December 2007
www.ieee.org/lmc

IEEE life members newsletter

contents

IEEE

Involvement with IEEE Proves Retirement Isn't for the Weary

Lyle D. Feisel, Chair, IEEE Life Members Committee
l.feisel@ieee.org

In my salad days—and even, I guess, in my main course days—I used to wonder what retired people did with their time when they were no longer spending 50 hours a week in the office and bringing work home at night. Now that I am in my dessert days, I am finding that, lo and behold, I am as busy as ever and have quite a backlog of things to be done in the future. (You will be relieved to know that I am not going to push this metaphor any further and contemplate my after-dinner drink days. Dessert is far enough.)

Dorothy and I do a lot of traveling, and I have a good workshop where I turn out projects of various size and complexity. Boating is good here in Maryland on the Miles River and, in the summer, the blue crabs command a considerable amount of my attention. And of course there is the church and the investment club and the Sail Committee that wanted some help with strategic planning. But I still have time for IEEE activities, and I am most thankful that the organization continues to offer me opportunities for involvement. I hope that you are also still active with our professional society. If not—or if you would like some additional involvement—there is plenty of opportunity.

As many of you know, Life Members, in about 40 sections, have formed Life Member Groups. If you are in one of those sections, this is an opportunity for you to interact with other life members and to provide whatever level of leadership you wish. If your section doesn't yet have such a group, you might consider starting one. The groups have various agendas, but they tend to provide a good mix of social interaction and technical programs at a general level.

Another opportunity for you to become involved is with IEEE conferences in your area. Very often, the conference organizers are looking for people to serve as ushers and helpers in various capacities. The pay isn't very good but you get to hang out with a lot of great IEEE Members.

At many IEEE conferences and meetings, there will be an IEEE booth that advertises membership as well as the various services that the IEEE provides. There is a need for people to staff the booth. Life members, with their long service and their obvious dedication to the organization, could educate nonmembers about the IEEE and provide information about the extent of our activities.

Finally, you can use just a small amount of your time to make a donation to the IEEE Life Members Fund. The fund provides financial support for a number of interesting projects including student activities, awards, historical projects, and more. This year, in recognition of contributions of US$100 or more, you will receive a very handsome coaster depicting an IEEE milestone. I hope you will join me and several thousand other life members in supporting the fund.

I must also tell you—with considerable regret—that I will complete my two-year term as chair of the Life Members Committee on 31 December. I have enjoyed serving in the position, and I have particularly enjoyed the e-mails that so many of you have sent. My e-mail address is still L.Feisel@ieee.org, and I would enjoy hearing from you.

Here's wishing you a happy and healthy 2008 and continued involvement in IEEE.

Membership Renewal/Member Elevations

Reminder – Membership Renewal

As a reminder, even though the membership dues for IEEE Life Members have been waived, all Life Members are required to renew their membership. Renewal notices have been sent to all members. Please take the time to return the renewal notice you received by mail or renew online via http://www.ieee.org/renewal. In order to renew your membership online, you must have an IEEE Web account. Please renew as soon as possible but no later than 25 February 2008.

Life Member Elevations

Being an IEEE Life Member indicates that an individual has achieved a distinguished status that has been reserved for those with a long association with the IEEE. Achieving this status does not alter your privileges or responsibilities in the IEEE, but it does mean that the IEEE will waive base membership dues. An individual is still responsible for Society dues unless you have met the five years of Society or IEEE-SA membership, immediately prior to attaining Life membership.

We are please to report that 2,028 members will be elevated to Life Member status effective 1 January 2008. These individuals have received a congratulatory letter from the IEEE president, an LM certificate, and a membership card.

If you have an inquiry regarding your IEEE Membership, please contact:

IEEE Member Services
445 Hoes Lane
Piscataway, NJ 08855 USA
+1 800 678 4333 or +1 732 981 0060
www.ieee.org/memberservices

The IEEE Life Members Fund (LMF) supports the activities of interest to Life Members, potential engineers and engineering students. The LMF is supported by the generosity of IEEE members. In recognition of contributions of US$100 and higher, donors will receive this distinctive coaster.

Want to Donate During Your Online Dues Renewal?

1) When you have completed your online renewal, click the yellow button—View Cart/Proceed to Checkout.
2) There is a blue box labeled, “What Do You Want To Do?” Click the link—Make a donation to the IEEE.
3) You have now arrived at the Web page reserved for donations—Contributions.
4) Browse the choice of funds. Fill in the amount you would like to contribute. Click the grey button—Make Contribution. To contribute to more than one fund, write the contribution amount next to each corresponding fund and click “Make Contribution” for each fund.
5) Your shopping cart balance will increase (the screen does not change).
6) To complete the online dues renewal process, click the yellow button—View Cart/Proceed to Checkout.

More information regarding online dues renewal can be viewed at http://www.ieee.org/organizations/foundation/dues-renewal.html

Thank you for your continued support and generosity to the IEEE Life Members Fund.

As per the IEEE Board of Directors, a name change for IEEE Regional Activities has been approved. All previous references to IEEE Regional Activities should now be referenced as IEEE Member and Geographic Activities (MGA).

Use Your IRA as Never Before

By Karen Galuchie, IEEE Development Office

U.S. IEEE Life Members 70 and older may be running out of time to take advantage of the IRA Charitable Rollover Provision, allowed under the Pension Protection Act of 2006, to make a gift to the IEEE Life Members Fund. This provision allows U.S. taxpayers to make tax-free distributions of up to US$100,000 from traditional or Roth Individual Retirement Account (IRA) assets to a qualified charitable organization, such as the IEEE Foundation.

This Provision is set to expire on 31 December 2007, but there is a possibility that it will be extended. On 12 Nov 2007, the United States House of Representatives passed the Temporary Tax Relief Act of 2007 (H.R. 3996), which includes a one-year extension of the (IRA) Charitable Rollover Provision. However, it must still be reviewed and voted upon by the United States Senate and if passed, signed into law by President Bush.

Highlights of the IRA Charitable Rollover Provision:

- The IEEE Foundation must receive your gift before 31 December 2007.
- You must be age 70_ or older.
- Distributions of any amount up to US$100,000 are allowed.
- Couples with separate IRAs can each gift up to US$100,000.
- Gifts must be transmitted directly to the IEEE Foundation from the IRA plan administrator.
- Gifts may be applied to satisfy your minimum required distribution from your IRA for 2007.
- Only traditional IRAs and Roth IRAs are eligible under this Provision.
- Because no income will be reported on your tax return, you will not receive a charitable income tax deduction for the gift.
- A gift receipt from the charity is specifically required for a donor to substantiate a charitable IRA distribution.

To make a gift to the IEEE Life Members Fund by taking advantage of the Charitable IRA Provision before it is too late, please contact your IRA manager and direct him to transfer the funds to the IEEE Foundation. To designate your gift to the IEEE Life Members Fund, instruct your IRA manager to make the gift payable to the “IEEE Foundation – IEEE Life Members Fund.” To ensure you receive proper acknowledgment for your gift, be sure to share your intentions with me, Karen Galuchie, from the IEEE Development Office, by telephone at +1 732 562 3860 or via e-mail at k.galuchie@ieee.org. If you have any questions, please contact me at the telephone number or email address above.

The IEEE Life Members Fund (LMF) is one of the over 100 funds administered by the IEEE Foundation. The LMF supports educational and professional projects that are of interest to IEEE Life Members and that reflect the breadth and range of the engineering field and make a significant, positive, global impact on the profession.

The IEEE Foundation is an organization qualified under U.S. Internal Revenue Code 501(c)(3) and is a qualified charitable organization as described in the Pension Protection Act of 2006. Its U.S. Employer Identification Number (EIN) is 23-7310664.

The information in this article is for educational purposes only and is not intended as legal, tax or investment advice. If you are considering a planned gift to the IEEE Foundation, we highly recommend you consult with your own tax, and legal advisors to determine the best options for you.

IEEE Mentoring Connection Program Seeks Life Members to Mentor Young Professionals

The IEEE Mentoring Connection is looking for “online” mentors to help guide younger IEEE professionals in career planning and professional development. Currently, 989 mentees—but only 440 mentors—have registered to participate. Mentor participation is open to all IEEE members above the grade of Student Member.

Gary Hinkle, a mentor in the program, says “Helping young engineers develop in their careers is very rewarding. Working with some of these individuals has proven to be quite a challenge, because of the diversity among those seeking mentors. I’m glad to be contributing to this program.”

The program enables mentees to select their mentoring partner online from a list of individuals who have volunteered to serve as mentors. After mentors are identified as a potential match, they are contacted and asked to begin establishing a relationship. IEEE mentors presently in the program include those in various engineering-related industries, government and academic positions, private consultant practices, and retired workers.

Interested members can visit http://www.ieee.org/mentoring for information on the roles and responsibilities of each mentoring partner, including additional program information and an FAQ page. Potential mentors are asked to review the time and effort commitment to the program necessary to ensure a successful mentoring partnership.

To enter the program Web site, please go to http://www.mentoringconnection.com and use the IEEE Group ID “IEEE2006” to enter for the first time. Once in, you will need to set your own User ID and Password.

If you have any questions, please contact Cathy Downer, Member and Geographic Activities, at c.downer@ieee.org.

Life Members—A Natural Resource

Wanted: Mature engineers who have lived under different circumstances and possess various experiences that have influenced their individual attitudes and aspirations. A local resource that is willing to volunteer, and one that needs to be accessible to local Regions, Sections and societies.

Volunteering is a way for older engineers to remain involved in society following retirement from formal employment. It is a means of engaging the mind, staying active and staying independent. Engineers have the innate desire to be continually active for as long as possible. It's also a win-win situation, both for the engineer and the profession.

Worldwide, Life Members are a team of 25,000 strong, which can help play a pivotal role both within and outside the IEEE. We have backgrounds in science and technology, economics, various disciplines of electrical engineering, computer science, social science, communications, strategic planning, information technology, business, marketing, and administration.

Life members can serve as local area resources for:

- judging science fair competitions
- after-school homework programs in math and science
- manning booths at local technical conferences (i.e. handling registration, badging, etc.)
- speaking on various topics of technology
- teaching other senior citizens about new technologies (computers, Internet, e-mail, etc.)
- merit badge counselors for the Boy Scouts program
- writing articles on case studies experienced
- passing on lessons learned and the critical thinking required to deal with the demands of business based on technological advances
- seminars on real-life issues that today's engineers will encounter in their daily work
- bringing real-world experiences to all engineers and future managers from entry level to those in positions of responsibility for an organization's future.

Local volunteers can play a crucial role, often filling the gaps in relation to personal assistance, mentoring, community relations and leadership.

For further information contact your local Section Chair and/or local LM Affinity Group:

Life Member Affinity Groups

Participating in Life Member Affinity Groups activities is an excellent way individuals can remain active and provide a contribution to IEEE and your local community. As of 1 December 2007, 44 LM Affinity Groups have been formed (see the list below). If there's none in your area you can start one. In order to establish an LM group, you need the signature of six IEEE members who have indicated they would be willing to participate in LM group activities.

Lou Luceri, LS

Life Members Affinity Groups—1 December 2007

Region 1
- Boston
- Mid-Hudson
- New York
- Schenectady
- Syracuse

Region 2
- Northern Virginia and Washington
- Philadelphia
- Pittsburgh

Region 3
- Atlanta
- Charlotte
- Daytona
- Florida West Coast
- Louisville
- Melbourne
- Palm Beach
- Winston Salem

Region 4
- Cedar Rapids
- Chicago
- Twin Cities

Region 5
- Dallas/Fort Worth
- Kansas City
- New Orleans
- Oklahoma City
- Wichita

Region 6
- Buenaventura
- Montana
- Phoenix

Region 7
- Hamilton
- Kingston
- London
- Montreal
- Ottawa
- Southern Alberta
- Toronto
- Vancouver
- Winnipeg

Region 8
- France
- Israel
- Italy
- United Kingdom and Republic of Ireland

Region 9
- Chile
- Puerto Rico and Caribbean
- South Brazil

Region 10
- New South Wales
- Bombay

A Pig in a Poke

In the meat-packing business, hog carcasses are called "hot" before entering the cooler. Knowing the exact weight of each carcass as it enters the cooler is important in the packing business. Our system was dubbed "The Toledo Hot Hog" scale.

Around 1956, our company needed a method of digitizing and recording weight from carcasses being conveyed on an overhead rail into the meat cooler. The conventional pendulum dial scale was all we had to work with then. This scale included a gear rack with a movement of about two inches travel. We made a glass "chart" consisting of 1,000 equally spaced lines, which was covered by a shutter connected to the gear rack. As the weight on the scale increased, the shutter uncovered more lines on the chart.

An optical arrangement swept a light beam through the chart onto a photocell so that the number of pulses generated with each sweep was equal to the number of lines uncovered by the shutter. Thus, we had an electronic analog to digital (A/D) converter for weight.

Vacuum tube binary coded decimal (BCD) counters tallied the pulses from the photocell. These used four 12AU7 dual triodes, making up four "flip flops" with feedback to force reset after ten pulses. With four such counters we could count 10,000 pulses.

The carcasses swayed and bounced on the weighing rail, so we made and totaled ten consecutive weighings per carcass, then moved the decimal point,to divide by ten and get the averaging effect.

The digital recorder was a paper tape punch, which recorded a weight and ID number for each carcass. We could process about 20 carcasses a minute. Of course the packers wanted more speed, but that came later.

On early installations, things went well once we got the cleanup crew to stop hosing down the electronics and the paper tape people to stop splicing the punch paper tape with Scotch tape. Tape punches didn't like the Scotch tape glue in the punch dies, and the electronics didn't like water!

After a few weeks, our BCD counters began to fail. As I puzzled the problem while standing on the packing floor, a man with bib overalls and big work boots said, "Come in to my lab for a minute." There, just off the meat packing floor, was a well-equipped electronics lab. He put one of our counters under a binocular microscope, pointed to a solder joint on the printed circuit board (PCB), and pushed on a component lead with a small probe.

With a puff, a cloud of rosin dust arose! Cold solder joints were the culprits!

Those were the days before wave solder machines, and all the PCBs were hand soldered, obviously not well enough. So, after resoldering all of our PCBs, we were back in business.

It was another lesson in misleading appearances. That tech, who looked like a meat packer, was really a well-trained electronic trouble shooter! He helped us turn a real problem into a successful "Hot Hog Scale" product.

Roger Williams, LS
Spring Hill, FL

Wire, More or Less

I grew up in a mid-size town in Northern Bohemia, surrounded on three sides by Saxon territory. I must have been in my early double-digit years, and lived in the Edison-gasse, so called because the local power station dominated its other end.

Our doorbell had been powered by two LaClache cells, which my father had recently replaced with a small transformer. Since it consumed too little power to show on the meter, the power company had imposed a steep fee, which my father found so outrageous he switched back to the battery, and gave me the transformer for Christmas that year. He had also installed dollhouse lights for my (still single-digit) sister, and I had found the ignition coil of an old Ford at a junkyard.

The power station director's son was a classmate of mine and had taken me there, after giving me a tour of his father's fascinating realm. The giant old generators were still there, but the only thing running was a similar machine he called a "phase pusher" (Phasenschieber). The power now came from deeper inside Bohemia.

With the transformer I managed to produce some rather jarring sparks, and I had just read about "coherers." From a small eye dropper filled with iron filings, strapped to the vibrator of a discarded door bell—sans bell—I was able to build a receiver that turned on the dollhouse lights whenever I drew sparks from my elementary transmitter.

I couldn't wait for father, a mechanical engineer, to return from work that day to demonstrate my "wireless remote control." It worked, and I gazed up in expectation. He examined my rat's nest on the floor and finally said, "Not bad, son. Just tell me one thing. What's wireless here?"

"Pop," went my self-esteem.

Max J. Schindler, LM
Boonton, NJ

If offered, would you participate in an IEEE Life Members travel/tour program? If yes, please send your comments to lifemembers@ieee.org.

Father Knows Best

From 1960 to 1965, I worked at the military engineering department of Zenith Radio Corporation in Chicago. My group adapted the electron beam parametric amplifier (EBPA) tube, invented by the late Dr. Robert Adler, an IEEE Fellow who was best known as the "Father of the TV Remote Control," to military radar systems. I did analog and r.f. circuit design for these amplifiers.

We designed and built a prototype for use on frequency agile radars. The EBPA made use of cyclotron resonance and operated in a solenoid. In the agile version, the magnetic field, and therefore the current, had to be changed in a matter of a few microseconds in order to track the radar frequency.

When we tested the agile version of the EBPA, we found that the performance was degraded for a period after each frequency change. We met with Dr. Adler to discuss this problem. Someone noted that the solenoid was wound on an aluminum tube and wondered if the current induced in the tube by the changing magnetic field could be causing the problem.

Dr. Adler went to a blackboard and wrote down the formula for the inductance of a single turn. He also wrote down the conductivity of aluminum and the approximate dimensions of the tube. He then computed the time constant of the tube, which was consistent with the observed period of degradation. We wound a solenoid on a bakelite tube, which solved the problem.

I later computed the time constant, using the exact values for the dimensions and conductance of the aluminum tube. The result was within a factor of two of the value computed by Dr. Adler without reference to any drawings or handbooks.

Robert Gilchrist Huenemann, LM
Hollister, CA

Couch Potatoes Should Give Thanks to Adler

Just before Dr. Robert Adler died recently, at the age of 92, he was granted somewhere around his 200th patent. Although his inventions covered many technologies, the invention for which he was most famous (much to his continual amusement) was the Zenith Space Command TV remote control. He invented the "clicker." Invented in 1954, this was a handheld device that emitted high frequency (ultrasound) tones from little aluminum rods. When the TV viewer pushed a button on the "clicker," a small metal pellet struck the end of a rod, making that clicking sound. Each one of four different rods emitted an ultrasound that corresponded to the commands of On/Off, Channel Up or Channel Down, and Mute (the user heard only the click). On the other hand, the Space Command receiver heard only the ultrasound tones and responded to these commands.

As the number of sets with remote controls grew, we found that other things made ultrasounds that sometimes would trigger a response from the Space Command receiver. Jangling car keys, rattling dog tags, and even the "Slinky Toy" would sometimes turn a TV set off or change channels. These events were rare, but with the constant push for quality, Zenith insisted that this problem be fixed.

I worked on the digital version of Space Command that solved these problems. Dr. Adler asked me to explain how this version worked. After that discussion he reminisced on how he came to invent the "clicker." As a young man, he had taken a tour of a metal fabrication factory. He remembered seeing a worker with a hammer in his hand, walking through the factory and playfully striking different objects. When he struck a large metal rod, it emitted the purest tone he had ever heard.

Years later, when sitting in a production-engineering meeting at Zenith, the topic focused on how to recover from the problems exhibited by Flashmatic. This early remote control would sometimes turn the TV set on when the sun rose. So, simple light was not a good choice. (Many years later, infrared in combination with digital coding became the remote control that we use today.) He remembered the worker striking the rod. He did some quick math in his head. If a rod were made much smaller and narrower, the frequency would be ultrasonic. A metal pellet, sent out just like kids flick spit balls, could replace the hammer. The "clicker" was born.

To people that worked at Zenith, Dr. Adler was famous for those "quick mental calculations" and for his wonderful way of teaching us basic physics. His breadth of knowledge and his way of making it simple is what I miss the most.

Robert Podowski, LS
Mundelein, IL

Cleanliness Is Next to Aggravation

In 1965, I was an electrical engineer for Honeywell's Aerospace division in St. Petersburg, Florida, where we were building the navigation systems for the upcoming Atlas-Centaur moon shot series. That series started with orbital tests to verify the overall soundness of the new rocket design. Eventually the rockets were successful at placing the first cameras on the moon.

My task was to test and calibrate the accelerometer pulse rebalance subsystem. The accelerometer consists of a pendulum mass suspended between two electromagnets such that as the pendulum starts to swing in one direction due to an accelerating force, the opposite electromagnet restores the pendulum to its center position. (Three accelerometers were mounted orthogonally in the same package as three gyroscopes to make up a complete navigation package.)

For instance, if an accelerometer is oriented to experience earth's gravity (vertical orientation), then the pendulum arm is in a horizontal position. One electromagnet is positioned above the pendulum mass, and another electromagnet is located below the mass. As the mass started to bend down due to gravity, a sensor on the pendulum arm signals the electronics to send a series of pulses through the upper electromagnet to pull the mass up to the neutral position. I don't remember exact values now, but for illustration let's say that the pulse rate was about 3,500 per second, and the number of pulses needed to hold the mass at neutral was about 100, equivalent to an acceleration of 1 g.

Although the manufacture of the accelerometers was quite exacting, there were slight variations in the pendulous mass, electromagnetic strength, position sensor accuracy, actual pulse power, and other factors. This meant that the actual pulse count to measure 1 g acceleration might be 98 pulses for one accelerometer and 102 pulses for a different accelerometer. Therefore, we had to calibrate each accelerometer with its rebalance electronics as a matched system.

The calibration setup consisted of connecting pulse counters to the rebalance circuit outputs, one for each electromagnet. This setup essentially counted the pulses to maintain 1g acceleration over a 24-hour period. An eventual overshoot would cause a pulse or two to be sent to the lower electromagnet to restore the mass to neutral position, since the system was essentially a bang-bang design.

For the calibration we had the system set up in a semiclean room environment. Although the systems were sealed, it was just considered good practice to be careful handling the units and maintain a general cleanliness in the lab. We wore white nylon smocks as a reminder of the requirement to be aware of the ultimate purpose of those systems. The system under test was mounted on a shelf in a 19-in. equipment cabinet, with the pulse counters located below it. The test leads from the pulse counters were exposed to the world as they were positioned in front of the cabinet and connected to the pulse electronics outputs.

As soon as everything was ready I started the test, which consisted of allowing the operation to run for 24 hours. At the end of that period, the total counts were recorded, and then another 24-hour test was run. I then compared the counts. Lo and behold, they were off by a considerable margin! So I tried another counter. Same result. This was becoming very frustrating, not to mention time consuming (48 hours per test run).

By some luck I discovered the cause of the problem: every time anyone walked by the test setup, extra pulses were counted. It soon became evident that the culprits were those nylon smocks—they were generating enough static to influence the counters! By connecting 0.1 microfarad capacitors from the counter probes to ground I could eliminate the extraneous static but not affect the rebalance pulse effect. From then on, very consistent pulse counts became the norm.

Incidentally, the actual moon shots were so well aimed by our navigation package, coupled with IBM's computer, that the mid-course correction maneuvers through that imaginary bull's eye in space were almost negligible.

Fred Kelley, LM
Woodbridge, VA

Seeing Was Believing

I joined Collins radio with a B.S.E.E in 1959, after serving as a U.S. Navy pilot and electronics officer and attending M.I.T. and Georgia Tech. During my interview and thereafter, Collins designers talked about loaded Q in circuits, meaning the ratio of L or C reactance to the apparent resistance at a particular frequency; that is how much reactance power (vars) circulates relative to the real power (watts) passing through. In 1959, the main application of loaded Q was calculation of resistance transformations that are equal to 1+Q2, that being the method's name.

HF resonators usually are composed of adjacent L and C branches having equal reactances of opposite signs at the passband center frequency. Arthur Collins always preferred top inductive or magnetic field coupling between resonators because of the greater harmonic attenuation, which increased with loaded Q. Despite only two years of junior college, Arthur Collins was an intuitive genius, who invariably could find a superior qualitative circuit without a quantitative method to justify it.

Fortunately, the famous Seymour Cohn published "Direct-Coupled Resonator Filters" in the 1957 *IRE Proceedings*, and it later dawned on me that resonator loaded Q was simply related to the microwave designer's normalized lowpass (LP) prototype network element values, resonators, and the connecting inverters. The impedance inverters Cohn employed between resonators were just the capacitive or magnetic couplings that always concerned Arthur Collins.

Collins engineers could write "working papers" that were preserved in a cataloged system. I wrote WP-8014 in 1965, which related the immortal loaded Q to microwave filter design concepts. Fairly often in engineering meetings with Mr. Collins and others, I would remark that the loaded Q product they were considering would produce a harmonic attenuation of so many decibels and that the passband would be flat if the resonator loaded Qs were distributed in a certain pattern. Finally, Arthur Collins called me one day to say he had discovered my working paper and the source of my quantitative remarks.

The title of this tale relates to Mr. Collins' doubt that Cohn's impedance inverters really existed. Inverters simplified filter design and tuning and produced voltages across resonators that are exactly ±90° out of phase. So Arthur Collins had my associate Dick Fenwick construct an elaborate three-resonator bandpass filter for the low HF band and tune it by the open-short-circuit method so familiar to microwave engineers. A signal at band center frequency was applied to this bench-top rig with vector voltmeters measuring the complex voltage across each resonator: All phases varied by 90° and had the expected magnitudes.

"Well, I'll be darned!" Mr. Collins said as he smiled at me and walked away. Seeing was believing!

Thomas R. Cuthbert, Jr., LM
Greenwood, AR

Cutting the Cord

In the 1960s, I worked at the Bell Telephone Laboratory in Murray Hill, New Jersey, and was taking EE courses at the Newark College of Engineering (NJIT). My boss was Ed Norton, who developed Norton's Theorem, which is still taught today in Network Theorem courses in EE.

We were developing "data phones," which today are our modems. The circuits would be designed and then manually constructed and tested using some of the first printed circuit board technology. Soldering irons were used to solder the transistors, resistors, diodes, etc., to the etched wires and sometimes by mistake we would leave the irons on overnight.

Mr. Norton would arrive early each morning to inspect the labs. When he found the smoldering soldering iron, he would disconnect the power cord, cut the cord in half, and then replace the cut cord in the power receptacle.

We would pick up the soldering iron later in the day to use it and find out it didn't work so we slowly traced the problem to the cord.

As we repaired the cord we learned a very vivid lesson about laboratory safety. It usually happened only once to each of us.

Mr. Norton was a great boss and mentor, and it was very rewarding to work for him and then go to class at night and learn his theorem.

Kevin J. McDermott, LS
Newark, NJ

Problem Solving

At the University of Massachusetts in the late 1950s, the head of the EE department was Dr. Roys. Dr. Roys also taught several courses, and whenever I think of problem solving I am reminded of a story he told.

He started by saying that there were generally two types of EE students. There were the "scientific students" and the "hands-on ham radio" types. To illustrate the difference he told of a problem given to develop a gas tube voltage regulator circuit using an unregulated power supply with two regulator tubes (apparently they had to be used in some type of series circuit with an assortment of variable and fixed resistors).

The development challenge was handled in two different ways. The "scientific types" stayed in the classroom with their pencils, pads, and slide rules, while the "ham types" went directly to the lab and started assembling circuits.

After a while, the classroom guys determined that, with the assortment of tubes and components at hand, there was a "double infinitude" of possible combinations. Further analysis showed that none would work.

The point was that the guys in the lab were in for a long frustrating ordeal. The best way to approach many problems is with a pencil and pad rather than heading straight to the lab.

Ed Cowern, LM
North Haven, CT

Sweet Smell of Success

Before I graduated as an EE at the University of Buenos Aires, Argentina, in 1967, I worked for some time at the Engineering Faculty's Instrumentation Lab. One time, I was repairing a Philips oscilloscope. It was a large unit full of vacuum tubes—at that time Philips had incorporated miniature tubes that still released a lot of heat, even if they were small. I had removed the side, top, and back panels and was taking measurements, testing the vacuum tubes and other components and calibrating the unit.

I was handling the unit by the rods on its edges, which was very heavy. At one point, I started smelling like someone was preparing a juicy steak; I looked at my right hand and the smell was coming from my thumb! It looked like while moving the scope by the rods, my thumb accidentally touched a contact strip that had—I found about this later—very close contact with +220 V and -220 V dc! Fortunately, there were other fellow workers around, and they helped me with the first aid kit that was available in the lab.

I believe this accident left a mark (actually two marks, +220V and -220 V dc) on my thumb and, somehow, gave me a direction for the rest of my professional life. In 1977, I started working with Hewlett-Packard's Instrument Group and retired in 2003 after more than 25 years.

Enrique Setaro, LM
Miami, FL

Rocketeering Behind the Iron Curtain

After receiving my diploma in 1956 from Warsaw University of Technology, and spending a short period as an assistant/instructor, I started work in the Institute of Precision Mechanics in Warsaw, Poland, where an R&D project in the area of rocket technology was developed. The project was carried out for the Polish Army, and to build an experimental earth-air rocket missile was its aim.

The project had started a little earlier, with the awareness and without objections of the Russians. But the heyday of the project fell during the period of augmented Polish sovereignty after the collapse of the Stalin regime, and the entire work was done with Polish hands exclusively. The Russians were quite advanced in rocket technology then, but no information was available for us from this source. A team of about 40 mostly young engineers, who hadn't any earlier experience with rockets, carried out the project. Our chief, Wieslaw Chrzanowski, was only few years older. He had fought in the Warsaw Uprising against German occupants, was taken prisoner, and, after the end of WWII and after being freed from a prisoner camp, started his engineering study in Germany until returning to Poland at the Warsaw University of Technology.

We started the project with information on rocket technology from freely available books and periodicals, among them a report of a Polish engineer who witnessed German rockets and fragments of related documents on Polish territory after the end of WWII. Our experimental missile was a two-stage rocket, with a solid fuel first stage and a liquid fuel second stage. In the rocket motor of the second stage (only in the matter of this motor did we obtain assistance from outside—Czechs, who were working on a similar project, provided us a consultation), aniline was used as a fuel and nitric acid as an oxidizer. The ceiling (vertical range) of the rocket was 15 km. I personally was responsible for board navigation instruments.

The experimental missile wasn't controlled and was only a ballistic flight, but board instruments were used to measure flight parameters including an artificial horizon, an accelerometer, and an altimeter. An artificial horizon and altimeter, typical instruments used then by Polish Air Forces, and manufactured in Poland under Russian license, were applied. Both instruments had been a bit rebuilt, with the most important change consisting of adding potentiometers as transmitters producing electric signal. The linear accelerometer—exactly speaking, two accelerometers, one for measuring big acceleration of the boost phase and the second for the period of soft acceleration by the second stage motor—was of the mass-spring type, equipped also with potentiometers of my own design.

Electric signals were transmitted by radio and recorded on the earth. All parameters of flight measured in this way, excluding only one of them, were to verify calculations. But we had no idea about the possible rotation of the missile around its longitudinal axis. This was measured with the artificial horizon, and it turned out that the rocket made almost five revolutions during its flight. The artificial horizon served one more aim. In the vertex of trajectory it produced a trigger signal to open a parachute—the entire second stage of the rocket was recovered in this way.

After approximately three years of work, three experimental rockets were launched on the firing ground in Drawsko, Poland (now frequently used for NATO maneuvers). One of them failed because the rocket motor of the second stage didn't start. The remaining two performed the flight successfully, with all systems efficient and meeting requirements. But almost immediately after that, we were told that the Army was no longer interested in the project since it was to be equipped with Russian anti–aircraft rocket missiles. Our team had been dissolved.

For a long time the authorities did not know what to do with us. We ultimately received the nickname "40 martyrs." Finally, a group of us took up a job in industrial automation that started its dynamic development in Poland. I never again have had deal with rocket technology.

Andrzej Kaczmarczyk, LM
Warsaw, Poland

How Microwaves Saved the Day

One of the highlights of my career as manager of TV engineering at the Sylvania Consumer Electronics Division occurred in 1965, when Sylvania introduced its line of color television sets featuring the new, much brighter, europium red phosphor. This was a dramatic improvement that brought color TV out of the dark room and into the living room.

Until that time, the red phosphor had been the dimmest, forcing the green and blue to be subdued or driven less to achieve white balance. Furthermore, the old sulfide red was really a shade of orange, which limited and distorted the color gamut of the whole system. The Europium phosphor is a true, deep red.

All color sets at that time were 100% vacuum tube and had 21-inch round-face picture tubes.

The discovery of the Europium phosphor came about from research by the Sylvania Lighting Division in conjunction with the Precision Materials Division, which made the phosphors. The research was aimed at improving florescent lamps, but the benefit for color TV was recognized immediately. The development was shared with the Tube Division ,and the phosphor was rushed into limited production. Because the Tube Division sold to most of the TV industry, the new CRTs were sampled to all our competitors, but we were given a six-month exclusive lead on production.

The big moment of public introduction came in June 1965, at the historic Edgewater Beach Hotel in Chicago. We had spent quite a bit of time in the lab, trying to pick images that would be the most dramatic in showing the increased brightness. Our conclusion was rather mundane, but it worked superbly. We chose one of the industry-standard color bar test patterns, the one with color bars on top and a large, bright, white area roughly centered at the bottom.

The problem then was that the equipment needed to generate that pattern, plus the sync and color encoding, occupied one or two eight-foot racks. We had two such setups at the factory in Batavia, New York, but they fed the production lines and the engineering lab. Two were needed because we could not risk shutting down production if one failed.

I called the chief engineers at the non-NBC TV stations in Chicago (RCA was our major competitor). They all had that pattern available, and one of them agreed to make it available to us at a reasonable cost, if we had a way to get the signal to the Edgewater Beach Hotel. Another phone call to the telephone company solved that problem. We contracted with them to set up a temporary microwave link from the TV studio downtown, to our location 8.5 miles away.

A couple of days before the show, a crew appeared with their big antenna and other equipment, which was set up on the roof of the hotel. They ran a long video cable down the outside of the building, to the ground floor, and equalized the frequency and phase response of the setup, providing us with a clean, composite video signal. We had our own RF modulator (Does anybody remember the old "megapix?") and distributed the RF signal to the showroom and auditorium stage.

Our TV sets were set up alongside RCA and Zenith receivers. Each had a microammeter (in an acrylic housing) connected in series with the 25 KV anode lead and mounted on top of the cabinet, to show equal composite beam current. The results were dramatic, and the show was a rousing success. That year Sylvania Consumer Electronics had a record-breaking profit.

Joseph DeMarinis, LS
Winchester, MA

The Rewards of Being Prepared

I became an electrical engineering student at the Massachusetts Institute of Technology in Cambridge, Massachusetts, in 1934. In my second year we were given the opportunity to apply for the electrical engineering cooperative program. This was a program that had been started in 1922 where selected students would alternate going to school for a semester with working for a company for a semester. The companies that interviewed the applicants and selected the students were the American Telephone and Telegraph Company, General Electric, and Boston Edison. The program lasted three years with three semesters per year, and students received both a bachelor's and a master's degree at graduation after five years. Both General Electric and the AT&T Company accepted me.

My first work semester began in February 1937 at General Electric in Schenectady, New York. I was initially assigned to Turbine Test where I was an oiler on a steam turbine powered generator for the city of Des Moine, Iowa. There were two of us student engineers working under supervision on testing a new turbine. My role was to help bring the turbine up to speed slowly over an eight-hour period while watching the temperature of the oil in the bearings.

Frankly, it was not a very thrilling job. As soon as I realized what I would be doing for the whole semester, I went to the office of the General Electric executive who was in charge of the cooperative students. I pointed out that at MIT I was majoring in communications, not in electrical power generation. Would it be possible for me to be assigned to a communications project at Schenectady instead of this power project, I asked. I was thrilled to hear the next day that I would be reassigned to Radio Transmitter Test to participate in the testing of a new radio transmitter being built for U.S. Navy destroyers.

I had been an active amateur radio operator since age 14 and was secretary of the MIT Amateur Radio Club back in Cambridge. Not only did I like my new job of quality control of inductances being produced for the new transmitters but also all the men working on assembling the transmitters surrounded me. However, an astonishing event was soon to happen.

My father was a master sergeant in the U.S. Army Coast Artillery, teaching trigonometry to soldiers that were students at the Coast Artillery School at Fort Monroe, Virginia. When I was home for Christmas vacation in December 1935, I found that one of my father's friends was teaching his class of radiomen how to pass the Federal Communications Commission's exam for "Radiotelephone First Class" license. It was very thoughtful of the Army to teach these soldiers a civilian skill they could use to get a job in a radio broadcasting station after their enlistment was completed. I sat in on the four-day class, went to the FCC office in Norfolk, Virginia, with them and took the exam. The exam was very thorough, and it took me 40 pages of writing to answer all the questions. Fortunately, I had received such good instruction that I passed and still have the official license certificate, dated 30 December 1935. I was 18 years old.

Now for the miracle: One day early in May, my supervisor told me that our boss, the head of Radio Transmitter Test, wanted to see me in his office. When I reported, he was looking at my personnel folder and said, "It says here that you have a Radiotelephone First Class License." He then went on to explain that the president of General Electric had given a complete radio broadcasting station to St. Lawrence University in Canton, New York, around 1922 when GE was increasing the power of its station WGY in Schenectady and replacing their transmitter with all new equipment. The university had one operator who had to go to Boston for a week in late May and asked GE if they could send a relief operator to Canton to keep their station, WCAD, operating. My boss explained that he could not get away at that time and asked me if I would go.

I was thrilled. My boss further explained that GE would buy my train tickets, and the university would arrange for me to stay in a dorm room and eat my meals in the Student Union at no personal expense. As a cooperative student engineer I would continue to receive 50 cents per hour (US$20 per week) from GE. I found out later that General Electric billed the University US$100 per day for me to run their broadcasting station during daylight hours from May 22 to May 27, 1937.

Russell C. Coile, LM
Pacific Grove, CA

Number One with a Bullet

On 15 March 1972, Shinkansen, or Japanese bullet train, began its commercial service by real-time computer systems, which had two off-the-shelf processors connected by a dual system controller, or DSC, for the high reliability and fail safe operation.

I was appointed as the project manager of the joint development between Japanese National Railways (JNR) and Hitachi Ltd. The aim of the project was to develop the computerized dispatching system for extended Shinkansen. There were an estimated maximum of 1,000 trains in commercial operation from 6 a.m. to midnight. Ten additional stations were added to the existing 30 stations between Tokyo and Osaka.

I had only 15 dispatched engineers of JNR who were experts on railway signaling and 12 software engineers from Hitachi in the project at the Hitachi facility. While the project was started in January 1971, the algorithm had not been fixed by JNR until June. In addition, the commercial operation moved up, from 1 April to 15 March. Nobody, including myself, had the firm confidence of success in just one year. On 4 January 1972, the systems were placed in Tokyo's train control center, but while debugging, or testing synthetic programs, the commercial operation between Tokyo and Osaka inhibited the systems from connecting to the railway system.

After battling against time constraints and insufficient test cases, the first train left the terminal stations at 6:00 a.m. on 15 March, under the control of the first generation COMTRAC (Computer Aided Traffic Control). Improvement and adjustment of software established 99.999% availability after two months.

Hirokazu Ihara, LF
Tokyo, Japan

Atoll Tale

While Thomas Webb, LSM, was involved with the Kwajalein missile tracking system in 1967, (April 2007 *Life Members Newsletter*, page 6) I was there on one of my first assignments, employed by the RCA Service Co. in the Government Service Division, EMC (Electromagnetic Compatibility) & Measurements, USAF. Also in 1967, my admission to the IEEE came to pass. These coincidences lead to my first submission.

My task was on Roi-Namur Island, Kwajalein Atoll, to find out if there was a radiation hazard to personnel, including natives concerned about their fertility while climbing the coconut trees. The large Tradex missile-tracking dish was understandably formidable in appearance, even to me.

The Tradex was requested to radiate on each of its frequencies, L-band, UHF and VHF at boresight power: 1–2 kW average on L and UHF; and 0.1 kW on VHF. Gain was 47 dB on L-band, with a 3-dB band-width of 0.6 degrees. Pulse width was 50 microseconds.

Power density measurements were made from a convenient helicopter—spiraling up, then down (for verification purposes). The height was from 100 to 300 feet. The pilot pointed out that the minimum safe elevation (his and ours) was 100 feet. That instability at 100 feet was very convincing.

The next question was how to measure from ground level up to the 100-foot level. Local personnel suggested they fabricate a wooden enclosed platform and hang it from a large mobile crane. (You now have an idea of where some of your tax dollars went.) That seemed like a good idea, with ropes at the corners, held by four volunteers for azimuth control. A long tape measure provided exact height above ground. We were about 260 feet from the 84-foot dish, just about as far as possible.

At a power density of 10-mW/sq. cm., the USAF danger standard in those days, many areas were off limits. Boresight power was safe everywhere (at that standard), but elevation and azimuth stops were needed to prevent radiation to other areas, including the coconut trees. If the standard now is 1-mW/sq. cm., we were well radiated.

The runway used to commute from Roi-Namur to Kwajalein Atoll in a C-47 aircraft was also found unsafe with the dish pointed in that direction.

Later, while thinking of the methods used for suspension, delegation would have been more appropriate for my longevity if not my helpers'. It was certainly very interesting. Just looking head on at the center of that huge dish, and wondering about the odds of someone inside hitting the wrong switch, still gives me the willies.

W.A. Kernaghan, LM
Independence, MO

Tracking Down a Production Problem

I have an interesting story, inspired by "Airsick Shunts" in the April 2007 newsletter.

Scanning small dc signals, such as those from thermocouples, was not so easy in the 1950s. The electronics I developed, and was my Ph.D. thesis, used a second harmonic magnetic modulator. This relied on the symmetrical BH loop of a magnetic core so that even harmonics would only result from a dc signal in as many turns as could be wound to upset the balance. The full circuit details were later published in the 1963 Intermag conference and subsequently in an AIEE paper (Forerunner to the IEEE).

In production by EMI Electronics, the electronics worked well and a good number are at the bottom of Cardigan Bay in the United Kingdom where re-entry tests were conducted on missile skin temperatures. Testing of the modules showed the balance was so good that only "Barkhausen noise" in the 3.8 mm dia. ferrite cores limited the sensitivity. Heating the system gave no measurable dc drift. But when the unit was then subjected to cold tests, a puzzling drift was observed. More puzzling still, the only parameter correlating to the drift was the modulator serial number!

The solution was eventually found after much effort. The cores were hand wound by an operator using a needle and thread. As she gained experience, she wound the toroids better and with a tighter winding. The temperature coefficients of expansion of copper and ferrite being such as to result in a mechanical pressure on the cores as temperature fell. The effect of this magnetostriction was to mimic the dc field that the modulator was sensing.

The work on the application was not wasted. Understanding the need, while working for the Plessey company, we won the contract for electronics to scan the skin temperatures of the prototype Concorde supersonic airliner. By the mid 1960s there was a new and better technology. We designed an MOS multiplexer with the scanning logic on-chip. I think that was a "first," as only GME at that time had anything, just a set of six transistors on a chip intended for such use.

The equipment is on show in the Concorde prototype in the aeronautical museum in Duxford in Cambridgeshire, U.K. There is also a picture of the Plessey chip in its 40 lead flatpack in the wonderful book, *The Ascent of Man* by J. Bronovsky, which accompanied his BBC TV series, although it is wrongly attributed to Edinburgh University. (I was the external examiner to the microelectronics M.Sc. course there in 1967.) The caption, in the only mention of anything electronic in the whole book, is of the "Concorde pocket calculator multiplexer chip."

Truly, electronic circuits have given me a lifetime of pleasure.

Richard C. Foss, LM
Ottawa, Canada

Our Mailing List

The *IEEE Life Members Newsletter* is distributed to Life Members and those who are not Life Members but are 1) IEEE members 65 years and older, 2) retired IEEE members aged 62–64, and 3) members of special boards and committees.

Submitting Articles

We welcome articles for this newsletter. In particular, we seek articles about projects that are initiated at the Section and Region level by Life Members as well as “Tales from the Vault,” which should focus on novel or interesting technical issues. The suggested length for “Tales from the Vault” submissions is 500 words.

Acronyms should be completely identified once. Reference dates (years) also should be included. Editing, including for length, may occur. If you wish to discuss a story idea before hand, you may contact Craig Causer, managing editor, by e-mail at lm-newsletter@ieee.org. The deadline to submit an article for possible inclusion in the next issue is 4 April 2008. Please include your Life grade, town, state, country, phone number, member number, and/or an e-mail address with your piece.

Stopping IEEE Services

Those Life Members who wish to have all services stopped should contact IEEE Member Services. If you are doing it at the request of someone else, submit the member's name, number, grade, address, change date and your connection, e.g., Section Chair.

IEEE Member Services

fax: +1 732 562 6380
or **phone:** +1 800 678 4333 (USA)
+1 732 981 0060 (worldwide)
or
contact us online at:
www.ieee.org/memberservices

2007 Life Members Committee

Qualifying for Life Member Status

To qualify as a Life Member, an IEEE Member must be at least 65 years old, and the sum of the member's age and the number of years of paid membership effective the following January must equal or exceed 100 years.

Have Questions, Ideas, or Problems?

Have questions regarding your Life Member status? Contact Member Services. Got something else you need to ask or discuss? E-mail the Life Members Committee or its staff at life-members@ieee.org, or call: +1 732 562 5501, or fax: +1 732 463 3657.

IEEE
445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331 USA

Non Profit Org.
U.S. Postage
Paid
Permit #7
Easton, PA