

# IEEE life members newsletter



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## Celebrating a Banner Year

Louis A. Luceri, Chair, IEEE Life Members Committee

It has been another banner year for IEEE Life Members. In January 2012, I reported a total of 2,476 members were elevated to Life status. In addition, we now have increased our Life Members Affinity Group count by five. The 2012 Milestone Technical Tour to Japan was also a success. You can find more information about the Japan tour on the IEEE Life Members Tech Tour Facebook page at <https://www.facebook.com/ieeelmtt>.

We are considering a Milestone Technical Tour of the Canadian Provinces for 2013. We are presently in the planning stages of which Milestones to consider and picking a tour company to package the trip. You will hear more about this tour toward the end of the calendar year and in the June 2013 issue of the *IEEE Life Members Newsletter*.

The design of the commemorative Milestone coaster honoring James Clerk Maxwell, who conceived and developed his unified theory of electricity, magnetism, and light, has been completed. This coaster is available now through 2013 for a US\$100 donation to the IEEE Life Members Fund (LMF). More information about the coaster is available on page 5.

Speaking of donations...in the June issue of the *IEEE Life Members Newsletter*, I made it a point to tell you about engagement. I want to follow up on that theme to show how Life Members can play an important role in their community and the world by donating to the LMF.

First, the Life Members Committee (LMC) is a "one of a kind" committee. The LMC is responsible to IEEE for sup-



**IEEE Life Members  
Committee Chair  
Louis A. Luceri**

porting the interests of existing and future members, and it is responsible to the IEEE Foundation for the management of IEEE LMFs. So, it is essentially a committee of the two organizations, and under each organization to which the LMC reports, it demonstrates the primary responsibility to that organization.

The LMF was established back in 1944 and is one of the donor-designated funds administered

by the IEEE Foundation. The LMF depends on donations from IEEE Members and friends and is used to support ongoing programs and award grants to projects. Member dues do not support the LMF.

Using the LMF, the LMC supports the activities of interest to Life Members, engineering students, and potential engineers that reflect the breadth and range of the engineering field; make a significant, positive global impact on the profession; and improve the awareness of engineering. The LMC supports both ongoing programs of IEEE and partners with the IEEE Foundation to award grants.

The following programs are made possible by the generous contributions entrusted to the LMC: the IEEE Life Members Graduate Study Fellowship in Electrical Engineering, the IEEE Life Members Fellowship in Electrical History, the Washington Internship for Students of Engineering, and the IEEE James H. Mulligan, Jr. Education Medal. (The 2012 Education Medal was awarded to Dr. Fawwaz T. Ulaby for his contributions to undergraduate and graduate engineering education through innovative textbooks, dedicated mentoring of students, and inspirational teaching



on Saturday 30 June 2012 at the IEEE Honors Ceremony in Boston.)

The LMF is one of three grant-making funds of the IEEE Foundation, the other two being the IEEE Foundation General Fund and the IEEE Humanitarian Technology Fund. As a member of this grants program, the LMF provides seed money in the form of grants to IEEE units and other charitable organizations for innovative projects in electrotechnology and related fields that will make a lasting impression on communities worldwide. To be considered for grant funding, the project should have a clearly defined objective and provide support in the focus areas of education, the history of technology, and applying technology for humanitarian causes.

There are two such grant application cycles per year. Those that are accepted are processed and reviewed by IEEE staff and a review committee consisting of three members of the LMC and three members of the Foundation board. Each member of the review committee examined all applications. Each was judged to determine whether or not it should be funded, and, after completing

the evaluation of each application, they were ranked in order of which projects should be approved and which group should accept ownership of the project (Foundation, Life Members, or Humanitarian Technology Fund).

I am pleased to announce that a total of 15 grants were accepted in the first cycle and, of those grants, eight were assigned to the LMF, for a total of US\$142,000. As of this writing, the second grant cycle has also been completed. A total of 14 were accepted, and seven were assigned to the LMF for the sum of US\$152,000. That brings the total amount of funding provided by the LMF to a grand total of US\$294,000 for the year. This could have only been done with your generous donations. Thank you!

I hope this effort helps to encourage you to become “engaged” in the work of the LMC. When your membership renewal form arrives, I hope you will consider making a generous donation to one (or several) of the different funds available. It is only through your donations that we are able to continue our work. And again, remember that no member dues are assigned to this program.

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## Call for Grant Applications

The IEEE Life Members Committee (LMC) is responsible for the administration of the IEEE Life Members Fund (LMF) in coordination with the IEEE Foundation. The Fund supports the awarding of grants to projects of interest to Life Members, potential engineers, and engineering students.

To be considered for grant funding by the LMC, a project should have a clearly defined objective and provide support in the following areas of interest:

- potential and/or young electrical and/or computer engineers
- IEEE Life Members

- mature IEEE members not yet qualified for Life Member status
- the history of electrical/computer engineering.

The IEEE Foundation and the LMC review grant applications in two cycles per year. Submissions are accepted until 11:59 p.m. eastern time on the deadline dates of 15 March and 6 August.

Grant applications may be submitted online. Before submitting an application, please review the IEEE Foundation’s grant guidelines. All the information you need about applying for a grant can be found at <http://www.ieee.org/organizations/foundation/grants.html>.

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## IEEE LMC Provides Grants to Diverse Programs

The IEEE Life Members Committee (LMC), a joint committee of IEEE and the IEEE Foundation, is responsible for the administration of the IEEE Life Members Fund (LMF). In coordination with the IEEE Foundation, the fund supports activities of interest to Life Members, potential engineers, and engineering students. It is supported by the generosity of IEEE Members. The IEEE LMF is pleased to announce its monetary support for the following programs.

**Tryengineering Training Program:** US\$20,000 to include training workshops and booths in schools, universities, and during events that present IEEE Tryengineering Web site activities to teachers, high school students, as

well as university students in Egypt. Tryengineering shows basic and practical concepts about engineering in many fields. The training program will introduce all participants to engineering concepts and careers where students will know more about engineering life and experiences.

**CORE-Community Outreach in Robotics Education:** US\$23,275 to the Whitney Foundation for Education Excellence in Cerritos, California, to continue its community outreach program to imitate hands-on engineering using multiple robotics platforms and provide science, technology, engineering, and math (STEM) education to students from all over Southern California. Community outreach includes conducting demonstrations

at home-school fairs, educational expos, corporate events, community events, and local K–14 schools. In the summer, they host a RoboCamp for students throughout the southland. This grant will fund the purchase of the robotics parts needed to convey the exhilaration of robotics to the youth of the community. In addition to allowing the club to continue their outstanding community outreach, the purchase of these parts will permit the club to expand their summer RoboCamp program to include multiple platforms and bring robotics/engineering to even more students.

**Electrical Engineering Student European Association LC Trieste Summer School:** US\$4,109 to the Electrical Engineering Student European Association LC Trieste to bring together students from all over Europe interested in modern applications of design and illustration methodologies and Web development in the service of entrepreneurship and employability of young people as well as social growth and progress. During one week of intensive work, experts in both design and Web development will deliver lectures to participants to provide current knowledge in illustration and software tools. Students will be taught how to use IT applications and design, illustration principles, advanced-level tools, and will learn how to develop these skills even further through innovative working sessions. Each student will have a chance to combine personal design and Web development techniques for constructing a case-specific personal project while receiving feedback from specialists and other participants. Through several roundtable discussions, new trends in design and Web development will be analyzed. Finally, apart from providing state-of-the-art technical skills, the project will promote the cooperation among students while increasing their productivity and quality of their work.

**2012 IEEE Global Humanitarian Technology Conference Travel Support and IEEE.tv Funding:** US\$45,000 to the 2012 IEEE Global Humanitarian Technology Conference (GHTC) to provide travel support to representatives from nongovernmental organizations and paper presenters. The funds will also be used to have IEEE.tv film the conference and then post it on the conference and Engineering for Change Web site for future viewing.

**MED International (Pilot Phase):** US\$10,000 to Terraglobe Ministries International, Inc., a nonprofit that partners with local facilities to eliminate barriers and better match donations with needs. While extra fully functional equipment sits untouched in warehouses in the United States, doctors in Zanzibar are hard-pressed to find the technology they need to provide basic medical care. The goal is to increase access to appropriate medical technology in Zanzibar so that hospitals there can deliver the necessary health care to those who need it most.

**Win the Green Future with STEM:** US\$19,500 to the Faculty of Technical Sciences in Serbia to encourage pre-

university students to consider STEM professions by showing that STEM professionals are ordinary people with extraordinary jobs. To achieve this goal, a four-month awareness campaign will be organized and culminate in a one-day event dealing with different forms of green energy in six main cities in Serbia. The project will bring STEM professionals and pre-university students closer to each other, showcasing the fascinating side of STEM professionals' jobs and their impact on citizens' daily lives and economic development. Pre-university students will have the opportunity to understand STEM by experiencing its day-to-day practice, by visiting the spaces and places where research is carried out, and by experiencing the machinery and equipment but, above all, by meeting and talking to the STEM people. The final event will be a real-time competition between cities involved in the project in producing clean energy using bicycles and involving both researchers and visitors.

**GHTC Student Paper and Photo Video:** US\$15,000 to the 2012 IEEE GHTC for two new competitions: Student Paper and Photo/Video. The funds for the Student Paper Competition will be used to bring students to the conference. The funds for the Photo/Video Competition will cover the awards for the winners (free registration and prize for first and second place).

**Third Mechatronics Engineering Week—University of Brasilia:** US\$5,000 to the Mecajun Mecatronica Junior de Brasilia for Mechatronics Engineering Week at the University of Brasilia. The event consists of a series of lectures, expositions, short courses, technical visits, and debates that were held 17–21 September 2012. The lectures provided students with a way to get to know the main companies in their field as well as the state-of-the-art research that is developed by the university and outside professors. The debates between engineers, students, and guest governmental representatives discussed the realities of the engineering market and were important to help students to behave proactively on pressing the university to improve.

The expositions showed the public the university's competitive plane design and robotics teams as well as its engineering Junior Enterprises. The technical visits took the participants to industries and governmental institutions that are relevant to the automation and control field. The short courses were taught by guest professors and company representatives and focused on themes of interest such as cloud computing, magnetic resonance imaging improvement, and microcontrollers.

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*To submit a grant application, visit the IEEE Foundation Web Site at [www.ieeefoundation.org](http://www.ieeefoundation.org). To the maximum extent possible, Life Members should financially support the LMF. You can make a donation to the LMF online at [www.ieee.org/donate](http://www.ieee.org/donate).*

# Japan Visited During Latest IEEE Life Member Technical Tour

IEEE Milestones celebrate technological breakthroughs or turning points. The IEEE Life Members Committee (LMC) has organized technology-themed tours around a number of IEEE Milestones. An IEEE LMC Technical Tour was held in Japan 20–28 May 2012. The tour included visits to IEEE Milestones and related museums as well as historical heritage sites in Nara, Kyoto, Nagoya, and Tokyo. IEEE Milestones included the Yosami Radio Transmitting Station (Nagoya), the First

Direct Broadcast Satellite Service (Tokyo), the Electronic Quartz Wristwatch, the Development of VHS Home Video Recording, and more.

The LMC has approved the planning for an IEEE Milestone Technical Tour in Canada for the Fall of 2013. The tour will focus on the IEEE Milestones of Central and Eastern Canada, as well as visiting related museums and Canada's heritage. If you have any questions about the tour, please contact [lm-tours@ieee.org](mailto:lm-tours@ieee.org).



*Tour participants visit Keage Power Station in Kyoto.*



*Taking a moment in front of the trains at Railway Park in Nagoya.*

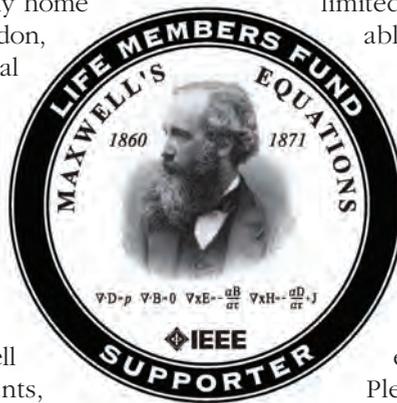


*The tour made a stop at the Memorial Museum of Yosami Transmitting Station, an IEEE Milestone.*

# The Maxwell's Equations Milestone Is a Commemorative Coaster

Between 1860 and 1871, at his family home Glenlair and at King's College London, where he was a professor of Natural Philosophy, James Clerk Maxwell conceived and developed his unified theory of electricity, magnetism, and light. A cornerstone of classical physics, the Theory of Electromagnetism is summarized in four key equations that now bear his name. Maxwell's equations today underpin all modern information and communication technologies. Maxwell built on the earlier work of many giants, including Ampere, Gauss, and Faraday, but he himself was a giant who revolutionized the field of electrical and optical physics and laid the groundwork for electrical, radio, and photonic engineering with his experiments, theories, and publications. The unification of the theories of electricity, magnetism, and light, which comes directly from Maxwell's equations, clearly sets Maxwell's work apart from similar achievements of the time.

Maxwell's Equations, 1861–1870, was dedicated as an IEEE Electrical Engineering Milestone in a ceremony held in Glenlair, Scotland, on 13 August 2009. To celebrate this important milestone, those who donate US\$100+ to the IEEE Foundation–Life Members Fund (LMF) from October 2012 to September 2013 will receive a limited-edition coaster depicting Maxwell and his equations. Maxwell's Equations is the sixth coaster in a series of limited edition coasters commemorating various historic IEEE Electrical Engineering Milestones. The first five depict Telstar, the Panama Canal, Japan's Bullet Train, ENIAC, and the Atom Smasher. Complete your



limited edition set of coasters, which are available for a US\$100 donation each.

If you received the promotional postcard introducing the coaster, it contained an artist's rendition of the equations but not what will appear in the final product. The final pewter cast coaster contains the specific, correct equations that this Milestone celebrates.

If you do not yet have your IEEE Life Member pin, a gift of US\$150 to the LMF entitles you to both the pin and the coaster. Please allow eight weeks for delivery.

Please support future achievements by giving back to the LMF when you confirm your Life Member profile or visit [iee.org/donate](http://iee.org/donate). The LMF provides grants to new and ongoing projects that are beneficial to potential engineers and engineering students. Your gift will both preserve the memory of the Maxwell's Equations engineering achievement and support future technological innovations. For more information, e-mail [donate@iee.org](mailto:donate@iee.org).

The IEEE History Committee established the IEEE Milestones in Electrical Engineering and Computing Program during the centennial year as an ongoing means to honor and commemorate significant technical achievements in the history of IEEE fields. Visit [ieeeghn.org](http://ieeeghn.org) to learn more about the IEEE Milestones Program.

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*Donors who receive low-cost articles with a fair value exceeding the U.S. IRS threshold will be notified that the tax deductible amount of their charitable gifts(s) have been reduced by the fair value of the items.*

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## IEEE Foundation Hosts Local Tampa Life Members

The IEEE Life Members Committee (LMC) and the IEEE Foundation hosted an IEEE Life Members Reception on 19 October at the Tampa Marriott Waterside Hotel in Florida. Local IEEE Life Members were invited, and more than 50 attended. The reception provided Life Members and the LMC an opportunity to gather in a social setting and exchange ideas about Life Members activities and to socialize and enjoy lunch.

John Meredith, IEEE Foundation Board member and IEEE LMC member, welcomed guests to the luncheon and introduced the



**Local Tampa, Florida, Life Members enjoyed the October reception at the Tampa Marriott Waterside Hotel.**



**John Meredith (left), IEEE Foundation board member, takes a moment during the lunch reception to meet IEEE Life Member Raymond Hentschel.**

2012 IEEE LMC members and IEEE Foundation staff to the group. During the gathering, IEEE LMC Chair Louis A. Luceri shared committee activities and accomplishments of the IEEE Life Members Fund (LMF) of the IEEE Foundation. The LMF supports technological and educational outreach; the preservation, research, and promotion of the history of the profession and IEEE; activities of interest to IEEE Life Members, potential engineers, and engineering students; and educational programs including student travel grants, poster contests, fellowships, and prize paper awards.

Karen Kaufman, IEEE Foundation communications manager, presented ways Life Members can support the LMF, and the activities it endorses, now and through planned giving. Donor incentives, such as Life Members

pins and IEEE Milestones coasters, were on display and discussed as well as the recognition donors receive based on the type and level of their giving. The PowerPoint presentation given is available at [www.ieeefoundation.org](http://www.ieeefoundation.org). Photos from the event will be available when you “Like” the IEEE Foundation at [www.facebook.com/IEEefoundation](http://www.facebook.com/IEEefoundation).

Feedback from the members was requested so the membership can continue to shape the scope and success of LMC efforts. Attendees shared stories of their local activities and engaged Life Members not currently involved in local Life Members Affinity Groups. They also discussed the importance of staying active and sharing knowledge and experiences with future engineers while transitioning into retirement and beyond. “We hope our guests made meaningful contacts that will keep them engaged in Life Member activities in the future,” said Kaufman. This is the seventh reception of its kind held specifically for Life Members. Another will be held in March or April 2013 during the next LMC meeting.

For more information about this reception or to make a donation, contact the IEEE Foundation Development Office +1 732 562 5550 or e-mail: [donate@ieee.org](mailto:donate@ieee.org). To learn more about the IEEE LMF, visit the IEEE LMC at [www.ieee.org/lmc](http://www.ieee.org/lmc).

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*Special thanks to those who donate to the IEEE LMF of the IEEE Foundation. Your donations allow us to host gatherings and support activities of interest to Life Members. Your donation may entitle you to receive a Life Members Pin or Milestone Coaster or to become a member of the **IEEE Heritage Circle** or the **IEEE Goldsmith Legacy League**. For more information, visit [www.ieeefoundation.org](http://www.ieeefoundation.org).*

## Is It Time to Update Your Will?

Your will is one of the most important documents you will ever sign. Is yours a vigorous, up-to-date, contemporary planning tool that is ready for duty when the time comes? Or does it belong in a museum for antique documents?

Without regular review and updating, an outdated will can create confusion and needless expense for surviving family and friends. Since you executed your current will, you should consider what may have changed:

- Did you get married?
- Did you get divorced?
- Did your family expand through the birth or adoption of a child or grandchild?
- Did a dependent child reach adulthood?
- Did your spouse pass away?
- Did any of the named beneficiaries in your will pass away?
- Did the value of your assets increase?
- Did you acquire new assets by gift or inheritance?
- Did you sell or give away any of the assets mentioned in your will?

- Did the needs of your beneficiaries change?
- Did the executor or trustee named in the will die, move away, or become disabled?
- Did you move to a different state?
- Did you buy or sell real estate?
- Did you decide to make any additional bequests?

If you answered yes to one or more of these questions, you may need to update your will. A small change may only require an amendment, known as a “codicil,” that preserves most of the provisions of your existing will. To make major changes, it may be preferable to execute a completely new will that revokes all prior wills. Either way, you should work with your attorney.

While planning updates to your will, please consider the impact IEEE has had on your education, career, and life. There are several ways you can inspire the future by including the IEEE Life Members Fund (LMF) of the IEEE Foundation in your will. Some IEEE members designate a specific dollar amount. Some bequeath a percentage of the “residue”—the amount remaining after paying all

inheritances, debts, and costs. Others make the bequest contingent (passing to us only if another beneficiary predeceases you) or in trust, providing income to your spouse or children before benefiting the IEEE Foundation. The IEEE Development Office is available to share more information about these options with you. Contact them at +1 732 562 3860 or e-mail at [donate@ieee.org](mailto:donate@ieee.org).



annual Honor Roll of Donors and on the “Wall of Honor.”

*This article is adapted from material provided by R&R Newkirk. It is not intended as legal advice. Consult your advisers.*

#### About the IEEE Foundation

The IEEE LMF is one of the more than 130 funds administered by the IEEE Foundation. The IEEE LMF supports educational and professional projects

When you include the IEEE LMF in your will, please share the good news with the IEEE Development Office. This helps us plan for the future and recognize your generosity during your lifetime by inviting you to join the **IEEE Goldsmith Legacy League**, our elite legacy giving donor recognition group.

The **IEEE Goldsmith Legacy League** is named in memory of Alfred N. and Gertrude Goldsmith, whose planned gifts seeded the IEEE Foundation’s ability to support the mission of the IEEE. Members of the **IEEE Goldsmith Legacy League** are *Forever Generous*. They are building tomorrow by leaving legacy gifts that will benefit future generations. In recognition of their special commitment, members of the **League** receive a keepsake coin and certificate of membership in a custom presentation binder, an invitation to attend the annual IEEE Honors Ceremony, the *IEEE Foundation Focus* newsletter, periodic updates on planned giving, as well as recognition in the

that are of interest to IEEE Life Members, that reflect the breadth and range of the engineering field, and that make a significant, positive, global impact on the profession. To learn more visit <http://www.ieee.org/lmc>.

# # #

Bequests to the IEEE LMF should be worded as follows:

*...to the IEEE Foundation, Incorporated, New York, NY, for the benefit of the IEEE Life Members Fund.*

As a tax-exempt 501(c)(3) organization in the United States, the IEEE Foundation relies on charitable donations to sustain and expand its efforts to provide philanthropic services to support the core purpose of IEEE—advancing technology for humanity. Donations are tax deductible to the fullest extent allowed by law in the United States. For other countries, please check with your local tax advisor. To learn more, visit [ieeefoundation.org](http://ieeefoundation.org).

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## Locating Local Life Member Activities

Are you interested in attending or volunteering at local activities for IEEE Life Members? Be sure to get in touch with your local Life Member Affinity Groups (LMAG). The list of all our LMAGs can be found at: [www.ieee.org/lmag](http://www.ieee.org/lmag).

New LMAGs have been formed this year, including:

- Princeton/Central Jersey LMAG (Region 1)
- Rock River Valley LMAG (Region 4)
- Boise LMAG (Region 6)
- Orange County LMAG (Region 6)
- Kansai LMAG (Region 10).

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## IEEE Power & Energy Scholarship Plus Initiative

Over the next decade, almost 62% of the power and energy industry in the United States has the potential to retire or leave for other reasons. At the same time, demand for qualified power engineers is projected to increase.

Now, more than ever, it is important to support the next generation of power engineering professionals. In a time when a growing number of our peers are retiring,

we can make an impact to channel bright individuals into energy careers in the United States and beyond.

In 2011, the IEEE Power & Energy Society (PES) launched the *IEEE PES Scholarship Plus Initiative* for students to pursue careers in power engineering. Since 2011, PES awarded US\$642,000 in scholarships to 265 undergraduate students from 109 universities across the United States. The *IEEE PES Scholarship Plus Initiative* provides



**Sarah Szewczyk from the University of Washington is a 2011–2012 PES scholar.**

multiyear scholarships and career experience opportunities to qualifying U.S. electrical engineering undergraduate students.

The purpose of the *IEEE PES Scholarship Plus Initiative* is to help address the crucial challenge facing the field of power and energy—the impending shortage of power engineers. It is with the help of champions such as you that we can save the power and energy profession from

further erosion and build for the future. You can help by supporting the *IEEE PES Scholarship Plus Initiative* by making a tax-deductible (the United States only) contribution today by visiting [www.ieee.org/donate](http://www.ieee.org/donate) and selecting the *IEEE PES Scholarship Plus Fund of the IEEE Foundation* to complete your donation.

The program is having an impact, as one of the 2011 PES scholars noted, “Receiving this scholarship has given me confidence in my selection of the power and energy track as a career path. As a PES scholar, I have gained connections and insight into the power and energy industry, and I feel that it has been an important step in my career.”

Today’s innovations in the power engineering industry are a reality because of the thousands of engineers who brought them to life. Thank you in advance for your consideration and generosity in making today an ideal time to strengthen the power industry.

Planning is underway to expand the program to Canada in 2013 and to other parts of the world as soon as possible. Questions may be directed to [pes-scholarship-info@ieee.org](mailto:pes-scholarship-info@ieee.org). To learn more about the *IEEE PES Scholarship Plus Initiative*, please visit [www.ieee-scholarship.org](http://www.ieee-scholarship.org).

Peter Sauer, LF

## tales from the vault

# Learning About Stock Cart Wheels the Hard Way

One day, I checked out from the instrument crib one of the few Tektronix oscilloscopes owned by Convair. They were too expensive to allow individual departments to own one, but you could borrow one for a brief time, so long as it was promptly returned in good shape. I boarded the freight elevator with my precious cargo loaded crosswise onto the stock cart they had loaned me. As I arrived at the ground level, I pulled the double vertical cargo doors open. The bottom half sank to ground level, and I pushed the cart to the apron outside. I turned to close the doors and promptly heard a deafening crash behind me. Wheeling frantically about, my eyes met a truly horrifying sight—the cart lay on its side. The scope, the

precious scope, the state-of-the-art scope, the *expensive* scope, had done a face-plant on the concrete! Visions of forfeiting six months of pay floated through my brain as I feverishly picked up the debris. I tried to stand the cart back up and immediately found the source of the problem. As I wheeled the cart over the gap between the elevator and apron, one of the wheels had dropped free and been left in the gap. Soon after my hand had left the cart, it begun majestically keeling over, but I had been looking the other way by then.

Heart pounding, I decided to continue to my lab and see what I could do to repair the damage. I knew, sooner or later, I was going to be forced to ‘fess up. Every single front panel knob

had either been seriously dinged or broken outright. But, to my amazement, the instrument still worked just fine—it just looked like death warmed over. The gods of the tool crib were not pleased when they beheld my transgression. However, since it was only cosmetic, they couldn’t really hang me too high, now could they? Boy, nobody built ‘em like Tek in those days. Some years later, when I worked for a while at Tektronix in Beaverton, they took great delight in hearing my tale of woe and how their product had survived such abuse. Besides, they sold Convair a whole new set of knobs.

Thomas I. Kirkpatrick, LM  
Half Moon Bay, California

## Madame Spears and Her Call Girls

During the early 1970s, a significant problem arose in the Bell System regarding the billing accuracy of customer-dialed toll telephone calls. While the problem was Bell System-wide and national in scope, Pacific Telephone & Telegraph (PT&T) customers, in particular, Bechtel Corporation, and American Airlines, complained of suspected false-billing patterns seen on their phone bills of two calls to the same phone number in quick succession. In the typical pattern, the first billed call was of short duration—just a few seconds—quickly followed by a subsequent billed call to the same phone number but of normal duration. The pattern became known as a “short plus subsequent (S+S) pair,” and greater than 0.5% of billed calls nationwide fell into this category. The problem escalated to the California Public Utilities Commission, and PT&T decided that something had to be done.

So in 1973 Bell Labs was charged to conduct the Electronic Switching System (ESS) Callback Experiment. The plan was that four 1AESS local telephone switching offices in California would be specially programmed to detect the S+S patterns and immediately transmit the relevant data to a central location, where agents would contact the calling customer to probe for information to characterize the calls.

Tim Wickham of Bell Labs Indian Hill in Naperville, Illinois, was responsible for developing the software overwrite for the four 1AESS offices. Any such software modification is always done with extreme care to avoid any possible down time of the switching offices providing telephone service to thousands of customers. During August and September 1973, the software overwrite was loaded, tested, and soaked in the designated Oakland, San Francisco, Los Angeles, and San Mateo 1AESS offices.

In parallel with the 1AESS development, I programmed a Hewlett Packard (HP) 2114 minicomputer to receive and process the real-time data

from the 1AESS offices and to then output the data on punched cards using a specially modified IBM 029 keypunch machine. Minicomputer applications were exploding in the early 1970s, primarily as operations support systems (OSS) that automated formerly manual Bell System network operations functions. Two available HP 2114 minicomputers were temporarily “borrowed,” one at Bell Labs in Holmdel, New Jersey, for development and one at the San Francisco call center to support the callback experiment. Programming the HP 2114 involved assembler language programming of the interface card drivers for the data-line input and keypunch output channels and a fairly sophisticated Fortran program to process data input, format/store/analyze data, perform flow control, and drive keypunch output. Modifying the IBM 029 keypunch required designing and building a hardware interface with TTL logic to process the HP 2114 output and mercury switches to drive the keypunch itself. It was a great and fun learning experience doing the hardware/software development, but my Bell Labs colleagues kidded me about this: Bill Covington referred to the hardware development as my little “Heathkit project” and, after I had completed the hardware development, Sterling Levie presented me with a 2”×2”×3” metal box labeled “HP Miniaturized Computer-Keypunch Unit,” which he claimed was available at the “Holmdel Labs store” where we picked up our office supplies and hardware components.

Virginia Spears of PT&T operations trained and supervised the eight callback agents who conducted the experiment at the 666 Folsom Street call center in San Francisco. All but one of the agents were female, so Larry Ackley, the colorful PT&T coordinator of the entire ESS callback experiment, referred to the operation as “Madame Spears and her call girls.” During the training on the HP 2114 minicomputer, one of the young ladies asked me, “Are computers going to take over the world?” After

all, computer ubiquity was just beginning to happen in the early 1970s with the rapid deployment of these small, dedicated minicomputers. The agents, to initiate customer contacts and conduct their interviews, used the data on the punched cards. Output data from the customer contact was recorded manually on the cards and later key-punched for processing. In conducting the customer interviews, the agents had to carefully avoid giving any impression that “big brother was watching.” These professional agents gently probed: was the customer aware of making two calls, and if so, what were the reasons and circumstances for making two calls in quick succession and what were their characteristics? Was the first call satisfactory (SAT) or unsatisfactory (UNSAT), and if UNSAT, was the short call a customer unaware billable (CUB) situation? If a call was billed in error, the agents made an immediate adjustment to the customer’s bill. Over a 35-day period in late 1973, more than 17,000 customer callbacks were recorded and an enormous amount of information was obtained to address the S+S pair billing problem.

Back at Bell Labs in Holmdel, I undertook a large data analysis and correlated the probability of SAT, UNSAT, and CUB to many regression factors, including short call duration, redial time to the subsequent call, call distance, business/residence, originating 1AESS, and others. In the end, more than two-thirds of the S+S pairs were determined to be billed in error. Many causes—faults, transmission problems, and cutoffs, among others—were found to contribute to such S+S pair occurrences. A major outcome of the experiment, based on the ESS callback data, was that the entire Bell System adopted a minimum chargeable duration (MCD) of 2 s, wherein calls of 2 s or less in duration would not be billed. As far as I know, this 2-s MCD rule is still in effect today for calls billed based on call duration.

Gerald R. (Jerry) Ash, LF  
North Clarendon, Vermont

## “Whump” There It Is

The article in the December 2008 *IEEE Life Member Newsletter* on “How Not to Test a Pressure Vessel” reminded me of a similar incident in 1960 at the Nevada test site on Project “Rover.” Project Rover was to result in a nuclear rocket engine for space travel, and a series of test reactors leading up to the final goal was called the Kiwi (non-flyable) test series. The general design was to use hydrogen as the thrust medium, heated in a core of graphite fuel rods, and expelled upward. The hydrogen was contained in a tank farm adjacent to the test cell. The reactor was on a railroad car that could be moved up to, and connected to, a concrete bunker (test cell). A separate shed on separate rails was used to protect the reactor from weather and could be

moved away from the test reactor when a test was to be run. The shed was made of a light steel frame covered with corrugated sheet steel.

Before each power reactor run, many tests of various types were performed on instrumentation, valve operation, fire protection, and so on. The valve tests began at the tank farm end and were performed by cycling each valve open and closed to ensure that remote position indications and controls and interlocks worked properly. The valves connecting the tank farm to the reactor were opened and closed one at a time so that there was never an open path from the tank farm to the reactor. There was no advance indication before there was a “whump” at the reactor site, and several corrugated sheets blew off the shed, and several

men came staggering out of what was left of the shed.

A low-level explosion had occurred, as a slug of hydrogen had been passed from the tank farm to the reactor as each valve had been cycled open and then closed. Had the valves been tested starting at the reactor, a slug would not have passed, but by starting at the tank farm end, a slug was passed and some small spark near the reactor from a relay or tool drop caused the hydrogen to ignite. Fortunately, there was only enough hydrogen to produce a low-order explosion, and no one was injured except for some short-term ringing in the ears. This event shows how important it is to carefully review test procedures.

George Block, LSM  
Kennewick, WA

## It’s Not Cold Solder Joints

In 2003, I was a reliability consultant for B/E Aerospace in Anaheim, California, working on predictions and a failure modes and effects analysis for the galley air cooler (GAC). As components of a cooling system for food, aircraft typically use about 20 GACs. One day, I was invited to a meeting with the supplier of the printed circuit (PC) boards.

Program Manager E.O. Knowles and Designer Tang Ha were also present. They were accusing the supplier of cold solder joints, which the supplier denied.

The rationale was that when the suspect joint on the failing circuit was touched with a hot soldering iron the failure disappeared. When I got back to the office, I looked at the schematic where they were touching the iron and concluded that it could not be cold solder joints because the diode part being touched was for protection and the board could function without it. We still did not know the root cause of the failures and the mean

time between failures was rapidly falling. The customer was getting logically upset because of the large quantity of failing boards.

We started an investigation with X-rays of the boards and looked at interlayer misalignment but no progress was being made on the root cause. One day, I took a failed board to a lab specializing in failures, and they noticed incorrect impedance across the suspect diode. They then suspected contamination. We subsequently talked to the PC board supplier and took samples of the flux, which is part of a normal material used to enhance solder conduction on the board. We had found out that even if small amounts of chlorine are contained in the flux then that would potentially cause problems if not washed properly following soldering.

Very small metal whiskers growing across the diode, initiated by the hidden flux with a chlorine component, caused the mechanism of failure. It

would be a latent failure. It would take some time for the metallic whiskers to migrate from one joint to another and cause a failure. Heating the joint with a soldering iron would melt away the whisker and was leading to the wrong conclusion.

The solution was to change to a different diode part with a different form factor that facilitated better cleaning underneath. Additionally, the PC board supplier was required to wash the boards in one direction and then rotate the board 90° and repeat the washing with de-ionized water to insure that all flux had been removed. These measures solved the problems.

In the over 40 years that I worked for Litton, I had never heard of this problem because of very good PC board suppliers. This investigation took about one year and probably cost about US\$100,000.

Joe Buttemeier, Member  
Woodland Hills, CA

## How Low Can You Go?

Articles published in the *IEEE Life Members Newsletter* most often reflect Members' past experiences with relatively hi-tech electronics and their contributions to the success of World War II communications. While that's as it should be, we would be remiss if we did not acknowledge that some pretty low-tech products also played a key role. I would like to present two of my contenders for this distinction.

Field wire (W110). This twisted pair of communications wire was as ubiquitous as it was tough. Its outer sheath of insulation was a mysterious blend of black plastic, rubber, and (probably) pitch. The outer sheath was embedded with multiple strands of stranded copper conductors. It was laid directly point-to-point, regardless

of terrain, over rocks, gullies, roads, ditches, and up and down mountain-sides. It survived army boots and jeeps, trucks and weather, and anything else short of a direct hit.

Of course its tough construction made it a bit difficult to use—stripping off the outer insulation and peeling back the steel wires, then more stripping to expose the inner conductors, but it was well worth the effort, and it's hard to think of anything else that would have performed so reliably under such extreme conditions. Its toughness was matched by the toughness of the wire crew, who managed to lay it when and where needed.

Nylon rope. This was rather novel when it was introduced in World War II, where it was widely used as guy lines to erect antenna masts and

poles. The field manual repeatedly stressed, in bold type, the admonition nylon stretches, to make sure that a bunch of young G.I.s would take this into account as we used it. The unsung hero, however, was the writer of the manual. To really impress the stretchability of nylon in our minds, he included a picture of a very attractive young woman with a very shapely leg outstretched, pulling on a nylon stocking, and captioned with "Remember, nylon stretches." Of course the first thing we did was to cut the picture out and tack it up in our radio shack, but the image did its job. Today, 65 years later, I still remember that nylon stretches.

J. A. Caffiaux, LSM  
Silver Spring, MD

## Initial Field Tests of LORAN-C

Long Range Navigation (LORAN-C) was much more accurate than its predecessor, LORAN-A, developed during World War II. It had an accuracy of on the order of 100 m, while the LORAN-A accuracy was several miles. This accuracy was obtained at the expense of great complexity. Our first prototype receiver, developed for the Air Force, weighed several hundred pounds and had a volume of several cubic feet. With the development of transistors, a system of more reasonable size and weight became possible. Our first transistorized prototype, developed for the U.S. Coast Guard, used germanium transistors (the only type available at the time).

Germanium transistors were very temperature sensitive. At the time, Texas Instruments (TI) was the only company able to fabricate silicon transistors; they were not yet available in quantity. One of our engineers, knowing of TI's monopoly on silicon transistors, purchased its stock and later sold it at a profit of over

US\$100,000 (a considerable sum 50 years ago). He was able to retire from our company (Sperry).

Our previous experience had been with vacuum tube circuits. Transistors were new to us. The thermal problems of germanium posed particular difficulties. Our first transistorized receiver still had three vacuum tube cathode followers, which dissipated 40 W (not including filament power), aggravating the thermal problems.

In the spring of 1958, I had the assignment of testing the LORAN-C receiver in the field. At the last minute, temporary modifications had to be "cleaned up," but there was no time to check them out because we were way behind schedule. I had to check out the receiver at the Coast Guard base in Elizabeth City, North Carolina, before loading it onto a plane. The receiver did not check out, of course. Two weeks of 14-h days were required to find all of the troubles, of which there were more than a dozen.

I finally got the receiver working and we flew over the Cape May

Lighthouse in New Jersey and found its correct position. Subsequent to this test, I devised a complementary symmetry emitter follower circuit. The three emitter follower circuits consumed less than 1/10 the power of the cathode follower circuits.

We successfully tested the receiver at numerous locations including Bermuda, the Bahamas, Puerto Rico, and Trinidad. I was constantly plagued by thermal problems, and it was never possible to put the cover on the receiver. As soon as the uncovered receiver warmed up, it would fail. To get it to operate, it was necessary to put critical circuits on extender boards. (Putting them outside the receiver, where it was cooler.)

LORAN-C was ultimately adopted as the primary navigation system for the U.S. Navy ballistic missile submarines. There were numerous other applications. It has now been superseded by the Global Positioning System.

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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](mailto:lm-newsletter@ieee.org). The deadline to submit an article for possible inclusion in the next issue is 3 April 2013. Please include your Life grade, town, state, country, phone number, member number, and/or an e-mail address with your piece.

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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.

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