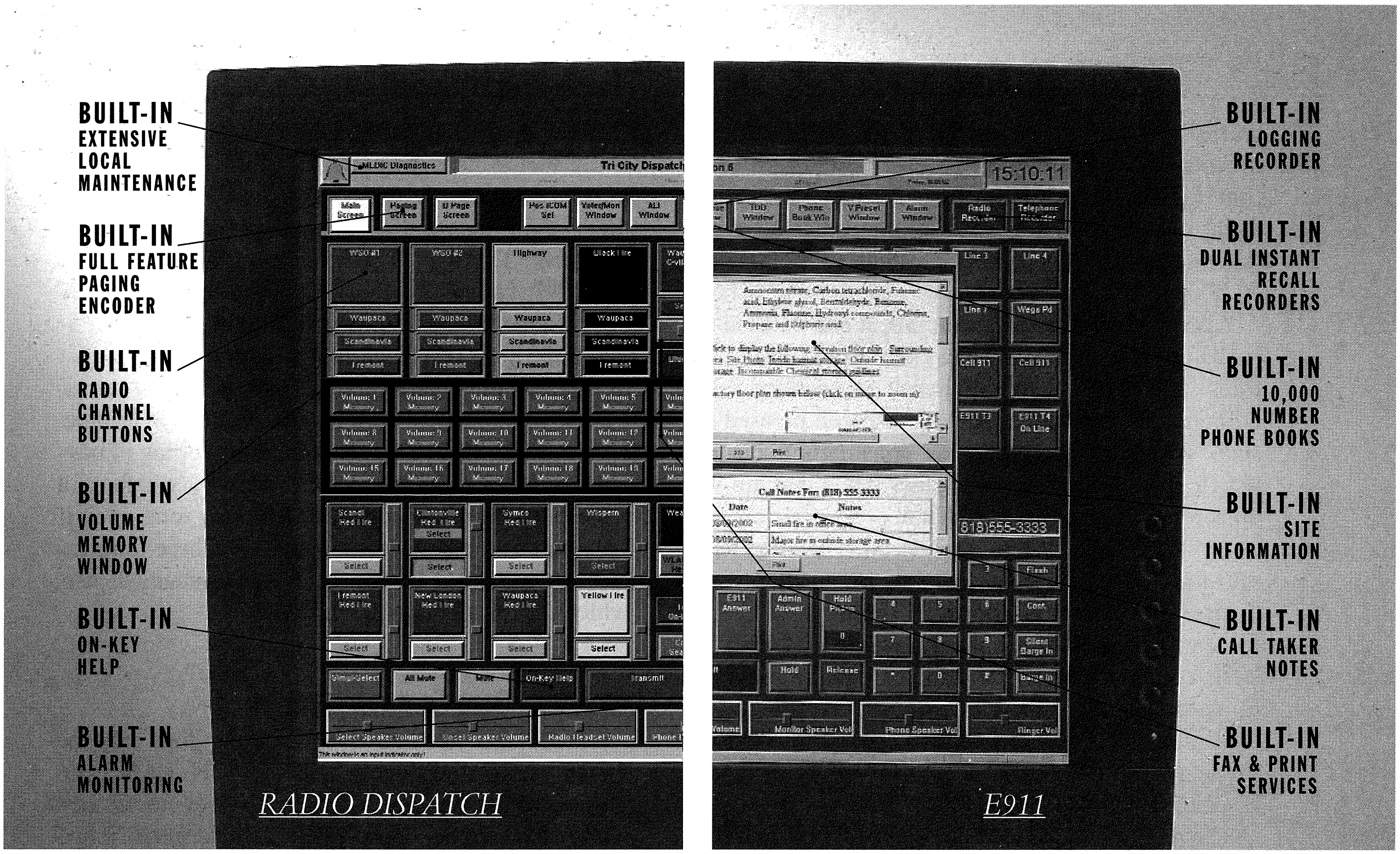
Preventing Collisions Through Communications

Midair collision avoidance using electronic means has been considered for more than 50 years. Although mid-air collisions are rare, when they do occur, they are catastrophic, resulting in casualties both in the air and on the ground. Because nearly all aircraft are being controlled by air traffic control, and the position of aircraft is determined by radar, safe separation is usually handled by air traffic controllers. However, there are many locations in the world where aircraft are not visible by an air traffic control radar, such as on transoceanic and north polar routes. A system was developed beginning in the mid-1970s — the traffic and collision avoidance system (TCAS, pronounced tee-kass) — that interrogated airborne radar transponders and determined range. Certain data can be exchanged between nearby aircraft using the new mode-S transponder. The system is a two-way ranging system that requires a TCAS unit and a mode-S transponder; it tends to be rather expensive and, therefore, is used mostly on air transport aircraft and large freighters.

Nearly every aircraft today has a global positioning system (GPS) receiver. The low price of GPS has made the system one of the best bargains in aviation electronics, and it is responsible for its widespread use. If a low-powered transmitter were provided on every aircraft that simply transmitted its latitude, longitude and altitude, as determined by GPS, nearby aircraft could receive these data and determine the proximity of other aircraft by using simple geometry algorithms. Because the position of aircraft within only 10 or 20 nautical miles (1 nautical mile =1,852 meters) are of any concern, a low-powered transmitter is required. This system is called automatic dependent surveillance, broadcast or ADS-B.

ADS-B is a communications system. Unlike TCAS where two-way ranging, communications and accurate timing are required, the ADS-B system is simple. ADS-B only needs to broadcast "own air-



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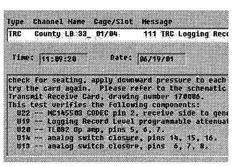

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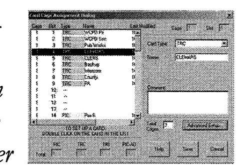

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MODULAR COMMUNICATION SYSTEMS, INC. 13309 SATICOY ST. NORTH HOLLYWOOD, CA 91605. E-MAIL: moducom@1x.netcom.com craft's" position every second or so, and to receive broadcasts from nearby "proximate" aircraft. In addition to current position, ADS-B transmits intent, flight plan information, identity and other information that can be used prevent conflicts either immediately or long-term.

ADS-B is not limited to aircraft; it can be used on such airport surface vehicles as snowplows and crash trucks. Collisions between aircraft and surface vehicles are not uncommon. ADS-B also can be used on such stationary equipment as construction cranes, new high-rise buildings and other items that are not on aeronautical charts or databases.

Any new radio system, such as ADS-B, requires a set of radio frequencies, as anyone involved in communications knows all too well. The obvious choice for a set of world-wide channels would be the use of VHF communications frequencies already assigned to aeronautical mobile. However, as previously explained, there exists serious congestion on these frequencies. One potential channel is the data link associated with the mode-S transponder.

The mode-S transponder is equipped with data-link capability, which means a number of data fields can be either requested by an interrogation or they can be broadcast spontaneously. All mode-S transmissions use a cyclic redundancy check (CRC) that helps ensure high data integrity, suitable for flight critical information. Although the data rate is 4 Mbps, mode-S transponders transmit only 56 or 112 data bits per transmission. Fortunately, ADS-B uses short messages, and the mode-S data link represents an existing communications channel ready for use by ADS-B.

The mode-S address is an important part of the future ADS-B system. Currently, only aircraft equipped with mode-S transponders would make use of the unique mode-S address but there is a unique mode-S address reserved for every registration number in the United States.

The mode-S transponder shares the 1,030 MHz uplink and the 1,090 MHz downlink frequency pair from World War II with all other ATCRBS and mode-S transponders and TCAS airborne interrogators. It is expected as more aircraft use TCAS, which still is required by federal aviation regulations (FARs), congestion eventually will become a problem.

Another source of radio spectrum for use with ADS-B is navigation frequencies abandoned in favor of more modern navigation methods. The Federal Radio Navigation Plan (RNP) predicts the obsolescence of several navigation aids, including VHF Omnirange (VOR), tactical air navigation (TACAN) and distance measuring (DME). If the RNP is implemented as currently written (this is a big "if"), hundreds of megahertz should become available for reassignment. The big "if"is because earlier editions of the RNP called for the obsolescence of virtually every terrestrial radio navigation aid in favor of GPS-based navigation. The danger of such a plan was recognized and the dates of decommissioning of terrestrial navigation aids were extended or are indefinite. However, the RNP calls for decommissioning of navigation aids, including DME/TACAN, which will free up hundreds of megahertz for other uses, even if only part of the RNP is implemented. These frequencies are allocated by the ITU for aeronautical use, which makes them quite attractive.

Airborne Data Communications

In addition to ADS-B data, other data may be linked to the flight deck from the ATN, such as en route and destination weather, notices to airmen (NOTAMs), pilot reports (PIREPS), terminal information service (TIS) and for the delivery of instrument clearances. The data link under development for free flight is a TDMA system, which will occupy the existing 25-kilohertz channels. This system is called the VHF data link (VDL) is capable of handling data, voice and a combination of both. The basic modulation scheme is eight-level DPSK modulation.

The system is configured to operate in four modes to cover the broad range of airborne communications requirements. Mode 1 is Gaussian minimum shift, MSK-AM carrier sense multiple access (CSMA). This mode helps ensure continuation the aircraft communications and reporting system (ACARS), an existing data service operating at 2,400 bits per second. Eventually, this slow, inefficient system will be replaced with another VDL mode but until that time, the older format must be supported. Similarly, most VDL transceivers will have DSB AM capability, and such transceivers are designated VHF data radio (VDR).

Time division multiple access (TDMA), with eight-level DPSK is used for modes 2, 3 and 4. The ATN is based on the ISO seven-layer model, and the VDL is the physical layer. The basic bit rate for mode 2 and 3 is 31.5 Kbps, which permits 10.5K symbols per second. Mode 2 of the VDL is a data-only mode, and it is a subnetwork of the ATN using a reservations based system to provide contention-free data service. Mode 3

supports a mix of voice and data using TDMA.

Mode 3 supports simultaneous digitized voice and data. Modulation is 31.5 Kbps D8PSK; channel access is TDMA. The system can support as many as four voice users, which represents a four-fold improvement over DSB-AM using the 25-kilohertz channel, and it is a 4/3 improvement compared with 8.333-kilohertz subchannels. Most importantly, both data and voice can share the same RF spectrum.

Mode 4 is a data only mode using frequency modulated Gaussian minimum shift keying. Channel access is through self-organizing TDMA or STDMA with a 19.2 Kbps data rate. Mode 4 will be used for ADS-B and other flight-related data.

The amount of data required by the ADS-B system is quite small. Although there would be a large number of users, the geographical range is limited and the messages are short; other data-link applications require considerably more data throughput. A communications system called the Universal Access Transceiver (UAT) has been proposed and is currently undergoing testing. This communications system will occupy a one-megahertz channel, and it will use GMSK at a data rate of 1 Mbps. This system is more than adequate for ADS-B, and it most likely will find applications for much higher data rates, such as uploading graphics to the flight deck.

Satellite Communications for Aircraft

The use of satellite communications links for aircraft has been a subject of experimentation for a number of years. There are two basic choices of satellite communications: low earth orbiting (LEO) and geostationary (GEO). The cost of launching a satellite, particularly a GEO, is extremely high, and the amount of traffic required for transoceanic or polar routes would not support a dedicated GEO satellite. Thus, GEO satellite communications will use a transponder on existing satellites. Fortunately, there are satellites for the purpose of oceanic route communications for marine interests, including the International Maritime Satellite (INMARSAT).

For the case of GEO satellites earth stations have fixed antennas, because the satellite remains stationary. From a moving platform, such as an aircraft, the antenna must be constantly aimed as the aircraft maneuvers. This results in a rather large radome on the upper surface of the aircraft, and it is usually installed only on larger aircraft. GEO satellites only provide earth coverage up to about 70 degrees of latitude, which is fine for ships at sea but inadequate for aircraft. In spite of this limitation, many aircraft are equipped with high-speed data communications for Internet access for passengers on those phases of flight that are below 70 degrees latitude.

Satellite communications for air traffic management to replace the current HF SSB system most likely will occur, using a mixture of LEO and GEO satellites. At this point, improved navigation with GPS and the use of TCAS for safe separation for polar and transoceanic routes is serving the aviation community reasonably well.

One area where satellite communications will play an important role is in search and rescue. The search and rescue satellite — SARSAT/COSPAS — was the result of a consortium consisting of Canada, France, the former Soviet Union and the United States; COSPAS is the Russian equivalent of SARSAT. SARSATs receive signals from "emergency portable individual rescue beacons" (EPIRB, pronounced "e-purb").

Modern EPIRBS replace the simple amplitude modulated, sweeping-tone beacons that have served for more than 40 years with digital designs that operate in conjunction with GPS. When an aircraft is down the EPIRB broadcasts precise position on a carrier frequency of 406.025 MHz, which may be received by a number of satellites equipped with SARSAT receivers. SARSAT does not require dedicated satellites but it is installed on other satellites. EPIRBS are not only for aircraft; ships, land vehicles and even such individuals as skiers may use them.

When Does It All Happen?

Like any system that requires global standardization, these upgrades in aviation communications will take some time. At this time, most of the standards are in place, and the next tasks include working out final details and phasing in the new systems. One of the biggest concerns is the phase-in periods where the old and new systems must coexist. VDL transceivers are in production and available for new and retrofit installations. ADS-B has been successfully demonstrated, and it is ready to implement with the mode-S data link. In the estimation of this author, the aviation communications system will be fully upgraded before we are all watching high-definition television (HDTV).

Dr. Helfrick is a professor at Embry-Riddle Aeronautical University in Daytona Beach, Fla.

In Retrospect: Dr. DeForest's Pioneer Broadcasting

By Maurice Zouary, Life Member, Radio Club of America

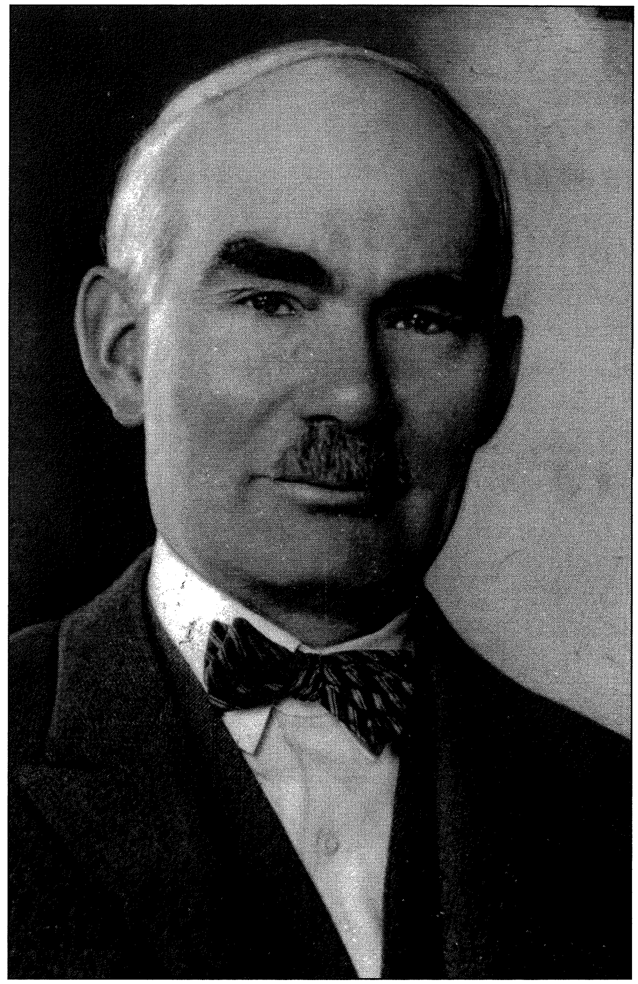
It is a mistake, it seems, to suppose that broadcasting is an altogether new phenomenon. It is quite true that broadcasting could never have attained anything like its present proportions until the potentialities of the electron tube as an oscillating transmitter and an amplifying receiver on the other were developed. Yet broadcasting of a kind was accomplished and a limited audience reached in the early day of the electron tube, notably in the hands of Dr. Lee DeForest, the inventor of the tube itself.

In the Radio Review of the New York Evening Mail, Dr. DeForest gives an interesting account of these pioneer experiments in broadcasting. After saying that the free distribution by radiophone of good music, amusement and instruction is the realization of his pet dream, he continues:

"For years, I have been advocating, preaching and practicing (when opportunity offered) this, the greatest possibility of the radiophone. The first broadcasting of music (other than phonograph) occurred in the spring 0f 1909 on top of the Metropolitan Opera House, where I erected a temporary radiotelephone transmitter connected with two microphones placed among the footlights of the stage.

The first opera singer whose voice was thus broadcast was Caruso, singing the role of Turiddu in 'Cavalleria Rusticana.' For his opening number, the 'Siciliana' was sung behind the curtains, the microphone was placed on a table beside which the great tenor stood and sang. This first radio opera was picked up by various ships in the harbor of New York, for that temporary antenna on the opera house roof was only a small affair, and broadcasting was limited in radius. Later, I had Madame Mazarini, of Hammerstein's Manhattan Opera Company, sing into the microphone of the radiophone in my old laboratory, 103 Park Avenue. Her selections were the 'Haberana' from 'Carmen,' and other songs.

There was no radiophone broadcasting from 1910 to 1916, except in California. In the early summer of 1916, the DeForest Company gave a regular nightly radio concert service from its tower at Highbridge in New York City. This music was frequently heard as far as Buffalo, N.Y., and Toronto, Ontario. The first 'radio dance' was then instituted. On a special occasion, jazz music was played at Highbridge, and the music was used for dancing by a large house party near Elizabeth, N.J.



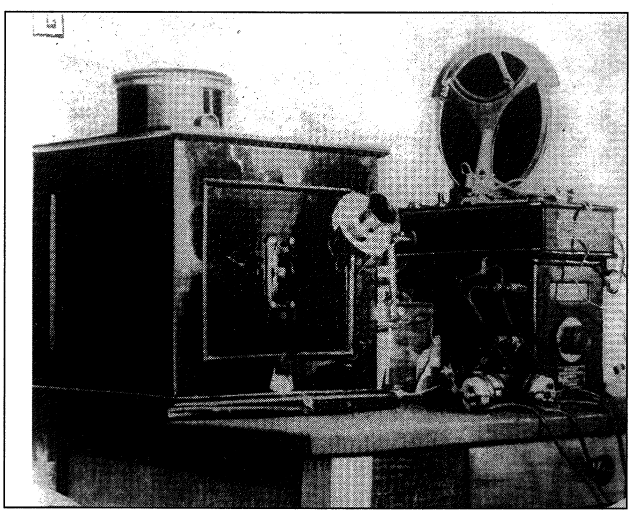
Dr. Lee DeForest

The election returns of November 1916 were broadcast to a large number of listeners throughout all the sections surrounding New York. I remember well how at midnight the listeners were bade good night with the pleasing announcement that Hughes had been elected. The Wilsonian majorities came in a day late.

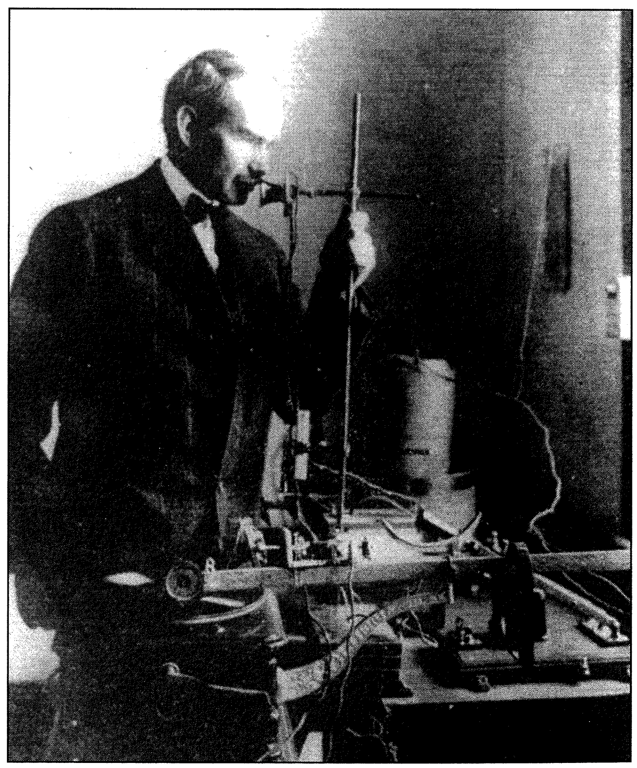
The approach of the war clouds compelled the

DeForest seated at Radiotelephone – 1912.

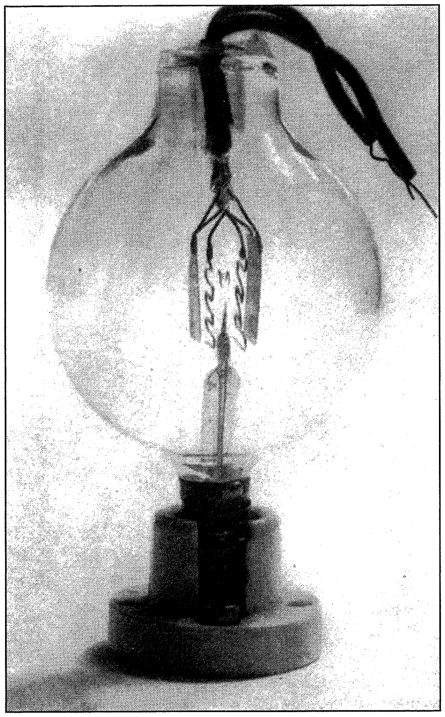
government to shut down the first regular broadcasting station shortly thereafter and when, in May 1919, the ban on amateur instruments was finally lifted, the radio inspector at New York announced that no radiophone broadcasting would be again permitted. Finally, the other interests caught the idea and, during the last few months, the ether has been filled with music, amusement and words of wisdom. This is, to me, especially gratifying for, since 1919, I had sought by letters and personal interviews with newspaper managers and owners to awaken a realization of what it would mean to all America - this new invention of intimate approach to practically every household in



The first radiotelephone transmitter and receiver (1907), using Audions in the receiver and a carbon-arc generator in the transmitter. The use of the Audion tube as a generator of radio waves did not come until later.



Radiobroadcasting began in 1907 with the voice-and-recorded-music programs which Lee DeForest put on the air from his Parker Building laboratory in New York City.

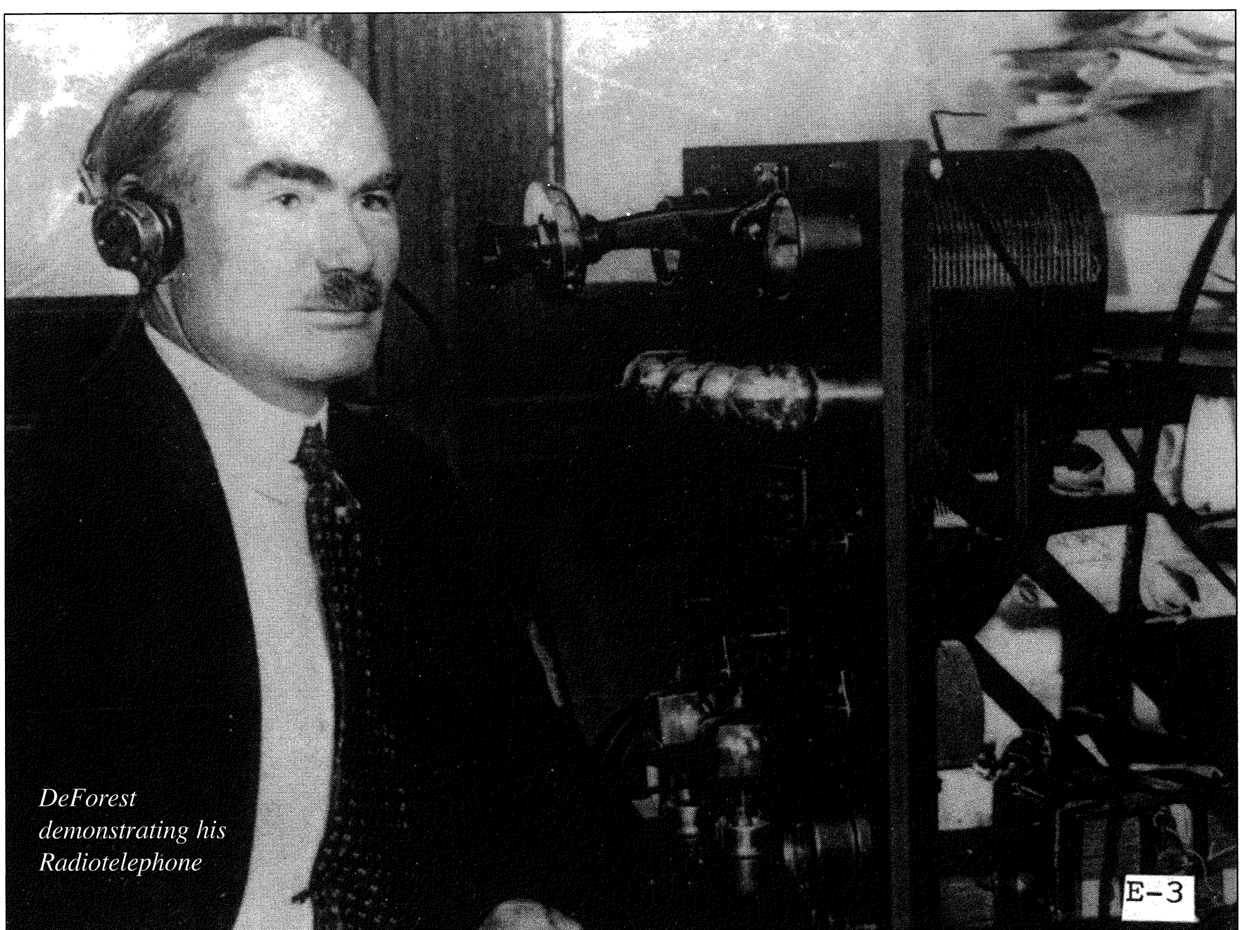


Another early type of Audion tube. The doubled plates and grids are plainly visible.

the nation, near and far, in towns, villages and, especially, isolated farms.

But even now, the real big opportunity of radio broadcasting, the phase most worthwhile to the nation, is hardly realized. It is not the idle pleasure of phonograph or jazz orchestra nor the capability of political haranguing for votes in the land on the eve of an election. It is, rather, the day and the night in educational facilities which are thus rendered available to the millions of people who cannot otherwise obtain it. Good music; entertaining talks on science by masters in this branch; household hints; instruction to farmers, which is so often poorly given, as needed in many sections, notably the South; the acquaintance of the youths, whether or not attending rural schools, with the best in literature, history and economic themes.

Invest such homes with good, clean amusement and we will find that in this, its own unapproachable filed, the radiophone will become one of the greatest factors for the education, the betterment, the uplift and the unification of the American people and, later, of all peoples in the history of our civilization."



DeForest demonstrating his Radiotelephone

E-3


Radio Club of America
and

Post 9/11: Improving Communications

FDNY Deputy Chief Vincent Dunn (Ret.) Keynotes the 2002 Radio Club Banquet

My talk tonight will center on how important a role communications played on 9/11. What priorities should the telecommunications industry be working on to aid in future catastrophes?

The answer to question number one is communications played a major life and death role at the World Trade Center (WTC) terrorist attack. But before we go any further let me say this:

- Radios and communication problems are often the fall guy at fire and emergency operations.
- Communication transmission and inoperable radios are favorite whipping boys.
- Communications is the most common fire ground problem.
- It is easy to blame everything that goes wrong at a fire on radios
- Communication problems have been part of every one of my lessons learned in post fire investigations over my 40-year career in the fire service.

FDNY Deputy Chief Vincent Dunn (Ret.) believes the most important fix New York City can implement post 9/11 is to install more antennas on high-rise buildings.

Radio Communications in the FDNY

The FDNY used a telegraph signal system to communicate while at fires from 1865 to 1965. For example: Box 364 would be tapped out on the telegraph key from the dispatcher to the firehouse as follows: tap-tap-tap space tap-tap-tap-tap-tap-tap-space tap-tap-tap-tap. A second alarm for box 364 would have two taps in front; and third alarm would have three taps in front of the 364. Engine companies were identified by five taps / ladder companies by seven taps / and chiefs by four taps. The telegraph communications were used as a backup system even after we had a radio and telephone system.

The first radio communication in the New York City Fire Department was heard in 1913. It was a ship-to-shore message to a fireboat. There was a base station in a Manhattan central office on 67th St. and one mobile station radio on a fireboat. The fireboat captain was directed to return the boat to its berth from a false alarm response up the Hudson River to box 936.

In 1952, all the fire trucks had mobile radios installed to receive and transmit voice messages. This new radio system on fire apparatus allowed fire companies to leave the firehouse and be dispatched to fires by the radio. Fire companies now could perform fire prevention inspections throughout the city and still be able to respond to fires. To this day, the FDNY is the only inspection agency in the City of New York. The fire department inspects every building in the city on a regular basis. No other city agency does this. Even the buildings department only inspects a building if there is a violation reported to them. Mayor Rudolph Giuliani, during his administration, recommended the Fire Department take over the Building Department,

In the 1960s, fire officers and firefighters were issued "handie-talkies" or so-called portable radios. We no longer relied on hand signals, shouting and runners to communicate at fires. These analog radios operated on a VHF channel.

In 2001, the FDNY purchased new digital portable radios for firefighters. These digital radios operated on the UHF channel. Soon after they were issued, there appeared to be a delay in signal transmission and a voice-quality problem with these new digital radios. They have been temporarily withdrawn from service until the problems are solved. The older analog portable radios are in use today by the firefighters. They were in use at the WTC collapse.

The new UHF digital radios have been reprogrammed in the analog mode in an attempt to remove the communication delay and to improve the voice quality. They now are being field tested by fire companies in Staten Island. Studies are being conducted to improve their use in high-rise buildings.

Back to the role communications played on September 11, 2001 at the WTC terrorist attack. There were eight major life-and-death communication events at the WTC on 9/11. Let's call them "communications events " instead of mistakes or problems. These communications events cost lives. The eight major life-and-death communications events were:

- Communication event #1: After the first plane struck the north World Trade Center tower, a fire-safety director instructed occupants of the south tower to return to their offices and not exit the building onto the plaza.
- Communication event #2: The fire department and the police department did not use the unified incident management system to communicate with each other.
- Communication event #3: Some occupants of the towers fleeing the fire went up the stairs. They attempted to go up to the roof and wait for helicopter rescues.
- Communication event #4: The fire chief in the north tower could not communicate with firefighters on the upper floors.
- Communication event #5: The fire chief in the south tower was able to communicate to the firefighters on the upper floors.
- Communication event #6: The fire officers at the command post could not transmit radio messages to communication headquarters, announcing the collapse of the south tower. Only a responding fireboat commander, who saw what had happened from the water, was able to tell him the south tower had collapsed.
- Communication event #7: Some firefighters in the north tower did not know the south tower had collapsed, so they continued to search for victims.
- Communication event #8: The police helicopter pilot could not communicate to the fire chief that the south tower was about to collapse.

The following are some brief comments on the above life and death communication events:

The fire safety director who told the occupants to return to their offices made a correct decision, based on the information he had at the time. Now we know his instructions cost lives. However, after the plane hit the north tower, the people in the south tower were safer if they stayed in the building. If the occupants had been allowed to leave and go out onto the plaza, they would have been struck with falling people, plane parts, glass and sections of the building façade.

As a fire chief, I would have given the same instructions. I would not have ordered the evacuation of the south tower. No one could predict the second plane would crash into the south tower. In hindsight, the communication announcement to go back into the building cost lives.

Unified Incident Management System

The fire service of America and the New York City Fire Department use a so-called unified incident management system. The FDNY has used this management system for 10 years. The unified incident management system is designed to organize and manage emergency operations. It also improves interagency communications, coordination and cooperation at fires. The system is designed for use at small- and large-scale fires and emergencies.

The unified incident management system is modeled after a typical business organization. At a fire or emergency, we have a CEO; a fire, police or EMS commander; an operation officer; a planning officer; a logistics officer; and a finance officer. The staff of the incident commander includes a safety officer, a public information officer and a liaison officer. The liaison officer would interact with other operating agencies, such as the police, fire or EMS.

The New York City Fire Department has several fire officers who go around the nation teaching other fire departments how to use this unified incident management system. The New York City Fire Department has the knowledge, the classroom facilities and the instructors who could teach this system to every agency in New York City. Several years ago, Gov. George Pataki signed an executive order requiring every emergency agency in New York State to use the unified incident management system. Unfortunately, the police commissioner and the fire commissioner have stated publicly, at a city council hearing, they would rather not use the unified incident management system.

Rooftop Mistake

Some people at the WTC went up the stairs to the roof to await rescue by helicopters instead of going down the stairs to the street. How did this miscommunication get into the minds of New Yorkers living and working in high-rise buildings? How did the fire service fail to communicate the life saving message to people living and working in high-rise buildings? You should never go upstairs during a fire. To escape a fire, you should exit down the stairs, not up.

People living and working in high-rise buildings should know going upstairs to the roof is not always possible. For example, not every stair extends up to the roof in a high-rise building. Some stairs dead-end at intermediate floors below the roof. Other stairs in high-rise office building lead up into mechanical machinery rooms, and not to the roof.

Also, people should know helicopters couldn't land on the roofs of most NYC high-rise buildings. Hundreds of people can go down a stairway in the same time it takes for one or two people to be rescued by a helicopter. The fire service should communicate to the people working and living in high-rise buildings never to go to the roof during a fire - always go down the stairs. Get below the fire. Flame and heat rises upward. Safety is below.

Perhaps there should be another warning sign in high-rise buildings, next to the sign that says, "Do not use this elevator in case of fire." We may need another sign to say, "Do not go to the roof in case of fire." This mistake already killed several people in the 1998 high-rise residential building fire that occurred in [actor] McCauley Culkin's apartment. People died in the smoke-filled stair attempting to get to the roof.

I believe the misconception of going up to the roof and waiting for helicopter rescue comes from watching helicopter rescues at famous high-rise fires around the world, shown on programs like the History Channel over and over again. These dramatic scenes of people dangling from cables during high-rise fires have given us the false idea that this is how we should leave a building during a high-rise fire. You never see, in the television program, the hundreds of people saved by descending a stairway. The fire service must do a better job of communicating to the public how to escape a high-rise fire. Always go down the stairs.

Lack of Communication

The fire chief was not able to communicate to some firefighters working on the upper floors of the north tower. The fire chief in command of the north tower, Joseph Callan, ordered all firefighters to leave the building at 0928 hours. His message was not heard by firefighters on the upper floors. This order to withdraw from the building was given 32 minutes after he arrived; 34 minutes before, the first tower — the south tower — collapsed.

The north tower collapsed at 10:28 one hour after Chief Callan called for all firefighters to leave. Unfortunately, the radios in the north tower did not transmit his message. When I spoke to him, I asked what he said over the inoperable radio. At 0928 hours, he ordered, "Everyone come down out of the building" and "Leave the building immediately."

I asked him what made him decide to order firefighters out of building. He stated the following reasons:

- The number of falling bodies crashing to the ground was dramatically increasing.
- There were no elevators working in this tower.
- Communications were growing weaker and weaker. They went from being bad to worse. Some firefighters heard his message but most did not.
- People coming out of the stairs to the lobby were far and few between. It went from a double file of office workers coming down the stairs into the lobby to person by person 20 feet apart. He also knew he now had more firefighters in the upper floors of the north building than office workers.
- Responding to the fire before entering the lobby, he had a good look at the plane crash damage and the extent of the fire on the upper floors. He knew the building could collapse.
- He also knew it takes time for a firefighter to walk down 40 or 50 stories. The portable radios in the north tower did not work even though there

was an antenna installed to enhance fire radio transmissions. Radios do not work in high-rise buildings because of the massive amount of steel and concrete in the structure.

There are approximately 850,000 buildings in NYC; they are mostly what we call low-rise buildings. We believe as many as 5,000 of the 850,000 are high-rise buildings. A high-rise building is any building over 75 feet high, and 75 feet is the height of our average aerial ladder. If the building is above the reach of our ladders, it is classified a high rise. The fire radios transmit messages okay in 845,000 buildings, the low-rise buildings.

Radios cannot transmit messages in the 5,000 high-rise buildings. Even today, in high-rise buildings, firefighters have to improvise communications. Fire officers must use a radio relay system positioning firefighters on intermediate floors, a wire system unraveled down a stairway or a high-rise repeater radio, which has proved unreliable. Sometimes we even have to use the lobby telephone. When there are no communication to the upper floors, the chief at the command post gives the telephone number used by building personnel at the lobby desk, to a fire officer going up to the fire. The chief tells him, "call us on the lobby telephone."

None of these communications improvisations are acceptable. Even before the 1993 WTC bombing, field command chiefs notified headquarters the radios did not work at high-rise fires. The initial response from headquarters was the cost of improvements was prohibitive. You must improvise the best you can, with what you have. During 1993 bombing, fire headquarters chiefs found out there were no radio communications possible in the high rise WTC building. After the 1993 bombing, the fire department began to address the radio problem. In the WTC, only, an antenna to enhance the fire radios was installed. They also purchased more powerful digital portable radios for issue to the fire companies. The members are questioning both of these efforts today.

South Tower Antenna

On 9/11 the chief in the south WTC tower was able to communicate to fire officers up to the 78th floor. The south tower had an antenna installed in the building to enhance fire department radios, and it worked. The north tower had an antenna installed also but it did not work. The command chief who directed operations in the south tower where the radios worked was a commander at the 1993 WTC bombing.

No one knows why the communications failed in the north tower. I wonder if the communications in the south tower would have transmitted effectively up further, beyond the 78th floor or up to the 110th floor? I would like to know the answer to these questions because I believe the solution to improving fire communications in high-rise buildings lies in installing antennas in buildings.

> ***Even before the 1993 WTC bombing, field command chiefs notified headquarters the radios did not work at high-rise fires. The initial response from headquarters was the cost of improvements was prohibitive.***

Back-Up Frequency

There were no communications from the fire command post after the south tower collapsed. The command post and the communication vehicle were destroyed by the first collapse. Only a fireboat commander responding in the harbor was able to see what happened. The fireboat officer told the Manhattan dispatcher over a citywide radio frequency that the WTC building collapsed. The fireboats operate on a different frequency than the Manhattan frequency. This citywide radio frequency is a backup for use when one of the borough radio frequencies is out of service.

There are six radio frequencies used for New York City fire communications: the Manhattan frequency, the Bronx and Staten Island combined frequency, the Brooklyn frequency, a Queens' frequency, a citywide frequency and the firefighters' portable radio frequency. The citywide radio frequency provides an important backup emergency-system during a major disaster, anywhere in the five boroughs.

Blinded by Debris

Fire officers operating in the north tower did not know the south tower had collapsed. They did not know the other building collapsed because they were inside stairways searching for a few remaining office workers. The stairway enclosure walls were insulated inside the walls of the building's core envelope. Firefighters in the north tower were out of sight and sound of the falling south tower. They were conducting what we call a secondary search; this is a second, more thorough search, than the initial primary search. Even outside, until the dust and smoke cleared from lower Manhattan, some did not know exactly what happened. Everyone was blinded by dust and smoke for at least 10 minutes. Some thought a bomb exploded or another plane crashed into the streets.

Fire, Police Radio Incompatibility

The police helicopter pilot was not able to communicate with fire commanders. The pilot could see the south tower was leaning and looked like it was about to collapse. He tried to reach the fire commander using the police radio. The fire radios and the police radios are on a difference frequency, and there was no communication between the two agencies. Fire radios must have the ability to send messages to the police officers on the ground and in aircraft.

Identify the Priorities

The second question is: what are the priorities that the telecommunications industry should be working on to aid future catastrophes? This is an excellent question, because there are several communication issues. Which one is most important? What are the priorities? They are all important; however, some communication needs should be addressed first. I have mentioned four communication problems:

- Interconnectivity of fire radios with police helicopter radios
- Interconnectivity of fire radios with radios of police officers on the ground
- The transmission delay, with the newly purchased UHF digital radios
- The need of antennas in the 2,000-to-5,000 high-rise buildings to enhance firefighter portable radio transmissions. This is sometimes called the infrastructure solution or the use of repeaters in buildings or the use of radio enhancers in high-rise buildings.

Of the four communication problems, the one I believe is the most important and should get the highest priority is the need for antennas in high-rise buildings. To protect the lives of people living and working in high-rise buildings, we should install antennas in 2,000 to 5,000 high-rise buildings to enhance the fire department radio transmissions. This should be accomplished before we address the other communication needs. This improvement will save lives.

I also believe I know how the telecommunications industry could achieve this. I would like to see someone in the telecommunications industry go to the Empire State Building and install a test antenna inside the structure. Call the local fire company to the building lobby and let him try the fire radio. See if the antenna can make his radio transmit a message from the lobby to the top floor of the Empire State Building.

Then see if the firefighters radio can transmit a message from the lobby to the lowest cellar. If you can make a fire radio work in the Empire State Building, which is a massive steel and concrete high-rise structure, you can make any fire radio transmit messages inside any high-rise building in the United States of America.

Honors and Some History Presented at the 2002 Radio Club Meeting and Banquet

By Richard "Rich" J. Reichler

Many of the diverse members of The Radio Club of America and their guests gathered on a rainy Friday, November 22, 2002, at the New York Athletic Club in New York City for a couple of the Radio Club's most significant yearly events. A technical symposium took place in the afternoon followed by the large annual awards banquet.

In the afternoon, about 45 attendees took part in the first ever "RCA Roundtable and Historical Exhibition." Three pioneers of the radio industry brought in and discussed some historic equipment, photographs, and memorabilia from their personal collections, including President Emeritus Gaetano "Tom" Amoscato of AMTOL Radio Communications Systems, Director William "Bill" Endres of Tele-Measurements and President Emeritus Jerry Minter of Components Corp. Maxine Carter-Lome and Rich Reichler moderated the affair and facilitated interactions between the speakers and the audience. Upon the conclusion of the presentation phase, the entire group mingled around the things on display and enjoyed close-up views and more detailed conversations about the many interesting items.

*Director **Vivian Carr** takes the podium, introducing each of the Radio Club of America Fellows for 2002.*

*Standing in for the absent **Jim Campbell** (insert), **Tom Amoscato**, president emeritus (left), accepts the annual Fred M. Link Award from Radio Club Director **Jay Kitchen**.*

The evening saw a crowd of about 230 participants enjoy the 93rd Anniversary Dinner and Awards Presentation. Nicely kicked off by Director Jay Kitchen, president of the Personal Communications Industry Association, the gala banquet featured a meal, an interesting keynote speech, the announcement of some important Radio Club information, the presentation of several awards and some good fellowship.

Vincent Dunn, Deputy Chief (Ret.) of the New York City Fire Department, gave the keynote address, informing the audience about wireless communications challenges faced at the World Trade Center during the Sept. 11, 2001, tragedy. The results of the Club's election of officers and directors then were detailed along with the Club's scholarship program and grants.

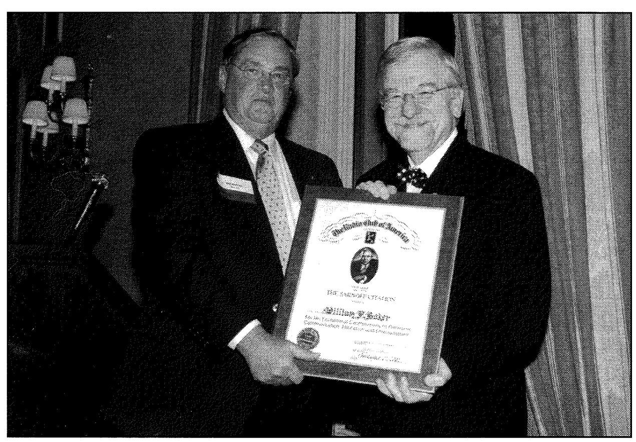
Next, it was time to present the major awards installed the newly elevated Fellows and listen to Alan F. Leffler's give the official Response for the Fellows.

*President **Steve Aldinger**, offers some opening remarks at the November banquet.*

***Bob Gunther** (left) grips and grins with **Kenneth Hoagland** (right), the 2002 recipient of the Frank A. Gunther Award for his major contributions to the advancement of military electronics communications systems.*

***FDNY Deputy Chief Vincent Dunn** (Ret.) accepts his commemorative plaque from President Emeritis **Mal Gurian** (right) after Dunn's inspirational and information keynote speech regarding two-way communications in the aftermath of 9/11.*

*Incoming President **Mercy Contreras** (left) presents **Karen J. Clark** (right) with the 2002 Special Services Award for "significant contributions to the support and advancement of the Radio Club of America."*



***Bill Endres** (left) congratulates **William Baker** (right) on his 2002 Sarnoff Citation, presented to him for his "exceptional contribution to electronic communication, education and entertainment."*

The 2002 Radio Club of America Fellows' Response

Presented by Alan F. Leffler

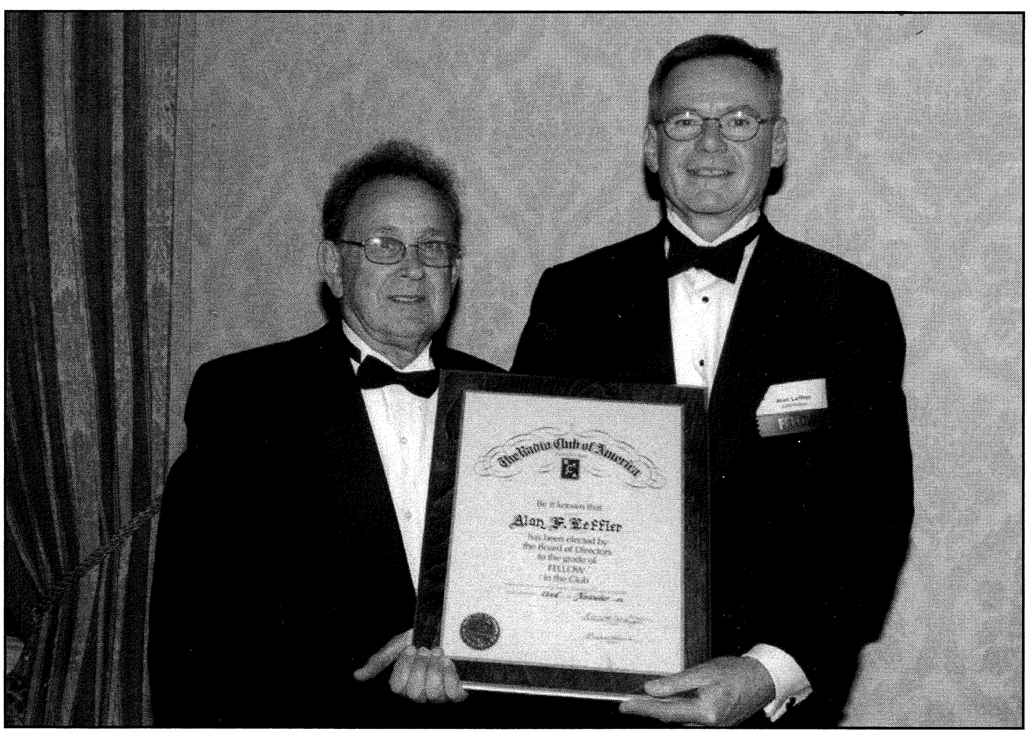
President Aldinger, directors, members, guests and Fellows. Giving me the podium to offer a "brief talk" as a salesman is a contradiction of terms, a real oxymoron! Don't worry; I'll be short! It is my privilege and a great honor to represent my fellow recipients in the esteemed Radio Club of America. Founded in 1909 and only years away from our centennial, the clubs tradition continues stronger than ever.

What are we really here for this evening? To sing our praises, provide a few strokes and send everyone on their way? Doubtful. We're here for a much bigger role in the grand scheme of life. I feel, and hopefully speak for the majority, that we're here to be a society of fellowship, goodwill, sharing insight and curiosity, growth and innovation. But never forget that we have an important role in shaping destinies. We must improve the safety and quality of life for humanity through RF "wireless;" that's the 60,000-ft. view.

As RCA members, we have an important mission. The events of 9/11 altered everything in our lives for U.S. society and even for the free world ...from basic freedom and security to innocence and even our pride. The thing terrorists didn't crush is our optimism. "While other nations often make fun of America's naïve optimism, deep down they envy that optimism" according to Thomas Friedman, an editorialist for the NY Times, who lives abroad. After all, we are the global center of earth that everything revolves around, the beacon of personal and economic freedom; regardless, such an encroachment on our shores was horrendous and unprecedented.

How does this shocking, unbelievable event affect us as an association? Radio or wireless communications, as we once again are called, were crucial and pivotal in the coordination and rescue at the World Trade Center disaster site and protecting the lives of so many people, among them our public safety police, fire and EMS. But, as Chief Vincent Dunn (Ret.) related, there are now important priorities and mandates for the telecommunications industry to be working on to avert future catastrophes.

We have a responsibility to work together to assure that important initia-



*President Emeritis **Mal Gurian** (left) presents **Alan F. Leffler** (right) with his Fellows plaque at the Radio Club of America annual dinner Nov. 22, 2002.*

tives, such as standards, interoperability and especially universal wireless in-building coverage are at the forefront of our thoughts and efforts. We must foster and direct action by our industry as their "Partner of Reason." Yes, we wield incredibly daunting powers if we act with our hearts, souls and intellect, and respond to these critical needs.

Never Give Up...

I want to digress a moment and speak about someone very inspirational.

Thomas A. Edison, my personal hero, understood the effect of perseverance on our lives, society and the world. He only had a third-grade education but his inventions and the commercialization of them made an incredible impact. When asked by a reporter about his apparent difficulty in developing a dry storage battery, his response was terse and to the point: "Sir, I have performed 25,000 experiments attempting to develop a dry storage battery. I know 25,000 ways NOT to design a battery...what do you know?" Talk about perseverance. Keep your resolve, fellows.

Your "take-away" from this brief talk is to be optimistic and don't give up. Persevere! If your resolve is strong for something you truly believe in, keep going and don't be discouraged. You will succeed. Don't forget your civic pride and responsibilities. We are all important; each with our specific talents, differing vantage points, insights, expertise, knowledge, creativity and capabilities.

Fortunately, we share the pride of being part of the most exciting and growing industry - wireless — one that ubiquitously impacts all personal lives and our world. We are making it possible for the generations that follow to embrace an "untethered society" where we can do essentially everything without being tied to a wired instrument for communications or information. We continue to ponder the implications.

I am pleased to represent the 2002 Fellow recipients: a diverse group from many walks of life: businessmen, professionals, doctors, educators, engineers, scientists, public servants and even sales/marketing people!

In closing, thanks again on behalf of the Fellows for recognizing us this evening. We will endeavor to maintain the high standards and traditions of the Radio Club of America. We may challenge and tweak some notions a bit to put our own mark on the club. For now, go and serve, mingle a bit first. This is your night, optimists!

The Radio Club of America Fellows, Class of 2002. Standing (left to right): Glen Nash, Robert Buus, Paul Shuch, Frank Weed, Jim Stratt, Paul Mills II, Lee Kaywork, Matthew Tyszka Jr. Seated (left to right): Charles Soulliard, Donald Appleby Jr., William Thornton, Verle Duvall, Alan Leffler. Not Pictured: Hadley Allhands, Lawrence Behr, Robert Moesch, Jack Quinn, Dennis Riise, Stephen E. Uhrig, Bart Whitehouse

2002 Radio Club of America Banquet Sponsors

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The Radio Club of America Scholarship Fund

By John E. Dettra, Jr., chairman, Radio Club Scholarship Committee

In 2001, the Long-Range Planning Committee made a report to the Board of Directors at the that included six recommendations for consideration for the Grants-in-Aid Committee; each was approved. During 2002, the Grants-in-Aid Committee met several times and assigned each of the six members one of the recommendations to study.

One of the requests was that the Committee name be changed to "The Radio Club Scholarship Committee." The Board approved the name change as well as renaming the fund "The Radio Club Scholarship Fund," defining the purpose of the fund more clearly.

Student Aid

The Radio Club Scholarship Fund has a current balance of more than $340,000, which produces an annual return of more than $19,000 for distribution. The Committee never makes any grants from the principal of the fund, and it only makes grants to college students. The Board approved grants of $2,000 each to the University of Texas-Austin, the University of California at Los Angeles, Virginia Polytechnic Institute, the University of Cincinnati, Florida A&M, Capitol College, Stevens Institute of Technology and Polytechnic University. Three $1,000 grants were made to the Foundation for Amateur Radio, which administers the grants to students within the Radio Club's guidelines.

The Scholarship Committee and the Board want to increase the size of the grants and to have more involvement with the students. The goal was a grant of $5,000 per student but all agreed to a grant of $2,000 per student due to limited resources. In studying the professional backgrounds of the membership and the board, the committee requests that the students be full-time third- or fourth-year students studying wireless telecommunications.

The committee further looked at the demographics of the Radio Club's membership, and it has added colleges in areas of the country where we have a significant membership as well as adding colleges dominated by minority students. The committee will establish a contact person on each campus to recommend one student and report back to the committee on that student's progress.

Seeking Named Funds

At the November 2002 Awards Dinner in New York City, the Scholarship Committee placed a pledge card at place setting. Those attending the banquet gave $7,330 to the fund, which was greatly appreciated.

The committee would like to have more Radio Club members establish named funds within the Scholarship Fund; at the present time, a donation of $10,000 will name a fund at your request. The Radio Club includes one member who has given more than $60,000; it is hoped that other members would seek to enjoy this satisfaction of seeing a needy student complete a degree. Because a $10,000 fund does not produce a $2,000 grant, the committee combines named funds to do so.

The Radio Club sponsors breakfast meetings with notable speakers at the various wireless trade shows; any undesignated funds from these breakfasts are donated to the Scholarship Fund. With the rising cost of college tuition, your help is greatly needed. Please contact the chairman directly or through the Radio Club office with ideas and donations.

There is a tremendous amount of satisfaction to those who have contributed funds to receive letters from the students thanking the donor for making it possible for them to finish a four-year program.

The Radio Club of America, Inc.

Founded 1909, New York, USA

TREASURER'S REPORT FOR FISCAL YEAR 2002

(October 1, 2001 - September 30, 2002)

CHANGES IN UNRESTRICTED NET ASSETS

REVENUES & GAINS	
Dues Collected & Applied	$32,895
Other Member Fees	1,359
Advertising Sales	12,757
Publications Sales	428
Banquet (net)	10
Pins & Plaques Sales	1,006
Interest on General Funds	23,104
Contributions - General Fund	860
- SW Section - members & sponsors	11,340
Net Realized Gain (Loss) on Investments	(325)
Net Unrealized Gain (Loss) on Investments	(8,336)
Total Unrestricted Revenues & Gains	$75,098
NET ASSETS RELEASED FROM RESTRICTIONS	$16,500
TOTAL UNRESTRICTED REVENUES, GAINS & OTHER SUPPORT	**$91,598**
EXPENSES	
Program Services	
Management & Consultant Fees	$28,949
Meeting Expense	15,465
Pins & Plaques	820
Postage	2,681
Printing & Stationery	2,110
Trade Show & Web Site Expense	1,150
Publications Printing	9,599
Publications Mailing Expense	3,175
Miscellaneous Program Expense	422
Grants	18,000
Total Program Services	$82,371
Management and General Services	
Ballot Expense	263
Insurance	1,601
Legal & Accounting	1,450
Office Supplies	213
Telephone	1,583
Miscellaneous G&A Expense	1,072
Total Management & General Services Expense	$6,182
Transfer Interest & Dividend Income to Temporarily Restricted Funds	21,090
Transfer to Temporarily Restricted Funds	5,000
TOTAL EXPENSES	**$114,643**
(DECREASE) IN UNRESTRICTED NET ASSETS	**($23,045)**

CHANGES IN TEMPORARILY RESTRICTED NET ASSETS

Grants and Contributions	$45,726
Transfers from Unrestricted Funds	26,090
Net Assets Released from Restrictions	
Restrictions Satisfied by Payments (Scholarships Awarded)	(16,500)
INCREASE IN TEMPORARILY RESTRICTED NET ASSETS	**$55,316**
INCREASE IN NET ASSETS	**$32,271**
Net Assets at Beginning of Year	463,438
NET ASSETS AT END OF YEAR	**$495,709**

BALANCE SHEET

ASSETS

Current Assets	
Cash-Operating	$54,157
Cash-Banquet & Section	31,738
Accounts Receivable	666
Accrued Interest	33
Prepaid Banquet Expenses	6,000
Total Current Assets	$92,594
Other Assets	
Investments	422,142
Inventory	3,286
Total Other Assets	$425,428
TOTAL ASSETS	**$518,022**

LIABILITIES

Current and Long Term Liabilities	
Prepaid Dues – Current	$13,821
Prepaid Dues - Long Term	8,492
Total Liabilities	$22,313
Net Assets	
Unrestricted	56,103
Restricted	439,606
Total Net Assets	$495,709
TOTAL LIABILITIES AND NET ASSETS	**$518,022**

TREASURER'S REPORT FOR FISCAL YEAR 2002

(October 1, 2001 – September 30, 2002) (continued)

SCHOLARSHIPS AND GRANTS FUNDS

	Capital	Available for Distribution	Totals
Opening Balance October 1, 2001	$290,095	$18,709	$308,804
Contributions & Additions	51,676		51,676
Interest Earned		17,008	17,008
Scholarships & Grants Awarded		(16,500)	(16,500)
Ending Balance September 30, 2002	**$341,771**	**$19,217**	**$360,988**

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