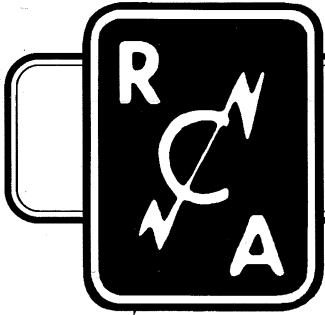


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FALL 1998

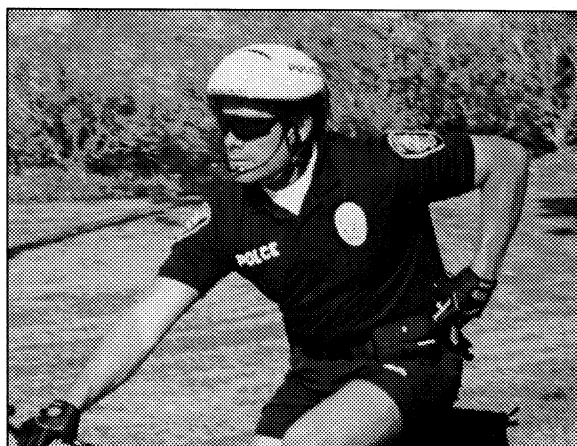


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A Tribute to Fred M

By Mercy Contreras

The Radio Club of America's annual banquet this year was dedicated to the memory of Fred M. Link. A historical photo exhibit featuring Fred during various stages of his career was on display during the cocktail hour. As people stopped to look at it, I couldn't help but overhear some of the comments they made, such as: "Fred brought me into this club," "Fred sponsored my membership" and "Fred is the reason that I am here tonight." As I engaged in conversation with various club members during the evening, I realized that many of us were in attendance in honor of Fred's legacy to us as an industry. Just as important, we were there seeking closure to our painful loss.

Tom Amoscato's tribute speech to Fred, which follows, was eloquent and moving.

"I would like to dedicate once again, our Annual 1998 Awards Banquet to Fred M. Link, a friend and a man that I have long admired, a truly great human being.

I was fortunate in that close to sixty years ago, I met Fred and was hired with the Link Radio Corp. He was considered The Father of FM Police and Public Safety Land Mobile equipment. Often called The Father of the Radio Club of America, Fred served as its dynamic president from 1968 to 1992, nearly a quarter of a century.

Fred was responsible for the growth of literally 70% of the Radio Club's most distinguished members. He was truly a world wide ambassador of Wireless and Land Mobile Communications, a

legend that will be listed in this closing 20th Century of extraordinary accomplishments of great people.

Fred had a built-in formula for success; it wasn't only brains and energy. These qualities are desirable sure, but they will carry you only so far. Fred had moved to the top. He was entrusted with command positions and endowed with a plus factor that took mere ability and doubled and tripled its effectiveness. To describe these magic characteristics there is only one word: "Integrity." The word means wholeness. In mathematics, an integer is a number that isn't divided into fractions, just as a man such as Fred wasn't divided against himself. He didn't think one thing and say another; he didn't believe in one thing and do another.

I've been convinced it is the absence of inner warfare that gave the extra energy and clarity of thought that made achievement inevitable, for *The Dynamo*, my pet name for Fred.

I'm sure, knowing Fred, he's working his W2ALU rig helping the powers above to communicate a little better with the world's population. Fred will always be in our prayers and be in our hearts forever."

Tom's speech was followed by a presentation made to Mrs. Mildred Link in honor of her dedication and loyal support of the Radio Club of America and especially the Grants-in-Aid program. Unfortunately Mildred was unable to attend. Joanne Link Sotres, Fred and Mildred's daughter, accepted the award on Mildred's behalf.

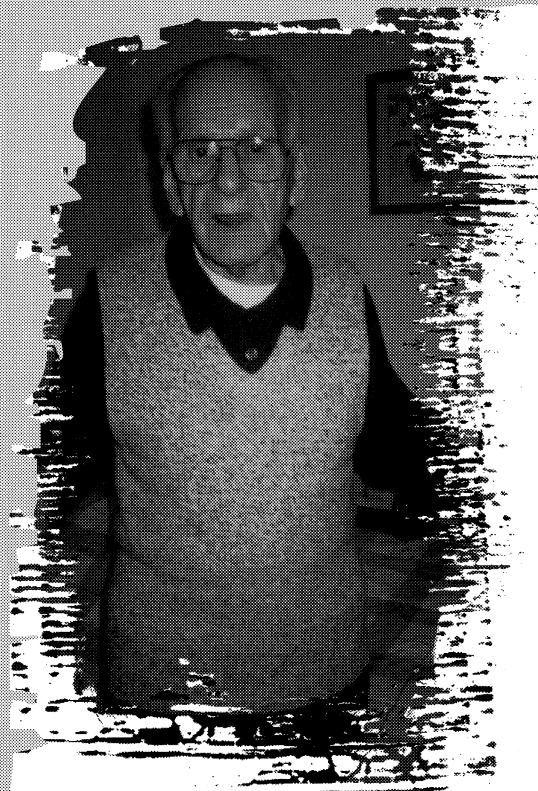
Link

Listed below and on the following pages are quotes from Mildred, Joanne and several of Fred's close friends. A project is under way to compile a collection of "Fred stories" like the ones printed below. If you would like to send a short write-up of one of your memorable adventures with Fred, we will include it and send you a copy of the collection once it is completed. Please send it to me, Mercy Contreras, Mobile Radio Technology, 5680 Greenwood Plaza Blvd., Suite 100, Englewood, CO 80111. You can e-mail me if you prefer at mercy_contreras@intertec.com.



Mildred Link:

"I was a radio widow as a bride. Fred was devoted to W2ALU. This was 1930. It was followed by his being an electrical engineer with AT&T, Dr. Lee DeForest, Dr. Allen DuMont, and then his own Link Radio Corporation, and the Radio Club of America...including his many friends in the communications businesses. We miss him!"



Joanne Link Sotres:

"For me he was...watching cartoons on the old Cathode Ray tube monitor in the 30's.

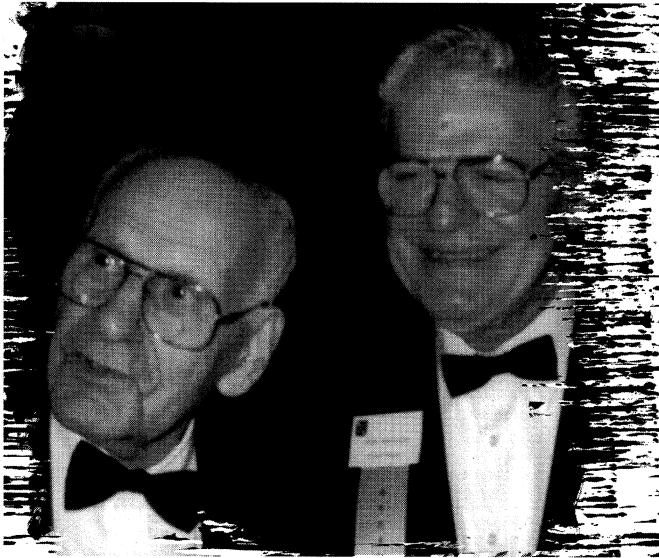
Boundless energy...taking the stairs two at a time to the music of Carmen Cavallero that always played on Sunday mornings in the 40's or visiting every exhibitor on every aisle of every trade show.

Having the test patterns endlessly adjusted on the prototype TVs.

Being told as a youngster to take this piece of equipment, a walkie talkie, and go as far away as possible.

The ribald storytelling while drinking Southern Comfort from the coonskin covered bottle at the CCC Breakfasts.

He was the greatest communicator of ALL."

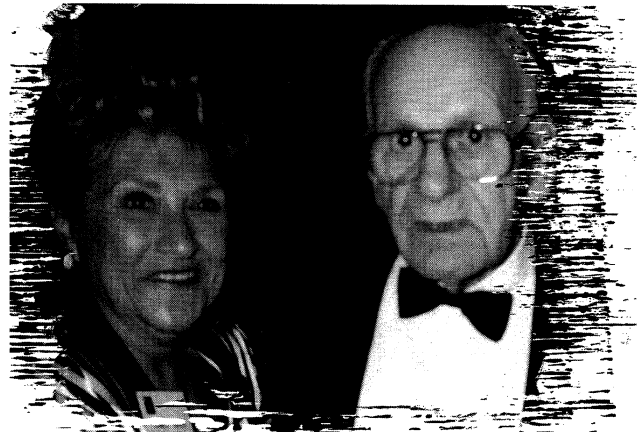


Gaetano J. "Tom" Amoscato:

I called him a dynamo. He was a man's man, like my Dad, whom I idolized. He was my mentor in many ways. A great person in many ways, including what he has contributed in the war effort, to individualism and plain decency. When people would come to him, he would take their good nature and verbal contribution as being a matter of fact. In many cases, that wasn't exactly the way it was. In the annals of the 20th century as it levels out and we come to the end of it, he will be one of the great contributors as a man, as an individual and as a success in humanity.

Connie Conte:

One thing I remember about Fred was that he always used to say to me, "Well, what do you know?" He was a great man, one of a kind, unique and honorable. I will always remember his kindness.



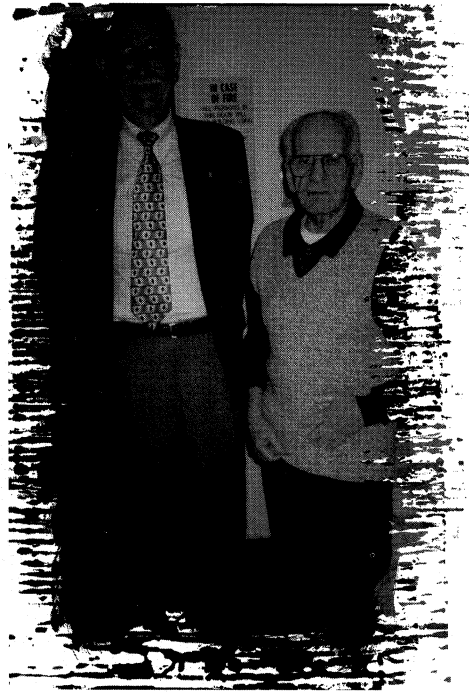
Mal Gurian:

I remember Fred....
For his untiring ability to assist others,
For his amazing memory and stories of the past,
For his humor and laughter he generated,
For his knowledge of an industry he lived,
For the vast amount of people he knew and knew him,
For his mental and physical strength he endured,
For the many trips we made with each other during our 35 years of acquaintance,
For the many people he loved and the love he received in return,
For his tremendous dedication to the Radio Club of America,
Mostly, for his smile and wonderful friendship.
Yes, I will always remember Fred Link.



Raymond C. Trott, P.E.:

Fred was the best storyteller I ever met. Stories about his experiences in the early days of radio piqued the interest of everyone who listened. They made the Radio Club breakfasts a success – stories about Will Rogers, “Silver Dollar” Jim West, Warden Laws of Sing-Sing, the *Morro Castle* and many more. I wish he had allowed them to be published.



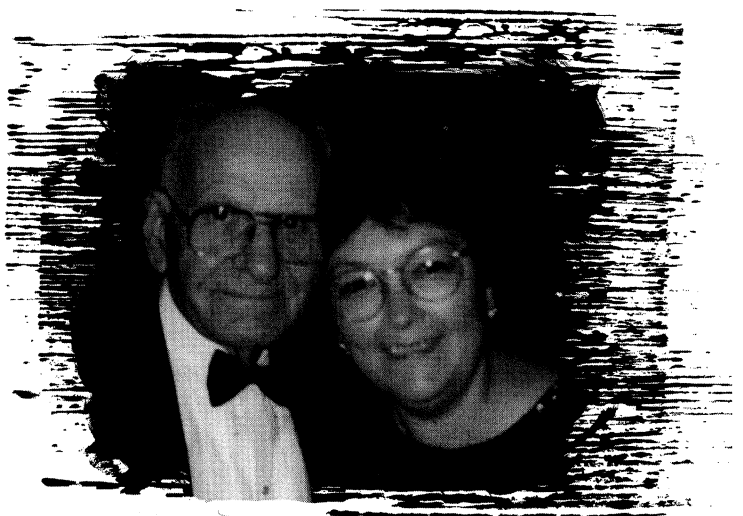
Don Bishop:

Fred would help people whether or not he might gain something in return. I told him that was a trait of his that I admired, and that he set a good example to follow. Recalling something that he once said to me: “People are so nice to me that sometimes I think they see me as some kind of tin god – which I’m not. But if they want to think so, I’ll accept it!” I always enjoyed his way with words. His sense of humor was unique.



Mercy Contreras:

Traveling with Fred was such an adventure. He was always the center of attention. I remember his 80th birthday party. It started out being a few friends and wound up being held in the Grand Ballroom with break dancers, a Dr. Ruth impersonator and a roast of Fred by some of his industry friends. Fred’s 85th birthday party was held at Union Station in Washington, D.C. The Marine band played as Don Bishop sang happy birthday to Fred. PCIA hosted Fred’s 90th birthday party and they presented him with an award for significant contributions to the industry. After the party, he had me call Memi (Fred’s wife, Mildred) and tell her about all the honors that were bestowed upon him. He loved for me to call, and he would stand and listen to me to see that I got all the details right. He was quite a guy. My dear Dazzy.





John E. Balint:

One of the things that people have lost sight of is that Fred was an excellent engineer. They think of the corporation and the financial status and the organization. He also was an excellent engineer. That's something people don't give him credit for. He had a penchant for having everything just so. He didn't cut any corners. Everything had to be as perfect as could be. He had the foresight, he and Fred Budelman, to go with this frequency modulation thing. He had a thorough understanding of it when it came down to designing the nuts and bolts.

William O. Hunt

I met Fred during my Communications Industries days. He was on retainer as a consultant. We got off to not a good start. But soon thereafter we became good friends. I looked upon Fred as the Renaissance pioneer for the wireless industry. I thought of him as a father, someone I could really look up to. He was as close to God or Jesus Christ as anyone I know. He did so much for all of us young guys coming up in the industry. He was a good friend and a mentor right to the finish line.

J.C. Smith:

Fred and I built the radio tower for "Silver Dollar" Jim West at the ranch. I had known Fred since day one, when I first built my tower for my cab company. He was one of the smartest radio men I ever knew, and I met and worked for a lot of them. He wanted to work before daylight and after dark. He didn't know when to quit. He never had a bad thing to say about anybody. He was always bragging about everyone he knew. A fine gentleman.

Jay Huckabee:

My association with Fred began over 50 years ago, when I was chief engineer of the radio division at West Production Company in Houston. Jim West's radio system was almost 100% Link Radio equipped. I saw Fred during his many visits from New York. When I moved to west Texas to open my own business, Fred gave me a territory for Link Radio sales from Abilene to El Paso and the panhandle to Mexico. I represented Link Radio until the company was sold and then continued with the DuMont Mobile Radio Division headed by Fred. No finer gentleman and friend have I ever known.

William Lieske Sr.:

One of the amazing things about Fred was his ability to remember faces. I've only gone to one or two of the IWCEs in recent years. A year or two ago, we happened to walk toward each other in an exhibit aisle. He pointed at me and said, "State of Oregon." It had been 40 years since I was head of the radio operations for the Oregon state police!



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Fred M. Link: 'Goodwill Ambass

By Don Bishop

*Fred Link was known
to several generations.
His fame began
with amateur
radio exploits,
continued with
police radio innovations,
included
World War II
radio manufacturing
and extended
with mobile
radio consulting.*

I met Fred M. Link in August 1984 at the Salt Lake City APCO conference. I was *Mobile Radio Technology's* new senior editor. Phil Cook, then a co-owner of MRT and its publisher, invited a group for lunch, including Fred.

"Fred, what do you do?" I asked.

"Don, it's been so long since anyone asked me, I don't know how to answer," he responded.

You see, Fred was so famous in the land mobile radio industry that hardly anyone ever had to ask. What followed was about 20 minutes of Fred's resume, which sketched an amazing story.

My last visit with Fred was on June 8, 1998, when Mercy Contreras (*MRT's* group publisher) and I took him to lunch at Loafer's Restaurant in Frenchtown, NJ. We talked about his friends in the industry and in the Radio Club of America. He passed away in his sleep on June 18 from a rapidly advancing leukemia that had been diagnosed only a few days before. He was 93.

Fred never wanted to cooperate in the writing of his biography. He wouldn't let me print his stories "while I'm alive," he said, "because I can't be sure what's the truth and what isn't. It might embarrass some people."

"But Fred, most of them are no longer with us," I persuaded.

"That's true, but I still can't be sure of what I say," he insisted.

Early on, Fred worked part-time as a telegraph operator for the railroad. He was 14.

"I learned Morse code to earn a merit badge in 'wireless' to qualify as maybe the first Eagle scout in Pennsylvania," Fred explained. "A lot of the railroad's Morse operators had left for the military in World War I, so I got some work as a relief operator."

During high school, Fred worked for his uncle, George Motter, as an apprentice electrician.

"I attended school half-days and worked the other half," he said. Fred earned a Journeyman's Certificate as an electrician by the time he entered Pennsylvania State College.

dor'

He was a radio amateur, first with spark station 3OV at Boy Scout Troop No. 7 in the York, PA, YMCA, and then with his own continuous wave (CW) station, 3BVA. Access to electrical parts at his uncle's company helped Fred to build these stations. From 1927 to 1933, he and John B. Knight Jr. operated W2ALU in New York and Passaic, New Jersey.

As a graduate electrical engineer in 1927, Fred went to work at New York Telephone and then, in 1929, DeForest Radio. In late 1931, Fred resigned from DeForest Radio along with a group of employees including the man who had hired him, Allen B. DuMont.

Fred had been in charge of tube manufacturing. A U.S. Navy radio inspector, Walter Peterman, suggested that Fred should consult the trustee of Duovac Radio Tube Company, Brooklyn, NY, to help the company to complete U.S. Navy orders for tubes. Fred did business for two years as "Fred M. Link, Consultant," with Duovac and other tube manufacturers. By 1933, Fred had become partners with R.C. Powell in the R.C. Powell Company, which manufactured remote broadcast amplifiers and radios.

Once Fred told me he bought out Powell; another time he said Powell became overwhelmed by the business challenges of the Depression, turned the company over to Fred and left. Either way, Fred became sole owner, changed the name to "Fred M. Link Company" and went to work completing a Signal Corps contract for equipment.

The Link company made a variety of electronic equipment, assisted other manufacturers (including DuMont) and provided repair services before concentrating on police radio communications equipment under a new name, Link Radio Corporation. "Fred Budelman, our chief engineer, was brilliant," Fred said. "He could take circuit diagrams, think about them overnight, and build prototypes the next day."

What put Link Radio in the forefront was the manufacture of frequency-modulated (FM) two-way radio equipment.

"That was the brainchild of Dan Noble, an electrical engineering professor at the University of Connecticut," Fred said. "He was con-



Fred M. Link, industry consultant and 'goodwill ambassador.'

'They tell me I was magnificent!'

Fred M. Link was my mentor and my good friend. My life was enriched by his friendship, and I shall forever cherish the memories of our many wonderful times together.

Fred passed away on June 18, 1998. It was a sad day for all of us in the land mobile industry. Fred was revered as the "father of two-way radio." Hardly a person in the industry didn't know Fred personally or by reputation. Fred was 93 when he passed away. His age, though, never stopped him from being as involved in the industry as his health would permit. As recently as the first week in June, Fred signed some letters announcing his resignation from the Radio Club banquet contributions committee. Committee? He was the committee! And until June 18, 1998, Fred was industry consultant to Mobile Radio Technology.

I am reminded of the wonderful times I shared with Fred. He once chastised me for not being present at one of his many keynote speeches.

"They tell me I was magnificent!" he proclaimed with a straight face. And I have no doubt that he was. Fred was quite a gifted speaker. For years he was the featured speaker at

the Radio Club of America breakfasts, and how we looked forward to his presentations. We sat there mesmerized by his stories about Silver Dollar Jim West or about the time he and Johnny Knight entered a DX contest and transmitted from their room at the New York City YMCA with bootlegged power from an elevator. Their operation caused so much interference to AM broadcast radio reception that authorities traced the source to their room. Fred had so many wonderful experiences to share. Remember his many adventures with Bill Lear, and how he met Nikola Tesla? Fred would stray from his story, and maybe take two or three digressions, but he always tied everything together in the end. Part of the fun of listening was wondering how in the world he would tie what he was talking about to what he had started to talk about in the first place.

As my friendship with Fred grew, so did my relationship with his lovely wife, Mildred, and his daughter, Joanne. Fred and Mildred are affectionately called "Dazzy" and "Memi" by their children, grandchildren and close friends. Memi and Joanne share Fred's wonderful sense of humor, amazing energy

and ability to make you feel like you are their best friend. I asked Memi if there was anything we could do for her. She said she would like to have a collection of Fred's "one liners." If you knew Fred you know of his special, and sometimes not too humble, way of saying things. Memi always got a kick out of hearing about them and would like to have a collection of them in remembrance of Fred. If you have any stories you would like to share with Memi please send them to me at Mobile Radio Technology, or you can email them to mercy_contreras@intertec.com. We would love to be able to give Memi a nice collection of "Fred stories."

In one of my last conversations with Fred, I told him that things were just not the same without his full involvement. I told him that we were trying to carry on like he expected us to, but that it would never be the same. His "one-liner" response was; "Well, that can't be denied, that can't be denied."

Dazzy, you were special, and we will miss you terribly. There will never be another quite like you. And that can't be denied, Dazzy. That can't be denied.

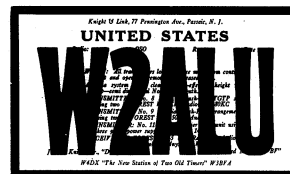
*-Mercy Contreras
Group Publisher*

sulting the state police on the design of a statewide communications network."

Noble had monitored experimental FM broadcasts from Edwin H. Armstrong's Alpine, NJ, station, and had developed an idea for using FM for communications.

"Noble visited Link Radio with diagrams and showed them to Budelman and me," Fred said. "The next day, Budelman had prototypes." Link Radio then built the Connecticut equipment.

With FM, Link Radio took the lead in police radio manufacturing, and later made equipment



Above: QSL cards from Fred Link's two amateur radio stations.

Left: Link Radio Corp. officers: Mildred Link, treasurer; Frederick T. Budelman, Vice President & Chief Engineer; Fred M. Link, President & General Manager; Donald G. Beachler, Secretary.

used by all military branches during World War II. His company earned five Army-Navy "E" awards. In 1950, Fred sold the company.

"I had been lucky many times," Fred said, but luck ran out with the sale of the business. His buyers gave him preferred (non-voting) stock. "I didn't need the cash," Fred said. His buyers came under federal indictment for reasons I never learned and diverted company resources to pay their legal expenses. Link Radio was in Chapter 11 bankruptcy by 1952 and was liquidated in 1953. Fred went back to work.

In 1954, under a five-year contract with DuMont Laboratories, run by his old friend Allen DuMont, Fred established a mobile radio division and hired many former Link Radio employees. The division served many former Link Radio customers that had been left without replacement equipment and service.

After the contract was up, Gen. David Sarnoff, the head of Radio Corporation of America (RCA), told one of his vice presidents to hire Fred as a consultant to resolve a problem with an RCA contract to provide police radio equipment to the city of Philadelphia. The Sarnoffs had met the Links on a cruise ship, and Sarnoff knew Fred by reputation and because Fred had helped to prepare compelling legal exhibits in opposition to RCA in a patent dispute. More luck?

"Sarnoff told this vice president how much I was to be paid, and it was more than the vice president made. He didn't like that very much," Fred said. Fred's help saved the contract, and Sarnoff kept him as a consultant from 1959 to 1965.

After 1965, Fred worked as a consultant for a variety of companies. One was Cambridge, England-based Pye Telecommunications, which became part of Philips Radio Communications Systems, which is now Simoco Telecommunications. Another was Communications Industries, one of whose founders, Jerry Stover, credits a Link radio with saving his life in World War II-somewhat for its communications capability, and somewhat for its capacity to stop bullets, as Jerry tells the story.

Others to benefit from Fred's expertise included Repco, E.F. Johnson, Ericsson, Trott Communications Group and ... *Mobile Radio Technology*. Fred became our industry consultant in 1984. He advised us about information we should publish and introduced us to industry figures he thought we should know-and he knew almost everyone. In recent years, as his eyesight weakened, he wanted help at the many trade shows he attended. I accompanied him so often that people started calling me his "bodyguard." I told him he was a "people magnet," because he attracted so much attention as we walked the exhibit aisles. "I prefer 'goodwill



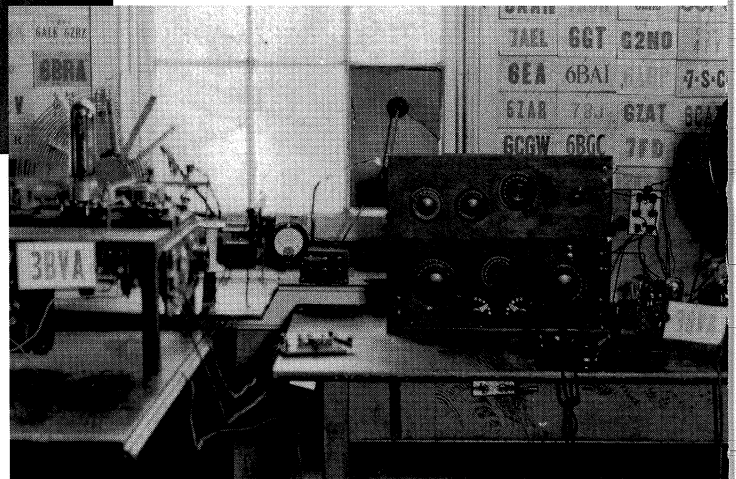
Fred Link (left) with his amateur radio partner, John B. Knight, at station W2ALU in their New York apartment in 1929.

ambassador,' Don, if you don't mind," he said.

Fred and his wife, Mildred, raised two daughters, Daryl, who died several years ago, and Joanne. They also raised American Saddlebred horses. "I can't say that horse-breeding made any money," Fred said. "But it brought me in contact with all the right people." The horses usually were ridden in competition by the Links' daughters. Their home, Robin Hill Farm, in Pittstown, NJ, contains countless awards and photographs from horse shows.

Fred led the Radio Club of America as president for 23 years, which also figured in the success of his consulting business.

Now you know something about Fred's life, but you shoulda heard his stories. Like the "Great Texas Antenna Shoot," wherein Fred's customer and benefactor, oilman Jim West, organized a shooting party to "remove" a base station antenna that was mounted too high. And the "Radio Equipped Horse-drawn Delivery Cart" that, thanks to a New York City ordinance, always went ahead of motorized trucks at the docks to pick up supplies for Link Radio. And the "Electric Windows That Sold the Radios," wherein foreign buyers, fascinated by electric windows on a Cadillac given to Fred by Jim West, agreed to a purchase while spending most of their time working the windows instead of watching the demonstration of radio equipment in the car.



And the "Lyndon Johnson Waiver," wherein the then-Senate majority leader called the FCC and obtained a waiver for Fred to install 3,000-watt VHF lowband base stations to communicate by skip with mobiles and airplanes across the United States. And Fred's travel to Havana and Mexico City to sell police radios. And many more.

Fred used to tell me, "Don, don't get old; you won't like it."

I would say, "First of all, what's the alternative? Second, if you're any example, what's wrong with it?"

"I guess you're right," he would concede. "I've been lucky."

Fred was lucky, although he also was *prepared* to take advantage of the opportunities that good fortune brought him, and he *recognized* those opportunities, and that made the difference. And I know I was lucky to know him.

God bless you, Fred.



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Reflections on the Role of Radio in Spectrum Management

.....
Remarks by Dale N. Hatfield
.....

*Dale N. Hatfield,
CEO of
Hatfield Associates, Inc.
spoke at the
Radio Club of America
Breakfast Meeting
Dallas, Texas
September 11, 1997*

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I am very pleased to be here in Dallas to address this Radio Club of America breakfast being held in conjunction with PCS '97. I am particularly pleased—and honored—because, like many of you in this room, I have been fascinated by radio communications since my childhood. Indeed, although it is now more than forty years ago, I can remember—as if it were yesterday—my early attempts at amateur radio DX'ing with a used Hallicrafters S-38C receiver, a crystal controlled transmitter using a single 807 as the power amplifier stage, and a simple dipole antenna strung between the chimney on our house and a tree in the back yard. Since I heard my first ionospherically propagated DX signal coming from Morocco, I have been hooked on wireless communications, so hooked that it eventually became my vocation as well.

A number of years later, I went to work as a radio engineer at the old Central Radio Propagation Laboratories of the U.S. Department of Commerce in Boulder, Colorado. There I became interested in the management of the invisible resource that makes wireless communications possible—the radio spectrum. And it is on that subject—spectrum management—that I would like to speak to you today. More specifically, I would like to step back and reflect on the role of government in spectrum management.

From a broad policy perspective, the issue in spectrum management that currently draws the most attention in academic circles, the trade press, and even the popular press, is the issue of competitive bidding or auctions. As most of you know, back in 1993 Congress gave the Federal Communications Commission the authority to employ competitive bidding—or auctions—in choosing from among mutually exclusive applications for radio licenses. The Commission has used that auction authority some fourteen times over the past four years. Earlier this summer the Commission initiated an inquiry in which it asked for comments on its auction processes. This inquiry was initiated in preparation for a report on the auction experience that it is required to submit to the Congress

ole of Government ement

by the end of this month.

I was a strong advocate of auctions for awarding licenses long before the Congress gave the Commission the authority to employ competitive bidding. I remain a strong advocate today. I readily admit that there have been some well-publicized difficulties with a few of the auctions that have already taken place—including the C-block Personal Communications Service (PCS) auctions and, more recently, with the Wireless Communications Service (WCS) auctions. However, as my former colleague—and still good friend and mentor—Henry Geller, is fond of saying, “Everything is compared to what.” That is, in my opinion, these difficulties the Commission has had with auctions pale in comparison to the difficulties of using other approaches for choosing from among competing applications—namely, comparative hearings and lotteries. Generally speaking, auctions have succeeded in getting spectrum into the hands of people who value it the most. They have done so quickly and efficiently while (a) generating a significant amount of revenue for the U.S. Treasury and (b) providing policy makers with a much better feel for the underlying value of the spectrum resource in different applications. Thus, I believe policy makers—with our help and support—should continue to develop and refine the auction processes to overcome these concerns lest we be forced to return to even less desirable alternatives.

I also readily admit that auctions may not be

appropriate for all services or in all situations. One such situation arises when the total economic and social benefits that flow to the public from a particular service are not reflected in market prices for spectrum—what an economist would refer to as the presence of “externalities.” For example, amateur radio provides additional economic and social benefits by (1) serving as a training ground for budding scientists and communications engineers, (2) encouraging experimentation and advancement of the radio art, (3) providing highly survivable basic communications services during natural disasters and other emergencies, and (4) promoting international comity through the type of “DX’ing” that got me hooked on wireless communications so many years ago. Similarly, I would argue that the unlicensed—Part 15—bands provide a unique opportunity for commercial (and non-commercial) entities to quickly develop and offer for sale devices and even systems that are of enormous economic and social value. The uniqueness stems from the fact that no licensing is involved at all. I could give other examples, but, clearly, policy makers must exhibit appropriate caution to make sure that we do not “short change” services that convey economic and social contributions that are not reflected in price alone.

While I am on the subject of auctions, I would like to offer one further thought: those of us who are interested in the spectrum management field—either from inside the government, from the private sector, or from academia—should

continually search for potentially better ways of awarding licenses to competing applicants.

For example, I recently read a paper prepared by Chuck Jackson and his colleagues at Strategic Policy Research, Inc., in Bethesda, Maryland. Their paper dealt with auctions for spectrum for satellite communications systems. Reading the paper reminded me that, in some situations at least, we can eliminate the need for auctions by clever engineering that allows multiple applicants to be accommodated within the same block of spectrum in a particular geographic area. In other words, we can reduce spectrum scarcity and sometimes avoid the need for auctions by deploying more spectrally efficient technologies and more sophisticated spectrum sharing techniques. While I reject the notion that all of the past problems associated with centralized spectrum management—namely, excessive rigidity, delays, waste, high regulatory costs, and alleged misallocation of the resource—can be solved by better engineering, it should not discourage us from trying technological solutions based upon more decentralized approaches.

Along these lines, Paul Baran, an amazing intellect who is credited with developing the concept of packet switching, has advocated a more decentralized, laissez-faire approach to spectrum management that would rely on technological innovations to eliminate spectrum scarcity and, hence, the need for auctions. Similarly, Eli Noam, a professor at Columbia University and a former state regulator, has advocated a technique he calls “Open Spectrum Access” that would substitute a system of spectrum access charges for exclusive licenses and auctions. Professor Noam argues quite strongly that, while auctions may be the best solution for now, technology is changing quite rapidly. Consequently, he argues that other techniques may be more appropriate in the future. Clearly, policy makers should be alert to such possibilities and, as an industry, we should encourage such innovative thinking.

I have spent a fair portion of my allotted time defending the use of auctions as a spectrum management tool, but that is not really the purpose of

my remarks here this morning. What I would really like to focus your attention on is a related but, in my opinion, an even more fundamental question. Simply stated, that question is “How deeply should the government be involved in determining how a particular block of spectrum is used?”

Note that this question is associated with the spectrum allocation process rather than the spectrum assignment process *per se*. Of course, the spectrum allocation process traditionally precedes the spectrum assignment or licensing process. That is, policy makers first determine the type of use permitted in a given block of spectrum and then utilize one of the techniques I mentioned a moment ago to assign individual licenses if (a) the licenses are to be assigned on a mutually exclusive basis and (b) the number of applications exceeds the number of licenses available. Auction results may help policy makers gain a better understanding of the value of the spectrum for different uses, as I alluded to earlier; but, in and of themselves, auctions have been regarded primarily as a technique for awarding licenses—not allocating spectrum.

Thus, the question “How deeply should the government be involved determining how a particular block of frequencies is used?” is a fundamental one—even more fundamental than the process of choosing from among competing applications within an allocation. At one extreme, the policy maker can specify with great precision the service that can be provided and the technology that can be used to offer it. At the other extreme, the policy maker can put no constraints on the service or services to be offered nor, with the exception of broad constraints to limit interference to other users of the spectrum, the technology used to provide them. I think it is fair to say that, in the past, this question has been answered on essentially an *ad hoc*, allocation-by-allocation, basis, but with a clear trend toward giving licensees greater flexibility in choosing the service to be offered and the technology to be employed. Clearly, this trend toward affording licensees greater flexibility in the use of the spectrum is a reflection of the dif-

difficulties that centralized governmental processes have in keeping up with rapid technological and marketplace changes.

This issue of how deeply the government should be involved in determining how a particular block of frequencies is used was brought to a head early this year when FCC staff members released a report entitled "Using Market-Based Spectrum Policy to Promote the Public Interest." Basically, the paper recommended that the Commission put increased reliance on market-based forces in the *allocation* of the radio spectrum resource. It did so by recommending that the Commission avoid mandating that spectrum be used to provide specific services. It also recommended that the Commission minimize regulations on how services are to be offered. In other words, the recommendations were that the Commission should move away from the more *ad hoc* approach to a consistent public policy of reducing government involvement in determining how spectrum is used. In essence, this would shift—at least to some degree—allocation decisions from the government to the private sector because it would be the latter who would be determining the use to which a particular block of spectrum would be put.

It is my understanding that the original intent was that these recommendations would be formally adopted as a policy statement by the Commission. However, while the proposals received strong support from Chairman Hundt, the working paper did not receive the support of a majority of the Commissioners. Commissioner Ness, for example, spoke out in favor of formulating a consensus statement on spectrum policy and noted that there was more agreement than disagreement among the Commissioners on the general direction of that policy. However, in a speech explaining her position, Commissioner Ness stated that "...we should not *allocate* spectrum by auction—as opposed to *assign* it by auction."

As you are aware, in the next few weeks, four new Commissioners will be appointed to the FCC. The four new Commissioners, including a

new Chairman, will join Commissioner Ness to produce a full five-person Commission once again. In my opinion, one of the most important issues facing the new Commission will be this issue; namely, how much control should the Federal government retain over how spectrum is used. It is certainly one of the most important issues for our wireless industry. Now my primary purpose here this morning is to alert—or re-alert—you to the fundamental importance of this issue. It is not to urge you to advocate any particular position on the issue, but rather to urge you to make your views known to the Commission—whatever those views might be.

Having said that, I would like to make two personal observations regarding the question. First of all, over the past five years or so I have taught telecommunications policy courses in the former Communist countries of Central and Eastern Europe. That experience drove home to me, in the clearest possible terms, the difficulties associated with trying to manage scarce resources on a centralized basis. Thus, now more than ever, my biases are in the direction of relying more upon the private sector responding to marketplace pressures and signals for the allocation of scarce resources—including spectrum. Nevertheless, I do believe that there are constructive—indeed vital—roles that the government can play in the allocation process. For example, while relying upon analogies is often dangerous, we accept the notion of government zoning in the use of land. While the zoning process can be—and sometimes is—abused, it does prevent someone from building a rendering plant in the middle of a residential neighborhood. The two uses are simply incompatible. Similarly, as engineers we know all about the difficulties associated with locating very high power radio systems in the same vicinity as low power systems. Thus, in my opinion, it is perfectly reasonable for the government to exercise some control over how the radio resource is used in order to facilitate compatible uses within particular geographic areas and regions of the spectrum. I could give other examples, but the point

I am trying to make is that the government can play a useful role in the allocation process while still placing strong—but not total—reliance upon marketplace forces. It is not an all or nothing proposition.

Second, there are obvious benefits in giving existing spectrum users the flexibility to adjust their services and the technologies they employ in response to marketplace forces. But the situation may be different when new spectrum is being made available for distribution by auction. There, some providers and manufacturers have argued that investment is spurred and equipment costs to users are reduced if, in advance of the auction, the Commission does specify how the particular block of spectrum is to be used. Admittedly, some providers may want the Commission to do so in order that they will have an opportunity to slow down the development of competitive services. But, to return to my example of land use, it is not unusual for the seller or lessor of a piece of land to advertise potential uses of the land to interested buyers. For instance, by pointing out that the piece of land is

ideal for a restaurant and by supplying factual information—such as traffic counts—the seller provides a useful service to potential buyers while improving his or her chance of getting a good price for the property. Thus, it seems perfectly responsible to me—and not inconsistent with increased reliance on marketplace forces—for the Commission to suggest potential uses and even facilitate the choice of a particular technology for use within a particular block of spectrum.

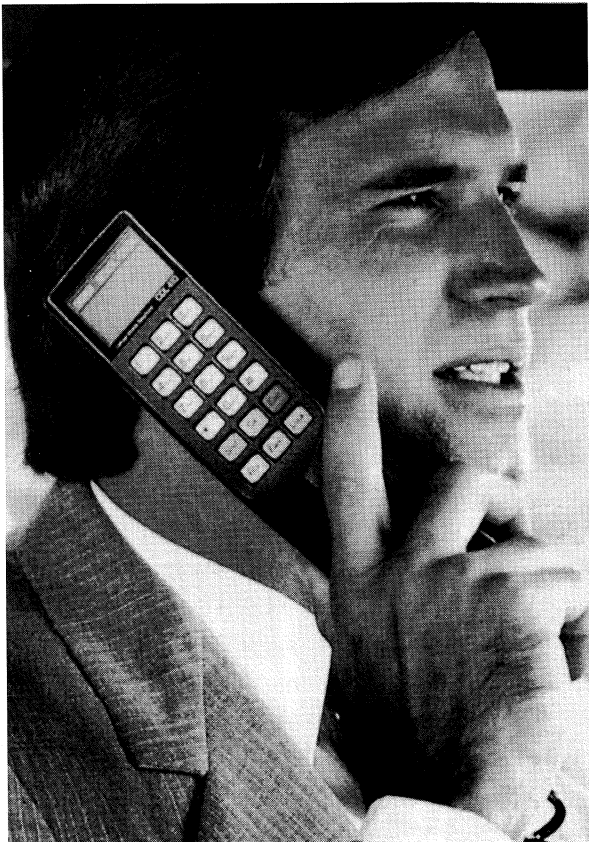
However, in closing, I would like to stress once again that my purpose is not to advocate a particular position on the issue of how much control the Federal government should retain over how spectrum is used. Rather, my intent here this morning was to draw your attention to the importance of the issue—an issue that goes beyond the question of whether the Commission should continue to use auctions in choosing from among mutually exclusive applications for radio licenses.

Thank you very much for your attention.





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The psychology of

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By Maurice H. Zouary

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It would be difficult indeed to determine just at what point in history entertainment all began. Whether it started with village story tellers, court jesters, medicine and wild west shows, or perhaps if we dig down into the musty past and dust off the archives stored away, we may find that the Mountebank developed into the wandering minstrel talking his stories and strumming his way through village streets. Then possibly to the variety performer who eventually became known as a Vaudevillian and part of a legend of one of the greatest forms of entertainment ever known.

It would be also difficult to decide which would be the strongest of human desires, to perform and entertain audiences, or be entertained as part of an audience.

It has been said in jest, that vaudeville really began in the Garden of Eden with Adam and Eve as a "team" introducing the first "double" act. There were no audiences, of course, but they did *start* something short of spectacular.

Does not the Bible state that Salome asked from King Herod the head of John The Baptist in return for her dancing?

It was never established whether her dance of the Seven Veils was a basic talent with a strong desire to entertain, or a genuine motive to achieve her purpose psychologically. Whichever, it may prove that the possibility of the vaudeville "single" *may* have existed then.

Somewhere along the path of civilization and the sophistication of the modern world there began a "psychology" of entertainment during the growth of the perpetuation of the theatre arts. Impresarios and performers alike, blessed with all the elements of creating great entertainment in abundance, knowing instinctively what would appeal most to the greatest majority, provided all of the essential ingredients of showmanship.

Variety, of course, was the key! Something enjoyable for everyone! It was of importance for a performer to make each in the audience forget their outside problems and become *involved* once inside the theatre. Impresarios had similar motivations, but it was also of

entertainment

necessity and desire to make their operations profitable to survive and continue to present great variety attractions.

As a matter of fact, the first all-variety entertainment was given in New York City in 1827. There were 12 performers and about 300 persons forming an audience.

About 1900, a performer who trod the board in the barren west was paid very little for his artistic endeavors. Still, he thoroughly enjoyed making people happy, if he could, with his act, although there *were* instances when he would be run out of town while playing the local honky-tonk.

Commonplace in the field of amateur tryouts as late as the 1930s was being the target of an impatient audience which was enough to discourage any budding entertainer. The day's unsold fruit was often thrown at performers by a rowdy audience. It did prove an endurance test that weeded out real amateurs from born troupers needing but experience.

About 1895 two bright young showmen, B. F. Keith and Edward Albee, opened what was known then as a "store show" in Boston. In time, however, they both had developed better business instincts as to a higher element of understanding and human communication in entertainment needs. Albee once stated his entertainment psychology, "It is easier to amuse with good, clean humor and refrain entirely from anything that is obscene or that has a tendency of violence to jar the sensibilities of a refined audi-

ence, particularly where it is composed to a large extent of young people alone or accompanied by their parents." With their last \$500 Keith-Albee Attractions decided to gamble and present their first musical revue. They organized the Gaiety Opera Company with a repertoire of Gilbert and Sullivan. The presentation proved revolutionary. With advanced methods, good taste and refined musical variety-vaudeville entertainment was presented thereon.

Although vaudeville saw its beginnings in 1827, it was not until 1895 when it began to reach momentum and then its heyday by 1927. Almost of all, it was also to become a great psychological factor for a happier America. It was the "human connection" that satisfied the tastes and desires of audiences who wanted the kind of entertainment adventure to forget all else of daily realism. Such vaudeville entertainment provided the tonic of life. Psychology here was that the supply *served* the demand.

Performers onstage could almost reach out directly to their audiences on practically a personal basis. Audience enthusiasm and the magnetic rapport they had with the performer was a human action-reaction relationship providing what is termed in modern broadcast jargon as "Instant Rating."

Great impresarios by the second decade provided the best of available talents, so that going to the vaudeville theatre became a joy and a national habit. There were the headliners and supporting acts, animal acts, jugglers, pyramid

and acrobatic acts along with other varieties including trained dog act. All making up the "psychological" factor of presenting something for everyone. Vaudevillians were considered assassins of dull care and the crown jewels of entertainment.

Then there emerged technology and mass communication testing the validity of the existing live entertainment media. This new technological entertainment encroached upon a firmly entrenched habit for large numbers of daily audiences enjoying variety vaudeville and the dramatic theatre.

The threat to the theatre was considered great. The development of silent motion pictures was well on its way out of the novelty stages, providing a new kind of sophisticated and dramatic visual entertainment. Radio by the mid-1920s began to present some programming of impact making its way into millions of homes.

There was, however, the void of personal involvement with this new technological entertainment by its audiences. The proper launching, therefore, required the need for a brand new psychological approach individual to a "dimensional entertainment" of this kind. Audiences were at best "observer-reaction" participants, so the brand of enthusiasm had to be different than anything experienced before. Nevertheless, people soon learned to respond and both new media were to revolutionize what had been long established as organized live entertainment habits of the masses.

The fact that silent films presented pictures in action-motion (using titles for spoken dialogue), and the fact that radio required imagination and the mind's-eye for word interpretation of visual happenings, did not impede the successful growth in both media. Silent motion pictures developed new screen talents largely from the theatre and vaudeville. But when Hollywood began to make wider use of sound in film productions, vaudeville's demise became certain. Headliners then joined performer ranks of both motion pictures and radio, swelling the rosters of talent bringing their own unique brand of entertainment which proved magnetic.

What was once a great form of live entertainment was essentially America in motley. Its social implications reflected the response of its audiences pronounced largely because its entertainment was basically topical fun.

The trend of its humor was a reflection of those times and an important expression of American Life. In short, people enjoyed *each other*. Here still, it was a psychology of supply *erving* demand.

Their laughter came from the heart even when such laughter was poked at themselves. But the 1930s became serious and disturbing years for Americans. Audiences had a basic need, more than ever, for psychological mesmerization *away* from the troubles arising out of the great depression period. Although there *were* a number of depictions with motion picture themes based on struggles of the time, radio and films would not largely reflect the bad times in realism. The entertainment industry produced the greatest capacity ever in multi-subject themes of some thirty categories. People across the county, 80 million a week, literally *escaped* to the movies. With the greatest number of original vaudeville, variety and comedy performers, entertainment was aided to a high degree in providing audiences with what was essential for their enjoyment and well being.

Wartime entertainment had a psychology of its own. There was a necessity for creating a patriotic spirit conditioning the mind as to the need for battle for the good of humanity. To provide the kind of escapism that was transit to realism for participants of the battlefield.

Movie theatres during the war years of the 1940s showed only a few minutes of actual war scenes in realism in the newsreels exhibited.

Recreated *war* themes in motion pictures, however, was regarded as entertainment. While such film themes did stir many audiences who liked war pictures, still they knew it was only a movie and that nobody was really being killed.

On the other hand, the stark realism of the Vietnam on-the-spot television war coverage, consistently exhibited in millions of homes, showing humanity being killed on the battle-

fronts, was a psychology of reality, not in the category of entertainment. Such realistic death scenes observed on a daily basis by the network news had caused profound psychological and sociological tremors in the makeup of American youth. This stark realism actually broke through the impersonal nature of television.

On the other side, commercial television in its early years did serve the needs of great masses with great variety and drama. No doubt, if television were to become popular and launched from its infancy, the public *had* to be *served*. Stars of drama, dance and music, comedy and stage musicals joined talented newcomers to provide a great variety of entertainment. The motion picture medium was at a decline and fewer films were being produced. Television had a great opportunity to grow into a revolutionary medium for conveyance of entertainment of appeal to a *total* audience.

But there was to be a decided decline by the 1960s, giving way to a different spirit in entertainment, largely reflecting the changing time and attitudes, especially among the young. Basically an unhappy spirit that pervaded America causing unrest with large numbers of the population. Instead of encountering the dissatisfaction with escapism in entertainment, television and motion pictures only enhanced life's realism with programs and formats which were void of entertainment values.

Today's decision makers in entertainment are drastically unlike those of the first half of this Century with the movie studios largely headed by great pioneer creative forces. Entertainment today in television is in the hands of a small cross-sampling of Americans who decide by *their* voice what the greatest number should have as entertainment.

In motion pictures, decision making is done and controlled by a non-creative bureaucratic corporate machine with the philosophy which is basically monetary.

It is no longer a demand and supply entertainment industry! The needs and tastes of the majority are no longer served! There is a new misdirected psychology here that places the

young into believing that if adults present violence, sex and bold permissive entertainment as a way of life in such a liberal fashion, then it must be an acceptable way of life.

There is no longer entertainment to escape to away from what has become deep psychological problems in our society. Entertainment today tends to amplify those daily problems of real life. Motion pictures and television have grown to become a major force and influence, and extremist fare as consistent offerings, are of interest only to minority numbers. There is a decided imbalance to this non-psychology in entertainment presumably for the masses. Creating a climate of social atmosphere of deep-rooted indifference to one another.

The motion picture and television media have the power to weave the very souls of their audiences into a web of mesmerization which has become part of the psyche of under-30s America. Certainly gone are the days when a P. T. Barnum, in his time, would present to an awe-struck public, Jumbo, the giant elephant; Tom Thumb, world's smallest man; and Jenny Lind the immortal, as the world's greatest attractions.

Nobody now is awe-struck about anything anymore!

We have entered into an age of space and super-realism and permissive entertainment of this kind that did create shock waves not too long ago. Escapism in entertainment has become a relic. Present creative forces governed largely by corporate financial reports, are only sensitive to ratings systems.

The count is diminishing of those who could well remember what enjoyable entertainment really meant in their lives. Entertainment that molded America to a happier frame. Aiding to lift individual spirit by a great variety of pure entertainment for essential leisure against the forces of daily problems.

Recent offerings have tended to include extreme impressionistic values. Already exposed to a daily diet of other media outside entertainment, reflecting largely of sadistic, political, racial, sex and violent crime reportings.

Psychology of entertainment is really the *psy-*

chology of audiences. The public became audiences when during moments of their lives, they seek to escape from the realism of daily environments.

That goes for the majority who really want the maximum of entertainment with a minimum of thinking.

Since the mental receptivity of audiences by and large is determined by mood principles. The mood for visual pleasure and emotional thrill, most certainly *not* for the mood of argument or disturbances.

To become popular, psychology in entertainment should mean a creative attempt to appeal to the emotional senses of the largest number of audiences. Providing the variety essential to the greatest cross-section of a very fickle human element.

A less permissive psychology away from a constant diet of realism and superrealism providing variety entertainment to the public, would begin to serve the majority who yearn for a more happier, lighter leisure hour spending.

It may be possible one day, for the original, early impresario psychology, to make its way in future entertainment with conscience on a higher order providing a new and important direction in the interest of the public.

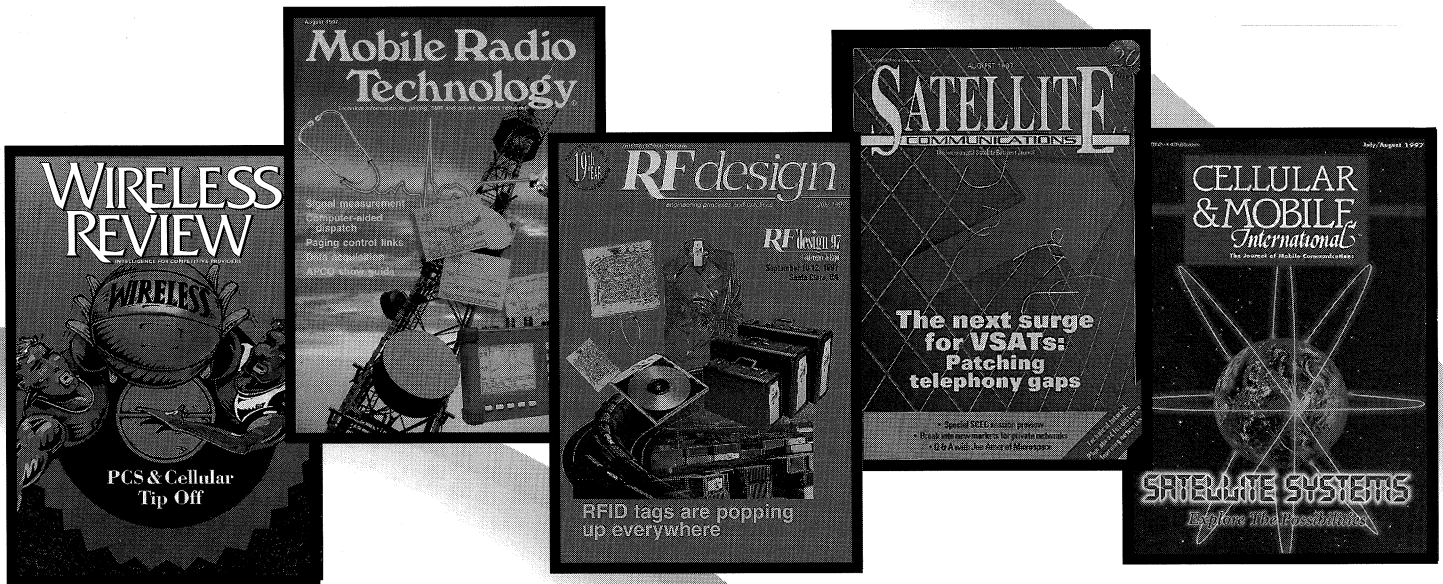
For a development of determination to deal with the positive aspects of what makes a good show for most people to enjoy without elements of decadence being amplified and exemplified as essential to human nature.

A possible resurgence to a wider and broader appeal of entertainment to serve the emotional senses of most audiences with greater offerings of pure entertainment values.

In simple, universal terms, what the public needs, eagerly wants, and hopes to see for their off-leisure hours, is more of the old time SHOW-MANSHIP! That rare ingredient of creative gem with the power to make people laugh and make them cry all at the same time. What's most important, it is *showmanship* that will make people happy.



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The FCC's new RF-

.....
By Ed Hare, KA1CV
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January 1997
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Every so often, an event gets the Amateur Radio community buzzing. On August 1, 1996, the FCC announced a significant rules change: Effective January 1, 1997, most radio services must comply with new requirements regulating human exposure to RF radiated fields. The new regulations include Amateur Radio; so, almost immediately, the telephones at ARRL Headquarters started ringing with members' questions. This overview accurately presents the best available information as *QST* goes to the printer. Sources for frequent updates appear under "Stay Tuned" at the end of this article.

Background

In 1982, the IEEE developed the C95.1-1982 Standard that described appropriate limits for human exposure to RF energy.¹ Medical researchers, engineers and industry developed this Standard. Shortly, the FCC wrote a set of regulations that required radio services to comply with the limits set in the Standard.

While the FCC was developing those early regulations, ARRL requested that the Amateur Radio Service be categorically exempt from any *specific* requirements under the regulations. We urged the FCC to rely upon the demonstrated technical competence of amateur operators and self-education as sufficient tools to ensure continued Amateur Radio safety. The FCC agreed, and we were categorically exempt from any specific requirement to perform a station evaluation under the old RF-exposure regulations.

The ARRL RF Safety Committee

To address what was then an emerging issue, in 1979 the ARRL Board of Directors formed the ARRL Bioeffects Committee. The ARRL Board has since reorganized this Committee as the ARRL RF Safety Committee. The committee consists of medical and research professionals. All of the current members hold Amateur Radio licenses.

Over the years, this committee has monitored developments in the

Exposure Regulations

the ARRL Board of Directors and Headquarters staff. Based on information in the Standards and other scientific studies, the committee wrote (and updates) an extensive set of recommendations that appears in *The ARRL Handbook* and *The ARRL Antenna Book*.²

New Standards

In 1991, IEEE published a new Standard, C.95.1-1991. (See the sidebar "How the IEEE C95.1 Standard Was Developed.") This Standard decreased the maximum recommended RF exposures and extended the frequency range covered by the original Standard. This set the stage for the rule changes that currently affect Amateur Radio.

Enter the FCC

On April 8, 1993, the FCC released a Notice of Proposed Rulemaking (ET Docket 93-62), announcing that it intended to develop a new set of regulations for all services, based on the C95.1-1991 Standard. ARRL filed comments asking that the Amateur Radio Service exemption continue, relying on the continued technical expertise and education of amateurs. The Amateur Radio Health Group filed comments requesting that Amateur Radio be included in the new regulations, citing some instances where amateur installations could exceed the exposure levels in the Standard and noting that not all hams have read the educational material available on the topic. The FCC took no further action until the US

Table 1: Maximum Permissible Exposure (MPE) Limits

Frequency Range (MHz)	Controlled Exposure (6-minute average)			Uncontrolled Exposure (30-minute average)		
	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Electric Field Strength (V/m)	Magnetic Field Strength	Power Density (mW/cm ²)
0.3-3.0	614	1.63	(100)*			
3.0-30	1842/f	4.89/f	(900/f ²)*			
0.3-1.34				614	1.63	(100)*
1.34-30				824/f	2.19/f	(180/f ²)*
30-300	61.4	0.163	1.0	27.5	0.073	0.2
300-1500	--	--	f/300	--	--	f/1500
1,500-100,000	--	--	5	--	--	1.0

f = frequency, in MHz

* = plane-wave equivalent power. (this means the equivalent far-field strength that would have the E- or H-field component calculated or measured. It does not apply well in the near field of an antenna.)

-- = not specified

How the IEEE C95.1 Standard Was Developed

I recently attended a one-day seminar conducted by the Chairperson of IEEE Standards Coordinating Committee 28, Non-Ionizing Radiation Hazards (SCC-28). This group has developed a number of IEEE Standards that relate to exposure to electromagnetic fields from 3 kHz to 300 GHz. This seminar educated engineers about the Standard and its development.

SCC-28 now has about 120 active members. About 200 more follow the Committee's work (including ARRL). SCC-28 is about 70% researchers, with others from various organizations and industry.

SCC-28 considers a large number of input sources and research papers. It evaluates these against scientific criteria. For example, they exclude papers that do not include measured RF field levels. The result included about 120 papers.

SCC-28 considered the topics and conclusions in these papers and combined them with the substantial collective knowledge of their learned membership. Finally, they reached a consensus that a standard for exposure could be set and did so.

An SAR (see the text of this article) of 4 W/kg determines the final Standard. This is the approximate level at which several animal species demonstrate temporary difficulty in performing complex tasks. (For example, a monkey trained to push a button six times to get a banana decided, when exposed to a 4-W/kg field, that he didn't want a banana. With removal of the field, he soon decided he was hungry, after all). The Committee deems these to be thermal effects. Human volunteers exposed to such fields usually asked, "Who turned on the sun?" They felt warm.

The Committee applied a

safety factor of 10, setting an SAR of 0.4 W/kg for controlled/occupational exposure and an additional safety factor of 5 (SAR = 0.08 W/kg) for uncontrolled exposure. The MPEs in the Standard and regulations account for how much energy the human body absorbs over different frequency ranges.

Some have suggested that this whole topic is unfounded—there are no adverse effects of RF energy. Several ARRL committees and other technical experts advise us that these Standards are realistic and we should heed them. I serve on two US standards bodies, and have participated in others. I know how difficult it is to find common ground in a large group. Given that 120 members of SCC-28 agreed upon this Standard, it is almost certainly based on sound scientific principles.

—Ed Hare, KA1CV

Congress added a mandate to the Telecommunications Act of 1996 for FCC to complete its work on revisions to the RF-exposure regulations.

It surprised ARRL when the FCC shortcut the process, going from a general proposal for new regulations to completed text in one fell swoop. FCC announced the new regulations in the 96-326 Report and Order, "Guidelines for Evaluating the Environmental Effects of Radio-Frequency Radiation."³

The Regulations

First, let's look at the regulations as they stand

at press time. (Also, see the sidebar, "ARRL Petitions the FCC for Change.") The most important change is that hams must now evaluate their stations for compliance with the FCC's RF-exposure regulations. (We were previously exempt from the evaluation, not the regulations.) Some hams think that these regulations apply *only* to hams. That's not true. The regulations have always applied to a wide range of services.

Most amateur stations already meet the exposure limits described in the regulations, especially considering things like duty cycle and antenna patterns. Most hams need only understand some new regulations and perform a "routine analysis"

of their station operation.

The regulations cover RF *exposure*, not RF *emission*. The regulations limit our signal strength in areas where it affects people.

Maximum Permissible Exposure (MPE)

The regulations have specific MPE requirements for radiated electric fields, magnetic fields and power density. (See Table 1.) MPEs are derived from the Specific Absorption Rate (SAR) at which tissue absorbs RF energy, usually expressed in watts per kilogram (W/kg). The FCC MPEs are not based strictly on IEEE C95.1, but rather on a hybrid between that Standard and one developed by the National Council on Radiation Protection and Measurements (NCRP),⁴ a body commissioned to develop recommendations for federal agencies.

From a safe SAR, the Standards and regulations set MPEs that vary with frequency. The most stringent requirements are from 30 to 300 MHz because various human-body resonances fall in that frequency range.

MPEs assume continuous-duty and operation. The regulations, however, allow us to average the total power over 6 minutes for controlled environments and 30 minutes for uncontrolled environments. This average considers both the duty factor of the operating mode and the actual on and off times over the worst-case averaging period.

Exposure "Environments"

The regulations define two primary RF-exposure environments: "controlled/occupational" and "uncontrolled/general public." In a "controlled" RF environment people know that RF is present and can take steps to control their exposure. These are primarily occupational environments, but the FCC includes amateurs and their immediate households (families). This applies to areas where you control access. The limits for controlled environments are evaluated differently (less stringent) than those for uncontrolled environments.

"Uncontrolled" RF environments are those open to the general-public, where persons would normally be unaware of exposure to RF energy.

This applies to all property near your station where you don't control public access: sidewalks, roads, neighboring homes and properties that might have some degree of public access.

The regulations require amateurs to evaluate their stations for both controlled and uncontrolled exposure areas.

Categorical Exclusions

All Amateur Radio stations must comply with MPE limits, regardless of power, operating mode or station configuration. (Even Ed Hare's 10-mW station must comply.—*Ed.*) However, the FCC presumes that certain stations are safe without an evaluation. Those are:

- Amateur stations using a transmitter power of less than 50 W PEP at the transmitter output terminal.
- Mobile or portable stations using a transmitter with push-to-talk control.

Paperwork

Other than a short certification on Form 610 station applications, the regulations do not normally require hams to file proof of evaluation with the FCC. The Commission recommends, however, that each amateur keep a record of the station evaluation procedure and its results, in case questions arise.

Examinations

The regulations add five questions on the topic of RF exposure to each Amateur Radio examination for Novice, Technician and General class licenses. The Question Pool Committee (QPC) is addressing this in the normal cycle of changes to the question pools. The Novice and Technician pools were released on December 1, 1996. (ARRL has asked the FCC to extend the deadline for the General Class question pool to its normal cycle, December 1, 1997.)

This entire matter has very much been a moving target, with changes forthcoming from every direction. I commend all QPC members, including the ARRL/VEC, for their diligent work to meet the tight deadlines imposed by these regulations.

ARRL Petitions the FCC for Change

No one, including ARRL, had an opportunity to comment on the specific regulations announced by the FCC. The regulations are significantly different from what the FCC proposed in the original Notice of Proposed Rulemaking. The FCC simply did not follow the "rules to make the rules." This lack of due process forms a significant part of several Petitions for Reconsideration.

There are petitions "on the plate" from industry and the amateur community. When the regulations were first announced, ARRL filed an emergency petition for relief from an implementation error that required question pools revision well before the effective date of the regulations.

Then our Laboratory staff, RF Safety Committee and outside experts poured over the 180+ page Report and Order (see note 3). We found many errors and flaws in the requirements as written.

The 50-W threshold for categorical exclusion is arbitrary: While the MPEs vary with frequency, the 50-W level does not. We ask that the 50-W level be increased at some frequencies, consistent with the MPEs. Some other services have exclusions when the antenna location is 10 meters from areas of exposure.

At HF, 150 W to any antenna would be unconditionally safe when the antenna is 10 meters from areas of exposure—with a significant safety margin. We asked the FCC to add these criteria to the 50-W criterion already in the regulations.

We did not ask for any change to the 50-W criterion at VHF and higher because some station and antenna configurations could result in fields that exceed the MPEs.

We considered higher limits, for HF, with a greater antenna separation. A safety margin similar to that for the 150-W scenario would require a rather great distance at some frequencies. We backed off this path because it might be misinterpreted. Local officials might assume that the worst-case distance for such high-power stations should apply to all amateur stations.

Part of the ARRL's petition for reconsideration asks the FCC to preempt local regulation of RF exposure. The congressional mandate to the FCC included the requirement to develop preemption of local regulation of RF exposure resulting from the operation of radios in the Personal Communications Services (of which we're not). In order to do so, they need the federal RF-exposure regulations. The result is that the Amateur

Radio Service bears the burden of these new regulations without the benefits of preemption.

As the FCC and amateur communities wrestled with understanding the requirements and rewriting Bulletin 65, it became apparent that neither the FCC nor the amateur community could meet the January 1, 1997, implementation date. If the FCC manages to complete Bulletin 65 by the target date of December 1, 1996, that would give amateurs only four weeks to obtain it, read it, understand it, perform the needed calculations and take steps to correct any problems. For example, if a ham wants to move a tower, it could require zoning approval and other paperwork. In some areas of the country, winter would prevent completion.

At their October meeting, the ARRL Board of Directors voted to ask the FCC to extend the implementation date by one year. The ARRL then joined the growing number of organizations and individual seeking relief from the short deadlines for these regulations. At press time, there has been no decision on any of the petitions for reconsideration before the FCC (although this may have all been decided by the time you read this).

—Ed Hare, KA1CV

Routine Station Evaluation

The regulations require amateur operators, whose stations are not categorically excluded, to perform a routine analysis of compliance with the

MPE limits. The FCC is relying on the demonstrated technical skill of Amateur Radio operators to evaluate their own stations.

The FCC regulations do not require field-

strength measurements. Measurements are one way to perform an analysis, but they're very tricky. With calibrated equipment and skilled measuring techniques, (2 dB error is pretty good. In untrained hands, errors exceeding 10 dB are likely. A ham who elects to make measurements will need calibrated equipment (including probes) and knowledge of its use. Many factors can confound measurements in the near field.

Most evaluations will be comparisons against typical charts to be developed by the FCC, relatively straightforward calculations of worst-case scenarios or computer modeling of near-field signal strength. The FCC encourages flexibility in the analysis, and will accept any technically valid approaches. Once an Amateur Radio operator determines that a station complies, operation may proceed. There's no need for FCC approval before operating.

FCC Office of Engineering and Technology "Bulletin 65"

To help hams perform the routine evaluation, the FCC is revising an existing document: *Evaluating Compliance With FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation* (also known as "OET Bulletin 65.")

At press time, Bulletin 65 is not complete. The ARRL and others have been offering specific comments to the FCC, after reviewing the first draft. There has been considerable discussion about what the document should contain. So far, all parties agree on two points: The material should be easy to use, and there should be more than the three pages devoted to Amateur Radio in the draft copy! The ARRL has gathered a group of technically astute volunteers to help staff and the RF Safety Committee select the most useful course of action. When the document is complete, another article will discuss the details of Bulletin 65.

Stay Tuned...

This article accurately presents the best available information as *QST* goes to the printer.

(Every time we got to "where it's at"—it moved.) You can get frequent updates from *The ARRL Letter*, W1AW bulletins and our RF-Safety Resource page on the ARRL Web site (look for the RF Safety News link on <http://www.arrl.org>) as new information develops. If the FCC grants our several Petitions for Reconsideration, we will have ample time to update ARRL publications and write additional *QST* articles to give you the specific information and tools you'll need to comply with the regulations.



Notes

1. IEEE C95.1-1982 has been superseded by IEEE C95.1-1991. Copies are available from IEEE Sales Office, 445 Hoes Ln, PO Box 1331, Piscataway, NJ 08855-1331; tel 800-678-4333; fax 908-981-9667; e-mail customer.service@ieee.org; Web <http://stdsbbs.ieee.org/faqs/order.html>.

2. ARRL publications are available from your local ARRL dealer or directly from ARRL. Mail orders to Pub Sales Dept, ARRL, 225 Main St., Newington, CT 06111-1494. You can call us toll-free at 888-277-5289; fax your order to 860-594-0303; or send e-mail to pubsales@arrl.org. Check out the full ARRL publications line on the World Wide Web at <http://www.arrl.org/catalog>.

3. These are available electronically on the FCC's Office of Engineering and Technology Web page. See http://www.fcc.gov/Bureaus/Engineering_Technology/Orders/fcc96326.txt. Contact the FCC's Int'l Transcription Service 1270 Fairfield Rd, Gettysburg, PA 17325; tel 717-377-1433 for paper copies. Note: FCC documents may refer to ANSI/IEEE C95.1-1991 as C95.1-1992.

4. NCRP Report No. 86, "Biological Effects and Exposure Criteria for Radio Frequency Electro-magnetic Fields," ISBN 0-913392-80-4. National Council on Radiation Protection and Measurements, 7910 Woodmont Ave, Bethesda, MD 20814; tel 301-657-2652, fax 301-907-8768, e-mail ncrp@ncrp.com; Web <http://www.ncrp.com>.

Spectrum Guide, Radio Frequency Allocations in the United States, 30 MHz—300 GHz

Spectrum Guide,
Radio Frequency
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30 MHz—300 GHz

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\$30.00,

374 pages, paperback
ISBN 0-9641546-1-7

Published by

New Signals Press

Available from
technical booksellers
and from

Publication Services

824 W. 10th St., Suite 100

Austin, TX 78701

800-460-0090

512-795-5006

Fax 512-478-9263

.....*Reviewed by Don Bishop (LF)*.....

Bennett Z. Kobb's *SpectrumGuide, Radio Frequency Allocations in the United States, 30 MHz—300 GHz* has a wonderful combination of organization, technical detail and commentary.

Have you ever seen a wall chart of radio spectrum allocations? *SpectrumGuide* provides detail that many times is required to understand such charts.

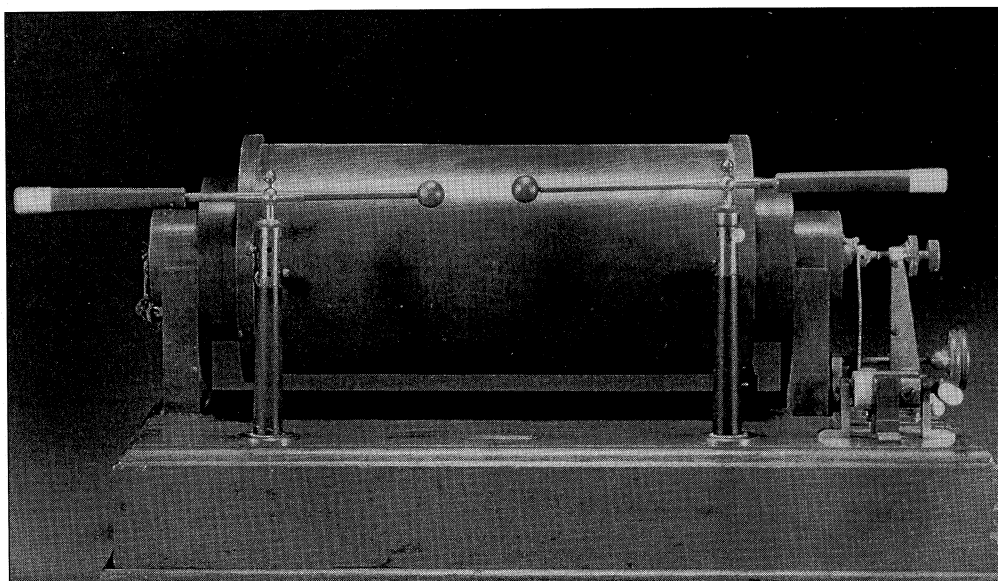
Do you ever read about government proposals to reallocate spectrum from one use to another? The guidebook gives the background on current uses and explains pending proposals.

I read the guide front-to-back, something most readers probably would not need to do. Because its spectrum descriptions are arranged in order from lowest frequency to highest, and because my familiarity with spectrum use is concentrated at the low end, the more I read, the more I found interesting. OK, so I skipped the 70 pages of international footnotes.

I enjoyed Kobb's short histories and commentaries on uses for portions of the spectrum. He had edited magazines and newsletters having to do with spectrum use, and he currently contributes to several newsletters. It is clear that he stays up to date on changes in spectrum use, and his historical notes and comments help to put trends in perspective.



The U.S. NATIONAL MARCONI MUSEUM



One of Marconi's earliest spark transmitters assembled at the Hall Street Works, Chelmsford, U.K., on display at the Marconi Museum.

The Guglielmo Marconi Foundation, U.S.A., Inc. & The U.S. National Marconi Museum is located in the historic district of Bedford, New Hampshire, marking the town's link with Bedford, England, where Marconi spent much of his childhood. The exhibits follow with equipment, literature, audio-visual presentations - the development of radio communications, from "Spark to Space." Displayed is early Marconi wireless equipment together with the progression of radios up to the current cellular telephone exhibit. Included too, will be displays of early medical RF therapy, broadcast, amateur, mobile two-way radio and personal communication system products.

An important aspect of the 14,000 square foot building is its John Frey Technical Library, containing thousands of radio communication periodicals, some in a series dating from 1920. All the publications are indexed by subject, author, date and publisher, and cataloged on CD-Rom that can be accessed by Internet on the library computer. The shelves also hold hundreds of engineering, text and reference books. The visitor to the museum will enjoy browsing through historical literature.

There is a restoration room for repair of vintage radios, a machine shop and a facility room for educational lectures to school groups, and for meetings of electronic orientated organizations. Plans are underway to house a 100 watt FM broadcast station in the educational section of the FM band, with emphasis in its programming of world scientific news.

Since the Museum is education oriented, the Marconi Legacy Fund has been established to provide scholarships to students in the pursuit of studies related to the art of radio communications. Your donation of vintage - and - modern electronic equipment, surplus to your needs, will be most welcome to benefit the Marconi Legacy Fund. As the Marconi Foundation is a non-profit corporation, all donations will be acknowledged for personal and tax records.

For information on how to contribute equipment, or join the Guglielmo Marconi Foundation U.S.A. and the Marconi Wireless Society International, please contact:

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Edmund Laport: The self-made genius

.....
Contributed by Ray Minichiello
.....

*Ray Minichiello
is
Chairman
of the
Marconi Foundation &
Museum*

Two ships passing in the night may be an old adage, but is fact when relating the story of two men, Guglielmo Marconi and Edmund Laport.

Guglielmo Marconi hardly needs in introduction. While Marconi indulged himself in wireless telegraph and radio broadcast receivers, Edmund Laport became prominent in the design of radio broadcast transmitters. A native son of New Hampshire, Edmund Laport was born in Nashua on July 2, 1902. Shortly thereafter the family of six moved to Concord where Edmund graduated from Morrill School of Mechanical Arts in June 1920. In that same year, Edmund Laport passed the Department of Commerce examination for his First Class Commercial Radio Operators License. Considering that Edmund Laport had just finished high school, passing this rigorous examination was quite an accomplishment.

It was not long after that that Mr. Laport distinguished himself in the field of radio broadcasting engineering. Following a brief employment at the General Electric Broadcast Division at Schenectady, New York, Mr. Laport joined the Westinghouse Broadcast group in Springfield, Massachusetts. In 1927, at the age of twenty-five, he went to Peking, China to erect three radio broadcast stations for the Chinese Government.

On his return to Springfield he promptly went to work to design a fifty-thousand watt radio broadcast station for installation in Rome, Italy. On September 1, 1929, he headed east to England aboard the R.M.S. Olympic, the sister ship of the R.M.S. Titanic that sunk seventeen years earlier on April 14, 1912. From England he would continue his journey to his final destination, Rome, Italy.

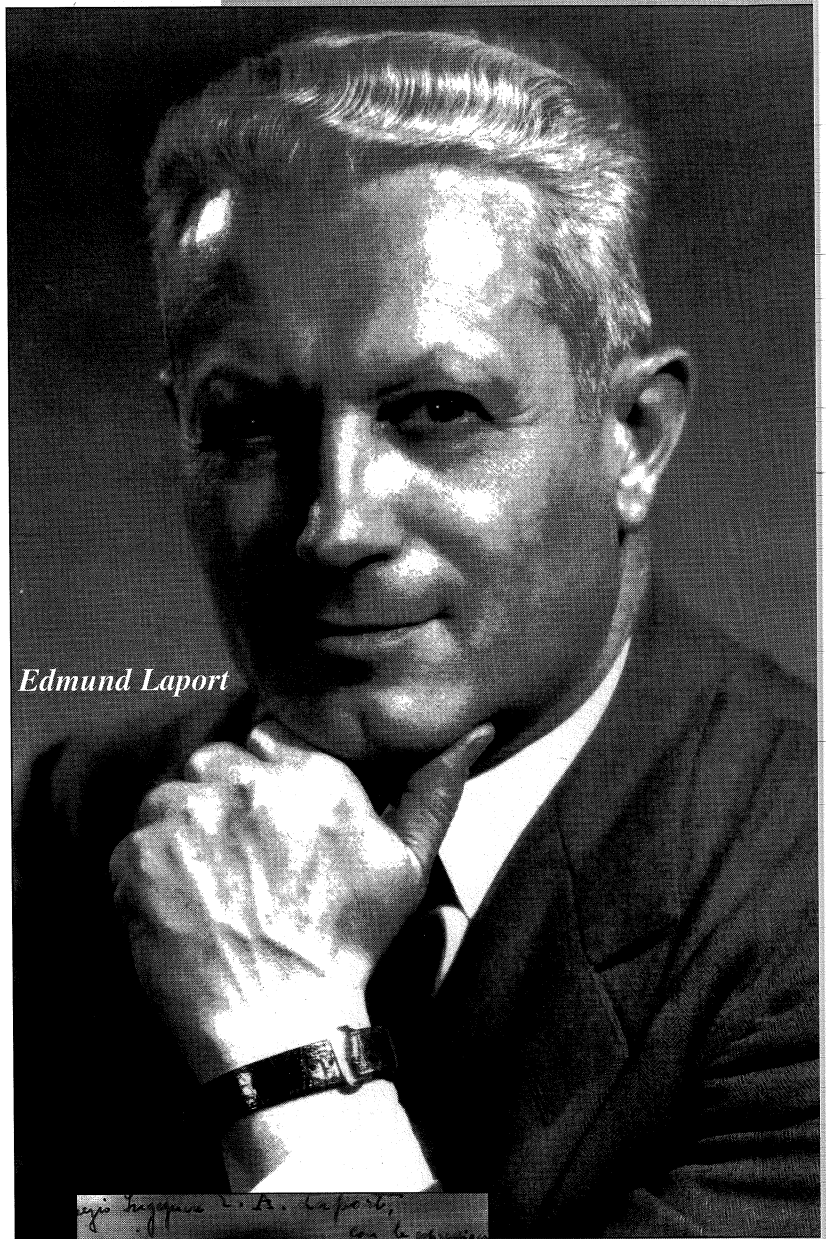
By coincidence, Marconi was aboard his own vessel headed west toward the United States to oversee installations of his own wireless shore stations. The two ships did indeed pass each other in the night. Although Marconi and Laport never met there was a certain parallel in their life experiences. Each enjoyed reading and writing Latin, each

s behind Radio

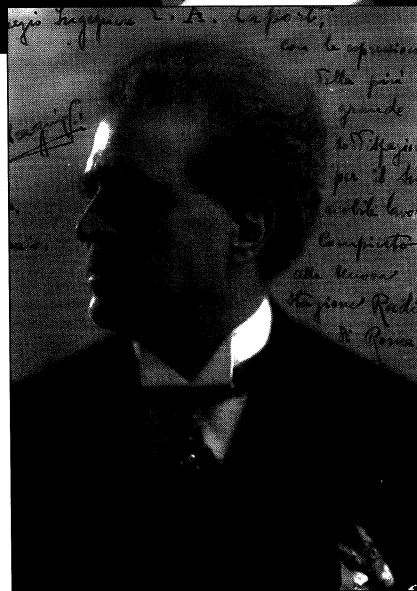
learned to speak several languages, and each made a major contribution to the field of radio engineering and to society.

On arrival in Rome he established his office to oversee the design and construction of the transmitter building together with its massive antenna system at the remote site in Santa Palomba on the outskirts of Rome. All this prior to the arrival of the components to be assembled of a 50,000 watt broadcast station, to be the most powerful radio station in Europe and Asia. Edmund Laport, at the young age of twenty-seven, had the enormous responsibility of managing its installation and acceptance by the Italian government.

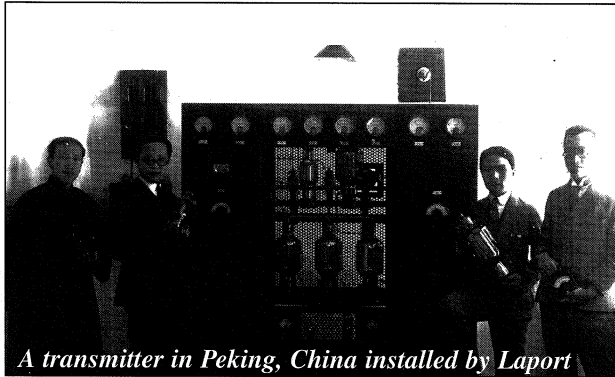
The arrival of Laport on the scene caused quite a stir with the Italian engineers and the press. The old heads among the astute Italian engineers were astounded to see this slim, unassuming young man who introduced himself as the designer and installation manager of the world's most powerful broadcast transmitter. In Italy, engineering tradition called for a young engineer be a disciple of the learned ones, usually reaching middle age before becoming a respected authority. But, contrary to the tradition, here comes Edmund Laport still maintaining a boyish charm at twenty-seven, and to the amazement of all, is quickly acknowledged as a lead authority. The Italian press sensationalized the arrival of such a young man assigned to this monumental project. Especially since his presence required formalities with heads of state, programmers and the Academy of Arts.



Edmund Laport



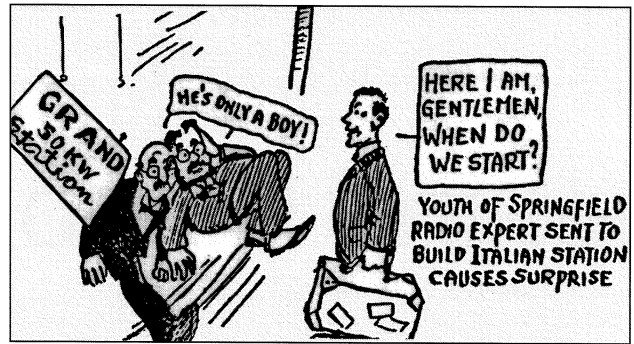
Pietro Mascagni became a lifelong friend and was involved with Laport in the broadcast design of concert halls and studios in Italy.



Encountering only few problems in the erection of the broadcast station, the transmitter was accepted by the Minister of Communications, Costanzo Ciano. Since in Italy, the Academy of Arts is associated with all forms of broadcasting to the public, the famous composer Pietro Mascagni became involved with Laport in the design of the broadcast concert hall and studios. Working closely together, Laport and Mascagni developed a lifetime friendship. Pietro Mascagni composed such famous operas as, "Cavalleria Rusticana," "Parisiene," "Amico Friz" and many other classics.

The inaugural broadcast on the evening of January 19, 1930, featured Pietro Mascagni conducting a four-hour symphonic program comprising selections mostly from his own works. To this day the program is regarded as one of the greatest musical programs ever presented on radio. The concert studio, in addition to the orchestra, was filled with high level members of the government and royalty. The highlight of the evening was a well earned tribute to Edmund Laport addressed to the radio audience by Pietro Mascagni, a statement of gratitude for a job well done.

The Italian government, recognizing the value of public radio broadcasting, contracted immediately with Marconi to construct a twelve kilo-watt short-wave station. The Marconi station, assigned call letters I2RO, carried the same daily programming of I1RO as in the regular broadcast band. The Marconi station I2RO became the favorite of short-wave listeners around the world during the period of 1930 to 1940.

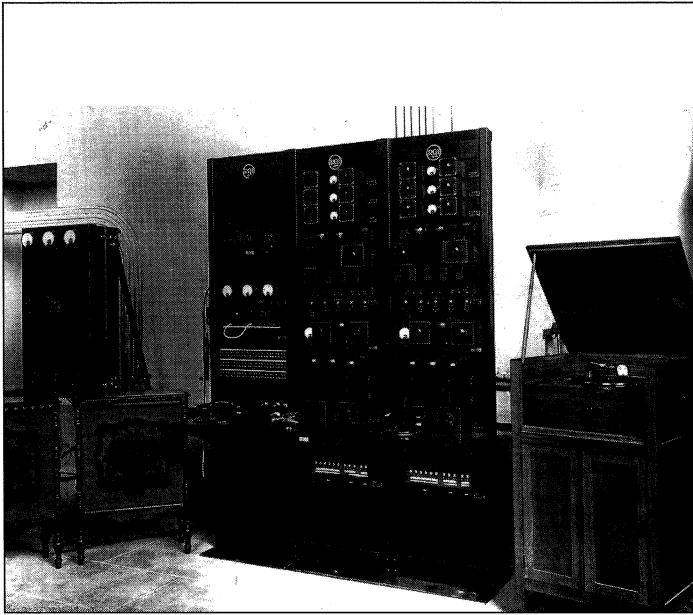


Cartoon from the Springfield News, October 16, 1929.

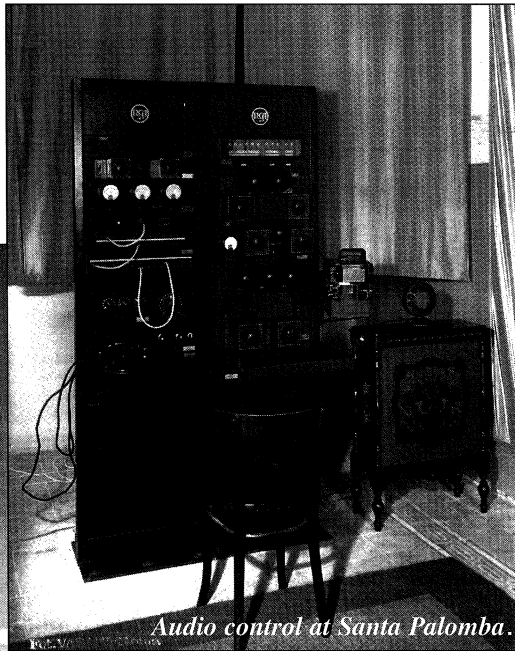
Following a lavish farewell dinner in his honor, Edmund Laport boarded the S.S. Roosevelt on May 20th to New York, then shortly thereafter back to Westinghouse in Springfield. At his engineering desk Laport developed designs of the most powerful broadcast stations in the United States and abroad. In 1936 Laport joined RCA. Two years later he was named Vice President and Director of Communication Engineering, the most highly recognized level of responsibility in the entire radio industry.

Edmund Laport never became a household name like that of Marconi. While the name of Marconi was attached to practically all radio broadcast receivers numbering in the millions, the credit to provide the programs belonged to the transmitter and antenna systems designed by Edmund Laport. Many Radio Club members retired from the Broadcast Industry will recall Edmund Laport as the transmitter and antenna genius of his time. A few of his installations were: WEAJ New York, WJZ Boundbrook, N.J., KFI Los Angeles, CA., WMTR Hollywood, CA., WEAN Providence, R.I., and WHK Cleveland, Ohio.

The significant similarity in the lives of Marconi and Laport is the fact that neither had the benefit of a college education. What they did have in common was a mother's inspiration. Each was taught the rewards of self-development. The parental encouragement at an early age to cultivate a taste for knowledge, read and study was the secret bestowed them. Letters to the young Marconi from his mother, as found in early documents, verify the wise words of wisdom imparted



Audio control room at main studios in Rome.



Audio control at Santa Palomba.



50,000 watt transmitter at Santa Palomba, Italy.

to him by his mother.

Men like Marconi and Laport, and also such names as Edison, Iacocca, Gates and Bell, are not the only examples of success by self development. In industry, General Electric Company as an example seeks out competence and not degrees as a requisite for executive roles. Two of the greatest presidents of General Electric, Charles Coffin and Charles Wilson, did not receive the benefit of college training. In fact, until recently, of the forty-one top executive officers, twelve did not have degrees! The proven record of men in General Electric Company and the success of Marconi and Laport alone is a powerful testimony to the rewards of self development.

The Marconi Museum is fortunate to have in its library the personal scrapbook of Edmund Laport, donated by his son, Robert Laport, now residing at Chapel Hill, North Carolina. Also received was a hard-cover

copy of a book written by Laport, "Antennas."

Although it is the Spanish edition, antenna designs are derived from the same most complex form of mathematics as the one printed in English.

Visitors are welcome to examine the personal scrapbook of Edmund Laport at the Museum Library by telephoning for a private viewing.



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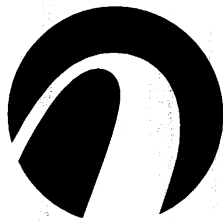
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Errata:

Regarding the Spring 1998 Proceedings issue in the Jim Hawkins' feature, the web site address for *Jim Hawkins, Radio Room* was missing from the copy. That web address is <http://www.exit109.com/~jimh/radio.shtml>.

In the same article, the caption for the photo on page 8 was incorrect. It should read "The Voice of America facility in Greenville, N.C. This facility is especially historic since it has been torn down since the photos were taken in 1991 and 1992."

Obituaries

Marcus Glaser, radio electronics pioneer

Marcus Glaser, founder of Glaser Electronic Development Company and an IEEE senior member, died 28 Dec. 1996 in Dayton, Ohio, USA. He was 89.

Mr. Glaser Graduated from Pratt Institute in Brooklyn, New York, in 1931. He began his career in 1929 with Brunswick Radio Company in its test equipment division.

During Word War II Mr. Glaser designed numerous pieces of electronic equipment used in the military services. During this time he was also the vice president and chief engineer at DeWald Radio and TV Corporation in Long Island, New York, USA. From 1966-83 he owned Glaser Electronic and was a consultant for the Department of Rehabilitation Medicine and Restorative Care, Wright State University School of Medicine, Dayton Ohio.

He owned numerous U.S. patents for his electronic inventions, many seminal to the field, and published a number of articles, including a book entitled "Navy Electrical and Electronic Training Aids." He was also a life member of the Radio Club of America.

Lillian Gunther, 87, pioneering woman pilot

Lillian M. Gunther, 87, of Todt Hill, the first woman from New York to receive a commercial pilot's license, died yesterday in Staten Island University Hospital, Ocean Breeze.

She was also the first Staten Island woman to obtain a private pilot's license.

Born Lillian M. Madden in the Bronx, Mrs. Gunther moved to New Dorp in 1930 and to Todt Hill in 1954.

In March 1941, Mrs. Gunther earned the distinction of being the first Island woman to hold a private pilot's license under the Civil Aeronautics Authority (CAA) course.

She told the Advance then that she looked "forward to getting a

commercial pilot's license some day."

"Some day" arrived in February of 1942 when Mrs. Gunther joined the ranks of the nation's small number of women commercial pilots and became the first woman from New York state to receive a commercial license.

In an interview with the Advance in 1942 Mrs. Gunther said she was always interested in doing things that "girls don't generally do."

She added: "I always wanted to fly my own plane."

In addition to being a pilot, Mrs. Gunther was also an amateur radio operator — her "second love," she said.

Mrs. Gunther credits her husband, Frank A. Gunther, a former president of the Radio Club of America, with inspiring in her a keen interest in radio communications.

Mr. Gunther is a pioneer of radio communication who worked directly with Maj. Edwin Armstrong on the invention of FM radio. He is also a former commander of the Staten Island Squadron of the Civil Air Patrol, and a former president of the Radio Engineering Laboratory.

Mrs. Gunther was a conga and rumba enthusiast and told the Advance she would sometimes trade dance lessons with pilots in exchange for flying pointers and trips.

She also enjoyed sailing and swimming.

Mrs. Gunther attended Wagner College, Grymes Hill.

She was a member of the Radio Club of America; the Quarter Century Wireless

Association; the New York Yacht Club; the Richmond County Yacht Club; and the Richmond County Country Club.

Surviving are her husband, Frank; two sons, Frank M. and Robert C.; five grandchildren, and four great-grandchildren.

The funeral will be Monday from the Casey Funeral Home, Castleton Corners, with a service at 10 a.m. in St. Andrew's Episcopal Church, Richmond. Burial will be in Moravian Cemetery, New Dorr.



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(a current resume may be attached to the application)

Please list the name of a member to whom you are personally known and who will sponsor you.

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The Radio Club of America was founded in 1909 by a group of the industry's pioneers, and is the first active electronics organization in the world. Its roster of members is a world-wide Who's Who that includes many who founded and built the radio industry.

The Club's objectives include promoting cooperation among individuals interested in electronic communications and in preserving its history. The Club administers its own Grants-In-Aid fund to provide educational scholarships from tax-deductible contributions of the Club's members and business organizations.

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