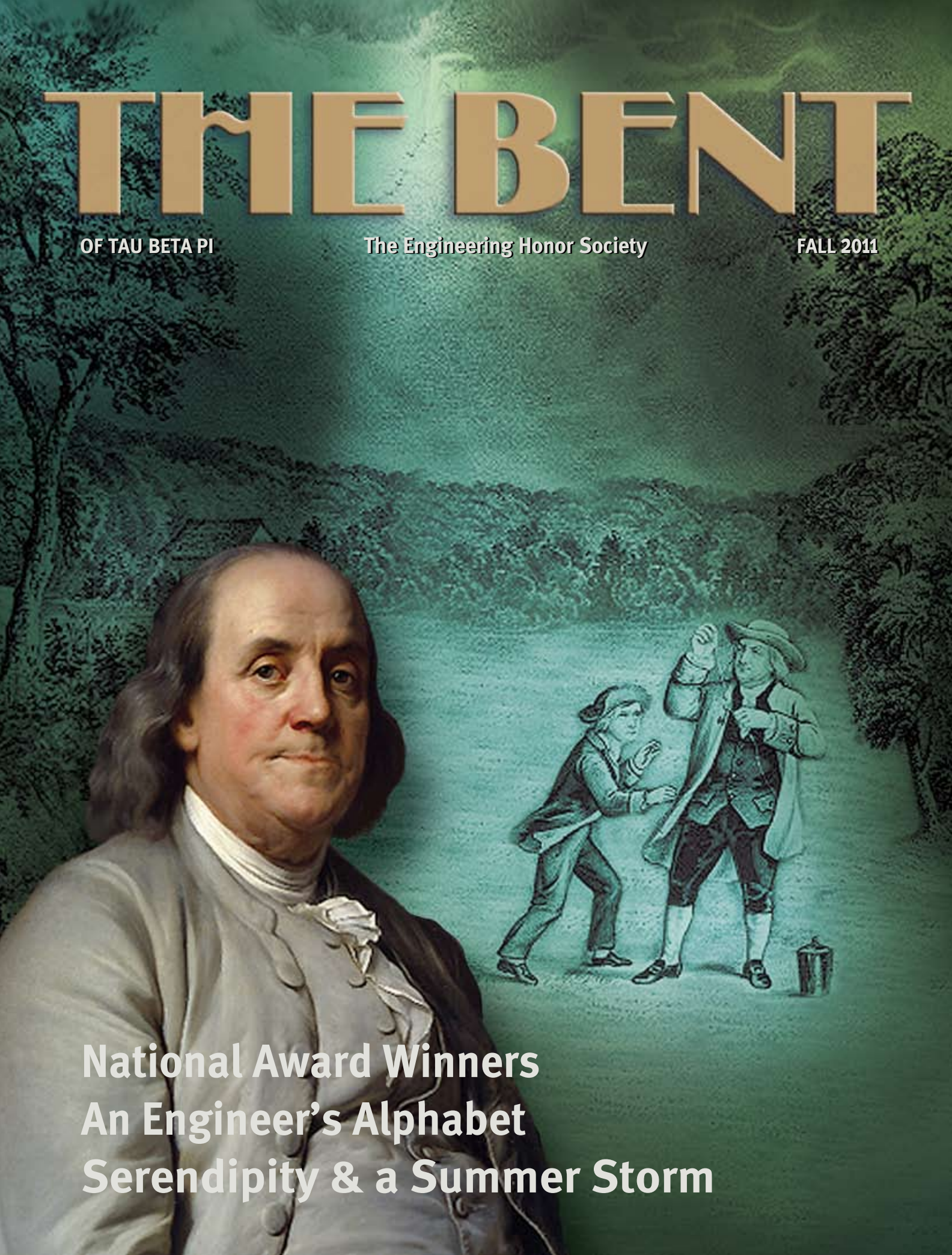
THE BENT

OF TAU BETA PI The Engineering Honor Society FALL 2011



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the Bent of Tau Beta Pi — The Engineering Honor Society

FALL 2011
Vol. CII / No. 4

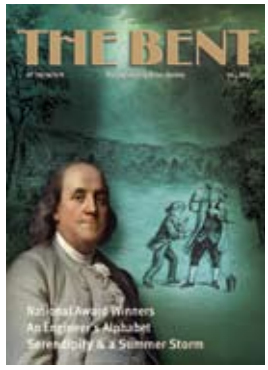
founded at Lehigh University, South Bethlehem, Pennsylvania, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent Office. Member, American Society for Engineering Education and (co-founder) Association of College Honor Societies. Affiliate, American Association for the Advancement of Science.

Features

ON THE COVER:

Dr. Bryen E. Lorenz writes of Benjamin Franklin's kite experiment to define electricity. In another feature, Dr. Henry Petroski spells out an alphabet for engineers.

Cover artist: Dali Polivka



Reports

Departments

TBPconnect
Tau Beta Pi's InCircle Community

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COUNCIL'S CORNER

The Tau Beta Pi Association was founded at Lehigh University in 1885 by Edward Higginson Williams Jr. to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. —Preamble to the Constitution

Time to Try Something New

This summer at 38 years of age and trying to be good parents by keeping a promise we made to our 10-year-old son, my wife and I enrolled in tae kwon do. I was fairly nervous because it had been almost 20 years since my athletic abilities had been put on public display. Having watched my son practice for more than a year, I was familiar with the white belt form and one-steps, but felt very unnatural and awkward when I started doing it. After the second class, the soreness in my entire body confirmed that it had been 20 years since I had done anything requiring athletic ability.

During the third class I broke the little toe on my right foot trying to "pivot gracefully." Determined not to give in to the soreness and the pain, I pressed on. After a couple of weeks the soreness disappeared, my coordination improved, and the movements started to feel natural. Two months later, I look forward to the class and feel guilty if I don't go. I have learned a great activity that we can do as a family, lost 10 pounds, and made new friends in the process. The point of my story is that while trying new things can be awkward or unnerving for most of us, the long-term benefits almost always outweigh the short-term pain.

As members of Tau Beta Pi, we are steeped in more than 125 years of tradition. Shortly the leadership of ΤΒΠ will be transitioning for only the third time as Curt Gomulinski takes the reins from Jim Froula. Under Jim's leadership programs like Fellowships, Scholarships, and Engineering Futures have grown and flourished. All of these programs came into being through dedicated volunteer members willing to try something new that extended beyond our Founder's vision. Through the years these programs have helped to keep our Association relevant by offering our members more than just another certificate to frame and hang on the wall.

Our Executive Council recognizes that one of the biggest challenges Tau Beta Pi faces is staying relevant. Inviting new candidates to join the Society and seeing them actually accept membership are two different things. Today's students have demands for their time far exceeding what I experienced only 15 years ago. To remain relevant, we need to look for new ideas and try new things to keep students, as well as our alumni, interested in Tau Beta Pi. We need to be willing to step outside our comfort zone, take some risks, and potentially endure some short-term growing pains. In the end we will be a much stronger organization because of it. This is the reason we have made the MindSET Program a key focus, but it alone is not enough.

Our Council has begun reaching out to targeted, experienced members through a vision development process to solicit their thoughts and ideas about the Association and its relevancy to members throughout their careers. Now I reach out to you for your thoughts and ideas. What are the things you would like to see us start doing or stop doing as an organization? The more ideas and feedback we receive, the better we will be able to help and support Curt as we build a plan to allow us to continue to grow and thrive during the next quarter century *(email: jason@tbp.org)*.

Before signing off, I personally thank you, Jim, for your years of service to Tau Beta Pi and thank your wife Barbara for all the support she has shown for you and our members. Your knowledge and dedication will be missed, but your friendship will remain treasured by all of us who have worked with you.

—**Jason A. Huggins,** P.E., *Florida Alpha '96,* Councillor

EDITORIAL

Reflections

It's time. The Tau Beta Pi clock ticks on, and it's time for a change. Curtis D. Gomulinski officially accedes to my title at the end of the 2011 Convention in Indianapolis, IN, when I will formally retire. However, with Curt's support, I will continue working as a consultant until the year end. I have enjoyed a wonderful 29 years of service under eight Executive Councils since the 1982 Convention in Moscow, ID. The Executive Council is graciously naming me as Executive Director/Secretary-Treasurer Emeritus, effective October 29, which means that I will be able to participate in future Conventions, as well as in development efforts.

Here are facts about how Tau Beta Pi has grown through the outstanding efforts of thousands of volunteers.

- By 1982, Tau Beta Pi had initiated 257,000 members. In 2011, the total exceeds 526,000.
- There were 185 collegiate chapters then; now there are 237 with our first international initiation in Qatar.
- BENT Life Subscribers numbered 38,000 in 1982. Twenty-nine years later there are more than 79,000 enrolled.
- By 1982, 423 Fellowships had been bestowed worth $904,000. Now, we have 943 for $5,290,000 plus another 478 awards without stipend, and the program has received national recognition from the ASEE.
- There was no Scholarship Program then. Today, 1,116 Scholars have been awarded $2,216,000.
- The operating revenue in 1981-82 was $1,094,000. In 2010-11, TBΠ had record revenues of $5,489,000.
- Total assets then were $2.7 million. The July 31, 2011, balance sheet reports assets of $21.8 million.
- In 1982, 20 companies matched employees gifts to TBΠ, and alumnus gifts totaled $2 million. Now, there are 227 firms, and the cumulative annual giving total is $22 million.
- Headquarters then comprised 11 employees, but not one computer. Today, we have 11 staffers, 14 PCs and laptops, four servers, a website with 12 million hits, and a web-based member reporting system.

Moving from numbers, I believe that the key events during the last three decades are:

- The establishment of the TBΠ Engineering Futures Program in 1988, now routinely teaching interpersonal skills to thousands of students annually and having been nationally recognized by the ASEE.
- The inauguration of the TBΠ Scholarship Program in 1998, which is growing and will assist multi-thousands of engineering students.
- The increasing generosity of 75,000 member-donors through our annual giving program and the wonderful bequests from William Fife, *CA A '21*, Leroy E. Record, *KS A '29*, Antoinette and Vincent A. Stabile, *NY Λ '40*, and Charles O. Forge, *CA Γ '56*, that will fund stipends for thousands of Fellows and Scholars and pave the way for other generous bequests.
- The development of our web-based membership reporting system, inaugurated in 2001, and *www.tbp.org* in 1994, which has increased the public visibility of TBΠ, as well as staff efficiency.

I must repeat the caution that Secretary-Treasurer R.H. Nagel gave in 1982 as he emptied his desk: "The Association should never be diverted from its fundamental purposes by engaging in activities that may be good by themselves but may detract from the true emphases of this honor society. The work of the collegiate chapters in identifying people of excellence, honoring them with membership, and imposing on them the obligations of life-long excellence and liberal culture is the basic mission of Tau Beta Pi."

Support Curt and the efficient Headquarters staff as well as I have been supported for three decades, and they will continue to build this Society into a major force in engineering education with greater visibility than ever.

Finally, thank you, the reader, who makes THE BENT possible. Thanks to the thousands of generous donors who allow this wonderful Association to survive and grow. Thanks to our advisors, officers, and other volunteers who give of themselves every day to lead and operate their chapters, the outstanding TBΠ programs, the Trust, and the entire Society. Thanks to all the folks at our suppliers, printers, financial institutions, and professional firms who provide outstanding service and fair costs. Thanks to the University of Tennessee, which provides office space and excellent internet service. Thanks to the dedicated staff at Headquarters who handle all the details of the daily chapter and financial operations, communications, meetings, and publications, and serve our members with kind words and smiles. Lastly, thanks to all my personal friends and family who have given great support during these three decades on the job. It's time. Happy trails!

J.D.F.

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- Universum Undergraduate Survey, 2011

LOCKHEED MARTIN

Rodger F. Smith, *Wisconsin Alpha '64*, managing director of Greenwich Associates, a consulting firm focusing on the investment management industry, was named as lead independent trustee for the board of Harbor Funds. He has served as an independent trustee representing shareholders since 1987 and as Chair of the Tau Beta Pi Trust Advisory Committee since 1985.

Dr. Arden L. Bement Jr., *Colorado Alpha '54*, has been named a Chevalier dans l'Ordre National de la Legion d'Honneur (Knight of the French Legion of Honor). He is former director of the National Science Foundation and director of the global policy research institute at Purdue University.

Dr. Terry D. Douglass, *Tennessee Alpha '65*, has received the University of Tennessee college of engineering's Nathan W. Dougherty award. Dr. Douglass is president of ProVision Healthcare, LLC. He was chairman of the board of CTI, specializing in products and services for medical imaging during 1983 to 2005, when it was acquired by Siemens.

Dr. Simon Ramo, *Utah Alpha '33*, has received the Robert H. Goddard trophy, pre-eminent award of the National Space Club, for his contributions to U.S. leadership in rocketry and astronautics. The physicist, engineer, and business leader led development of microwave and missile technology and is sometimes known as father of the intercontinental ballistic missile (ICBM).

Dr. Kenneth C. Hover, P.E., *Ohio Beta '72*, has become president of the American Concrete Institute, assuming the post as senior vice president after the passing of ACI president Richard D. Stehly. Dr. Hover is professor of civil and environmental engineering at Cornell University.

Dr. Ronald M. Latanision, *Pennsylvania Beta '64*, (shown) is the new editor-in-chief of the NAE magazine, *The Bridge*. He replaces the late **Dr. George Bugliarello-Wondrich,** *New York Rho '51*. Dr. Latanision is corporate vice president at consultants Exponent. He was previously on the Massachusetts Institute of Technology faculty and was elected to the NAE in 1985. He has served as a science advisor to the U.S. House of Representatives science and technology committee.

Robert B. Johnson, P.E., *Illinois Beta '69*, has received a Robert Cornforth award from the National Council of Structural Engineers Associations for outstanding service to the profession. He is a senior engineer for Bowman, Barrett & Associates in Chicago, IL., and has spoken to thousands of school children on structural engineering in outreach programs. He has also been a prolific writer on engineering.

Dr. Bruce E. Rittmann, *Missouri Gamma '74*, received the environmental engineering excellence award from the American Association of Environmental Engineers. He was honored for developing a biofilm reactor to decontaminate water. Dr. Rittmann is director of the center for environmental biotechnology in the biodesign institute at Arizona State University.

SAE Awards

SAE International named two Tau Bates among recipients of this year's young industry leadership awards. They were **Stacy M. Martin,** *LA Γ '05*, senior manufacturing engineer at General Motors, and **Jennifer C. Wheeler,** *TN B '97*, senior project engineer at AVL Powertrain Engineering, Inc.

John P. Rugh, *CO Δ '85*, received a SAE International Lloyd L. Withrow distinguished speaker award. He is a senior engineer at the Department of Energy's National Renewable Energy Laboratory.

SPE Honors

The Society of Plastics Engineers' international award has been presented to **Dr. Musa R. Kamal,** *IL A '58*, professor emeritus in the chemical engineering department at McGill University in Montreal, Canada. He is an international leader in polymer engineering. The Fred E. Schwab education award went to **Dr. Walter L. Bradley,** *TX A '65*, distinguished professor of engineering at Baylor University. He has championed polymers education for the past 33 years.

Vision Development Group

Blue Sky Thinking for Tau Beta Pi

Seated at the Vision Development Group's first brainstorming session are (L-R): Gil Amelio, Larry Simonson, Ray Rothrock, and Norman Pih.

Standing are Pat Harker, Harry Lange, Henry Schacht, Pat McDaniel, Jay Light, and Rodger Smith. Not pictured: Ralph Rockow and Sherry Jennings-King.

The surprise announcement at the 2010 Convention of Jim Froula's plan to retire in October 2011 set into motion the Executive Council's task to envision the characteristics of a new leader and to hire the best fit. The event also sparked a parallel series of discussions among ΤΒΠ leadership who deemed it an opportune time to revisit the vision of this outstanding Society. **Rodger F. Smith,** *WI A '64*, managing director of Greenwich Associates and Chair of ΤΒΠ's Trust Advisory Committee since 1985, proposed a plan to accomplish this.

Noting that many of our members are current and former CEOs and chairs of major companies in many industries and that dozens hold high positions in academe, he suggested that we invite several of them to help formulate a new plan or vision for ΤΒΠ. The proposal was enthusiastically embraced, and the following people, informally known as the Vision Development Group, quickly began work: Rodger Smith, **Harry W. Lange,** *MI Z '75*, vice president and portfolio manager for Fidelity Investments and a member of the Trust Advisory Committee; ΤΒΠ President **Larry A. Simonson**, Ph.D., P.E.; Executive Councillor **Norman Pih**; District 11 Director **Sherry D. Jennings-King,** *TN A '93*; and Director of Development **Patricia B. McDaniel**.

After more than a dozen conference calls among the dedicated group (with Harry sometimes joining at 6 a.m. from Japan) and considering numerous distinguished members, the following were available to help the committee embark on its first brainstorming mission: **Dr. Gilbert F. Amelio,** *GA A '65*, senior partner at Sienna Ventures, former CEO and chairman of Apple Computer Inc., and former president, CEO, and chairman of National Semiconductor Corporation; **Dr. Patrick T. Harker,** *PA Δ '81*, president of the University of Delaware and former dean of the Wharton School at the University of Pennsylvania; **Dr. Jay O. Light,** *NY Δ '64*, dean emeritus of Harvard Business School; **Ralph A. Rockow,** *OH Γ '58*, founder and president of Exodyne, Inc., of Phoenix, AZ; **Ray A. Rothrock,** *TX Δ '77*, general partner of Venrock Associates venture capital firm in Palo Alto, CA; and **Henry B. Schacht,** *CT A '56*, managing director and senior advisor at Warburg Pincus LLC private equity firm and former chairman and CEO of Lucent Technologies and Cummins Engine Company.

During the first meeting, held in New York City on April 15, Dr. Light facilitated a lively discussion with the group. Mr. Rockow participated by phone. In the half-day meeting, the group identified the strengths of ΤΒΠ's programs, its ability to influence engineering education, the potential to influence students to enter engineering, ways to help students stay in engineering, and how to help members' career development after graduation.

The group plans to meet again on October 26 in New York City to discuss how the Association can work to strengthen its brand and best ways to communicate with our large membership.

Pat Harker makes a point during the Manhattan meeting.

Aggressive Engineering, Passive Houses

• After reading the (excellent) subject article in THE BENT (Summer 2011), I noticed the photo of the fuel prices that was part of Trudy Bell's bio and assumed it was there to provide impact of the ever-increasing cost of fossil fuels.

I recalled a fuel sign that I saw in New Hampshire in 2009 when I was returning to Cambridge, MA, from a short trip to Canada. It takes a humorous approach to expressing the rise of the fuel prices. I thought your

readers might appreciate it, so I've attached it to this note.

Marion A. Darrow, AZ A '61

• When you talked about blowing insulation into your walls and replacing windows, you didn't mention that you had an energy audit performed on your house. Did you have one done? You also mentioned the air-tightness issue but did not mention having your house air sealed. As the cost benefit of the air sealing is substantially higher than the extra insulation, I would think that would be the best place to start for your house.

Jack Sol-Church

• I enjoyed reading your article on "Passive Houses" in the Summer issue of THE BENT. I also wanted to share the following. During my retirement I have made a hobby of reducing our utility bills. Our house (4,470 ft^2.) was built in the late 1980s, so we had some advantages compared to your 1914 vintage home. During the course of the last 10 years our total usage of gas (therms) and electricity (kwh) has been reduced by about 40 percent. We have improved the insulation and the seal of the house, but the biggest impact came from a project that reduces infrared gain through the windows. That one project has lowered our annual electricity usage by 20 percent by reducing the electricity for air cooling in the Chicago area by 90 percent during our three-month air-conditioning season. These savings are perhaps available through the use of externally mounted *solar screens*. My method involves a more open (removable) grate. Each design has its advantages. I've applied for a patent but won't know until the end of the year if one will be issued or not. Either way, the grate will be able to deliver substantial savings for residential and commercial buildings. Payout on materials at our home has been three-to-four years, and I expect an improved manufacturing design could produce a two-year payout on combined labor and materials.

I'm delighted to see the engineering community remind the public that conservation is still in the mix for energy and environmental projects. Who wants to spend billions on *green energy* only to continue to use it so extravagantly? Controlling sunlight through the windows offers a good economic payback, the timing couldn't be better, and, as your numbers show, the opportunity is *huge*!

Horace J. Cochran, CA Δ '67

Biosphere and Sustainability

• I read "The Biosphere and the Sustainability Coalition," by David F. Ludwig and Timothy J. Iannuzzi in the Summer 2011 BENT. In my opinion, the article is a proliferation of voluminous "techno babble" full of misunderstood and undefined words. It causes the reader to become hypnotized with *politically correct* ideology about subjugating humanity to the Earth, instead of improving our lot by mastering the physical universe, as has been done by our engineering predecessors before the ecology movement came into existence.

Hidden in this diatribe is the thinking of eighteenth century French philosopher Jean-Jacques Rousseau and his "back-to-nature" vision. Although written to dazzle the young engineers in college today, it can be reduced—by those who have lived long enough to understand what's really going on—to the following, concentrated extract:

> *To solve the problems of the world, we must believe that world government under the United Nations is the final solution to our problems of dealing with nature.*

This conclusion is hidden in the obfuscation of the diatribe presented to the professional engineer readers of THE BENT by Messrs. Ludwig and Iannuzzi. I caution the Editor that we need to beware of such subversion if we are to value our survival, not only as engineers, but also as mankind.

Frank M. Pelteson, OH Γ'49

Microprocessors

• Alan S. Brown's article in the Spring 2011 issue of THE BENT, "Microprocessors Face a Multicore Future," was interesting, but I think the author was misinformed on at least three topics.

In the second paragraph he said that Gordon Moore noted that the number of transistors on commercial microprocessors had doubled every year for the past seven years. There were no microprocessors in 1965. Gordon Moore's statement was about integrated circuits.

In the second paragraph in the section titled "The Law," he wrote that Intel's 8080 processor had a clock frequency of 2 MHz and could perform 2 million operations a second. The 8080 took 4, 5, 7, 10, or 11 clock times to perform an instruction; so its execution speed was between 182,000 and 500,000 instructions a second.

In the following paragraph he stated that "Faster clock speeds require higher voltages, …." This is, of course, false. Faster clock speeds require lower voltages for numerous reasons.

James L. Konsevich, MA Z '64

[On the first one, my notes say "integrated circuit," but I wrote the term "microprocessor." I should have written "microcircuit" or "microchip," but did not catch my error.

Guilty on the second one also. I equated clock speed with instructions per second. I should have caught that.

As for voltage, I got that from Jim Held, an Intel fellow and director of Terascale Computing Research. He said one of his research problems was that if you run faster, you have higher voltage and it produces more heat. Konsevich is right that everyone wants to reduce voltage, but I believe there is a tradeoff between speed and supply voltage. This article describes some of that: en.wikipedia.org/wiki/CPU_core_voltage.

—Alan Brown]

Growing Leaders/Skills for Success

• I appreciated Solange Dao's Council's Corner on "Growing Leaders" in the Spring 2011 issue. She relates well her experiences in leadership training and of ΤΒΠ playing a key role. Then, in noting the challenges to ΤΒΠ in having the outreach to train others and encouraging the Georgia Beta President's efforts, she asked the question of how ΤΒΠ can stand out among all the other campus organizations and activities.

I jotted down a couple of ideas about energizing teams that came to mind from my own leadership training and experience in program dynamics. I found it interesting to have several of these thoughts reinforced by Dr. Peter J. Denning's excellent article on page 21, "Skills for Success in Engineering and Beyond: Getting Your Ideas Adopted." He outlines well that for success as innovators and innovative organizations there is need for depth of skills (with both sequential and concurrent application of these skills) across eight of what he terms *practices*—Sensing, Envisioning, Offering, Adopting, Sustaining, Executing, Leading, and Embodying—many of these involving personalities, politics, and business/marketing aspects.

This supported my answer to a question asked in 2009 by Duane Nellis, president of the University of Idaho. My *alma mater* had embarked on an innovation initiative, and I was asked to speak with the deans of the colleges and student leaders on the subject of innovation. Being lead inventor on more than 50 patents across a range of products, I touched on the expected and natural question of what it is to be innovative creatively. I then put greater emphasis on what I've seen required in capabilities, or a culture, for success with innovation—and what I see as opportunity in the need for more leaders with these broader capabilities, and earlier in their careers. Much like in the article by Dr. Denning, my points come from corporate experience across global programs, particularly ones bringing forward features and technologies departing from the status quo. Here, my learning to understand, perform, and politic, particularly within Dr. Denning's *Offering*, *Adopting*, and *Sustaining*

practices, played key roles in success of these innovations surviving out there to lead in industry.

Thus, I called on the deans of the colleges for ideas to better introduce engineering and science students to skills in *personality politics*, teaming and "idea socializing" with non-engineers—and for business, political-science, and law students to have earlier networking with the engineering side.

I suggested to the undergraduate- and graduate-student leaders to initiate monthly "discussion-innovation-pizza parties" of dean's list students from across the university, even if starting *ad hoc* or as quasi *flash mobs*, and then enticing funding assistance, speakers/facilitators, and mentors from faculty of the engineering, business/economics, science, art and architecture, agriculture, natural resources, social sciences, and law colleges.

I suggested that each such meeting have a topic posing a "What/How?" question, whether lowest energy in a home, uses of micro generators, or implications of personal flight. Today, I would propose maybe using a 10-minute TED video as ice-breaker to a topic—any interesting topic able to be discussed from the angles of ideas, technologies, use, and marketing and social consideration.

I explained ways that I keep corporate idea sessions loose and fun—with a student engineer/artist available to illustrate and communicate everyone's ideas and a facilitator keeping the ensuing loops of discussion moving rapidly. No determinate outcome is required, as the point is to provide entertaining means to expand thought and enable people to meet those sharing common interests, and link synergistic talents, experience, and energy—thus increasing the probability of innovation and means to act on innovation.

So, to Vice President Dao's call for ideas on how to have ΤΒΠ stand out and "be the meaty entrée that's the top choice," my answer is to visibly be the creative leader on campus—where a student's left brain and right brain see ΤΒΠ-sponsored events as where it is happening. As with Georgia Beta's ideas, this also would help reach out early to freshmen and sophomores.

What other campus organization is a more natural sponsor of cross-discipline, discussion-innovation-networking groups? It may take some graphics/communications help and leveraging social networks of top students in the other disciplines (the all "practices" in play) to get other top organizations drawn in to work with you.

But, as national emphasis is coming back onto engineering and the sciences, this is a great time for ΤΒΠ. The chapters have a nationally recognized *brand* of excellence from which to expand connections for their members, and, in doing so, attract, train, and mentor upcoming leaders … and voilà! … you have free PR of *buzz* further growing a chapter's identity.

Russell W. Strong ID A '76

I'm Going to Medical School!

• Thanks so much for including the letter "I'm Going to Med School!" from Waldemar Semrau in the Summer 2011 issue of THE BENT. I also hope eventually to go to medical school in a similar manner, but I have selected Emory University. I admire the words chosen by Waldemar, and I hope they may influence more candidates to consider entering med school in their future plans.

Robert S.(Bob) Duggan, Jr., GA A '51

Thanks Tau Beta Pi

• I am writing to express my gratitude for Tau Beta Pi's Long Term Care Outreach and Education Program. I appreciate your foresight in establishing this benefit for members.

As my wife Barb and I started looking into long-term care we quickly discovered that it is a complicated product with many *moving parts*. We searched the internet for educational material and attended local seminars. Eventually we dived in and started talking to long-term-care insurance representatives. Fortunately, I had filed your June 2009 email announcing the new LTCOEP.

As a result I contacted ΤΒΠ and subsequently made connection with Stacey Malow-Williams, a counselor at LTC Financial Partners. Right from the start we were impressed with her knowledge and personal attention to our needs. She has a real heart for customer service. With her patient guidance we settled on a policy tailored to our situation. It is a big financial commitment, but we now enjoy a sense of comfort that we have responsibly acted to provide for our potential long-term care needs.

My purpose in writing is to thank ΤΒΠ and provide you with our very positive feedback regarding our experience with the firm. You are free to share our comments with your management contacts at LTC Financial Partners. We think it would be especially appropriate if Stacey's supervisor could see this note.

Mark R. Kurzen, OH Δ '71

Cleve's Back!

Cleveland L. Campbell, P.E., *Iowa Alpha '47*, is once again offering to match first-time donations to Tau Beta Pi's Annual Giving Program.

Any such gift received in 2011 (up to $2,000) will be matched dollar-for-dollar until we reach $25,000. Past challenges of $10K, $12K, and $25K were all met and matched.

Cleve's matching funds are used to create new *TBΠ*-Campbell Scholarships. If you are a first-time donor and would welcome Cleve to match your gift, please send a check (write *"Campbell match"* on it) to: Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697, or use a credit card by calling us at 865/546-4578.

Thanks go to Cleve for supporting our scholars and to all loyal donors.

"Mr. and Mrs. Campbell,

Thank you for funding this scholarship. The legacy that you leave is both honorable and long-lasting; it encourages me and my fellow engineers to leave legacies of our own."

—**Joel N. Mehler,** *Kansas Beta '05*
Campbell Scholar No. 4

• Thank you for the ongoing BENT subscription. As a Catholic priest and former mechanical engineer, I am pleased that THE BENT keeps me in touch with goings-on in the technical fields and education.

Mark N. Van Alstine, SC Δ '87

• We have talked on the phone, and I am the fifth great-grandson of James White (home is in the park in downtown Knoxville) and the fourth great-grandson of both Charles McClung and James Scott—both of Knoxville circa 1795. Sorry to learn of your leaving TBΠ—you will be missed. Thanks for your work.

Charles McClung Scott Jr., BG (AUS Ret.), TX Δ '53

• I want to know if THE BENT is available as a PDF file. I've always enjoyed reading it and always looked forward to new editions.

Jim, I also read about your upcoming retirement in October and I wanted to thank you for the years of service you provided TBΠ. We briefly met at a TBΠ Convention. Your leadership has really enabled TBΠ to survive and thrive when many other groups have folded. Best wishes.

Pedro L. Febles Cortez, IL Δ '98
[THE BENT is available as a PDF file for subscribers. Send a message to tbp@tbp.org.*—Ed.]*

Cover Correction

• Just in case this hasn't been noted already, the Summer 2011 issue has a slight error on the back cover. The last Indiana Convention was at Purdue in 1993, not 1996 (Rapid City). I noticed this because my first was Cleveland in 1995, and I have never been to a Convention in Indiana.

Dr. Charles W. Caldwell, CA Λ '64

VOLUNTEER RECOGNITION

Tau Beta Pi depends on many generous alumni to keep our national programs and chapters running strong. We thank all of our volunteers for their time, energy, and commitment.

In particular, the Society recognizes these two Engineering Futures Facilitators who have served the collegiate chapters for 18 and for six years as of July 31, 2011:

• **Douglas L. Himes,** *MD B '82*—18 years; and
• **Julia M. Nolan,** *CA Λ '03*—6 years.

Tau Beta Pi: THE BENT

Find us on Facebook

Distinguished Alumni are recognized for their demonstration of outstanding adherence to the ideals of Tau Beta Pi (integrity, breadth of interest, adaptability, and unselfish activity) and for fostering a spirit of liberal culture in society. Recipients exemplify excellence in both leadership and character to members of collegiate chapters.

2011 DISTINGUISHED ALUMNUS

Richard G. Higgins

In recognition of outstanding lifetime achievements, **Richard G. Higgins,** *Maine Alpha '79*, is the 2011 ΤΒΠ Distinguished Alumnus. He held three vice-presidential positions during his 26 years at the Boeing Company, retiring in 2005 as vice-president for The Americas.

He recently endowed the Richard and Jean Higgins materials testing laboratory at the University of Maine, where engineering students test materials like shear plates, concrete cylinders, and wooden trusses to determine their strength.

Mr. Higgins serves on the college of engineering's advisory board. He helped to develop a new minor in engineering leadership and management. The curriculum, which includes courses on communication, environmental and business ethics, critical thinking, and decision making, aims to provide undergraduate engineering and engineering technology majors with an understanding of how to achieve the vision and goals of an organization.

A native of New Jersey, Mr. Higgins had a political science degree and a stint in the U.S. Coast Guard Reserve under his belt when he enrolled at Maine.

He joined Boeing as a structural engineer after graduating with a B.S. in civil engineering and later completed an M.B.A. at Seattle University and executive studies at the University of Washington and Carnegie-Mellon University.

His first assignment at Boeing was with the 757 wind-design group, before moving to service engineering where he helped airlines resolve in-service technical problems. Mr. Higgins is most proud of the airplane safety and maintenance work he accomplished as manager, director, and finally vice-president of maintenance engineering. He won the *Aviation Week* safety award in 1999. Other duties included chairing and serving on the boards of several subsidiaries.

A long-time participant in industrial activities, Mr. Higgins has been recognized for his leadership and contributions to the Air Transport Association and the Aerospace Industries Association.

He recently embarked on a new career in writing and has received a master's in history from Vermont's Norwich University. After completing a novel, he is writing a book telling the story of the Red Army during World War II and has begun work on a biography of U.S. wartime aviation hero James "Jimmy" Doolittle.

Passionate about military history —especially the Civil War—since he was a child, Richard says that, for him, the battlefield represents "the other side of the coin." Aviation brings people together to solve problems, while war drives them apart. "It's very important to understand why humans resort to conflict to solve problems," he says.

His love of military history became "an important part of my career" when, as an executive, he would travel the globe, discussing with world aviation leaders how his firm could facilitate aviation in their particular countries.

"But we couldn't talk about airlines all day, and so this would give us common ground," he recalls. "I'd ask, 'didn't such and such a battle happen close by here?' It would open up a whole new discussion. They'd take me on tours of battlefields, and everybody would go away feeling honored that I'd taken time to learn about their country. For myself, I gained great insight into their history and culture."

Mr. Higgins and his wife of 38 years Jean live in Santa Fe, NM, where he is president of his neighborhood's Tano Road Association. He is a board member of the Civil War Preservation Trust, Santa Fe Opera, and the Advanced Placement Initiative of New Mexico.

GIVING BY ALUMNI IN 2010-11 SETS RECORD

Generous Tau Bates Gave $938,409 in the annual giving program during the year that ended July 31, 2011. The average gift from 11,460 donors was $81.89, the highest figure to date. Total giving rose by 7.6 percent during this year of recognizing the 125th anniversary of ΤΒΠ. By comparison in 2009-10, 12,156 donors gave $871,914 for a $71.73 average gift.

Included in these figures is $37,270 allocated to the Fellowship and Scholarship Programs from the 227 companies and foundations that match gifts made by their employees to ΤΒΠ.

Additionally, a grant of $50,000 was given by the **S.D. Bechtel Jr. Fund,** *IN A '46*, for the K-12 MindSET Program. Generous bequests were received from the estates of **Charles O. Forge,** *CA Γ'56*, for $21,000 and **Marlin U. Zimmerman Jr.,** *MD A '44*, for $200,000.

Contributions from alumni are being used for Fellowships, Scholarships, and the Engineering Futures, K-12 MindSET, and Laureate Programs, for training chapter advisors at the Convention, for visits by ΤΒΠ officers to chapters, and for supporting ΤΒΠ. The giving program began in 1963-64 when $7,860 was contributed. Cumulative gifts since 1963 have reached $22.1 million.

Tau Beta Pi received its first bequest in 1963 from **Henry B. Evans,** *PA A 1893*, who was ΤΒΠ's first President in 1895-96. The cumulative value of bequests and capital gifts is now $11,797,000. These gifts have been used to establish the following funds: Fellowship, M. Anderson Fellowship, D.L. Arm Fellowship, Best Fellowship, Deuchler Fellowship, C.R. Dodson Fellowship/Scholarship, C.O. Forge Fellowship, E.P. Hanley Fellowship, Stark Fellowship, M.U. Zimmerman Jr. Fellowship, Alabama Power Scholarship, ΤΒΠ Scholarship, H.M. Alford Scholarship, E.E. Althouse Scholarship, R.A. Curtis Scholarship, C.O. Forge Scholarship, L.E. Record Scholarship, A.C. Scribner Scholarship, V.A. Stabile Scholarship, Engineering Futures, GIG, McDonald Mentor, Program Development, and Student Assistance. Together they generated $2,185,000 in earnings and investment gains used during 2010-11 for activities of the collegiate chapters and replenishing the funds.

During the year, ΤΒΠ received $140,000 contributed by an irrevocable trust restricted to Fellowships—from the late **William Fife,** *CA A '21*.

The Tau Beta Pi Outstanding Advisor has been recognized every year since 1994. Selection is made by a national committee of deans of engineering colleges.

2011 NATIONAL OUTSTANDING ADVISOR

Dr. Robert L. Ward, P.E.

In recognition of service to his chapter and the Association, **Dr. Robert L. Ward,** P.E., *Ohio Iota '88*, is named the 2011 Tau Beta Pi National Outstanding Advisor. A professor in the civil engineering college at Ohio Northern University, he has been Chief Advisor to Ohio Iota since 1996.

Nominating him for the award, his chapter officers said: "Dr. Ward is an advisor who strives to make Tau Beta Pi better each year by encouraging every member to be active in all of the events. He guides the officers in running the group, but allows each officer to truly be a leader for the group. He helps find new opportunities in order to allow students to volunteer to support the community and the school. This builds the character of each of the members and also allows people in need to be served. Dr. Ward's support for new ideas has allowed the chapter to grow, take on new challenges, and continue [its] effectiveness as a service organization."

Under his direction, Ohio Iota won the R.C. Matthews Outstanding Chapter Award in 2002-03, and received honorable mentions for the years 2004-05 and 2009-10. At the 2010 Quasquicentennial Convention, it was the most decorated chapter—winning five awards.

Ohio Iota is one of the smallest chapters (approximately 25 eligible students each year), and Dr. Ward is pivotal in providing the necessary continuity from year to year. It is one of our star performers, initiating 100 per cent of eligible candidates. Since 1975, the chapter has taken home the Outstanding Chapter Award three times, along with 11 honorable mentions! It has had an unbroken streak of 15 Secretary's Commendations and has received the Chapter Project Award every year since its creation, using the money to fund an annual outstanding sophomore award.

He is a strong supporter of ΤΒΠ national programs, including Engineering Futures and Greater Interest in Government. Students are encouraged to apply for scholarships and fellowships. In the past 10 years, Ohio Iota students have received six fellowships and seven scholarships, an outstanding achievement for the small numbers there. He regularly attends the annual Convention, serving as an excellent resource for newer advisors, and he was named to the Advisor Recruitment and Development Committee.

Dr. Ward received bachelor's and master's degrees from the University of Missouri and his Ph.D. from the University of Arkansas. He spent eight years in the work force as O'Fallon, MO, city engineer, a project engineer with Eastman Kodak, and with the U.S. Army Corps of Engineers.

Dr. Ward joined Ohio Northern as an assistant professor in 1989, after teaching experience at St. Louis Community College, Kansas State University, the University of Arkansas, and New Mexico State University.

He specializes in water resources, engaging students in projects such as performing studies of increased storm-water run off from campus buildings and parking lots. He is committed to his college's outreach activities, teaching civil engineering concepts to middle- and high-school students, as well as working with MATHCOUNTS and JETS. He serves as a member of the local Ada water steering committee and undertakes consulting projects.

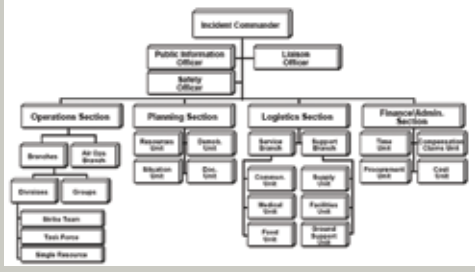
Dr. Ward has also been active in the ASEE, both regionally and nationally, serving for two years as executive board chair for the north central section and as campus representative. He is a past director of the Ohio Society of Professional Engineers and was chair of its professional engineers in education practice division.

Lyle's Law of Linking

Those readers who are of my generation will recall that the late sixties and early seventies were a time of considerable ferment on college campuses. There were some weighty issues such as the Vietnam War, civil rights, the draft, and hardhats versus hippies. There were also some issues that were less cosmic in nature but were almost as intractable, such as dormitory visitation policies.

Before 1970, most campus policies governing visits to men's dorms by women and to women's dorms by men were pretty simple, boiling down to just one word: PROHIBITED. But a brave new world was emerging as students became restless and more liberated and the old principle of *in loco parentis* began to fade. Striving to accommodate this new reality, many campuses undertook a review of visitation policies. While our campus was by nature pretty conservative, our president had a good view of the cultural horizon and—somewhat reluctantly—appointed a committee to develop a new policy. Since I am telling this story, you have probably already concluded that I was a member of that august group.

Link authority to responsibility.



Someone called us all together, and we discussed and reviewed and rehashed and re-discussed and, after a few meetings, had gotten absolutely nowhere. Then one day I received a phone call from the president's secretary who told me the boss would like to see me. In his office, he asked me about our progress, and I reported that there was very little. He then let it be known by word and gesture that it was my responsibility to get this job done, whereupon I replied that I was not the chair of the committee, whereupon he replied, "Well, you are now." So, newly burdened with responsibility but also armed with authority, I called a meeting of the committee, explained the new order, and we hammered out a visitation policy. I also learned a valuable lesson that I state now as Lyle's Law of Linking: *Link authority to responsibility.*

You have undoubtedly heard or read that a particular manager is "good at delegating responsibility." That may be an admirable trait, but unless the manager simultaneously delegates the authority needed to get the job done, it is not really delegation. It is more properly called, "passing the buck." If someone is to be held responsible for producing a particular result, it is essential to be given the authority over the processes that will determine whether the result is attained. This is another of those laws that one feels should be prefaced by the phrase, "Needless to say. . .", but then you realize it needs to be said.

Managers can start observing this law by agreeing that they will not claim to be "delegating responsibility." They will delegate authority. This is the action that requires courage and good judgment and organizational skill. The manager is saying to the other person, "I am taking my hands off these knobs and levers. You take over." Then make it clear to that other person that since they now have control, they also have the responsibility of achieving the desired result. Authority has been delegated. Responsibility has been—what?—assigned? I don't think delegated is the right word. But whatever you call it, authority and responsibility have been linked.

An understanding of the Law of Linking is important to 'managees,' as well. Whenever you are assigned a responsibility, you would do well to ask if the law is being obeyed. Ask yourself if it is clear that you have the authority needed to fulfill that responsibility. If you have doubts about it, see your boss and ask if you have analyzed the situation correctly and, if you have, what an appropriate remedy would be. Of course, you have to do this tactfully so the remedy isn't just that you go to work somewhere else. But an astute manager will appreciate the fact that you are able to determine what you need to do the job and will make sure you have the necessary authority.

The Law of Linking can even be useful in child rearing. It has been said that the most important job of a parent is to create an adult who is no longer dependent upon the parent. That means giving children increasing responsibility as they mature. But you can't expect them to take on responsibility unless they have the related authority. You can't give your teenagers the responsibility of taking the trash to the dump if you don't give them the keys to the pickup.

While good leaders are adept at delegating authority and assigning responsibility, they recognize that delegation and assignment are not synonymous with divestiture. When a ship enters inland waters, she will generally take aboard a local

pilot who then assumes authority over the navigation of the vessel and also the responsibility of seeing it safely through the various hazards to shipping. The captain, however, retains the authority to reassume control because he knows he cannot divest himself of the ultimate responsibility for the safety of the ship.

I saw this happen once when I was serving aboard the *USS Norton Sound*. We came into Port Hueneme when the Santa Ana winds were blowing about 50 knots and the pilot could not control the ship. Unexpectedly, he suddenly appeared on the fantail, obviously unhappy. The skipper had assumed control and ordered him off the bridge. There were a few tense minutes but eventually we were safely tied up. I'm not sure what happened to the pilot as a result of this little drama, but I am fairly certain that if we had crashed into another ship, our skipper would have lost his command and probably the rest of his naval career. No matter what happened, he was ultimately responsible.

It takes great courage to delegate authority. I would suggest that it takes even more to un-delegate it. But sometimes it needs to be done. Even here, though, Lyle's Law of Linking provides some useful guidance. If you take back the authority, take back the responsibility as well.

I should probably tell the rest of the story about the visitation rules. The code we developed was a compromise among the various factions, resulting in a copious compendium of rules that specified visiting hours, how wide doors had to be open, how many feet had to be on the floor, etc. But time continued its inexorable march, and one year, maybe two years, later the whole thing was discarded, and we pretty much deregulated dormitory visitation. In the process, Lyle's Law was obeyed. Authority and responsibility were tightly linked. Regarding this issue, the school now had neither.

—**Lyle D. Feisel,** Ph.D., P.E.
Iowa Alpha '61

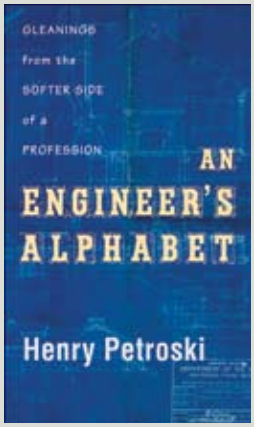
Gleanings from the Softer Side of a Profession: An Engineer's Alphabet (Excerpts From)

by Dr. Henry Petroski, P.E., *New York Xi '63*

This abecedarian is one engineer's collection of thoughts, quotations, anecdotes, facts, trivia, arcana, and miscellanea relating to the practice, history, culture, and traditions of his profession. The entries, which represent the distillation of decades of reading, writing, talking, and thinking about engineers and engineering, range from brief essays on concepts and practices that are central to the profession to lists of its great achievements. This book is at the same time an anthology, a commonplace book, and a reference volume.

A

"alphabet of the engineer." In his autobiography, James Nasmyth (1808–1890), the Scottish engineer and inventor of the steam hammer, wrote often of his learning to draw and of its importance for the practice of engineering. According to Nasmyth: "Mechanical drawing is the alphabet of the engineer. Without this the workman is merely 'a hand.' With it he indicates the possession of 'a head.' " Using mechanical drawing figuratively as well as literally, Nasmyth allowed for it to represent the ability of the creative engineer to conceptualize and communicate ideas, and thereby lead technological innovations and enterprises. Engineers cannot easily be leaders beyond the technical sphere without also having a sense of their own profession's culture and traditions, and it is in this sense that Nasmyth's phrase has been adopted as the title of this book. *An Engineer's Alphabet* is meant to call attention to the importance of putting the quantitative engineer in touch with qualitative language and thought, emphasizing the importance of both sides of the brain to truly creative engineering. See *James Nasmyth, Engineer: An Autobiography, new edition*, Samuel Smiles, ed. (London: John Murray, 1885).



From: *An Engineer's Alphabet: Gleanings from the Softer Side of a Profession*, by Henry Petroski, Copyright © 2011 Henry Petroski. Reprinted with the permission of Cambridge University Press.

The alphabet metaphor was also used by Robert Fulton (1765–1815), who is perhaps best known for his work on the steamboat. Before devoting himself full time to engineering and inventing, Fulton worked as a portrait painter, first in Philadelphia and later in England. It was while he was abroad that he published *A Treatise on the Improvement of Canal Navigation* (London: I. and J. Taylor, 1796), on whose title page he is identified as "R. Fulton, civil engineer," the relatively new designation for the profession that distinguished its practitioners not from the yet-to-be-coined "mechanical engineer" but from the military engineers who had traditionally been responsible for large projects. In the preface

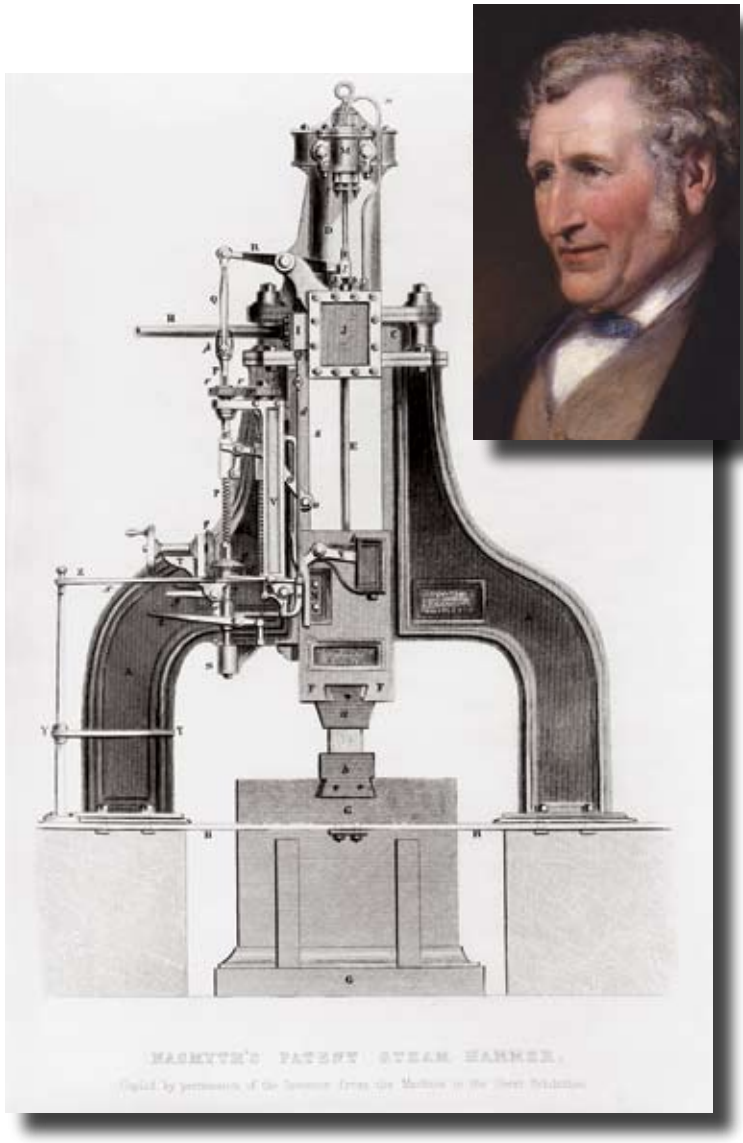


Diagram of a steam hammer patented by Scottish engineer James Nasmyth (1808-90) (Inset). Illustration in: *Cyclopædia of useful arts, mechanical and chemical, manufactures, mining, and engineering*, ed. by Charles Tomlinson, London: New York, G. Virtue & Co., 1854.

to the book, Fulton reflected on the concepts of invention and improvement, observing that "the component parts of all new machines may be said to be old." It is in this context that he wrote that "the mechanic should sit down among levers, screws, wedges, wheels, & c. like a poet among the letters of the alphabet, considering them as the exhibition of his thoughts; in which a new arrangement transmits a new idea to the world." When that new arrangement produces a "new and desired effect" Fulton notes, its creator possesses that quality "which is usually dignified with the term Genius." . . .

B

badges of engineering societies. Also known as pins, badges of distinction were once worn on watch chains but now are often worn on the lapel of a jacket to identify members of a society and to distinguish members of different grades. Among the oldest badges is that of Phi Beta Kappa. The society's famous key, which evolved from the original square badge, did not come into use until decades after the society's founding in 1776. (For more on keys, see keys of honor societies.)

The idea of a badge to be worn by members of the American Society of Civil Engineers was proposed in the late nineteenth century because, as the society had grown, the secretary could not know every member personally. To save everyone the embarrassment of having to ask individuals whether they were members, they were expected to wear their badges when traveling to or participating in national meetings. The first design for an ASCE badge was adopted in 1884. It consisted of the letters *ASCE*, the society's founding date of 1852, and a depiction of the engineer's surveying instrument known as a wye level, all on a blue shield. This design was not universally popular among members, however, because lay people did not recognize the level and mistook it for all sorts of irrelevant devices. . . .

C

Centennial of Engineering. The one-hundredth anniversary of engineering in America was celebrated in 1952 to coincide with the centennial of the American Society of Civil Engineers, the country's first permanent national professional engineering organization. At the time of the society's founding, the term "civil engineer" included all engineers who were not military engineers, and so the organization welcomed those practicing the rudiments of what would later come to be called mining, mechanical, and other forms of engineering. In time, there were formed specialized societies for mining engineers, mechanical engineers, and others. A three-cent U.S. postage stamp—then sufficient to mail a first-class letter across the country—was issued to commemorate the Centennial of Engineering.

D

Dilbert. This cartoon-character engineer began to gain prominence in the early 1990s in the syndicated comic strip of the same name. The strip, drawn by Scott Adams, who worked with engineers before beginning to caricature them, developed a devoted readership that followed the daily office activities of Dilbert and his co-workers. Dilbert has been described as "a nerdy but lovable engineer" and as "Everyengineer," although I am not sure that his short-sleeved shirt and curling tie is the image of themselves that engineers wish to have propagated. The comic strip is in fact more often about the sociology and psychology of the workplace than about engineers and engineering. . . .

The fob-mounted Tau Beta Pi and Phi Beta Kappa keys of **Harry R. Lee,** *Pennsylvania Alpha '06,* first Editor-in-Chief of The Bent in 1906. They were received from him in November 1967 and are on display at Headquarters in Knoxville, TN.

E

"electronic engineer." When the American Institute of Electrical Engineers (founded in 1884) and the Institute of Radio Engineers (1912) decided to merge, it was at first thought that the name of the new organization would be the Institute of Electrical Engineers. Dropping the word "American" was consistent with the aspiration to become a truly international organization. However, the abbreviation IEE was already taken, by the long-established British society known as the Institution of Electrical Engineers. Furthermore, although the AIEE had already included electronics as a subdivision, some IRE members wished to recognize the growing field more explicitly. There still ensued some debate as to whether the singular or plural form of electronic should be used; that is, whether the new society should be called the Institute of Electrical and Electronic Engineers or the Institute of Electrical and Electronics Engineers. While the merger became effective on January

This stamp was issued in September 1967 by the United States Post Office, commemorating the 1965 space walk by **Lt. Col. Edward H. White II,** *MI G '52,* (right) the first-ever by an American. The issue was eight months after he and two other astronauts—**Virgil I. Grissom,** *IN A '50,* and **Roger B. Chaffee,** *IN A '57*—were killed during a prelaunch test for the first manned Apollo mission. It was the first time in USPO history that the design was actually spread over two stamps (one which featured White, the other his Gemini capsule—the two connected by a tether), which was considered befitting the *twins* aspect of the Gemini mission.

1, 1963, the final form of the name was not decided until February of that year. Those who favored the singular form were advised that an "electronic engineer could only be a robot, operating by internal tubes or transistors." Since the new IEEE wished its members to be dues-paying flesh-and-blood engineers, the singularists relented, and the society's name included the plural, "electronics engineers."

F

father-and-son engineers. Among notable father-and-son pairs in the history of engineering have been the British civil engineers John Rennie, the elder (1761–1821) and the younger (1794–1874), who were responsible for several London bridges; the British pioneering railroad engineers, George Stephenson (1781–1848) and Robert Stephenson (1803–59); Marc Isambard Brunel (1769–1849) and Isambard Kingdom Brunel (1806–59), the former a French-born engineer who practiced in America before settling in England, and the latter considered by some to be among the most heroic of the Victorian engineers; John Augustus Roebling (1806–69) and Washington Augustus Roebling (1837–1926), the American bridge engineers whose masterpiece was the Brooklyn Bridge; and Elmer A. Sperry *[NJ A '21]* (1860–1930), the mechanical and electrical engineer who developed a practical gyroscope, and Lawrence B. Sperry (1892–1923), whose aeronautical achievements included an automatic aircraft stabilizer. . . .

G

glass half full. Someone who sees a partially filled glass as half full is an often-cited definition of an optimist. Someone who sees the same glass as half empty is taken to be a pessimist. It has been said that someone who sees the glass as poorly designed, because it is twice as large as it needs to be, is surely an engineer.

H

honor societies. Tau Beta Pi was founded in 1885 at Lehigh University as an engineering alternative to the humanities honor society Phi Beta Kappa. Students in any field of engineering can be initiated into Tau Beta Pi; however, most engineering fields also have their own specific honor society. . . .

I

iron ring. A ring of iron, steel, or similar metal is worn by some engineers on the little finger of their working hand to serve as a reminder of their responsibility to society and to symbolize their membership in and commitment to the principles of their profession. The presence of such a ring used to be an almost sure sign that its wearer was an engineer who was educated in Canada. Although the tradition of wearing an iron ring is still most often associated with Canadian engineers, Scandinavian and other European engineers have had similar traditions, and stainless-steel rings began to be worn by some engineers in the United States in the 1970s. . . .

K

keys of honor societies. Traditionally, a key is a charm worn by a member of an honor society to signify membership. (In contrast, professional society insignia have tended to be in the form of badges and lapel pins.) As late as the middle of the twentieth century, when engineering was still almost exclusively a male profession, it was common for engineers to wear one or more keys and badges suspended from a watch-, key-, or tie-clip chain. By the end of the century, only the oldest generation of engineers followed this practice, and the insignia that professional and honor societies still offered their members increasingly took the form of cuff links, tie tacks, pendants, earrings, and lapel pins, as well as keys.

The term key came to be applied to the older piece of society jewelry first in the nineteenth century, when pocket watches were common and were connected to men's vests by watch chains, which also served to hold small winding keys. Some members of America's oldest academic honor society, Phi Beta Kappa, which predated engineering and scientific honor societies by more than a century, altered their society badges by attaching the steel shank of a watch key to them. (Keys were necessary because the winding stem was not introduced in America until later in the nineteenth century. These watch keys were smaller versions of those used to wind grandfather clocks and spring-driven toys.) The modern honor-society key evolved from these early functional ones. . . .

L

liberal education. According to the *Encyclopaedia Britannica* (15th edition), "by integrating the study of the humanities, social sciences, mathematics, physical sciences, and technology and by providing experience in analysis, synthesis, and experimentation, the undergraduate engineering program offers a modern liberal education." Increasingly, the engineering curriculum has been said to constitute the liberal education of the twenty-first century, in that engineers are expected to take courses in the humanities and social sciences as well as in the sciences, mathematics, and, of course, engineering. The typical liberal arts curriculum, on the other hand, rarely requires much exposure to science or mathematics, let alone engineering or technology courses. . . .

M

movies about engineers and engineering. There are more movies about engineers and engineering than is commonly acknowledged. Indeed, it has been estimated that during the 1920s there were on the order of 50 feature films with an engineer in the male lead. In keeping with the popularity of westerns and the image of the engineer working outdoors, most of these films had a frontier setting. . . .

Dr. Henry Petroski, P.E., *New York Xi '63,* is the Aleksandar S. Vesic professor of civil engineering and a professor of history at Duke University. His most recent book is *The Essential Engineer: Why Science Alone Will Not Solve Our Global Problems*. A member of the National Academy of Engineering, a distinguished member of the ASCE, and a fellow of the ASME, American Academy of Arts and Sciences, and Institution of Engineers of Ireland, he has received the Ralph Coats Roe medal from ASME and the Washington award from the Western Society of Engineers.

EXECUTIVE COUNCIL MEETING

The Executive Council met in Orlando, FL, on August 6, 2011.

The Council reviewed and accepted the Membership Study Report for 2010-11 indicating that a significant number of engineering students continue to seem uninterested in ΤΒΠ membership. The Council accepted the report and recommendations of the Distinguished Alumnus Selection Committee, modified the ΤΒΠ Distinguished Alumnus Program nomination procedure, and set a limit of five awards per year.

A.J. Flowerday was appointed to the District Program Planning Committee to a term ending in June 2013. The Council appointed District 8 Director Bruce A. DeVantier, *IL E '77*, and District 12 Director Gregory M. Newcomb, *CO B '06*, to terms ending June 30, 2014. The Council voted Distinguished Service awards to retiring District Directors C.D. Gomulinski and P.D. Homen and reviewed plans for the June 9, 2012, meeting of national officers and directors.

Councillor Norman Pih reported on the planned meeting of the ΤΒΠ Engineering Futures Planning Committee in Knoxville, TN, on September 3.

Councillor J.F.K. Earle, Ph.D., P.E., reported on recent progress in the ΤΒΠ K-12 MindSET Program, the development of four basic modules available for training teachers and parents and presenting lab sessions for students, the new MindSET website, and a successful training session for 21 teachers conducted by the Florida Alpha Chapter on June 13. Informational material had been sent again to all alumnus chapters in July.

The Council reviewed and modified plans for the 2011 Convention to be held in Indianapolis, IN, on October 27-29. A proposal to modify the postponement process of electees who fail to attend initiations was reviewed and will be sent to the Convention. The Council policy on professionalism will be reviewed by the Convention.

A chapter proposal for a Greater Interest in Government project grant was declined because it did not meet the guidelines.

President Larry A. Simonson, Ph.D., P.E., reported on the discussions of the Vision Development Group at its meeting in New York City on July 14. Councillor Pih summarized the discussions and decisions of the Trust Advisory Committee at its meeting on July 14 in New York City. James W. Johnson Jr., *NC A '77*, was re-appointed to the TAC to a term ending June 30, 2017.

Executive Director J.D. Froula reported on the status of the 2011 Alumnus Giving Program and the AGP Multi-State Registration Project. His preliminary fourth-quarter report of the fiscal year had been sent to the Council and was reviewed and received, and his annual report was received. A bequest payment of $10,000 was received from the estate of C.O. Forge, *CA Γ '56*, and the Council allocated it to the Engineering Futures Fund.

To start something...
you just need a trailer...
a great idea...
and your own winning team...

YAHOO! was started in a Stanford University campus trailer in 1994 by Chih-Yuan "Jerry" Yang, *California Gamma '90,* left, and David R. Filo, *Louisiana Beta '88,* who were electrical engineering graduate students when they created a website named "Jerry and David's Guide to the World Wide Web." This was a directory of other websites, organized in a hierarchy, as opposed to a searchable index of pages. In April 1994, "Jerry and David's Guide to the World Wide Web" was renamed "Yahoo!" The rest is history. They worked together and with others to build a team. This became a multinational corporation with more than 14,000 employees and 2011 total equity of $12.53 billion.

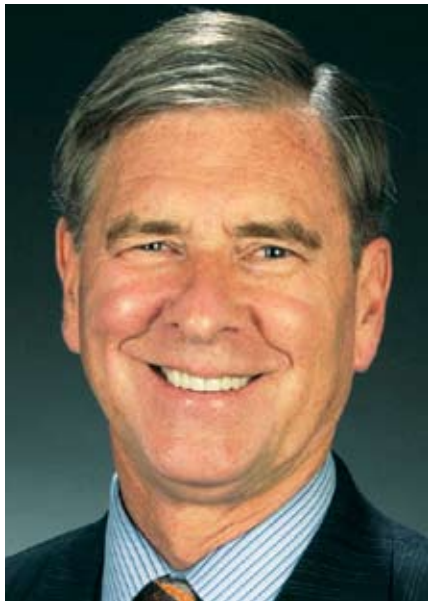
Tau Beta Pi's Engineering Futures Program teaches students the special skills needed to create and run such effective teams, like resolving interpersonal problems, conducting effective meetings, and presenting results to stakeholders. Your chapter can schedule an Engineering Futures session by contacting *sherry@tbp.org*.

TBΠ Engineering Futures
...make the difference

Established in 2006, the Tau Beta Pi-McDonald Mentor Award celebrates excellence in mentoring and advising among educators and engineers who have consistently supported the personal and professional development of their students and colleagues. It recognizes those who have shown true concern for individuals, supported an environment for developing talents, and earned respect and recognition for their contributions to their field and the greater community.

2011 TBΠ-MCDONALD MENTOR

Dr. William R. Goodin



For his outstanding success in mentoring engineering students, **Dr. William R. Goodin**, *California Epsilon '75*, is the 2011 TBΠ-McDonald Mentor. He is an Advisor to California Epsilon and director of short course and technical management programs at the UCLA extension, which he joined in 1983. He assists new engineering managers and supervisors in the workplace transition from technical to managerial roles.

Dr. Goodin received a B.A. in mathematics from San Jose State University in 1969, before going to UCLA to earn a master's in computer science in 1971, a Ph.D. in mechanical engineering in 1975, and a M.Engr. in engineering management in 1982. He previously worked as a senior environmental engineer with Dames & Moore, a software developer for Digital Productions, and a senior staff engineer at Hughes Aircraft Company.

Dr. Goodin's nomination statement declares: "Bill has provided constant support and counsel to the UCLA Chapter officers and the entire membership by ensuring transition of officer responsibilities and chapter structure, ensuring that event logistics are coordinated through the appropriate campus groups and programs, confirming that financial matters are in order, and ensuring compliance with both university policies and TBΠ bylaws.

"In addition, Bill continually offers career advice, job search strategies, and feedback on résumés to many members and is regularly asked to provide letters of recommendation for students pursuing careers and graduate-school opportunities."

It continues: "Bill has consistently helped improve the leadership skills of the TBΠ officers by providing feedback and advice on a variety of issues related to strategic planning, meeting and event planning and logistics, and day-to-day operation of the chapter. He has also extended his support to junior officers and helps them prepare for senior leadership positions."

As a past president of the institution's engineering alumni association and member of alumnus advisory boards there, he has provided the chapter with support like project funding and speakers for meetings.

Dr. Goodin is an active member of many other groups and honor societies, including ASCE, AIChE, and IEEE. He serves as an advisor and mentor to the Society of Women Engineers, which honored him for his steadfast support for advancing women in engineering, and as his SWE region's outstanding collegiate mentor.

California Epsilon members have also paid tribute to his work encouraging female members to run for office and giving them support.

Serving as a faculty advisor and student-group liaison takes up the majority of his weekends and time after work. His concern for the students has created a great rapport between them, while his close relationship with the alumni and ties to industry through his extension role bring great benefit to the chapter.

Cooperation among honor societies and other organizations is another area that has benefited from Dr. Goodin's wide-ranging activities. An example is when the chapter's tutoring program was overwhelmed by the demand in computer science. He brought California Epsilon together with two other engineering honor societies to set up an "incredibly successful" tutoring program.

There has also been praise for increasing the participation of alumni. He set up the TBΠ Alumnus Advisory Board on campus to support the chapter in areas such as career workshops and mock interviews. Other encouragement occurs in coaching areas like public speaking, leading meetings, creating an environment for people to succeed, and juggling the life-work balance.

2011 LAUREATES

Five Laureates have been selected in the 30th year of Tau Beta Pi's annual program to recognize gifted engineering students who have excelled in non-technical areas. Award categories include arts, athletics, diverse achievements, and service. The Laureates join 74 other outstanding Tau Bates who have been cited since the program began in 1982. They will be honored during ceremonies on October 29, 2011, at the 106th annual Convention in Indianapolis, IN, where they will each receive a $2,500 check and a commemorative plaque.

The Laureate Program was inaugurated to further Tau Beta Pi's second basic purpose as stated in the preamble to the Constitution: "to foster a spirit of liberal culture in engineering colleges." A committee of District Directors considered 11 nominees from 11 chapters.

Rosary Christine T. Abot

ROSARY CHRISTINE T. ABOT, *Indiana Gamma '11*, has been named a 2011 Tau Beta Pi Laureate for her diverse achievements. She has shown a broad range of interests as a volunteer in her community as well as her own academic career by earning both a B.S. in chemical engineering and a B.A. in philosophy. Her interest at the intersection of theology and engineering gives her the potential to make a significant contribution to the integration of engineering with liberal culture in the United States. She has been taking a humanitarian approach to analyze engineering ethics and educational issues. She hopes this will contribute to improved ethics education and greater communication between engineering and the humanities. During the 2008-09 academic year, she participated in an exchange program with the University of Cambridge where she immediately joined a rowing team as a coxswain for King's College and Wolfson College. Upon returning to Notre Dame she mentored students preparing for their exchange at Cambridge. She also served as captain for her team in the Notre Dame mock trial association and led them to awards at regional and invitational events. As a member of the engineering honors program, Rosary proposed the creation of a student council to mentor younger members, and she served as its first chair. She worked for three weeks as a substitute teacher for fourth and fifth grades at Corpus Christi School in San Francisco and served as a teacher's aide for another eight weeks. During the summer of 2010, she traveled to Mongolia on a grant from Cambridge and taught English.

Zachary W. Carr

ZACHARY W. CARR, *New Jersey Alpha '11*, is a 2011 Tau Beta Pi Laureate for his achievements in athletics. He was the starting goaltender for the Steven's Institute of Technology varsity soccer team during all four years of his college career. He led his team to four conference championships, four NCAA tournament appearances, and a trip to the NCAA finals in 2008. His leadership on and off the field as well as his impressive school-record 55 career shutouts have all contributed to individual recognition as first team academic All American in 2009 and 2010 and male athlete of the year at Stevens. Soccer has helped him learn many life skills, including teamwork, perseverance, and the results of hard work. Heavily involved in sports, he still found time to maintain a 3.92 G.P.A. while earning both a bachelor's degree in biomedical engineering and an M.E. in engineering management. He was selected as a student representative working on the opening of a Stevens graduate campus in Washington, DC. He later participated in the school's presidential search committee—a group of students consulting with the search firm seeking the new leader. In addition, Zach gave back to the school through approximately 100 hours of tutoring per semester and was involved in other volunteer activities in the community, such as serving dinners at the Hoboken Homeless Shelter. Whether planning a fundraising event, tutoring at a school for autistic children, helping underprivileged children to receive tennis lessons, or helping to choose a school president, his influence is felt everywhere that he contributes.

Ann M. Gleason Gilman

ANN M. GLEASON GILMAN, *Iowa Alpha '11*, was chosen a 2011 Tau Beta Pi Laureate for her achievements in athletics. She was Iowa State University's varsity soccer goaltender during 2006-09, finishing as the school's all-time leader in career wins, shutouts, and saves. She also led the Big 12 Conference in saves for two of her four years and was named to the academic All-Big 12 first team in her sophomore through senior years. A past-member of the Minnesota Lightning W-League soccer team, she served as an Olympic development program coaching assistant for three years. She contributed to the community as a volunteer with local youth girls soccer and the Special Olympics of Iowa. She has also been active in mentoring and helping other chemical engineering students. She assisted in the department of chemical and biological engineering as a supplemental instruction leader for an upper-level chemical engineering course. She attended lectures with students and used the class material to develop and conduct three, 50-minute sessions each week, helping them to boost their grades. She spent eight months in 2010 as a project engineer co-op with Cargill Corn Milling in Cedar Rapids, IA, running capital projects, one with a cost saving of $100,000 for the firm. An active member of Iowa Alpha, Ann was the chapter Project Officer for the Spring 2011 semester.

Jonathan A. Gross

JONATHAN A. GROSS, *Arizona Alpha '11*, is a 2011 Tau Beta Pi Laureate for his achievements in the arts. Since his first piano lesson at the age of seven, he has demonstrated an aptitude for the performing arts and a dedication to promoting classical music to everyone he encounters. He is completing a bachelor of science in computer engineering and a bachelor of music in piano performance. He uses his keyboard skills to bridge the gap between these two worlds and has maintained a 4.0 G.P.A. in both fields. He has attracted a large number of his engineering peers to his piano recitals and has volunteered hundreds of hours in preparing for and performing at numerous events within the college of engineering. On the engineering front, he was the electrical lead on a senior-design project. He also organized a team of programmers in the algorithm design and function implementation of Tic-Tac-Toe in C, which involved writing an artificial intelligence program that never loses. Jonathan officially served as a university engineering ambassador and is well recognized in the engineering community as the embodiment of that role. ΤΒΠ activities have included service as Webmaster and rebuilding the Arizona Alpha website from scratch, with an aesthetic redesign to bring unity and carry over distinctive elements from the ΤΒΠ international website.

Jennifer A. Johnson

JENNIFER A. JOHNSON, *South Carolina Alpha '11*, is a 2011 Tau Beta Pi Laureate for her diverse achievements. She has a well established history of service that began in early high school and continued to grow and diversify through college. Tau Beta Pi Spencer Fellow No. 56 and Tau Beta Pi Lindeburg Scholar No. 2, she served as President of her ΤΒΠ chapter and was active in Chi Epsilon, the Society of Women Engineers, and the Institute of Transportation Engineers. She volunteered as a member of the advisory board for the transportation continuity council to address campus and community transportation needs. Jennifer was active in Clemson University's women in science and engineering program, mentoring both middle-school and fresmen college women. She served as head counselor for Women in Science and Engineering's high-school summer camp and as a project leader for outreach events. In addition to engineering and science-related activities, she coached Daniel High School varsity girls basketball team and volunteered for the Mason Dixon basketball tournament at the South Carolina School for the Deaf and Blind. Having been a high-school basketball star, she turned to coaching following a career-ending knee injury. After graduating with her B.S. in civil engineering, she is remaining at Clemson for Ph.D. studies in intelligent transportation systems. Proposed graduate research involves integrating electric vehicles into an emerging concept called IntelliDrive, in which vehicles and infrastructure communicate to improve efficiency, mobility, and safety.

Benjamin Franklin: Philadelphia, Serendipity, and a Summer Storm

by Dr. Bryen E. Lorenz, *Pennsylvania Iota '76*

The eighteenth century had produced many important advances in the natural sciences that were to have a profound influence on the direction of scientific thought in later decades. This is certainly true in the case of Benjamin Franklin.

Franklin, a longtime resident of Philadelphia, was actually born in the city of Boston in January 1706. At age 17, Benjamin left home as a runaway from apprenticeship to his brother James, who owned a small printing business, to seek his fortune in Philadelphia. Through pluck, common sense, an indomitable spirit, and good fortune, he rose steadily in colonial society.

As his business interests prospered, he became intellectually restless looking for something that would stimulate his imagination. His investigations into electricity began in this way during a return trip to Boston in 1743, when he witnessed a demonstration of static electricity staged by a traveling showman. By 1751, eight years later, he published his masterwork, *Experiments and Observations on Electricity, Made in Philadelphia in America*, to which he constantly added in subsequent editions. This work was widely distributed and read by his European contemporaries with great interest, having been translated into Latin, French, German, and Italian.

Ben Franklin and son William are shown during the 1752 experiment with a kite (top right), in this painting by Charles E. Mills.

Proving His Belief

However, it was the kite experiment that was to gain him world renown by proving his belief that the brilliant lightning flashes arcing miles across the summer sky and the sparks that crackled by treading over a woolen carpet and then touching a metal doorknob on a cold winter's night were actually the result of the same electrical phenomenon. The connection between these seemingly unrelated natural events, electrical sparks and lightning, was carefully recorded in his journal. In the entries for November 1749, he listed twelve similarities, "1. Giving light. 2. Color of light. 3. Crooked directions. 4. Swift motion. 5. Being conducted by metals. 6. Crack or noise in exploding. 7. Subsisting in water and ice. 8. Rendering bodies it passes through. 9. Destroying animals. 10. Melting metals. 11. Firing inflammable substances. 12. Sulpherous smell." He concluded, "We do not know whether this property is in lightning. But since they agree in all particulars wherein we already compare them, is it not probable they agree likewise in this? Let the experiment be made."

Static Charge

His intention in performing this experiment in June 1752 was to extract static charge from the dark storm clouds as they hovered overhead through a pointed wire mounted on a silk kite.

Franklin had thought of using a church steeple for the experiment, but believed that the steeples available in Philadelphia at the time did not have the height needed for the experiment to succeed. The dramatic scheme to use a kite instead of a steeple was conceived out of desperation. It was hoped that this contrivance would place a conductor high enough into the storm clouds to collect electric charge.

As later retellings of the story would falsely claim, Franklin did not attempt to capture lightning on that hot summer day, but rather to determine the conditions for producing lightning. If he could establish the electrical content of the storm clouds, he could then argue that the lightning had a common origin with that of ordinary terrestrial discharges. It is amazing how this point has become

confused, even to the present day, with Franklin credited in a recent television biography as supposedly "plucking lightning from the heavens."

The plan on that day was for William, his son who by then was a man in his early twenties, to fly the kite in the city commons. This plot of land served as a grazing pasture for cattle and other livestock. It was large enough for William to run down the field and allow gusts of wind produced by the oncoming storm to lift the kite into the heavens. Meanwhile, Benjamin was hidden in a nearby shed, presumably to avoid possible ridicule by onlookers in the surrounding neighborhood as well as to offer some protection in taking measurements. Affixed to the wire conductor that the kite carried aloft was a long length of twine connected to a key. The key was electrically isolated by a non-conductive silk ribbon. When the time was right, the ribbon could be manipulated in such a way as to allow the key to touch a Leyden jar. (The Leyden jar was constructed with metal foil fitted to the outside and inside of a glass jar. The foil covering the inside and outside of the jar was electrically isolated. The inner foil was in turn connected to a metal post that protruded from the top of the jar.)

Store Charge

The function of the jar was to serve as a capacitor—a device used to store charge. When the twine became wet from the rain, a conductive path existed from the pointed wire attached to the kite to the Leyden jar, via the metal key. If all went according to plan, when the key came in contact with the metal post of the Leyden jar, which had been carefully discharged before the experiment began, a sampling of the electrical charge stored in the storm clouds would be captured. At that point, experiments could be carried out using the jar as if the jar had originally been charged in the conventional way by rubbing an amber rod with fur or a glass rod with silk.

Benjamin Franklin (1706-90) painted in France by Joseph-Siffred Duplessis during Franklin's stay in 1776-85 when he was Commissioner for the United States. This image was used for the U.S. 100-dollar bill, shown below in the 1996 version.

Franklin confidently wrote, "…As soon as any of the thunder-clouds come over the kite, the pointed wire will draw the electric fire from them, and the kite, with all the twine, will be electrified, and the loose filaments of the twine will stand out every way, and be attracted by an approaching finger. And when the rain has wetted the kite and twine, so that it can conduct the electric fire freely, you will find it stream out plentifully from the key on the approach of your knuckle. At this key the phial may be charged; and from electric fire thus obtained, spirits may be kindled, and all the other electric experiments performed, which are usually done by the help of a rubbed glass globe or tube, and thereby the sameness of the electric matter with that of the lightning completely demonstrated." The danger that surrounded his investigation into the nature of lightning cannot be overstated. One year later, Professor Georg Wilhelm Richmann from St. Petersburg, Russia, died from electrocution attempting the same experiment. Nevertheless, Harvard and Yale Universities gave him honorary degrees a year later for his groundbreaking work. The Royal Society of London presented him with the prestigious Copley Medal, the first such medal presented to someone living outside Britain. Benjamin Franklin was now internationally famous.

Franklin soon used this newly acquired knowledge to design a lightning rod, a simple preventative measure to protect property from fires caused by lightning strikes. We now know that a stroke of lightning averages about 40,000 amps and transfers about 1.0 coulomb of charge in a fraction of a second—an awesome force of nature. During the 18th Century, the popular belief was that the ringing of church bells as storms approached would repel them, due to the consecrated ground upon which the church stood. Walter Isaacson states in his book *Benjamin Franklin* that, during a 35-year period in the mid-1700s in Germany, 386 churches were struck by lightning and more than a hundred bell ringers were killed. Franklin commented, "The lightning seems to strike steeples of choice and at the very time the bells are ringing; yet still they continue to bless the new bells and jangle the old ones whenever it thunders."

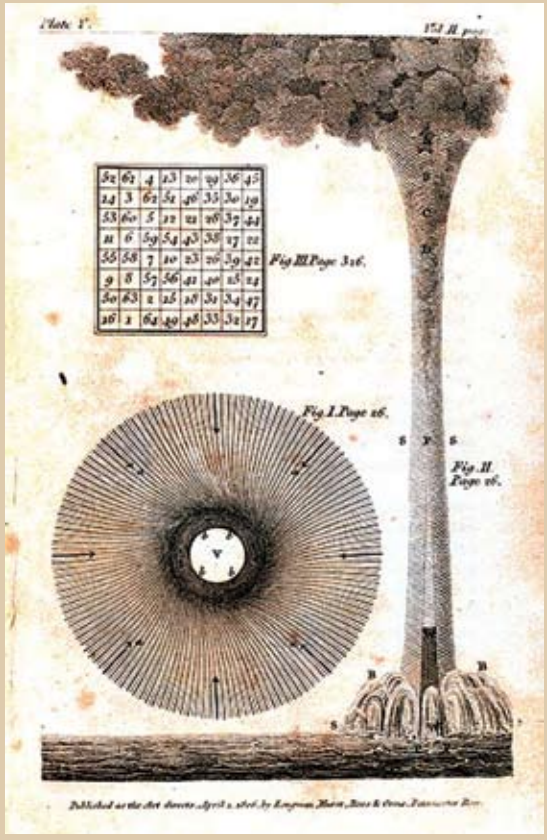
Frightened Wife

By the end of 1752, the recently completed State House had lightning rods installed. Franklin's own version of the lightning rod that he fashioned for his own house included a six-inch gap in the wire leading from the lightning rod on his roof to a well. The gap was located by his bedroom door. In the gap, a metal ball and two bells were placed such that ringing could be heard when the lightning rod was struck. His frightened wife Deborah Read wrote to him some years later while he was visiting London complaining of this device. He responded that the problem would be solved by simply placing a wire across the gap.

The results of the experiment and who was to be given credit for the discovery were not without controversy. In the spring of 1752, a similar experiment was attempted by Messieurs de Buffon, D'Alibard, and de Lor. In the village of Marly, a town near Paris, a sentry box was outfitted with a 40-foot vertical iron rod. On the afternoon of May 10, 1752,

as an electrical storm raged overhead, the apparatus set up in the sentry box was able to draw sparks from the rod. Within weeks it was replicated in other venues throughout France. Ironically, the idea for the sentry box had been first proposed by Franklin himself through excerpts from his letters that had been originally presented to the Royal Society of London and appeared in the popular British press in 1750.

Critics have argued that the kite experiment reported by Franklin was presented without independent confirmation. This could equally have been a hoax. In fact, the first public mention by Franklin appeared in October of 1752, four months after the event, in the *Pennsylvania Gazette*. He announced, "As frequent mention is made in the public papers from Europe of the success of the Philadelphia Experiment for drawing the electric fire from the clouds, it may be agreeable to the curious to be informed that the same experiment has succeeded in Philadelphia, though in a different and more easy manner." Much scholarly work has gone into this debate and appears to side with Franklin's account of the events on that day. Certainly history has favored Franklin, with little mention given to the French successes.



An illustration from Franklin's paper on "Waterspouts and Whirlwinds."

"Terrible Substance"

Controversy began in 1755, prompted by the Boston earthquake of the same year, which would soon surround Franklin's use of lightning rods. Because the rods had been installed on many buildings, the question arose whether lightning rods caused earthquakes. The Reverend Thomas Prince of Boston admonished his parishioners in one of his sermons, "The more Points of Iron are erected in round the Earth, so draw the Electrical Substance out of the Air; the more the Earth must needs be charged with it. And therefore it seems worthy of Consideration, Whether any Part of the Earth being fuller of this terrible Substance, may not be more exposed to more shocking Earthquakes. In Boston are more erected than anywhere else in New England and Boston seems to be more dreadfully shaken…."

The response to such criticism was typified by Professor John Winthrop of Harvard University. "Philosophy, like everything else, has its fashions, and the reigning mode of late has been, to explain everything by Electricity.… Now it seems it is the cause of earthquakes…. The two cases are in no way parallel; … the electrical substance, when in the bowels of the earth, is in circumstances essentially different from what it is, when in the clouds of the air."

The story of Franklin's investigations into electricity does not end here, but takes another interesting turn. Around the time of the kite experiment, Franklin had also noted another puzzling electrical phenomenon. By placing a silver can on an insulated stand and applying an electrical charge, a cork when moved to within a few inches of the outside of the can would be strongly attracted. However, when the same cork was suspended by a silk thread and lowered into the can, Franklin found that no electric forces were exerted on the cork—no matter where it was located within the can. He mentioned this curious behavior to his young friend, Joseph Priestley, a Unitarian minister whom Franklin had met during a stay in London.

Obey Such a Law

The cork's behavior reminded Priestley of the work of Isaac Newton, a fellow Englishman, in explaining gravitational forces. The concept that inside a uniform hollow sphere the net gravitational force on an object is zero is a direct consequence of the inverse-square-law dependence of the force. Priestley correctly proposed that the static electrical forces may also obey such a law. In 1767, he published this bold assertion in his work *History and Present State of Electricity*. Priestley was later to discover oxygen. Eventually, he was forced to emigrate to the American colonies for his unconventional religious and political views. He would settle in Northumberland, a town in rural Pennsylvania, where he lived until his death. Toward the end of the 1700s, a French military engineer, Charles Coulomb, demonstrated by using a torsion balance that the electrostatic force does indeed vary as the inverse square of the distance.

Franklin's work in electricity also brought into common use a misconception on the nature of electrical current, which still persists to this day. He imagined that electricity was some form of invisible fluid present in all matter. By rubbing insulating substances together, friction would cause the fluid to move from one material to the other. The movement of this fluid constituted an electrical current. Too little

of this electric fluid caused the material to be *negatively* charged, while too much of this fluid caused the material to be *positively* charged. As an arbitrary convention, he identified *positive* with the type of charge obtained by rubbing a glass rod with silk and *negative* with that acquired by rubbing an amber rod with fur. To his way of thinking, the electrical fluid would naturally seek to flow from the positively charged material to the negatively charged material. This convention still exists today, at least in the engineering community.

However, in 1897 the British physicist Sir Joseph "J.J." Thomson discovered the electron, a subatomic particle with negative charge. The electron is the charge carrier responsible for current conducted in metal wire such as copper or iron. Textbooks in physics portray electron current as moving electrons from the negative terminal of a battery to the positive terminal, while textbooks in engineering describe current in the conventional sense moving positive charge in the opposite direction. (Actually, in some cases such as with holes and conduction electrons in doped semiconductor material, charge carriers are in the form of both positive (holes) and negative (free electrons).) Each method of analysis, if used consistently, will lead to the same results, although from different points of view.

Benjamin's interest in scientific inquiry diminished after writing his book, turning toward politics instead. Eventually, this would lead him into becoming a delegate to the Continental Congress and a patriot committed to the rebel cause. With this came his estrangement from his son William, who had risen to become the royal governor of New Jersey—only to be imprisoned during the Revolutionary War and to die in exile and in poverty in later years. The two had never reconciled. Yet an ironic turn of events would lead to the kite experiment once again. As Esmond Wright relates in his book, *Franklin of Philadelphia*, in 1776 the British Board of Ordnance had asked the Royal Society for a preferred method of securing the arsenals at Purfleet from possible explosion due to errant lightning strikes. The Royal Society appointed a committee to investigate.

Political Views

The question eventually became whether a pointed or blunt lightning rod end should be used in this application. Franklin, who was appointed a member of the committee, recommended a pointed end which was based on his earlier kite experiment. One dissenter on the committee had opted for a blunt end. Nevertheless, the committee's recommendation was for a pointed end. King George III, angered by Franklin's political views, had asked Sir John Pringle, president of the society, to give an opinion in favor of the blunt end. Pringle replied that, "The laws of Nature were not changeable at royal pleasure." To this the King indignantly responded, "…by the King's authority that a president of the Royal Society entertaining such an opinion ought to resign." Pringle promptly resigned. The London gossip soon found an apt verse to relish the moment.

While you, great George, for safety hunt,
And sharp conductors change for blunt,
The nation's out of joint.
Franklin a wiser course pursues,
And all your thunder fearless views,
By keeping to the point.

Despite his absence from active scientific inquiry in his later years, his outlook for the future of scientific progress was optimistic. One of his quotations, both wistful and insightful, that captures his feelings on this subject recounts, "Furnished as all Europe now is with Academies of Science, with nice instruments and the spirit of experiment, the progress of human knowledge will be rapid and discoveries made of which we have at present no conception. I begin to be almost sorry I was born too soon, since I cannot have the happiness of knowing what will be known a hundred years hence." In fact, 75 years after Franklin's death James Clerk Maxwell would publish his masterpiece, *A Dynamical Theory of the Electromagnetic Field*, that collected the work of many investigators in magnetism, electricity, and optics into a unified theoretical framework. Franklin would have been pleased.

As we look back at the accomplishments of Benjamin Franklin in his investigations into the nature of electricity, there is much folklore, and misconceptions that have crept in during the last 250 years have been amplified by generations of grade schoolers. In light of modern discoveries, the world views his work as marginal or maybe even irrelevant. It is hoped that the reader appreciates that what at first glance appears trivial, actually has much more substance and controversy than is generally known. I believe that the phrase attributed to Carl C. Van Doren, a 1939 Pulitzer Prize winner for his biography entitled *Benjamin Franklin*, best sums up Franklin's contribution to the understanding of electricity, "He found electricity a curiosity and left it a science." I could not agree more.

Dr. Bryen E. Lorenz, *Pennsylvania Iota '76,* is a professor of engineering at Widener University and serves as the chair of the department of electrical engineering. He received his B.A. and M.A. in physics in 1969 and 1974, from Temple University. He obtained his M.S. and Ph.D. in electrical engineering from Drexel University in 1976 and 1981. In 1986, he was awarded the Lindback distinguished faculty member award. During the past two-dozen years, he has published widely in both technical areas and on topical issues. He has been involved in the local IEEE section and is also a member of ASEE, and Sigma Xi. His research interests are in electronics, magnetics, and instrumentation.

Embry-Riddle Aeronautical University

A full-scale, stainless-steel sculpture of the 1903 Wright Flyer in front of the library is a campus centerpiece.

IMAGES COURTESY OF ERAU

Embry-Riddle Aeronautical University (ERAU) is the world's largest institution of higher education specializing in aviation and aerospace. It is an independent, not-for-profit university that grew out of the Embry-Riddle Company, founded in 1925 by John Paul Riddle and T. Higbee Embry at Lunken airport in Cincinnati, OH. In 1926 Embry-Riddle began training pilots and mechanics and the following year moved into the business of carrying airmail for the U.S. Post Office. The Aviation Company (later known as Avco) was created to help finance Embry-Riddle's operations. By the end of 1929, the Aviation Company held a controlling interest in 81 companies involved with carrying passengers and airmail and manufacturing aircraft. The growth of Avco led to the creation of American Airways (today known as American Airlines).

In 1930 Embry and Riddle agreed to merge into American Airways. Embry went to California, where he lived until his death in 1946. Riddle moved to Miami, FL, and founded several aeronautical businesses. He took on John McKay as a new partner and re-opened the flight school in 1939 as Embry-Riddle International School of Aviation. The school trained thousands of pilots and mechanics for the military services of the U.S. and Great Britain during World War II.

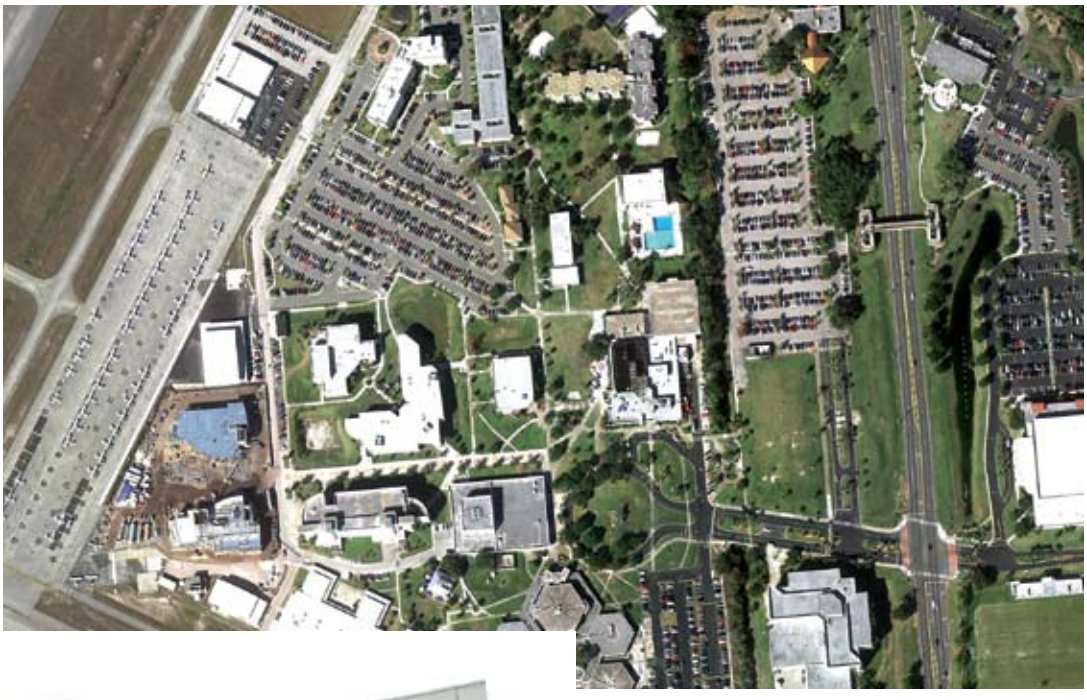
As the war drew to a close, Riddle sold his interest in the school to McKay. When McKay died in 1951, his wife Isabel took over the operation. Riddle continued to live in the Miami area, forming Riddle Airlines and a government-sponsored aeronautical school in Brazil.

Over the years Riddle maintained contact with Embry-Riddle and made regular visits until his death in 1989. He loved to walk around campus and engage students in conversation. He was such a low-key personality that some students were unaware of who he was.

Isabel McKay changed the company to a non-profit school in 1961 and changed its name to Embry-Riddle Aeronautical Institute. In 1963 she hired entrepreneur and former naval aviator Jack R. Hunt to be its president. Hunt oversaw the moving of the entire Embry-Riddle operation from Miami to Daytona Beach, FL, in 1965. About a third of the 239 students who made the move were in the engineering-related programs offered at the time. Initial quarters were in World War II naval buildings at Daytona Beach Regional Airport, which had been built as a wartime military training facility. Under Hunt's leadership, construction of a new campus began in 1968 on a 178-acre tract comprising most of the northeast corner of the airport property. Mr. Hunt served as president of the institute for 21 years, until his death at age 65 in 1984.

One by one, buildings have been and continue to be constructed to support student life, flight-related training, and the needs of the evolving academic programs. The school became accredited by the Southern Association of Colleges and Schools in 1968. In 1970 it was renamed Embry-Riddle Aeronautical University. By this time its focus had broadened from just training pilots and mechanics to providing associate and/or bachelor-degree programs in all aviation-related areas, including engineering. (In 1979 the facilities of Prescott College in Prescott, AZ, were purchased and transformed into the university's second residential campus.)

The bachelor's in aeronautical engineering started in the 1960s while the school was still in Miami. In 1975 it was finally accredited by ABET (formerly ECPD, the Engineers Council for Professional Development). In 1985 the master's in aeronautical engineering was introduced. Soon thereafter in 1988, with ABET's approval, the title of the undergraduate degree was changed from *aeronautical* to *aerospace*, and so was the master's.



Aerial view of the Daytona Beach campus, which includes the Lehman Engineering and Technology Center, below, housing classrooms and laboratories for the colleges of engineering and arts and sciences.

Throughout the years leading into the 21st century under the presidential leadership of LTG Kenneth L. Tallman (1986-90), Steven M. Sliwa, *NJ Δ '77* (1990-98), and George C. Ebbs (1998-2005), Embry-Riddle continued its transition from a technical school to a university. To its flagship aerospace engineering program on the Daytona Beach campus were added bachelor's degrees in engineering physics, civil engineering, computer engineering, software engineering, mechanical engineering, and electrical engineering. All of these programs are accredited by ABET's engineering accreditation commission. Master's programs were added in engineering physics, software engineering, mechanical engineering, and electrical and computer engineering.

Only recently, in 2003, were academic operations organized into four colleges: arts and sciences, aviation, business, and engineering. All engineering programs reside in the college of engineering with the exception of engineering physics, which is in the college of arts and sciences.

President John P. Johnson is now overseeing and promoting the university's growing activity in applied aviation and aerospace research. In 2010 Ph.D. programs in aviation and engineering physics were launched.

Fall 2010 enrollment at the Daytona Beach campus was 5,035 students, with 38 percent in the seven engineering programs, mostly in aerospace engineering. The remaining students are in the more than 20 degree programs offered by the other three colleges.

The campus holds 1,330,000 gross square feet of facilities on 185 acres. The three-story Lehman Engineering and Technology Center, housing classrooms and laboratories for the colleges of engineering and arts and sciences, opened in 1995. Recent additions include an advanced flight-simulation building, a residence hall, the college of aviation building, and the college of business building. Nearly completed is a new complex of buildings to house flight operations and fleet maintenance as well as classrooms and laboratories for the aviation maintenance program. A new administration building and visitors welcome center is under construction. Building plans during the next five years include new athletic facilities, a college of arts and sciences building, a student union, and a new classroom facility.

Progress and growth on the Daytona campus has been paralleled by development of the Prescott campus, as well as the worldwide campus. Worldwide programs consist of learning centers literally throughout the world where students who cannot attend the residential campuses can take courses and earn degrees. Degree programs can also be taken on the internet through "Worldwide Online."

This article was prepared by Dr. Howard D. Curtis, Indiana Alpha '63, *professor of aerospace engineering and Chief Advisor of Florida Iota. The story of the Florida Iota Chapter installation on March 12, 2011, appeared on pages 14-15 of the Summer issue.*

SPOTLIGHT

Increasing Female Faculty

Increasing female STEM faculty numbers "has become an area of intense focus for academe in recent years," says *Inside Higher Ed.*

It adds: "Attempts to boost these numbers have focused on everything from probing the barriers at individual institutions to encouraging more girls, while they are still in school, to consider careers in these fields."

At the Ramps into Academia workshop, held recently at the University of Washington, organizers took a different approach: encouraging talented and accomplished women to leave private industry and return to campus.

Calling the effort "notable because it seeks to woo back scientists who may, in turn, serve as role models for younger women about to consider their career options," *Inside Higher Ed* reported that "organizers have been pleased with the results so far."

STEM Grows Stronger

STEM initiatives are spreading nationwide, spurred by an increased emphasis on science and math and pressure to fill a job market void with future engineers and science-savvy students.

The Minneapolis *Star Tribune* reports that there are roughly 40 such programs in Minnesota, and almost all of the districts in the Minneapolis area have a STEM program of some sort. Some schools are planning to debut additional STEM programs in the coming school year or are expanding their programs to cover more grades.

Such efforts have come under fire from places like the Center for American Progress, which recently released a report that found uneven results and "called for better standards for teacher training."

Salary Levels Hold

While the cost of living and salaries vary based on metropolitan area or region, recent data shows that engineering salaries across the nation remain above average.

According to information from the NSPE's engineering income and salary survey, the gap between the highest and lowest median engineering salaries based on geographic location is only $19,000. The Pacific Southwest region earns the highest median annual salary of $89,000, while the Upper Mountain region earns the lowest at $70,000. These are both much higher than the national median household income of $48,451, according to the U.S. Census Bureau's American community survey conducted in 2006.

The survey contrasted pay levels for holders of different levels of degree. Below are the average salaries for full-time permanent employees earlier this year:

B.S. engineering degree	$ 88,627
M.A./M.S. (not engineering) ...	107,822
M.B.A. degree	110,099
M.S. engineering degree	97,305
M.B.A. and an M.A. or M.S.	111,613
Doctorate in engineering	120,145.

Student-to-Faculty Ratios

Student-to-faculty ratios reflect various approaches and conditions at engineering colleges, including the influence of graduate programs, school size, and whether the institution is public or private. Here are figures issued by ASEE for student/faculty ratios for 2008-09 bachelor's degrees:

Highest ratio of B.S. grads to faculty*	
1. California State Poly. U., Pomona	7.8
2. Kettering University	7.2
3. California State University, Fresno	6.1
4. San Jose State University	5.8
5. California State University, Chico	5.8
6. Lawrence Technological University	5.8
7. U.S. Naval Academy	5.6
8. California Poly. State U., SLO	5.4
9. Purdue University, Calumet	5.4
10. University of North Florida	5.3
Lowest ratio of B.S. grads to faculty*	
1. Yale University	0.91
2. California Institute of Technology	1.2
3. Howard University	1.3
4. Princeton University	1.4
5. University of California, Santa Cruz	1.4
6. Brown University	1.4
7. University of Memphis	1.4
8. University of Rochester	1.5
9. Wayne State University	1.5
10. Mercer University	1.6

**Minimum of 50 degrees awarded. 258 schools fit the criteria for this table. Faculty refers to tenured/tenure-track faculty members.*

PEOPLE

Dr. Donald M. Blackketter, *Wyoming Alpha '87*, has become chancellor of Montana Tech of the University of Montana. He had been dean of the college of engineering at the University of Idaho since 2008. Dr. Blackketter joined UI in 1989 as a mechanical engineering assistant professor. He was assistant director for the National Institute for Advanced Transportation Technology from 1998 to 2005.

Dr. Nigel N. Clark, *West Virginia Alpha '80*, who shepherded the formation of West Virginia University's 2020 strategic plan for the future, has been named associate vice president for academic planning. A professor of mechanical and aerospace engineering with a focus on alternative fuels, engines, and emissions research, he was chair of engineering in the college of engineering and mineral resources. Dr. Clark earned his B.S. and Ph.D. at the University of Natal in South Africa.

Dr. Cheryl B. Schrader, *Indiana Delta '84*, has been appointed to the new position of associate vice president for strategic research initiatives at Boise State University. She had served as dean of the college of engineering since 2003. Previously, Dr. Schrader was associate dean for graduate studies and research at the University of Texas at San Antonio. **Dr. Amy J. Moll,** *Illinois Alpha '87*, co-founder and past chair of the department of materials science and engineering, will serve as the interim engineering dean.

Dr. P. Barry Butler, *Iowa Beta '79,* is now the provost of the University of

Iowa, after serving as interim provost since October 2010. He was dean of the college of engineering, where he holds the rank of professor in the department of mechanical and industrial engineering. Dr. Butler serves on the boards of state and national technology organizations committed to economic growth and the advancement of science, technology, engineering, and math (STEM) education, including the American Wind Energy Association.

Dr. Jack R. Lohmann, *Oklahoma Gamma '74,* editor of ASEE's *Journal of Engineering Education*, has received the 2011 global award for excellence in engineering education from the International Federation of Engineering Education Societies. The award committee agreed that Dr. Lohmann's work "has had a clear impact on the profession worldwide." He is vice provost for faculty and academic development and professor of industrial and systems engineering at Georgia Institute of Technology.

Dr. Douglass L. Henderson, *Arizona Alpha '78,* is one of 11 people honored at a White House ceremony with Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring. He is a professor of engineering physics at the engineering college of the University of Wisconsin–Madison, with interests including fusion reactor technology, nuclear waste, and radiation transport.

Dr. Zia A. Yamayee, P.E., *Washington Delta '72,* has stepped down after 15 years as dean of the University of Portland school of engineering. After a sabbatical year, he will return to a faculty position as distinguished professor of engineering. Dr. Yamayee earned his B.S.E.E. at Kabul University before moving to the U.S., where he helped to establish the Washington Delta and Oregon Gamma chapters.

FACILITIES

Massachusetts Institute of Technology has been given the majority of the stock of Bose Corporation in the form of non-voting shares by founder **Dr. Amar G. Bose,** *Massachusetts Beta '52.* The school will receive annual cash dividends on those shares, and those dividends will be used to sustain and advance its education and research mission. Under the terms of the gift, the institute cannot sell its Bose shares and will not participate in the management or governance of the company. The corporation will remain a private and independent company, with Dr. Bose as chairman and technical director. In a letter to the firm's employees, he paid tribute to his mentors at the school. Dr. Bose explained that the gift represents his long-held desire to support education and reaffirmed the company's mission to play for the long run.

Brigham Young University has received a $10 million donation from alumnus **David N. Weidman,** *Utah Beta '78,* and wife Rachel to fund a center for global leadership. The Weidman Center for Global Leadership will be part of the college of engineering and technology. It joins the ranks of recently established leadership-focused programs at engineering schools. Weidman is chairman and chief executive officer of chemicals giant Celanese Corporation, and Rachel has a bachelor's degree from the university.

The University of Akron has been selected to provide the educational and training components for the High Institute for Elastomer Industries, an educational facility in Saudi Arabia being developed to train high-school graduates. Partners in the project include the Saudi Basic Industries Corporation; affiliates of ExxonMobil Chemical; and the Saudi national industrial clusters development program, a governmental program to boost growing industries. The institute, located in Yanbu, is expected to enroll its first students in September 2012.

The University of Notre Dame has built a 160,000-square-foot, $70 million structure called Stinson-Remick Hall, which houses a nanotechnology research center, the university's new energy center, an undergraduate interdisciplinary learning center, and a 9,000-square-foot semiconductor processing and device fabrication clean room.

The school has a history of engineering developments in a variety of fields from the construction of the first hand-driven wind tunnel in America to the successful transmission of one of the first wireless messages in the country. A major benefactor for the center was ConAgra food company director **Kenneth E. Stinson,** *Indiana Gamma '64.*

Boise State University is receiving a $13 million donation from multinational semiconductor firm Micron Technology to the college of engineering to start a Ph.D. program in materials science and engineering. This is the largest charitable gift in the university's 80-year history.

Related research in Boise State's MSE department ranges from using DNA as nanoscale scaffolding to developing materials that withstand extreme environmental conditions. An undergraduate degree program and two master's degree programs bridge the pure and applied sciences and produce graduates with interdisciplinary skills. The addition of a doctoral program promises direct benefits for the university and Boise-based Micron.

Drexel University and the Academy of Natural Sciences have announced an affiliation plan to work jointly on science research. Fields of research for the two Philadelphia institutions will include environmental degradation, biodiversity, global ecosystem interactions and sustainability. The arrangement will better position them to seek funding from the National Science Foundation, the Environmental Protection Agency, and the National Institutes of Health, they reported. The move was launched with a $1 million grant from the Pew Charitable Trusts.

Brain Ticklers

RESULTS FROM SPRING 2011

Perfect

Couillard, J. Gregory	IL	A '89
*Kimsey, David B.	AL	A '71
*Mayer, Michael A.	IL	A '89
Slegel, Timothy J.	PA	A '80
*Spong, Robert N.	UT	A '58
*Stout, Roger P.	AZ	B '77
*Strong, Michael D.	PA	A '84

Other

Alexander, Jay A.	IL	Γ '86
Aron, Gert	IA	B '58
Bachmann, David E.	MO	B '72
*Beaudet, Paul R.	Father of member	
Bernacki, Stephen E.	MA	A '70
Bertrand, Richard M.	WI	B '73
Brule, John D.	MI	B '49
Conway, David B.	TX	I '79
*Fenstermacher, T. Edward	MD	B '80
Glaser, Anton	Non-member	
Grewal, Rashi	NJ	Γ '09
Harter, Eamonn T.	ID	Γ '06
*Harvey, Arthur J.	OH	A '83
*Jones, John F.	WI	A '59
Oliver, Christopher R.	AL	E '08
Prince, Lawrence R.	CT	B '91
Quintana, Juan S.	OH	Θ '62
Rasbold, J. Charles	OH	A '83
Robillard, David J.	MD	Γ '88
*Routh, Andre G.	FL	B '89
*Schmidt, V. Hugo	WA	B '51
Sentman, Mark H.	CA	E '86
Sentman, Andrew	Son of member	
Silver, Robert E.	NY	P '80
Stadlin, Walter O.	NJ	Γ '52
Stribling, Jeffrey R.	CA	A '92
Stumpf, Kenneth A.	MI	Δ '73
Summerfield, Steven L.	MO	Γ '85
Sutor, David C.	Son of member	
Van Wyk, Rogell	IN	A '59
*Voellinger, Edward J.	Non-member	
Wills, Kenneth J.	MT	A '84

* Denotes correct bonus solution

SPRING REVIEW

The Spring Ticklers appear to have been more difficult than usual, with only a few perfect scores. Two regular problems (Number 2 about a spider chasing an ant and Number 4 about card arrangements) had a lower percentage of correct answers than the Bonus problem.

SUMMER SOLUTIONS

Readers' entries for the Summer problems will be acknowledged in the Winter BENT. Meanwhile, here are the answers:

1 The points awarded to Al, Bob, Carl, Don, and Ed on each question of the five-question math test are shown in the following table.

Question	Points Awarded					Total points each student
	1	2	3	4	5	
Al	2	10	10	10	2	34
Bob	0	7	0	10	2	19
Carl	2	10	2	10	7	31
Don	10	2	10	10	10	42
Ed	0	0	0	2	7	9
Total each question	14	29	22	42	28	

To arrive at this table, note that the totals of the rows and the columns can only be expressed as a sum of the numbers 10, 7, 2 and 0; possibilities are: 9 = 7 + 2; 14 = 10 + 2 + 2 = 7 + 7; 19 = 10 + 7 + 2; 22 = 10 + 10 + 2; 29 = 10 + 10 + 7 + 2; 31 = 10 + 7 + 7 + 7 = 10 + 10 + 7 + 2 + 2; 34 = 10 + 10 + 10 + 2 + 2 = 10 + 10 + 7 + 7; 42 = 10 + 10 + 10 + 10 + 2. Because Q4 was so easy and Ed only got a total of 9 points, Ed must have been the one who got a 2 on Q4; therefore, Column 4 must be (10, 10, 10, 10, 2). Since Ed scored higher than Bob on Q5, Row 5 must be (0, 0, 0, 2, 7). Note that if the answer to Q2 were 17, then three 10s would be awarded, the sum of which is larger than 29; therefore, the second column must be (10, ?, 10, ?, 0) with the unknowns being 2 and 7.

Note that if the answer to Q3 were 5, then Bob would have scored two 10s, which sum to more than 19, so '5' is not the answer to Q3. Since Row 3 sums to 22, the correct answer must be '11,' and Column 3 is (10, ?, ?, 10, 0) with unknowns 0 and 2. Since Row 1 sums to 34 and already contains three 10s, the other two scores must be 2, so Row 1 is (2, 10, 10, 10, 2). Column 1 sums to 14 and must contain a 10, but the 10 can't be in Rows 2 or 3 because the row sums won't work. Therefore, Don got the 10 on Q1.

Next, note that for Column 1 to sum to 14 and Row 3 to sum to 31, Carl must have scored a 2 on Q1. For Column 3 to sum to 22 and Row 3 to sum to 31, Carl must have scored a 2 on Q3. This means that Carl scored a 7 on Q5. Since Ed got more credit for Q5 than Bob, Bob must have scored a 2 on Q5 and a 7 on Q2. Finally, the only remaining score to be determined is Don's score on Q2, which must be a 2.

2 Stated in base 11, the simultaneous cryptic additions decode as:

USA + FDR = WPA : 5a4 + 320 = 914
USA + WPA = PARK : 5a4 + 914 = 1408,
where 'a' stands for the digit 10.

3 In a game of 7-card stud with deuces wild, the probability of getting 5-of-a-kind is 7,622/1,672,307 ≈ 0.004558. There are 52!/(45!7!) = 133,784,560 possible 7-card hands. Consider the probability of getting one deuce and four cards of the same denomination. There are 12 possibilities for the 5-of-a-kind card (J, Q, K, A, or 3 through 10). There are four possibilities for the deuce (club, diamond, heart, or spade), and 44(43)/2 possibilities for the two extra cards (which can't be a deuce). This makes 4(12)(44)(43)/2 = 45,408 ways to get 5-of-a-kind using only one deuce. The following table shows the cases that must be considered. The probability is the total ways to get 5-of-a-kind divided by the number of possible hands: 609,760/133,784,560 = 7,622/1,672,307 ≈ 0.004558.

No. of 2s	5 of a Kind Cards	No. of Other Cards	Formula	Value
1	4K	2	4(12)(44)(43)/2	45,408
2	3K	2	6(12)(4)(44)(43)/2	272,448
2	4K	1	6(12)(44)	3,168
3	1Pr	2	4(12)(6)(44)(40)/2	253,440
3	2Pr	0	4(12)(11)(6²)/2	9,504
3	3K	1	4(12)(4)(44)	8,448
3	4K	0	4(12)	48
4		3	48(47)(46)/6	17,296
Total ways to get 5-of-a-kind				609,760

4 To divide 26 coins, 10 heads and 16 tails, into two groups with an equal number of heads in each group while blindfolded, first divide the coins into two groups with 10 coins in one group and 16 coins in the other group. Then, flip over the ten coins in the 10-coin group. To see how this works, let H be the number of heads in the 10-coin group; then, 10 - H is the number of heads in the 16-coin group. When the 10-coin group is flipped, the number of heads will be 10 - H, the same as the 16-coin group.

5 The number $z = i$ to the ith to the ith to the ith power ad infinitum approaches the limit $r(\cos\theta + i\sin\theta)$, where $r = 0.567555$ and $\theta = 0.688454$ radians. To see this, substitute the expression for z into z to get $z = i^z$.

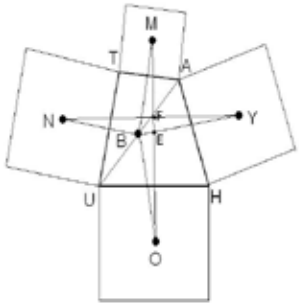
Next, express i as $e^{i\pi/2}$ to get $z = e^{i\pi z/2}$. Let $z = re^{i\theta} = r(\cos\theta + i\sin\theta)$, and substitute into the modified equation for z, yielding $re^{i\theta} = e^{i\pi r(\cos\theta + i\sin\theta)/2} = e^{-\pi r\sin\theta/2}e^{i\pi r\cos\theta/2}$. From this, we get two simultaneous equations in r and θ: $r = e^{-\pi r\sin\theta/2}$ (or $\ln r = -\pi r\sin\theta/2$) and $\theta = \pi r\cos\theta/2$. Solving yields $r = 0.56755$ and $\theta = 0.68845$ radians. Solution by trial and error is easy using a spreadsheet; pick r and calculate $\theta = \sin^{-1}(-2\ln r/\pi r)$. Then, calculate $r = 2\theta/\pi\cos\theta$; if the r's don't match, pick a new r.

Bonus. The 2x4 map, numbered 1-8 on one side and a-h on the other side, can be folded into 40 different final configurations that have the "1" on the top. The configurations can be found using *snake* diagrams. (See W. F. Lunnon, "Multi-dimensional map-folding," *The Computer Journal* 14(1):75-80, February 1971. *comjnl.oxfordjournals.org/contact/14/1/75.full.pdf+html*.) The 40 configurations, listed in alphanumeric order of the upper surfaces, are:

13d8ge6b,	13db68ge,	13g8de6b,
13ge68db,	18d3ge6b,	18g3db6e,
1b3d8g6e,	1b3g6e8d,	1b3g8d6e,
1b68g3de,	1b6d8g3e,	1b6e8g3d,
1b6ed8g3,	1b6eg3d8,	1b6eg8d3,
1b6g3d8e,	1b6g8d3e,	1b8d3g6e,
1bd3g86e,	1bd86eg3,	1d3b6g8e,
1d3g8e6b,	1d8e6g3b,	1d8g3b6e,
1e3d8g6b,	1e3g8d6b,	1e68g3db,
1e6b3d8g,	1e6b3g8d,	1e6b8d3g,
1e6bd3g8,	1e6d8g3b,	1e6g3d8b,
1e6g8d3b,	1e8d3g6b,	1e8g6b3d,
1ed3g86b,	1eg86bd3,	1g3d8b6e,
1g8d3b6e.		

Double Bonus. Van Aubel's Quadrilateral Theorem states that the lines connecting the midpoints of squares constructed on opposite sides of any quadrilateral are equal in length and mutually perpendicular. Refer to the diagram for the proof. Construct a square on each side of the quadrilateral UTAH with centers N, M, Y, and O.

Construct UA and find the midpoint B. It can be shown that BN = BM, BY = BO, and that angles NBM and OBY are right angles (see *aguite.homestead.com/files/triangle_squares1.html*). Therefore, triangle NBY is congruent to triangle MBO by side-angle-side congruence. So, NY = MO and angle



BYN equals angle BOM. Let E be the point where MO and BY cross. Since OBY = 90°, then BOE + BEO = 90°. Let F be the point where NY and MO cross. Since MEY = BEO and BYN = BOM, then BYN + MEY = 90°. Therefore, OFY = 90° and, hence, YFM = 90°. Therefore, NY is perpendicular to MO.

NEW FALL PROBLEMS

1 Joe the butcher received a bill in the mail. Unfortunately it had gotten wet, and the first and last digits were unreadable. What was legible was:

72 turkeys $_67.9_

How much was the bill, and what is the cost of one turkey assuming they all cost the same?

—*The Stanford Mathematics Problem Book*, by G. Polya and J. Kilpatrick

2 Determine the equation of a parabola that passes through the four points (x_i, y_i): (0, -1), (-1, 0), (1, 0), and (0, 3).

—**Craig K. Galer,** *MI A '77*

3 Two perfect logicians, Ann and Beth, have each been assigned a number by a moderator. Neither woman knows either of the numbers, but they do know that the numbers consist of two positive odd integers that are either the same or differ by 2 and that, if the two integers are different, then the larger one is assigned to Beth. Ann and Beth sit in front of computer monitors, arranged so that each can see only her own monitor. They take turns typing in questions of the form, "Is Y's number X?" about the other's number, where X is a positive odd integer. For example, Ann could ask, "Is Beth's number 7?", and Beth could ask, "Is Ann's number 11?" After receiving an honest yes or no answer on the monitor from the moderator, the questioner states aloud, either "I know my number" or "I don't know my number." The following conversation ensues:

Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I don't know my number."
Ann: "I don't know my number."
Beth: "I know my number."

What are Ann's and Beth's numbers?

—adapted from *All-Star Mathlete Puzzles* by **Dr. Richard I. Hess,** *CA B '62*

4 Numbers b and c are chosen at random from the range of real numbers bounded by $-q$ and q. Express the probability, as a function of q, that the quadratic equation, $x^2 + bx + c = 0$, will have complex roots.

—**William S. Alderson,** *MI E '43*

5 A uniform billiard ball of diameter D rolls without slipping along a pool table toward a cushion. What height of cushion creates a rebound that maintains rolling-without-slipping motion?

—**Jeffrey R. Stribling,** *CA A '92*

Bonus. A geosynchronous orbit is a circular orbit with an orbital period of 24 hours. These orbits, typically used by the equatorial *stationary* class of communications satellites, have a radius R_s equal to about 26,300 miles. Another class of satellites, the Russian Molniya class, employ inclined, highly eccentric orbits characterized by a 12-hour orbital period. Assuming that the closest approach to the earth's surface of a Molniya orbit is 100 miles to avoid burning in the atmosphere, for what range of eccentricities is the apogee greater than R_s?

—*Technology Review*

(Continued on page 36.)

The Executive Council met in Knoxville, TN, on June 10-11, 2011.

The Council enthusiastically voted two ΤΒΠ Superior Service Awards and a Resolution of Appreciation to retiring advisors of the collegiate chapters.

Kevin A. Davis, *CA A '08*, Diana Hasegan, *PA E '10*, and Ellen S. Styles, *AL Δ '85*, were appointed as Engineering Futures Facilitators to terms ending June 2014. Councillor Norman Pih reported on the meeting of the Engineering Futures Planning Committee in Phoenix, AZ, on May 21. The Council re-appointed Dr. Dennis J. Tyner and Scott V. Eckersall to terms ending June 30, 2012, and Nancy F. Gray, Cheryl Cheng, and J.P. Blackford to the EFPC to terms ending June 30, 2014.

The Council re-appointed D. Stephen Pierre Jr., *AL E '90*, as Director of Fellowships, Edward J. D'Avignon, *NY B '88*, as Director of Rituals, and Russell W. Pierce, *WA A '70*, as Director of Engineering Futures to terms ending June 2015.

The Council re-appointed Dr. Sally J. Steadman and Barry L. Frost III to the Advisor Recruitment & Development Committee to terms ending June 30, 2012, and June 30, 2013, respectively and granted a ΤΒΠ Resolution of Appreciation to Dr. Robert E. Efimba, P.E, for five years of service to the committee.

ED/ST-designate Curtis D. Gomulinski, member of the 2011 Laureate Selection Committee reported that his group had named five ΤΒΠ Laureates from 11 nominees. The selections of Richard G. Higgins, *ME A '79*, as the 2011 ΤΒΠ Distinguished Alumnus and of Dr. William R. Goodin, *CA E '75*, as the 2011 ΤΒΠ-McDonald Mentor were accepted.

The Council confirmed the acceptance of Mr. Gomulinski as ED/ST-designate and accepted the report summary of the selection process.

Councillor J.F.K. Earle, Ph.D., P.E., reported on recent progress in the ΤΒΠ K-12 MindSET Program and a teacher-training session to be conducted by the Florida Alpha Chapter on June 13.

The Council reviewed and modified plans for the 2011 Convention to be held in Indianapolis, IN, on October 27-29. Proposals to locate the Headquarters permanently in Knoxville, TN, and to modify the retirement provisions for the Secretary-Treasurer were reviewed and will be sent to the Convention. The Council appointed a permanent Convention Chair and a Parliamentarian for the 2011 annual meeting.

The Council reviewed final arrangements for the June 11 meeting of national officers and directors. Councillors reported on their participation at District Conferences.

The Council reviewed the preliminary petitions for new collegiate chapters from the local engineering honor societies at Penn State Erie and the College of New Jersey, and Vice President Solange C. Dao, P.E., and Dr. Earle were named to represent the Council on inspection visits on September 8 and 22, respectively. A request from the University of Arkansas at Little Rock to be considered eligible to establish a chapter was reviewed.

President Larry A. Simonson reported on the discussions of the ΤΒΠ Vision Development Group at its meeting in New York City on April 15. The Council heard plans for the meeting of the Trust Advisory Committee on July 14 in New York City. The Council disbanded the Financial Development Committee and voted ΤΒΠ Resolutions of Appreciation to Sherry D. Jennings-King and James W. Johnson Jr.

Executive Director J.D. Froula reported on the status of the 2011 Alumnus Giving Program, the AGP Multi-State Registration Project, and the first initiation of 20 initiates of Texas Delta at Texas A&M University at Qatar on April 20. The Council amended and approved the 2011-12 budget and a plan for the July 31 allocation transfers to the trust funds. A bequest of $5,000 was received from the estate of E.G. Lucken, *NY I '42*, and two named ΤΒΠ-Lucken Scholarships will be awarded.

The Council established the ΤΒΠ Audit Committee and appointed Councillors Norman Pih and Jason A. Huggins, P.E., to the committee.

IRA ROLLOVERS REINSTATED!

You senior Tau Bates can once again make tax-free donations to ΤΒΠ for a limited time from your IRAs if you are **age 70½ or older**. A recent law allows tax-free charitable donations from an IRA under simple conditions! You must act before December 31, 2011.

This is good news for anyone contemplating making a major gift to ΤΒΠ or another qualified charity. Under the Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010, any donor age 70½ or older may contribute up to $100,000 annually from an IRA account and avoid federal-tax consequences. The charitable gift amount can count against the donor's required minimum distribution (RMD).

When the amount withdrawn from the IRA account is paid directly to the charity, it is not counted as federally taxable income. However, because the gift would be excluded from income, it may not be included as a charitable deduction on a federal tax return. These rules will apply to gifts made through December 31, 2011.

BRAIN TICKLERS

(Continued from page 35.)

Double Bonus. What are the last seven digits of $7{,}777{,}777^{7{,}777{,}777}$?

—Adapted from Colin Singleton in *New Scientist*

Send your answers to any or all of the Brain Ticklers to: **Curt Gomulinski, Tau Beta Pi, P. O. Box 2697, Knoxville, TN 37901-2697,** or email plain text only to: *BrainTicklers@tbp.org*. The cutoff date for entries to the Fall column is the appearance of the Winter Bent in December. The method of solution is not necessary. We also welcome any interesting new problems that may be suitable for use in the column. The Double Bonus is not graded. Jim will forward your entries to the judges, who are: **F.J. Tydeman,** *CA Δ '73;* **D.A. Dechman**, *TX A '57*, and the columnists for this issue,

—**J.L. Bradshaw,** *PA A '82*, and
Dr. H.G. McIlvried III, *PA Γ '53.*

Executive Director's Report

by James D. Froula, *Tennessee Alpha '67*

SECRETARY'S REPORT

OVERALL, THE year 2010-11 exceeded expectations in nearly every respect, and a gain on investments in the trust was recorded. An historic international initiation of Tau Beta Pi members was held in Doha, Qatar, on April 20, 2011. Excellent support by alumni through volunteer efforts, bequests, and record annual contributions was impressive, while corporate and university financial support of the Convention and THE BENT remained high. TBPCONNECT, a popular online member-only community of 12,000, grew by 4,700. Tau Beta Pi hosted receptions for alumni in six cities. MindSET, the K-12 Math & Science Program, received a major grant and is completing a Teacher Professional Development manual.

CHAPTERS

The 2010 Convention granted a charter to Embry-Riddle Aeronautical University, formally established as the Florida Iota Chapter on March 12, 2011. An account of the installation was published in THE BENT.

An inspection committee visited the University of San Diego last fall, and a petition from the school will be considered by the 2011 Convention. Another petition was rejected for technical reasons. Two petitions for new chapters were received, and inspection teams will visit the local engineering honor societies at Penn State Erie and the College of New Jersey in September.

Maine Alpha celebrated its 100th anniversary. Tau Beta Pi renamed the Grand Rapids Alumnus Chapter as the West Michigan Alumnus Chapter; 17 of 60 alumnus chapters are active.

A total of 224 chapters (215 in 2010) completed annual surveys that listed approximately 1,250 projects. A report on the contents of the survey has been published in the September 2011 issue of THE BULLETIN, available online.

MEMBERSHIP

The chapters initiated 8,747 members in 2010-11, up 0.5% and the highest total in 15 years. This included 8,360 undergraduates, 278 graduate students, 49 alumni, and 60 eminent engineers.

Tau Bates led by then Maryland Beta President Helen Ji (second left) were to the fore when Tau Beta Pi was a proud official partner and booth host at the inaugural USA Science & Engineering Festival in Washington, DC, on October 23-24, 2010. The country's first national science festival hosted activities from more than 500 of the country's leading engineering and science organizations, aiming to re-ignite the interest of our nation's youth in the sciences. The culmination of the festival was the two-day expo on the National Mall. Estimates are that 500,000 people attended the event.

Tau Beta Pi's initiated membership on July 31, 2011, was 526,409, and an estimated 56,000 are deceased.

During the year, about 35,200 engineering students in the 237 TBΠ chapter schools were scholastically eligible for membership in the top one-fifth of their senior or the top eighth of their junior classes. About 40.6% of these were members of TBΠ at the close of the year, down from the previous year's 42.2%. About 3.2% were not initiated, chiefly because of their chapters' failure to hold spring ceremonies. The remaining 56% indicated a lack of interest in membership, up from 55% last year.

Tau Beta Pi chapter schools graduate about 92% of all B.S. engineers at 386 schools with ABET EAC-accredited programs and the other five schools without EAC-accreditation.

Thirty-four chapters held only one election and initiation of new members, but all others held two or more. Three chapters held initiations without approval. Two members resigned during the year, and none was expelled.

CONVENTION

The 105th TBΠ Convention was held in October 2010 in King of Prussia with Pennsylvania Alpha as host. The meeting was fully reported in THE BENT and THE BULLETIN. The 2011 Convention will be hosted by the Indiana chapters in Indianapolis. The 2012 Convention will be hosted by Kentucky Alpha in Lexington.

The 2010 Convention: approved one amendment to the Constitution and Bylaws of the Association, which was ratified by the chapters, to allow multiple Officers and Directors appointed to a Convention committee to serve as advisors to that committee and correct an error in the actual procedure of selecting, rather than electing, the Convention Chair; amended Bylaw V to fine a chapter $5 for failure to file the appropriate IRS 990 form and $50 for failure to file the form for two consecutive years; directed each chapter to specify in its chapter bylaws its method of determining junior and senior standing and to report compliance to Headquarters by April 1, 2011; decided to use the standard reimbursement schedule

for the 2011 Convention; accepted two appealed programs not accredited by ABET/EAC; recommended acceptance of the invitation from Iowa Alpha to host the 2013 Convention in Ames; and heard a status update on the K-12 MindSET Program.

OFFICIALS

The TBΠ Executive Council, elected for the 2006-10 term and re-elected by the Convention for the 2010-14 term, comprises President L.A. Simonson, Ph.D., P.E., Vice President S.C. Dao, P.E., and Councillors J.F.K. Earle, Ph.D., P.E., J.A. Huggins, P.E., and N. Pih. Council meetings were held on Aug. 6, Aug. 23, Sept. 11, Oct. 6, and Dec. 4, 2011, and May 14 and June 10-11, 2011.

Tau Beta Pi has three appointed Directors with responsibilities in major areas of its interest: D.S. Pierre Jr., P.E., serves as Director of Fellowships, E.J. D'Avignon as Director of Rituals, and R.W. Pierce as Director of Engineering Futures. Members of the Fellowship Board include: Dr. Darrell W. Donahue, Dr. S.L.R. Holl, and Maj. J.L.H. Jamieson. The Trust Advisory Committee, which directs investment activities of the corporate trustee, includes R.F. Smith (chair), H.W. Lange, and J.W. Johnson Jr.

District Directors on July 31, were:

District 1	Lynn B. Farrington, E.I.
	Selden J. Houghton
	Matthew V. Paragano
	Lauren J. Swett, P.E.
District 2	Anthony M. Olenik
	Thomas A. Pinkham IV
	Jason Rogan***
	George Youssef
District 3	Dr. Edward P. Gorzkowski III
	Alexander J. Rovnan
District 4	Joseph P. Blackford
	Lisa C. Gascoigne
	Russell L. Werneth
District 5	Rebecca A. Holcomb*
	Dr. Elizabeth A. Stephan
District 6	Kassy M. Lum
	Dee Anne Stirm
	Ellen S. Styles
District 7	Ellie R. Armstrong
	David E. Dale
	Andrew J. Flowerday
District 8	Stacey L. Forkner
	Ricardo K. Komai
District 9	Robert C. Huck*
	Brenda A. Kramer
	Adriann R. Sullivan
District 10	Brian R. Buisson
	Daniel A. Kamat
	Brandon M. Page
District 11	Dr. James C. Hill
	Sherry D. Jennings-King
District 12	Wade A. Hull**
	Lindy M. Johnson, P.E.
	Tricia E. Gomulinski
District 13	Jeffrey G. Dabling
	Matthew T. Pittard
District 14	Timothy M. Edgar
	Ian J. Frank
District 15	Joseph R. Burnett
	Scott E. Fable
	Kimberly Stillmaker, E.I.
District 16	Jason A. Corl
	Scott V. Eckersall
	Stacey H. Ross

(/**/*** anniversary of 6/12/18 years)*

The International Headquarters staff, which is located on the Knoxville campus of the University of Tennessee, includes Executive Director J.D. Froula, P.E., Assistant Secretary-Treasurer R.E. Hawks, Director of Development P.B. McDaniel, and nine additional employees (see *tbp.org*). Curtis D. Gomulinski was appointed Executive Director & Secretary-Treasurer-designate.

DISTRICT PROGRAM

Fifteen Districts held at least one conference last year and conducted meetings during the 2010 Convention, and Directors visited many chapters during the year. The Directors and the Council met in Knoxville, TN, in June 2011 and discussed means for improving regional activities and communications and for helping the collegiate chapters.

Tau Beta Pi The Engineering Honor Society

Mission

To mark in a fitting manner those who have conferred honor upon their *Alma Mater* by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering.

Vision

Tau Beta Pi will be universally recognized as the premier honor society.

ENGINEERING FUTURES

The TBΠ Engineering Futures Program presented a total of 234 training sessions by 37 volunteer facilitators to develop the leadership skills of student members during 2010-11. This award-winning program helps to prepare engineering students for their careers by enhancing their overall personal effectiveness through interpersonal-skills and teamwork-development seminars.

FELLOWSHIPS

The website carries reports by Tau Beta Pi's 77th fellowship group of 27 students, 15 with stipend, who were selected in the spring of 2010. The 78th group, comprising 35 students—17 with stipend, will do graduate work in 2011-12 and was announced in the Summer 2011 BENT. Fellows with stipends are paid cash grants of $10,000 each. Fourteen James Fife Fellowships, sponsored by an irrevocable trust bequeathed by William Fife, *CA A '21*, were given.

AWARDS

Tau Beta Pi's top chapter prize, the R.C. Matthews Outstanding Chapter Award, was given to California Psi for the excellence of its total program in 2009-10. Honorable mentions went to California Alpha and Ohio Iota. The R.H. Nagel Most Improved Chapter Award went to Montana Alpha; honorable mention was given to Michigan Lambda.

The Council made two Chapter Project Grants under the Greater Interest in Government Program and five grants under the MindSET Program. The Headquarters staff gave 27 Secretary's Commendations to chapters for the perfection of their reports to TBΠ in 2009-10, 30 Chapter Project Awards for ingenuity and creativity in activities, and 31 Commendations for membership improvements.

The 2011 Distinguished Alumnus Award will be presented at the Convention to Richard G. Higgins, *ME A '79*.

The 2011 National Outstanding Advisor was selected in May by a national committee of engineering deans: Drs. C.B. Schrader, (chair), R.J. Marley, and M.S. Ingber. The recipient of a $1,000 cash award and an equal sum to be presented to his dean's discretionary fund is Dr. Robert L. Ward, P.E., *OH I '88*, Ohio Iota Chief Advisor.

The 2011 TBΠ-McDonald Mentor was selected in June by a committee of three District Directors. The recipient of a $1,000 cash award with an equal sum to be presented to the California Epsilon Chapter is Dr. William R. Goodin, *CA E '75*.

During the year, the Executive Council gave nine Resolutions of Appreciation, four Superior Service Awards, and three Distinguished Service Awards to collegiate chapter advisors and national officials for long and outstanding service.

LAUREATES

A selection committee of three District Directors chose five Laureates from 11 nominees. *[See page 24.]*

SCHOLARSHIPS/GRANTS

The 13th group of 156 ΤΒΠ Scholars, who will complete their undergraduate engineering studies in 2011-12, was announced in the Summer BENT. Each Scholar receives a cash grant of $1,000 or $2,000. Since the program began in 1999, Tau Beta Pi has given and committed $2,216,000 to 1,116 students. The one-time Merl Baker Distinguished Alumnus Scholarship was awarded.

In the ΤΒΠ Chapter Performance Scholarship Program, $8,000 was made available to students to be selected by 16 chapters.

Six $1,000 grants for the first year of college study in 2011-12 for incoming freshman engineering students were provided by the Society (for a 13-year total of 83) through the national program conducted by the Society of Automotive Engineers. No Special Assistance Grant was made.

CONTRIBUTIONS FROM ALUMNI

Tau Beta Pi's 2010 Annual Giving Campaign brought gifts of $930,253 (up 15%) from 11,956 donors (down 1.6%), including 420 new donors (down 27%). Their names were published in the Winter and Spring 2011 issues of THE BENT. Included in the total is $37,270 allocated to the Fellowship and Scholarship Programs from 227 companies that match gifts from employees. The 2011 Giving Program began in February, and the response by July 31 reached $563,000 from 7,400 loyal members.

The Society uses minimal professional assistance in the conduct of this extremely efficient program; the national officers are deeply grateful to the generous alumni whose gifts fund important programs that help our chapters and student members.

President Simonson and others visited with alumni at receptions in Huntsville, AL; King of Prussia and Philadelphia, PA; Knoxville, TN; Arlington, VA; and Vancouver, BC. Alumni also attended several District conferences: D1, Orono, ME; D2, Binghamton, NY; D5, Gainesville, FL; D6, Nashville, TN; and D15, Reno, NV.

OTHER ACTIVITIES

Tau Beta Pi has maintained its affiliations with the American Association for the Advancement of Science and the Association of College Honor Societies and its association membership in the American Society for Engineering Education. The Executive Director is Tau Beta Pi's official representative to these organizations, although other officers of the Association occasionally attend their meetings.

The Society was included as an eligible organization in the 2011 national Combined Federal Campaign. Tau Beta Pi operates its own web-based job board—The Best People—and maintains other valuable benefits for members. The AlumNet Program, an electronic mentoring service operating effectively since 2001 to foster student-alumnus interactions, was ended. The Association was a contributing society to National Engineers Week 2011.

Tau Beta Pi has maintained its classification under Section 501(c)(3) of the U.S. Internal Revenue Code as a tax-exempt, charitable and educational, non-private organization and is exempt from sales tax in 16 states. Collegiate chapters are separately classified under Section 501(c)(7) of the code, except Michigan Gamma, which changed to Section 501(c)(4).

TREASURER'S REPORT

THE FINANCIAL CONDITION of ΤΒΠ at the close of the fiscal year was improved because of a large bequest, record giving by alumni, and substantial investment capital gains. Revenue over expense was $2,642,000. Assets grew in 2010-11 by $2,788,000 to a total of $21,846,000.

FINANCIAL POSITION STATEMENT

The several named trust funds are commingled and invested under the jurisdiction of the ΤΒΠ Trust Advisory Committee. The trustee is the trust department of the PNC Bank in Cleveland, OH. The trustee performed satisfactorily during the year.

Investment earnings of the funds, less trustee fees and including capital gains, are used for the purposes indicated by the fund titles: paying fellowship and scholarship stipends, paying for BENT magazines delivered to life subscribers, paying project grants to winners in the MindSET and Greater Interest in Government Programs, helping to support the Convention, and financing many useful activities of the collegiate chapters. Overall net earnings of the investments, including security sales and market gains, were 19%; the previous year's figure is 14%. Paid investment earnings were $454,000; net investment market gains were $2,919,000.

Securities held by the trustee on July 31, 2011, are carried at market value of $20,447,000, an increase of 19.3% from the previous year, and comprise holdings in 11 non-overlapping, no-load mutual funds. Equity securities constituted 90% of the total trust funds.

The current liability in fellowships and scholarships is for those stipends committed in 2010-11 for payment in 2011-12 to student winners. The 2011 Convention liability includes the assessments paid by new initiates during the year and $9,250 in gifts from corporate and university sponsors. The deferred BENT subscription liability is for both annual subscriptions and the four-year subscriptions for new members included in the national initiation fee. The liability for delivering future magazines under four-year subscriptions is entered on the books at the time of initiation.

The decrease in BENT life subscription liability was countered by the 391 new life subscribers. Life subscription fees are recorded as a liability because of the commitment against the annual earnings of those fees to pay for copies of THE BENT to be delivered. This liability represents the total value of all life subscriptions in force on July 31, 2011, at their enrollment-fee prices, less an actuarial proportion of $1,218,800 recognized as revenue since 2004. Upon the deaths of life subscribers, their paid fees are transferred on the books to the Fellowship Fund and are reported as revenue.

The net assets of the Association increased by $2,788,000 because of trust investment gains of $2,919,000. A subsidiary report details the changes during the year in individual funds, most of which increased because of the gain in market value.

The L.E. Record Scholarship Fund grew by $605,000, Vincent A. Stabile Scholarship Fund by $568,000, the Fellowship Fund by $258,000, the Convention Fund by $240,000, and THE BENT Life Subscription Fund balance by $218,000, but the Engineering Futures Fund fell by $26,000, and the Program Development Fund declined by $94,000 to pay District Program expenses. A capital gift annuity and the new Marlin Zimmerman Fellowship Fund were established after a generous bequest.

THE TAU BETA PI ASSOCIATION

STATEMENT OF FINANCIAL POSITION

On July 31, 2010 and 2011

ASSETS

Current Assets	*2011*	*2010*
Cash and cash equivalents	$ 471,119	$ 466,044
Accounts receivable:		
Chapters	38,008	49,644
Student loans	19,000	23,270
BENT life subscription installments	7,574	9,117
Trust contributions	5,000	200,000
Other	7,816	14,691
Total Receivables	77,398	296,722
Inventory	19,988	25,802
Split-interest agreements, current portion	72,792	69,161
Prepaid expenses	14,499	10,852
Total Current Assets	655,796	868,581
Depreciable: Furniture and equipment	156,861	213,407
Less accumulated depreciation	-134,148	-183,993
Total Depreciable	22,713	29,414
Other Assets		
Investments	20,447,299	17,476,268
Split-interest agreement net of cur. portion	720,416	684,483
	$21,167,715	$18,160,751
TOTAL ASSETS	$21,846,224	$19,058,746

LIABILITIES AND NET ASSETS

Current Liabilities	*2011*	*2010*
Accounts payable		
Chapters	$ 6,131	$ 6,131
Laureate awards	12,500	12,500
Fellowships/Scholarships	471,000	369,000
Other	11,926	12,579
Accrued expenses	42,148	33,819
Annuities payable, current portion	19,037	13,137
Deferred Convention revenue	70,444	80,893
Deferred BENT revenue, current	60,262	58,804
Total Current Liabilities	693,448	586,863
Annuities payable, net of current portion	117,428	64,027
Deferred BENT subscription revenue	76,616	73,678
THE BENT life subscriptions	1,259,286	1,276,739
Total Long-term Liabilities	1,453,330	1,414,444
TOTAL LIABILITIES	2,146,778	2,001,307
Net Assets		
Unrestricted:		
Undesignated	925,783	250,828
Designated	7,372,842	6,461,839
Temporarily restricted	6,154,643	5,138,158
Permanently restricted	5,246,178	5,206,614
TOTAL NET ASSETS	19,699,446	17,057,439
TOTAL LIABILITIES & NET ASSETS	$21,846,224	$19,058,746

Financial statements have been audited.

STATEMENT OF ACTIVITIES

Chapter and initiation fees (shown less THE BENT subscription portion) were unchanged.

Overall contributions and bequests fell by $802,000. Total gifts from alumni and matching corporations in the two annual giving programs in 2010-11 amounted to $938,409 (up 7.6% from 2009-10). The Association is deeply grateful to the 11,460 members who contributed during the year.

Convention revenue consists of assessments for the 2011 Convention, $65,750 in industrial gifts, and $57,400 from 117 alternate delegates and visitors.

BENT publication revenue rose by $18,000 aided by improved recruitment advertising; expenses rose by $4,000. Total investment earnings and market gains on the Life Subscription Fund grew by $159,000. In 2010-11, the invested fund earned $2.15 per life copy delivered, compared with the previous year's $1.51. Earnings per life copy exceeded cost by $0.85, versus last years' excess earnings of $0.21 per copy.

The total of interest and dividends in 2010-11 rose by $241,000. The net gain on investments was $2,919,000, reflecting reported changes in market value.

The 10 major chapter programs (the first 10 under Expenses) usually show an operating loss. Convention expenses dropped by $14,000 and include the cost of attendance by one student delegate from each collegiate chapter, alternate delegates, alumnus delegates, chapter advisors, and visitors—but not by national officers.

Expenses for fellowships and scholarships rose by $101,000 because more scholarships were given. (Revenue for these awards includes all matching gifts from corporations and alumnus contributions specifically earmarked by donors.) Since the Fellowship Program was inaugurated in 1929, ΤΒΠ has given and committed $5,290,000 in stipends to 943 Fellows and $2,216,000 to 1,116 young Scholars. Fellowships and scholarships comprise the major philanthropic program of the Society—made possible by gifts from alumni, friends, and participating industrial firms.

INITIATION FEES

Tau Beta Pi's low national initiation fee covers the cost of the official badge, membership certificate, copies of the Constitution and Bylaws and Information booklets, and a four-year subscription to THE BENT. The national fee has been $32 since August 1, 2004. In addition, new members were charged an assessment of $7 for partial support of the annual Convention.

STUDENT LOANS

Only two new loans were made to members in 2010-11 for a total of $4,500. None was for the amount of TBΠ's initiation fee. Three loans were repaid, and one was written off during the year, leaving eight outstanding on July 31, 2011, with a principal balance of $19,000. Since inauguration in 1932 of the program, 1,779 loans have been made to student members for a total of $855,000.

EDITOR'S REPORT

THE BENT

During 2010-11, the four issues contained a total of 216 pages, and 386,348 copies of the magazine were available for paid subscribers. This is a 0.7% increase in paid copies above the previous year's circulation total. Engineering and graduate-school recruitment advertising for the year totaled 17.5 pages, a 14% increase from the previous year. Total production cost of the magazine per paid copy was $1.30, up from $1.29 the preceding year.

New BENT life subscribers added during the year numbered 391 (up from 381), bringing total life subscriptions to 79,256. Of all the life subscribers enrolled since 1929 when the plan was instituted, 10,472 are deceased, and their fees total-

THE TAU BETA PI ASSOCIATION

STATEMENT OF ACTIVITIES

For the years ended July 31, 2010 and 2011

REVENUE	*Unrestricted*	*Temporarily Restricted*	*Permanently Restricted*	*2011*	*2010*
Initiation and chapter fees and fines	$ 209,710			209,710	209,635
Chapter and individual sales	122,063			122,063	114,901
Contributions and bequests	1,101,480	1,375	0	1,102,855	1,905,169
Convention	184,125			184,125	181,598
THE BENT publication	254,098			254,098	236,208
Net life subscription fee transfer	39,979			39,979	16,246
Student loan interest	705			705	1,171
Miscellaneous/ Net gain on equipment sales	22,848			22,848	31,790
Interest and dividends	218,027	375,832		593,859	352,952
Net gain (loss) on investments	1,402,539	1,517,223		2,919,762	1,947,919
Change in value of split-interest agreements			39,564	39,564	8,377
Net assets released from restrictions	877,945	(877,945)	-	0	0
TOTAL REVENUE	4,433,519	1,016,485	39,564	5,489,568	5,005,966
EXPENSE					
Program services:					
Chapter and initiate supplies	297,991			297,991	252,975
Cost of chapter and individual sales	106,015			106,015	103,526
Convention	453,037			453,037	467,243
Advisor Program	22,170			22,170	14,600
Alumnus Program	54,626			54,626	43,311
BENT publication	500,676			500,676	496,233
BULLETIN publication	17,426			17,426	16,572
District Program	234,249			234,249	220,183
Engineering Futures Program	158,426			158,426	133,178
Fellowship & Scholarship Program	544,017			544,017	442,884
Greater Interest in Government Program	3,969			3,969	5,912
K-12 MindSET Program	44,480			44,480	50,026
Laureate Program	20,237			20,237	19,641
McDonald Mentor Program	5,618			5,618	5,577
Student Assistance Program	1,883			1,883	1,785
Student Loan Program	8,846			8,846	11,230
Total program services:	2,473,666			2,473,666	2,284,876
General and administrative	135,290			135,290	98,201
Alumnus Giving Program	238,605	0	0	238,605	241,243
TOTAL EXPENSE	2,847,561			2,847,561	2,624,320
CHANGE IN NET ASSETS	1,585,958	1,016,485	39,564	2,642,007	2,381,646
Net assets, beginning of year	6,712,667	5,138,158	5,206,614	17,057,439	14,675,793
Net assets, end of year	$8,298,625	6,154,643	5,246,178	19,699,446	17,057,439

Financial statements have been audited.

ing $303,223 have been transferred to the Fellowship Fund in accord with the Constitutional requirement.

An average of 202 copies per issue in 2010-11 was delivered to annual renewal subscribers, 32,794 copies to original four-year subscribers, and 63,591 copies to life subscribers, for a total of 96,587 paid copies per issue. The total number of paid copies for the Summer 2011 magazine was 96,981.

THE BENT carries articles on general professional topics in engineering, news about TBΠ and its members and chapters, and regular departments. The Association is indebted to the alumni who serve as judges and writers of the Brain Ticklers column: H.G. McIlvried III (chair), D.A. Dechman, J.L. Bradshaw, and F.J. Tydeman.

Publication of THE BENT is a major activity of the Headquarters staff. By Bylaw provision, the Secretary-Treasurer of the Association serves as editor.

THE BULLETIN

During 2010-11, the three issues contained a total of 26 pages, and no copies were printed. All issues are available on the website. Published chiefly for the information of the student members and the advisors of the collegiate chapters, the newsletter is a valuable means of exchanging project ideas and distributing information and instructions on chapter operations. The Executive Director serves as editor of THE BULLETIN.

WEBSITE AND OTHER PUBLICATIONS

A new edition of the *Constitution and Bylaws and Eligibility Code* was published in July. The *Information Book 2011* was published last Fall.

Other descriptive brochures and promotional materials were updated and reprinted during the year for chapter use.

The website received improvements throughout the year and more than 3,250,000 visits. It contains much interesting operational and historical information at *tbp.org*.

—James D. Froula, P.E.
Executive Director
Secretary-Treasurer and Editor

Embry-Riddle Aeronautical University's bright new coquina stone-mounted Bent monument was dedicated outside Lehman Building on the campus grounds in Daytona Beach, FL, by Dr. Maj D. Mirmirani, *CA Γ '67*, dean of engineering (left) and Dr. Richard H. Heist, *NY Ξ '67*, ERAU executive V.P. and chief academic officer. The Florida Iota Chapter of Tau Beta Pi was installed on March 12, 2011. Vice President Solange C. Dao, P.E., was official installing deputy of the Society's 244th collegiate chapter, assisted by Executive Director James D. Froula, P.E. (ret.) (right). The story of the Florida Iota Chapter installation appeared on pages 14-15 of the Summer issue.

SEEKING 2012 AWARD NOMINEES BY FEBRUARY 1 AND APRIL 1

ΤΒΠ **DISTINGUISHED ALUMNUS AWARD**

The Association wishes to recognize ΤΒΠ alumni who have demonstrated integrity, breadth of interest both inside and outside engineering, adaptability, and unselfish activity as cited in our Eligibility Code and who have fostered a spirit of liberal culture on local, national, and/or international scales. Their personal qualities of excellence and leadership serve as examples to influence the professional careers and lives of our collegiate members.

Chosen by a committee of national officers appointed by the Executive Council, awardees are introduced at the Convention. A ΤΒΠ Scholarship is named in honor of each Distinguished Alumnus.

Any individual member or any ΤΒΠ chapter may nominate any alumnus member, except a national official. There is no limit on the number of nominations. A nomination requires only minimal information in digital format to be sent by February 1 to the Executive Director.

Required documentation includes the name, contact information, ΤΒΠ chapter, two references, and a summary of the nominee's lifetime achievements with emphasis on their impact on liberal culture. Send it by mail, email to *tbp@tbp.org*, or online at *www.tbp.org*.

After a screening, the Selection Committee may contact by March 1 each nominee with a record of lifetime contributions that parallel the objectives of the award.

The Council encourages nominations from ΤΒΠ members who are readers of The Bent.

ΤΒΠ **MCDONALD MENTOR AWARD**

Marion and Capers W. (*North Carolina Gamma '74*) McDonald and ΤΒΠ established an award to celebrate excellence in mentoring and advising among ΤΒΠ educators and engineers. The honor recognizes those who have consistently supported the personal and professional development of their students and colleagues through mentorship.

As engineering educators or as professionals in industry, government, or service organizations, these ΤΒΠ mentors contribute to our engineering community in many ways, serving as effective advocates and guides in both professional and administrative matters. They show true concern for individuals, support an environment for developing talents, and have earned respect and recognition for their contributions to their field and to the greater community.

Recipients of the ΤΒΠ-McDonald Mentor Award are presented a special medallion and a $2,000 cash award ($1,000 to honoree and $1,000 to a chapter). Any chapter or member may nominate any alumnus member(s). The following brief material in digital format must arrive at Headquarters by April 1:

1) A one-page summary of achievements and/or contributions exemplifying the objective of the award.

2) Two letters of reference from persons other than the nominating party or sponsoring chapter president who are familiar with the nominee's contributions and achievements, such as a dean or supervising personnel.

DISTRICT 2

The New York Tau Chapter at Binghamton University hosted 110 student and alumnus members of ΤΒΠ for the District 2 Spring Conference February 12-13, 2011. Meetings were held in the recently built University Downtown Center.

Student leaders from 20 chapters and the College of New Jersey, a petitioning institution, arrived Saturday afternoon. They were welcomed by Pete Partell, Watson school of engineering associate dean, and Chief Advisor Kristie A. Shirreffs. District 2 Director George Youssef led a chapter operations workshop, focusing on membership reports, elections and initiations, and other key activities throughout the year.

On Saturday evening a reception was hosted for local alumni, who shared their recollections of ΤΒΠ and met the national officers. Association Vice President Solange Dao presented information about the programs sponsored by ΤΒΠ and its current status, and she led a discussion on personal development.

Later, many student leaders explored the downtown Binghamton nightlife and then rose Sunday morning for breakfast, a group picture, and Engineering Futures training to strengthen their leadership effectiveness. Team Chartering and Effective Presentation Skills were presented by Facilitators Dr. Annette M. Brenner and Felipe A. Leon. Simultaneously, Ms. Dao provided a workshop on effective leadership skills.

A local favorite—Spiedies chicken—was provided for lunch. The conference closed with a well deserved round of applause for the host chapter and its hospitality. District Directors urged all the student leaders to use the information that they gathered effectively to reinvigorate their chapters and grow our ΤΒΠ membership.

—**Anthony M. Olenik** *NY T '08*, District 2 Director

District 2 Spring Conference delegates at Binghamton.

DISTRICT 6

The 2011 District 6 conference was hosted February 4-5 by Tennessee Beta at Vanderbilt University in Nashville.

The conference opened with a cocktail reception at Embassy Suites followed by dinner, icebreakers, and a District Interactive Chapter Exchange at Featheringill Hall on campus. After sharing ideas and solutions to chapter operations, members were encouraged to explore city nightlife through a downtown scavenger hunt.

Students worked in teams to build replica structures of well-known buildings, using only dried spaghetti and marshmallows.

After breakfast, members checked out and headed to campus for more activities. A helpful presentation by Executive Councillor Dr. Jonathan Earle was enjoyed, followed by a design competition provided by Tennessee Beta.

Students were promptly "rick-rolled" by a District Director before receiving an overview of Engineering Futures by J.P. Blackford. Students learned how to handle stressful situations in the work place as well as to work together on quick solutions.

The conference hosted many chapter advisors and nearby alumni who offered advice and support to graduating seniors in a session after lunch. Other student members were taken to a computer lab for a demo of the ΤΒΠ online system.

Concluding the conference, Mississippi Alpha gave a unique presentation on the Bent polishing party project, and District Directors then reviewed projects, awards, financial health, and national programs.

—**Kassy M. Lum,** *KY A '10*, District 6 Director

CHAPTER ETERNAL

The condensed style of these notices of death is made necessary by Tau Beta Pi's large membership and space limitations in The Bent. *You may write the Editor for further facts concerning the following deceased members. The assistance of all is earnestly sought in reporting to ΤΒΠ the deaths of Association members, with appropriate details.*

AL B '40 **Walker, William A.;** September 8, 2009.
AK A '60 **Mease, John W.;** March 17, 2011.
AZ A '50 **Pattison, Karl M.;** February 12, 2002.
'78 **Panuska, Brian R.;** April 12, 2010.
AR A '33 **Mowery Jr., Calvin L.;** June 12, 2011.
CA A '41 **Gourdin, Hugh O.;** June 23, 2011.
CA B '40 **Foster, Gerald P.;** May 9, 2011.
CA Γ '42 **Helliwell, Robert A.;** May 3, 2011.
CA Δ '37 **Busby, Marvin L.;** December 9, 1993.
'37 **Esselman, Richard B.;** August 6, 1994.
'37 **Jessup, Warren T.;** July 18, 2004.
'37 **Sayler, Francis A.;** no details.
'38 **De-Flon, James;** September 3, 1996.
'38 **English, John M.;** August 9, 1993.
'38 **Freberg, Carl R.;** June 5, 2010.
'38 **Harvey, Clarence C.;** March 13, 2008.
'38 **Strobl, Lee J.;** June 9, 1993.
'40 **Atkin, Howard P.;** November 11, 1994.
'40 **Carlin, James J.;** October 5, 2008.
'40 **Edwards, Richard H.;** January 22, 1993.
'40 **Kipp, Rudy B.;** November 15, 2007.
'40 **Lehmkuhl, John G.;** June 8, 1999.
'40 **Linne, Kendall B.;** May 3, 2007.
'40 **Loomis, Robert C.;** January 4, 1995.
'40 **Moorhead, George H.;** November 26, 1995.
'40 **Nass, Walter R.;** November 4, 2002.
'40 **Suffron, James O.;** June 25, 2008.
'40 **Wambsgans, Robert F.;** June 17, 1991.
'40 **White, Rossiter L.;** April 6, 2002.
'41 **Hurd, Charles W.;** April 13, 1994.
'41 **Noon, Alonzo W.;** no details.
'41 **Woodward, William H.;** no details.
'42 **Handy, Lyman L.;** September 14, 2004.
'42 **Klopfenstein, Arthur;** no details.
'42 **Offley Jr., Robert H.;** February 3, 2008.
'43 **Hoag, Willard E.;** September 8, 2008.
'43 **Jackson, Melvin W.;** October 26, 2003.
'43 **Partridge, Robert G.;** October 13, 1996.
'43 **Troesch, B. Andreas;** October 30, 2001.
'44 **Beroza, Paul P.;** October 28, 2000.
'44 **Daigh, Robert C.;** December 18, 2003.
'44 **Eckdahl, Donald E.;** July 23, 2001.
'44 **Hansen, Harlan R.;** June 10, 2007.
'44 **Helfman, Howard N.;** June 3, 1993.
'44 **Helm, William P.;** May 13, 1994.
'44 **Hoffing, Edgar H.;** March 8, 2008.
'44 **Meng, Ching-Hwa;** May 26, 1999.
'44 **Nonoshita, Ryoji G.;** December 30, 2009.
'44 **Roeder, John R.;** April 2, 2009.
'45 **Graessle, Howard D.;** no details.
'45 **Mann, Robert J.;** July 22, 1993.
'45 **Salter, Sylvan E.** March 14, 1993.
'45 **Slough, Jack M.;** no details.
'45 **Worthy, Neil M.;** August 5, 2004.
'46 **Browning, Glen E.;** December 24, 1997.
'46 **Jackson, Don V.;** December 31, 1998.
'46 **Johnson, Claus P.;** December 19, 2000.
'46 **McChrystal, William R.;** June 20, 2009.
'47 **Deckman, Gordon;** May 13, 1988.
'47 **Galat, Sanford;** March 22, 2005.
'47 **Gleason, Geoffrey I.;** October 3, 2005.
'47 **Grisat, Oscar E.;** December 30, 1993.
'47 **Hennessy, Paul V.;** July 31, 2002.
'47 **Isgrig, Franklin E.;** November 27, 2005.
'47 **Newbury, Charles B.;** June 17, 2010.
'47 **Ruzicka, Elmer V.;** no details.
'47 **Stelzriede, Marshall E.;** January 1, 2005.
'48 **Bieniek, Maciej P.;** January 24, 2006.
'48 **Bradway, Louis A.;** no details.
'48 **Bush, Vincent R.;** November 4, 2002.
'48 **Butler Jr., Merrill;** May 19, 2008.
'48 **Cole, David B.;** January 14, 1999.
'48 **Conn, Ralph B.;** November 15, 2010.
'48 **Deverell, Clyde J.;** no details.
'48 **Hirtler, Robert W.;** March 18, 2008.
'48 **Houge, Donald B.;** May 17, 2010.
'48 **Jorda, Robert M.;** August 4, 2005.
'48 **Keppel, Richard A.;** December 13, 2005.
'48 **MacMillan, Robert S.;** September 6, 2009.
CA E '35 **Coleman, Edward P.;** March 17, 2011. *[Centenarian No. 81]*
CO B '44 **Bair, Willard E.;** September 3, 2009.
CO Γ '50 **Veldorale, Daniel P.;** May 9, 2005.
CT B '55 **Maryeski, William P.;** September 23, 2001.
DC Γ '49 **Kemelhor, Robert E.;** March 4, 2011.
FL A '52 **Mills, John M.;** June 15, 2011.
'58 **Carr Jr., Ivan H.;** May 11, 2010.
FL B '53 **Hollums Jr., Ellis;** March 9, 2003.
'56 **Adderton, Robert S.;** October 13, 2010.
GA A '48 **Lackey, Mack E.;** June 23, 2011.
'53 **White, William E.;** May 3, 2011.
IL A '56 **Oling, Louis;** August 24, 2010.
'56 **Schaefer, Robert W.;** June 7, 2011.
IL B '43 **Messinger, Henry P.;** no details.
'53 **Kemp, Robert K.;** April 22, 2009.
IN A '39 **Smith, William H.;** May 6, 2011.
'56 **Kurze, George P.;** February 4, 2010.
'57 **Maniotes, John;** May 13, 2009.
'71 **Pratt, Kerry D.;** December 20, 2009.
KS A '39 **Razak, C. Kenneth;** June 14, 2010.
KS Γ '83 **McLeod, Michael J.;** April 6, 2011.
LA B '53 **Orth Jr., Louis P.;** January 16, 2011.
ME A '48 **Maxim, James A.;** November 17, 2010.
MD A '51 **Phillips, Owen M.;** October 13, 2010.
MD B '55 **Owings, James B.;** June 16, 2011.
'59 **Prince, Leonard E.;** May 21, 2010.
'81 **Lefkowitz, Theodore J.;** May 5, 2011.
MA B '38 **Lohman Jr., Ira H.;** March 13, 2010.
'56 **Reis Jr., Wendyl A.;** October 22, 2005.
'58 **Conrady, Denis A.;** June 13, 2011.
'61 **Pease, Robert A.;** June 18, 2011.
MA Δ '47 **Lord Jr., Samuel S.;** May 27, 2011.
MI A '49 **Barrett, Orrin H.;** July 7, 2011.
'52 **Owen, Hartley;** July 15, 2011.
MI Γ '38 **Hoisington, Robert H.;** April 22, 2011.
'52 **Varterasian, John H.;** February 21, 2007.
MI Δ '66 **Meininger Jr., Milton A.;** June 30, 2011.
MI E '49 **Stocker, Donald V.;** May 19, 2010.
MN A '37 **Amundson, Neal R.;** February 16, 2011.
'55 **Forest, James R.** February 21, 2011.
MS B '44 **Brenkert Jr., Karl;** May 19, 2011.
MO B '61 **Laurenson III, Robert M.;** June 9, 2011.
NM B '45 **Gross, William A.;** February 20, 2011.

NY	A	'38	**Harris, Cyril M.;** January 11, 2011.
		'55	**Freiman, Charles V.;** November 9, 2010.
NY	B	'49	**Eggleston, Erwin W.;** November 25, 2010.
NY	Γ	'42	**Green, Walter P.;** no details.
		'49	**Gerken, John M.;** April 14, 2011.
		'52	**De Maio, Louis M.;** April 23, 2011.
		'58	**Berdan, Maurice R.;** May 18, 2011.
NY	E	'41	**Kapfer, William H.;** December 23, 2009.
NY	Z	'52	**Natkin, Alvin M.;** March 28, 2011.
NY	H	'49	**Leventer, Wilbur A.;** November 24, 2010.
NY	Θ	'64	**Hendricks, Eugene E.;** September 29, 2009.
NY	I	'52	**Duffey, Robert;** April 1, 2011.
		'57	**Yasuda, Kentaro;** October 6, 2005.
NY	N	'52	**Ratajczak, Richard A.;** January 18, 2011.
NY	Ξ	'56	**O'Melia, Charles R.;** December 16, 2010.
NC	A	'50	**Proctor Jr., William C.;** June 25, 2010.
OH	A	'49	**Hamilton Jr., Gail B.;** June 4, 2010.
		'52	**De Nobel, Richard W.;** May 21, 2011.
OH	B	'62	**Will, Richard H.;** July 29, 2011.
OH	Γ	'39	**Egger, Bernard E.;** April 3, 2011.
		'48	**Kouyoumjian, Robert G.;** January 3, 2011.
		'76	**Laurence, Michael G.;** February 11, 2010.
OH	Z	'80	**Stalzer, Richard B.;** July 24, 2008.
OH	K	'47	**Grumbach, Robert S.;** December 8, 2009.
OK	Γ	'48	**Morgan, Travis O.;** June 19, 2011.
PA	A	'50	**Schneiders Jr., Francis A.;** July 4, 2011.
PA	B	'47	**Crockett, Robert M.;** June 27, 2011.
		'57	**Schimmel, George W.;** June 29, 2011.
PA	H	'49	**Maloney, Kenneth F.;** May 13, 2011.
SC	B	'60	**Nichols, Morris E.;** April 3, 2011.
TN	A	'43	**Culberson, Oran L.;** July 6, 2011.
		'43	**Gulley, Willard Q.;** May 11, 2011.
		'50	**Wilson, William A.;** May 31, 2011.
		'73	**McKnight, Rayburn D.;** March 1, 2010.
		'78	**Craven, Timothy A.;** December 16, 2001.
TX	A	'44	**Warren, Thomas W.;** May 28, 2011.
		'45	**Barrow, Thomas D.;** January 27, 2011.
		'49	**Cotton Jr., Beryl W.;** April 7, 2005.
		'51	**Campbell, Bobby D.;** March 2, 2011.
		'71	**Hall, David S.;** May 14, 2011.
TX	B	'47	**Coffee, Charles W.;** March 8, 2011.
		'48	**Loveless, Howard L.;** July 3, 2011.
TX	I	'39	**Clements Jr., William P.;** May 29, 2011.
		'77	**Shepherd, Glen C.;** June 25, 2010.
UT	A	'37	**Harris, L. Dale;** June 21, 2005.
		'48	**Alley, Charles L.;** no details.
		'49	**Ajioka, James S.;** March 15, 2004.
		'57	**Langford, Jerry E.;** July 13, 2010.
UT	B	'47	**Pope, William J.;** November 30, 2010.
VA	B	'50	**Hopkins, Oren E.;** May 8, 2011.
WA	A	'39	**Drummond, William H. P.;** November 25, 2010.
		'70	**Hatter Jr., Wayne E.;** February 5, 2011.
WV	A	'50	**McKee, Argyle D.;** November 4, 2007.
WI	A	'50	**Klinge, George K.;** December 6, 2009.
		'54	**Werth, George R.;** December 3, 2010.
WI	B	'43	**Brindza, Louis B.;** March 30, 2011.

Correction

Steven G. Hitz, WI Γ '76, was incorrectly added to Chapter Eternal in the Spring 2010 issue of The Bent. He is alive and well.

LONG-TERM CARE EDUCATION

Because more than 60 percent of members age 65 and over will need some type of long-term care, it's wise to know options. A Long-Term Care Outreach and Education Program for members and families is offered through LTC Financial Partners. Learn more at — *ltctbp.com.*

HEADQUARTERS VISITORS

Benjamin L. Langrill, *Michigan Epsilon '08,* Laurel, MD; April 12, 2010.
Kathleen L. Colbry, *Michigan Alpha '99,* Okemos, MI; April 19, 2010.
Dirk J. Colbry, *Michigan Alpha '06,* Okemos, MI; April 19, 2010.
Steven A. Stramsak, *Michigan Eta '01,* Berkeley, MI; May 14, 2010.
Colleen L. Hill, *Michigan Epsilon '00,* Berkeley, MI; May 14, 2010.
Christopher A. Burtka, Michigan Iota '04, Milford, MI; May 14, 2010.
Tricia E. Schwaller, South Dakota Alpha '98, Centennial, CO; May 14, 2010.
Curtis D. Gomulinski, *Michigan Epsilon '01;* Ypsilanti, MI; May 14, 2010.
Russell L. Werneth, *Maryland Beta '64,* Owings, MD; June 9, 2010.
Jason A. Huggins, P.E., *Florida Alpha '96,* Gulf Breeze, FL; June 11, 2010.
Norman Pih, *Tennessee Alpha '82,* Flagstaff, AZ; June 11, 2010.
Jonathan F.K. Earle, Ph.D., P.E., *Florida Alpha '65,* Gainesville, FL; June 11, 2010.
Larry A. Simonson, Ph.D., P.E., *South Dakota Alpha '69,* Rapid City, SD; June 10-11, 2010.
Solange C. Dao, P.E., *Florida Alpha '95,* Orlando, FL; June 10-11, 2010.
Elson Y. Liu, *Arizona Alpha '01,* Ann Arbor, MI; June 30, 2010.
Stephan L. King-Monroe, *Michigan Epsilon '08,* Mountain House, CA; July 2, 2010.
Alan J. Passman, *Florida Alpha '06,* Clearwater, FL; September 17, 2010.
H. Lee Martin, Ph.D., *Tennessee Alpha '78,* Knoxville, TN; November 11, 2010.
Jonathan F.K. Earle, Ph.D., P.E., *Florida Alpha '65,* Gainesville, FL; December 3, 2010.
Yvonne Earle, *Gainesville, FL;* December 3, 2010.
Norman Pih, *Tennessee Alpha '82,* Flagstaff, AZ; December 3, 2010.
Larry A. Simonson, Ph.D., P.E., *South Dakota Alpha '69,* Rapid City, SD; December 3, 2010.
Solange C. Dao, P.E., *Florida Alpha '95,* Orlando, FL; December 4, 2010.
Jason A. Huggins, P.E., *Florida Alpha '96,* Gulf Breeze, FL; December 4, 2010.
Richard R. Andre, C.S.P., *New York Kappa '96,* Washington, DC; March 7, 2011.
Philip W. Barnhart, *Tennessee Alpha '48,* Arlington, VA; May 12, 2011.
David R. Barnhart, Arlington, VA; May 12, 2011.
Brian R. Buisson, *Louisiana Epsilon '06,* River Rouge, LA; June 10, 2011.
Natalie Tompson, New Orleans, LA; June 10, 2011.
Anthony M. Olenik, *New York Tau '08,* Vestal, NY; June 10, 2011.
Thomas A. Pinkham IV, *Massachusetts Epsilon '88,* Pittsford, NY; June 10, 2011.
Daniel A. Kamat, *Texas Alpha '97,* Austin, TX; June 10, 2011.
Robert L. Ward, Ph.D., P.E., *Ohio Iota '88,* Ada, OH; June 10, 2011.
Karen Ward, *Ada, OH;* June 10, 2011.
D. Stephen Pierre Jr., P.E., *Alabama Epsilon '90,* Mobile, AL; June 10, 2011.
Brenda A. Kramer, *Kansas Gamma '95,* Valley Falls, KS; June 10, 2011.
Adriann R. Sullivan, *Kansas Gamma '10,* Kansas City, MO; June 10, 2011.
Matthew T. Pittard, *Utah Beta '01,* Sahuarita, AZ; June 10, 2011.
Ellie R. Armstrong, *Ohio Zeta '01,* Macedonia, OH; June 10, 2011.
Joseph P. Blackford, *District of Columbia Gamma '95,* Washington, DC; June 10, 2011.
Kassy M. Lum, *Kentucky Alpha '10,* Lexington, KY; June 10, 2011.
Matthew V. Paragano, *New Jersey Alpha '08,* Southbridge, MA; June 10, 2011.
Barry L. Frost III, *Michigan Alpha '93,* Hamilton, MI; June 11, 2011.
Joseph R. Burnett, *California Upsilon,* Fair Oaks, CA; June 11, 2011.
Scott E. Fable, *California Tau '96,* San Francisco, CA; June 11, 2011.
Stacey H. Ross, *California Kappa '06,* Santa Monica, CA; June 12, 2011.
Aaron T. Stillmaker, *California Rho '08,* West Sacramento, CA; *June 13, 2011.*
Kimberly R. Stillmaker, E.I., *California Rho '08,* West Sacramento, CA; June 13, 2011.

California Tau

Jeffrey A. Sawyer, '05, and wife Nicole have announced the birth on June 8 of their first child, Jackson Allan Sawyer, who weighed 6 pounds, 15 ounces, and was 19.5 inches long. Sawyer is an Engineering Futures Facilitator for District 16.

Connecticut Alpha

Dr. Derek A. Paley, '97, is working on an NSF grant to improve forecasting of hurricane intensity using a coordinated fleet of unmanned aeronautical vehicles. He is an assistant professor in the department of aerospace engineering at the University of Maryland and director of the collective dynamics and control laboratory there.

Connecticut Beta

Dennis M. Bushnell, '63, is chief scientist at NASA's Langley Research Center, Hampton, VA. He is responsible for technical oversight and advanced program formulation, with technical emphasis on atmospheric sciences and structures, flight electronics/control, aerodynamics, space access, and other areas.

Michael A. Cantor, '80, is a founding partner in Cantor Colburn LLP, a national firm with more than 50 attorneys and patent agents specializing in intellectual property law. He is also an adjunct professor in patent law at the University of Connecticut law school. Cantor has been actively involved in educational outreach geared to introduce school-age children to engineering and the world of invention.

Illinois Beta

Vincent P. Sobash, P.E., **'77,** is an emergency management program specialist for the U.S. Navy's naval facilities engineering command and has been named the NSPE 2011 federal engineer of the year. Sobash is an expert in contingency engineering and disaster response, and he ensures disaster readiness for a 3,500-person organization in support of worldwide relief efforts. He deployed with the joint task force involved after the Haiti earthquake.

Indiana Alpha

Michael J. Jackovich, P.E., **'74,** is employed by We-Energies as the electrical engineer on the Glacier Hills Wind Park. This facility is under construction near Cambria, WI. Consisting of 90 1.8MW wind turbines, it will be the largest wind power project in the state when it is completed in December 2011.

Maine Alpha

Dr. Henry P. Sheng, P.E., **'54,** was a soloist with the Claremont Symphony Orchestra, Claremont, CA, recently when he performed the *Piano Concerto No.1* by Johann Simon Mayr (1763-1845). Dr. Sheng is an AIChE fellow and a lecturer in the department of chemical and environmental engineering at the University of California-Riverside.

Massachusetts Beta

Dr. E. Terence Foster, P.E., **'63,** has been appointed an associate director of the University of Nebraska-Lincoln's school of architectural engineering and construction. He draws upon more than 20 years of experience as a corporate executive in the construction, logistics, and computer services industries and has served as CEO of two design/construction firms.

Maryland Alpha

Dr. Kevin T. Turner, '99, has received an outstanding young manufacturing engineer award from the Society of Manufacturing Engineers. He is an assistant professor of mechanical engineering at the University of Wisconsin–Madison. His primary research interests involve the manufacturing and mechanics of micro and nanoscale systems.

Maryland Delta

Keilan G. Freeman, '11, has been named to the Capital One/CoSIDA academic all-America university division at-large first team, the College Sports Information Directors of America announced. The swimmer earned a second-team citation in 2009-10. Freeman was a member of the four America East championship-winning teams with the Retrievers.

Michigan Eta

Jeffrey M. Roman, P.E., **'01,** has been named 2011 engineer of the year by the Florida Engineering Society's Calusa chapter for his work to promote the profession. He has visited many K-12 and university classrooms giving presentations and undertaking activities. He also tracks legislation affecting engineers and lobbies elected officials. Roman is a principal and director of engineering at EnSite, Inc., of Fort Myers, FL.

Montana Beta

Ivan Sljivar, '11, is a former standout for Montana Tech's basketball team and became the Frontier Conference recipient of the NAIA Dr. LeRoy Walker champions of character award. The award is named for the first African-American president of the United States Olympic Committee. Sljivar came to the United States as a foreign exchange student from Belgrade, Serbia, to extend his basketball career, as well as to study mechanical engineering.

Nebraska Alpha

Dr. Stephanie G. Adams, '89, has joined Virginia Tech's college of engineering as the head of its engineering education department. She had served as an associate professor of mechanical engineering at Virginia Commonwealth University, where she had been the associate dean for undergraduate studies during 2008-10.

New Jersey Gamma

Faizan H. Naqvi, '12, is the third in a line of New Jersey Gamma electrical-engineer brothers to receive a Goldwater scholarship. **Mohammad F.H. Naqvi, '09,** began the run and is now with Lockheed Martin's space systems company. He was followed by **Salman H. Naqvi, '10,** who is working on a master's degree at Stanford. All three were Tau Beta Pi Scholars, and Salman was also a ΤΒΠ Fellow.

Marshall A. Lerner, '62, is managing partner of the intellectual property law firm of Kleinberg & Lerner LLP, based in Los Angeles, CA. He received his J.D. degree with honors from George Washington University in 1965. Lerner had worked as a patent examiner in the U.S. Patent and Trademark Office and a patent advisor in the Office of Naval Research.

New York Iota

Stephen J. Wilkowski, '80, has received the IEEE Region 1 award for outstanding support of its mission based on his service to the North Jersey section and to the Vehicular Technology Society.

Ohio Kappa

Dr. Sayata Ghose, '04, has received an outstanding young manufacturing engineer award from the Society of Manufacturing Engineers. She is a senior research scientist with the National Institute of Aerospace and a resident researcher at NASA's Langley Research Center. Dr. Ghose's most recent work in the field of polymer processing has focused on manufacturing high-temperature resins for aerospace vehicles such as supersonic aircraft and launch vehicles.

Pennsylvania Gamma

John R. Bertucci, '63, is chairman of the board at MKS Instruments, Inc., a worldwide provider of process control technologies for semiconductor and other advanced manufacturing processes. He joined his firm in 1970 and retired as executive chairman at the end of 2006.

Tennessee Gamma

Dr. Adedeji B. Badiru, P.E., **'79,** is professor and department chair of systems and engineering management at the Air Force Institute of Technology. He has won the 2011 International Public Management Association for Human Resources 49th annual federal employee of the year award in the managerial category.

Utah Beta

Armondo DeCarlo, '95, has transferred to the Air Force Materiel Command at Hill AFB, UT. He is a mechanical engineer supporting the joint direct-attack munition program. A defense acquisition corps member, DeCarlo is department of defense acquisition level III certified in systems engineering.

Washington Beta

Stanley W. Nelson, '66, has retired from the Washington State department of transportation after 25 years as facilities architect for the southwest region (Vancouver). New activities include traveling, flying radio-controlled airplanes, 0-gage model railroad, and using his ham radio license (KF7OJA).

Wisconsin Gamma

Paul Trombino III, P.E., **'95,** has been named as director of the Iowa department of transportation. He was previously the bureau director of transit, local roads, rails, and harbors for the Wisconsin department of transportation where he administered planning, program funding, and projects throughout the state. Trombino's appointment was subject to senate confirmation.

Write Your Own Alumnus Note!

Your fellow Tau Bates are interested in news about you. Send items about civic activities, honors won, weddings, births, promotions, changes in address, etc. to Tau Beta Pi, Box 2697, Knoxville, TN 37901-2697 or to *alumnote@tbp.org*. Material for publication must be received for the **Winter** issue by November 1, **Spring** issue by February 1, **Summer** issue by May 1, and **Fall** issue by August 1. Include name, address, chapter, class year, and email address or phone no. Thank you!

The PC Weenies

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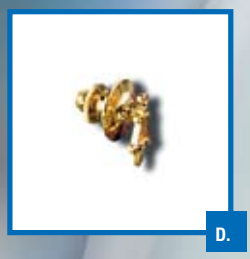
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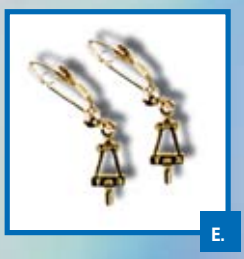
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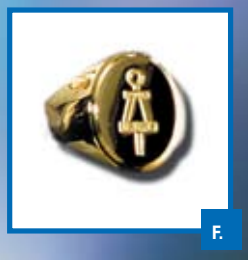
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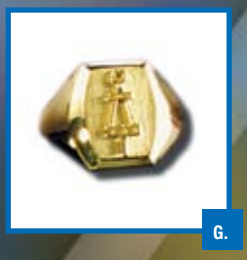
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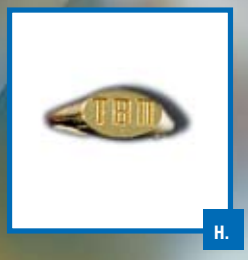
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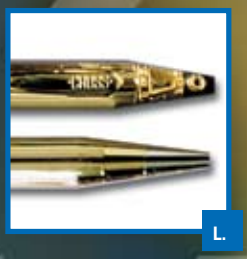
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