WPI Journal

WORCESTER POLYTECHNIC INSTITUTE

AUGUST 1984

The Pure Light of Lasers Sparks WPI Research

The Higgins House Then and Now

Unraveling Rainbows

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WORCESTER POLYTECHNIC INSTITUTE

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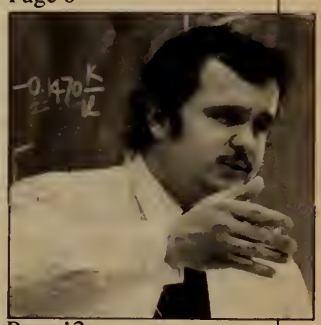

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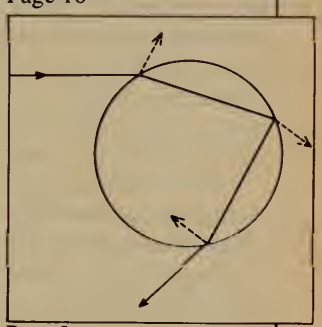

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Cover: Bob Cruickshank and Aman Khan eye an holography experiment that measures the vibration of jet-engine turbine blades. Photo by Michael Carroll. Opposite: The elegant south window of the Great Hall at the Higgins House, lush with springtime ivy. Photo by Michael Carroll.

BOOKS

Washington's Best Kept Secrets:
A U.S. Government Guide to International Business

By William Delphos, '74 MG
Publisher: John Wiley & Sons, New York, 1983

by Ruth Trask

In *Best Kept Secrets*, his 270-page international business guide, Bill Delphos, '74 MG, not only cuts red tape, he also cuts the mustard. His informative "how-to" manual, which should be required reading for would-be international entrepreneurs, is opening doors in Washington, DC, and in business communities around the world.

Described in business circles as "a 32-year-old whirlwind," Delphos has come through with a first publishing venture that has been termed "astounding." To conceive and produce a book in less than a year is a feat almost unheard of in the publishing world, let alone in the molasses-like mire of government bureaucracy. But the book was one whose time had come, and the first printing of 10,000 copies is already exhausted.

"The guide is designed to unscramble the scores of U.S. government programs available for American firms seeking to do business abroad," says Delphos. The idea for the project jelled when he came across studies showing that the average U.S. businessman had only the foggiest idea of how government programs could help him get into the export business.

"There were countless books covering exporting," he continues, "but not a single one offered a simple, how-to guide. The American businessman had to go to Washington and see a dozen mega-agencies. There was no central information point."

To remedy the situation, Delphos, who is vice president of operations for the Washington-based Overseas Private Investment Corp. (OPIC), took on the job

Bill Delphos and President Ronald Reagan

of putting together a one-stop guide to international business. The result of his collaboration with seven government trade agencies is a tightly edited manual outlining markets, opportunities, travel preparations, feasibility studies, regulations, financing, investments and training. It gives names, phone numbers, addresses and costs. Most importantly, it uses the direct "supermarket" approach—listing the services available (e.g., direct loans) and the administering agencies much as a supermarket displays products by brand name labels that also identify the manufacturer.

"If a company wants to export its product, it can identify sources of market information, specific countries where that product should find ready acceptance, and what the U.S. government offers by way of assistance, without spending two weeks on the phone to Washington," Delphos explains.

Interspersed with the nuts and bolts are stories of companies and entrepreneurs who have taken advantage of various government programs and succeeded. For example, Kentron International of Dallas, through the efforts of the Commerce Department, is upgrading the Pakistan Railway communications system under a $50 million contract. The Department of Agriculture helped U.S. tanners enter the China leather market, increasing sales from $49 million to $65 million within two years. A feasibility study grant helped LEMCO Engineers of St. Louis, MO, win a $9 million contract for engineering high-voltage transmission lines in Bangkok.

OPIC, Delphos' agency, has itself guaranteed loans for numerous international ventures. For instance, it guaranteed a loan to establish a Caterpillar Tractor equipment dealership in Honduras, insured an AMF investment in sports equipment manufacture in China, and backed a three-year program to train management executives in Southern Asia in the use of American technology.

One small businessman found listed in the guide a simple booklet that gave him the opportunity to latch onto a foreign-government contract in the health industry. "He isn't classified as a 'small' businessman any longer," Delphos smiles.

Secrets also outlines a Small Business Administration program that gives free legal counsel for the first-time exporter. It reports that between the Departments of Agriculture and Commerce there are 21 overseas offices that the U.S. businessman can use for $50 a day or less, including secretarial, clerical, marketing assistance, Telex and telephones. It also details such obscure policies as a Department of Agriculture program that provides American companies with cash allowances for point-of-purchase displays in foreign countries.

Last November, *Washington's Best Kept Secrets* was launched during a spectacular 50-city video conference attended by 5,000 businessmen interested in doing business around the world. Called "Operation Opportunity," the conference was co-sponsored by the seven government agencies which collaborated on the guide, plus several private sponsors, including *Fortune* magazine, Deloitte Haskins & Sells, and John Wiley & Sons. Well-known TV personality Edwin Newman served as moderator.

While Delphos deservedly takes the credit for conceiving and editing the fast-selling *Secrets*, he admits that his wife, Betsy, came up with the title. "The title sounds a bit more provocative than the material, don't you think?" he laughs.

NEWS FROM THE HILL

Joseph Glasser, '35 EE

Peter H. Horstmann, '55 ME

William Delphos, '74 MG

Three Alumni Elected to Trustee Terms

Effective July 1, 1984, three alumni were elected to serve on the WPI Board of Trustees. Joseph Glasser, '35 EE, an incumbent, will serve a second five-year term, until June 30, 1989. William A. Delphos, '74 MG, and Peter H. Horstmann, '55 ME, will each serve an eight-year term, until June 30, 1992.

Delphos, who holds an MBA from Northwestern University (1976) is vice president for operations of the Overseas Private Investment Corp., Washington, D.C. He is also editor of *Washington's Best Kept Secrets*, a government guide to international business (see review, page 2); chairman of Operation Opportunity, a presidential program to help American firms win in overseas markets; and a former board member of Gould, Inc. He is an Alumni Fund head agent. While a student at WPI, he was president of the Interfraternity Council and a member of Skull. He is also a member and past section chief of Phi Gamma Delta fraternity.

Glasser is a consultant and the director of the Center for Business and Industry at North Essex Community College, Haverhill, MA. He is also a retired vice president of Raytheon Co. He received an honorary doctor of science degree from the University of Lowell in 1973 and in 1978 won WPI's Robert Goddard Award for professional achievement. He serves on the boards of several organizations, including the Lawrence (MA) General Hospital, Andover (MA) Memorial Library, and Lawrence (MA) Savings Bank. He is also vice president of the Haverhill Chamber of Commerce. A member of the WPI Board since 1979, Glasser also sits on the advisory board at WPI's Department of Management.

As an alumnus, Horstmann has been active in WPI affairs since 1965, when he began serving on the alumni board of Sigma Phi Epsilon fraternity. He was president of the WPI Alumni Association (1981–83), was a member and later chairman of the Alumni Fund Board (1971–78), and won the WPI Herbert F. Taylor Award in 1980 for distinguished service to his alma mater. In his undergraduate years, he was senior class president, member of Skull and Tau Beta Pi, and co-captain of the undefeated 1954 football team. He has served on the boards of the Holden (MA) school and Wachusett regional school districts. He also referees college football games throughout New England. Horstmann is vice president of Coppus Engineering Corp., Worcester, and president of Suburban Driver Service, Ho-Ho-Kus, NJ. He earned an MBA from Western New England College in 1964.

The college is indeed fortunate to have these three outstanding individuals on its Board of Trustees.

Comings. . . .

As we went to press, Director of Admissions Roy Seaberg, '56 ME, reported that WPI will welcome in September a freshman class that upholds the academic quality of the past several incoming groups. In terms of applicants who have accepted admission, the overall number is down only a handful, to 662, from last year's record 667—this in the face of declining demographics across the nation and especially in the Northeast.

"For the past five years," says Seaberg, "the average SAT scores of all incoming WPI freshmen have stood at 650 math (men, 640 women) and 530 English (men and women), out of a possible perfect score of 800 on each test. This is a positive sign that we are at least maintaining quality in the face of declining SAT scores nationwide."

Other statistics: Of the current 662 acceptances, 54 percent hail from Massachusetts, 68 percent from New England. Both percentages are roughly the same as in the 1983–84 school year. Foreign students make up about 6 percent of the class,

Michael Carroll

As work nears completion on the renovated and enlarged Washburn Shops, some departments, such as Materials Engineering and Management, have already moved back into the building. Here, a mason lays up brickwork for the Shops' new main entrance, which opens onto Freeman Plaza. Rededication is scheduled for early autumn.

and women 20 percent (again, about equal to last year's figures).

Overall, of those indicating preferred areas of study, 26 percent have pointed to electrical engineering, mechanical engineering 14 percent, computer science 12 percent, "undecided engineering" 10 percent, and any of the science/mathematics programs 8 percent in total.

Sons or daughters of alumni number 19 in the class, and 3 grandchildren of alumni will enter WPI in September. More than 140 relatives of current students will also be matriculating for the first time in the fall.

"Although we went to our waiting list to bring in the class size we desire," Seaberg says, "we've done so for three of the past four years as well. There's nothing unusual about this, except that this year we planned for it."

. . . And Goings

WPI's 573 degree recipients at the 116th Commencement received more than a diploma. They also got a copy of David McCullough's *The Great Bridge*, the award-winning story of the building of the Brooklyn Bridge. With it they got a homework assignment from President Edmund T. Cranch. "This is both a final academic gesture," Cranch said, "and a way to make sure you read at least one book after graduation.

"There's a catch, though," he added. "You'll be quizzed on the book at your fifth reunion."

Bachelor of science degrees were awarded to 471 seniors. Another 64 received master of science degrees, five the master of mathematics, and four the doctor of philosophy. In all, since May 1983, degrees awarded by WPI total 755, of which 601 were the bachelor of science.

Honorary doctorates were awarded to commencement speaker Dr. John Lott Brown, '46 EE, president of the University of South Florida; Dr. Ray E. Bolz, immediate past vice president and dean of the faculty at WPI; the late Charles C. Bonin, '38 CE, a civil engineer business executive and former WPI trustee; and David McCullough, writer-historian.

Firla Appointed Publications Committee Chairman

William J. Firla, Jr., '60 ME, has been appointed chairman of the WPI Alumni Publications Committee by Alumni Association president Harry W. Tenney, Jr., '56 ME. Firla succeeds Donald E. Ross, '54 ME, whose term expired June 30. Firla, a consulting systems engineer for IBM, is a former chairman of WPI's Public Relations Advisory Committee. He is a resident of Needham, MA.

Ross had served as chairman of the committee since 1981. He is executive vice president of MPB Corp., Keene, NH, a maker of precision bearings.

The Publications Committee acts as an advisor to the editor of the WPI *Journal*, providing critical analysis of current and planned issues of the magazine as well as advice on publishing direction and production policy.

Currently, three alumni sit on the Committee besides the chairman. In the next year, however, additional members will be added to broaden the perspectives and geographical representation of the group. If you know of any alumni who you think may be qualified to serve on this body, we encourage you to contact Mr. Firla (130 Tower Ave., Needham, MA 02194) or Mr. Tenney (74 Gulf St., West Long Branch, NJ 07764).

(Editor's Note: Working with the Publications Committee under Don Ross's leadership has been a pleasure, and I anticipate more of the same with Bill Firla as chairman. As editor, I value each member's efforts on behalf of the college. And I want especially to recognize the contribution Don has made to WPI and the help he has given me so selflessly as Committee chairman, colleague and friend. Thanks, Don!)

Roger Perry

As if the traffic wasn't bad enough on May 19 at the corner of Park and Salisbury streets, what with WPI Commencement and the Worcester Craft Center Fair that afternoon in the same neighborhood. Actually, these two houses made their way quite nicely that day from Dean Street to new foundations on a site off Salisbury Street near Assumption College. To make way for WPI's soon-to-be built Residence Hall 6, two couples, WPI students Vincent and May-Shun Pawlowski, and Mr. and Mrs. William Gillin, paid the college token amounts for the houses, rather than see them razed. It took workers all day and half the night to move enough utility wires and tree branches to finish the job. And although the Pawlowskis and the Gillins didn't know each other before this venture, they certainly do now.

Spring Sports Wrap-up

Hammer-thrower Pete Sifferlen's (Sudbury, MA) all-America performance and second-place finish at the Division III NCAA Track & Field Championships highlighted a successful spring sports season at WPI.

Sifferlen, a two-time all-America, and high-hurdler Dan Pond (Grafton, MA) qualified to participate in the Nationals held at Carleton College, Northfield, MN. Sifferlen, who finished fourth in 1983, had a best throw during the finals, 179–4, that fell just two feet behind the eventual winner but did earn him all-America honors for the second consecutive year. Pond, who set a Division III New England record in early May, didn't qualify for the finals in the 110-high hurdles.

The men's track team enjoyed a banner year, finishing 8–2 for its 14th consecutive winning season. Coach Merl Norcross's squad captured the City Championship Meet and finished a strong fourth at the Division III New England Championships. Five individuals, plus the 4×100 relay team, garnered all-New England honors.

The women's club crew team added excitement to the spring, as well. The varsity four-boat placed second at the Dad Vail Regatta in Philadelphia and brought home a silver medal. The Engineers crossed the finish line just six seconds behind Coast Guard in the final heat.

Another club team, men's lacrosse, distinguished itself as the laxmen won their last seven games to finish 9–4 and claim the Pilgrim League championship. WPI had an unblemished 5–0 League record, including a season-ending 11–10 overtime win over Providence that decided the championship. Bill Zagrany (Westfield, MA) paced the scoring attack with 36 goals and 9 assists on the year, while John Joseph (Longmeadow, MA) and Dave Anderson (East Greenwich, RI) tallied 22 and 17 goals, respectively.

WPI placed five members on the Pilgrim League all-star team, including Zagrany, Dave Sheehan (Wilmette, IL), Chris Clausson (Wayland, MA), Dave Collette (Leominster, MA) and Bill Simpson (Needham, MA).

The men's tennis team also had a fine season, snapping a 13-year losing skein with a 5–3 record. WPI was led by number-one singles Dan Mott (Holden, MA). He had a sparkling 6–2 record and at one point during the campaign was 5–0. Number three, Carlo Gretter (Venezuela), and number four, John Scacciotti (Maynard, MA), played well all season for head coach Alan King. And Eric Reidmiester (Brooklyn, CT) won five consecutive matches to finish 5–1.

In a close 400-meter race, All-New England Economou breaks the tape against MIT's best.

Although the baseball team ended with an 8–19 mark, there were obvious bright spots, including the play of center fielder Chuck Hickey (Ashland, MA), who led the Engineers in seven offensive categories. Meanwhile, impressive freshmen like Dave Scala (Worcester, MA) and Mike Shipulski (Methuen, MA) played with the poise of seasoned veterans. Other stars for WPI were Jack Holzman (Braintree, MA), Dan Coakley (Sterling, MA), and Steve Nolan (Malden, MA). The pitching staff was led by ace righty Bob Hess (Needham, MA). He finished with a 5–4 record, an enviable 2.81 earned run average, and the only shutout of the season.

Like the diamondmen, the women's softball squad had fine individual performances despite its 6–7 record. Pitcher Michelle Bugbee (Holliston, MA) won all six games and ended with an impressive 3.39 earned run average. Hitting stars were Chris Clancy (Braintree, MA), Moe McGlone (Middleboro, MA), and Cindy Perkins (Nashua, NH).

The men's golf team suffered through a 2–10 season, but a shining light was the presence of Eric Meerback (Easton, CT), who consistently shot the team low. And the women's club track team showed a 1–4 record, with the lone win coming against Clark. Elaine Santry (Weymouth, MA) and Michelle Payant (Southbridge, MA) excelled for the Engineers.

At the conclusion of the season, student athletic awards were presented at the annual Varsity Awards Banquet. Pete Sifferlen and Chiara Whalen (Brick, NJ) were presented the Varsity Awards for outstanding senior athletes, while Bob Hess received the Percy Carpenter Award for sportsmanship, and Karen Brock (N. Hartland, VT) won the Patricia Graham Award for leadership and sportsmanship. The Leo S. Hansson Award was given to Carlo Gretter as the outstanding sophomore; and the Coaches Awards, to outstanding freshmen, were presented to John Loonie (Brockton, MA), Amilcar Carniero (Framingham, MA) and Cindy Perkins. The Ted Coghlin Managers Award went to Martina Gorski (Webster, MA).

Gene Blaum
Sports Information Director

WPI Wins Two More CASE Awards

It is an unusual year when WPI fails to win at least one Recognition Award from the Council for the Advancement and Support of Education (CASE). In 1983–84, WPI was honored with two of these prestigious prizes, which celebrate special achievement in the fields of institutional development—alumni affairs, public relations, publications and fund raising.

First, for the fifth time in six years, the college has been recognized for excellence in alumni giving with receipt of the coveted CASE-U.S. Steel Foundation Award. This prize acknowledges sustained performance over four years in alumni giving to the annual fund. Over the past 24 years, this program has recognized more than 500 institutions through cash gifts totaling nearly $1 million.

"Five out of six isn't bad," says former Alumni Fund managing director Sharon C. Davis, "especially when only a few colleges can lay claim to a more consistent record. WPI alumni have much to be proud of." Sharon resigned her WPI post June 30 to become director of development of the Bancroft School, Worcester.

WPI congratulates and thanks not only the thousands of alumni whose generous concern for their alma mater has made this sustained performance possible, but certainly Sharon Davis as well. Her leadership has had much to do with the Alumni Fund's success over the past decade.

The second CASE Recognition Award was given to the WPI *Journal*, for improvement in periodicals programs. This award is based on content, writing, editing, visual communication, printing, use of resources, and objectives for improvement.

Son of a gun!

A PASSION FULFILLED, FOR ALL TO ENJOY

WPI's magnificent Higgins House continues to impress us with its enduring qualities of taste and construction. And its history is a tale as colorful as that of the 16th-century Tudor castle that inspired Aldus Higgins, '93, to create a dream house for his wife May.

By Lora Brueck

Of all the inquiries that come to the WPI Archives, more concern WPI's priceless Higgins House than any other aspect of the college history. Questions come from students—some writing Humanities project reports—others from faculty, staff and the public, all satisfying a curiosity about the House: Who was Higgins? When was the estate built? Why a mini-castle tucked away on the edge of the WPI campus? How did the house look in its prime? How has the house been used, and what is its future?

Some of the answers to these questions can be found in the artifacts of the WPI Archives; but many are built into Higgins House itself—in the sneers of the gargoyles, in the ancient wood paneling, in the fluted chimneys and antique tile.

Most of us stand in awe of the Higgins House—that a WPI graduate lived in such grandeur; that a mere 60 years ago construction of this magnificence was economically possible; that such time, care and attention to detail were invested in a house.

Overleaf: In 1925, the "new" Higgins House was one of Worcester's choicest properties. Clockwise from top left: Aldous C. Higgins '93, in 1940; gables show a recurring pattern: anchor and porpoise entwined; details from the garden; the elegant Great Hall.

The story of Higgins House goes back to the 1865 founding of WPI itself, known then as the Worcester County Free Institute of Industrial Science. The school combined the dreams—and financial resources—of two local industrialists, John Boynton and Ichabod Washburn, to train young men as engineers. Boynton's Institute gave them the classroom knowledge and Washburn's Shops the hands-on experience.

Milton Prince Higgins had grown up on a Standish, Maine, farm, where, as a boy, he tinkered in his father's copper shop. After receiving all the education available in Standish, he went to Manchester, New Hampshire, to work in the Amoskeag Mills. Higgins came to Worcester in 1868, as the first superintendent of the Washburn Shops. A recent graduate of Dartmouth College's Chandler Scientific School, he came highly recommended to Ichabod Washburn by his Dartmouth professor, John Woodman, for whom Higgins would name his second son.

When Higgins arrived in Worcester, he already had plans to marry Katherine Chapin, but first he needed to pay off his college debts and save a little nest egg. They were married in 1870 and moved into a boardinghouse on Boynton Street, where most of the school's faculty lived. Soon, Milton and Kitty were able to purchase her dream of a house, at the corner of Bliss (now West) and Salisbury streets, the present site of Goddard Hall. It was here that Aldus Chapin Higgins, the first of four Higgins children, was born in 1872.

The Higgins children were a familiar sight on the Tech campus, and it was only natural that Aldus and John should be educated here. Aldus graduated in 1893, and John in 1896. The yearbook of the class of 1893, the *Aftermath*, shows Aldus's popularity among his classmates: "'Allie' is a striking refutation of the doctrine that no good thing can be connected with the faculty. Be it said to his credit that no confidence of his classmates was ever betrayed by him."

Aldus left Worcester for law school at Washington's National University. In 1898, he married a Washington, D.C., woman and graduate of Vassar College, Edgenie Brosius. Back in Worcester, Milton Higgins bought the triple-decker next door, at 218 West Street, for his son, and Aldus and Genie moved in.

At about this time, the propriety of an educational institution carrying on a commercially successful business—the Washburn Shops—became increasingly controversial. The WPI trustees decided to discontinue the business of the Shops, retaining but a small teaching role for it. Milton Higgins was asked to resign. With his friend, WPI mechanical engineering professor George Alden, the two left to continue the hydraulic elevator business they had started in the Washburn Shops.

At about that time, Milton Higgins became a partner in the Norton Company, with its new grinding-wheel business. By the time the Higgins House was being planned in the early 1920s, many changes had taken place in Aldus Higgins' life. His beloved wife Edgenie Brosius had died suddenly in 1911 at the age of 39, leaving him with two children, Elizabeth, 11, and Milton, 9. He continued living at 218 West Street, next door to his childhood home, and in 1914 married a Worcester woman, Mary Sprague Green, known as "May."

Soon after their marriage, Aldus bought a dozen acres behind the Higgins' homes on West Street, then a barren field, from the heirs of Harrison Bliss and the Worces-

Michael Carroll

Michael Carroll

ter Art Museum, who had been donated the land by Stephen Salisbury. Here Aldus and May planned their dream house.

Aldus had risen through various positions at Norton to become treasurer of the company. In 1914, his invention of the water-cooled furnace won him prestige worldwide. His work frequently took him to Europe, where his interest in art grew. He loved the old English castles with their turrets and moats. One in particular, Compton Wyngates, struck his fancy. To duplicate it in Worcester, in miniature, on the land where he had lived most of his life, became his passion.

Compton Wyngates, located in central England, in Warwickshire, was built in about 1525, after fortified castles were out of date, but it retained many of their features—a moat, secret hiding places, multiple stairways, and towers with crenated battlements. It had 80 rooms and 17 flights of stairs. In the 1790s it was ordered destroyed by the destitute Lord Northampton, but a servant saved it from ruin. All but 30 of its 275 windows were bricked over to avoid paying the window tax.

Some of the external features of Compton Wyngates are replicated in Higgins House: the multiplicity of ornamental brick chimneys, all different from one another; the half-timbered gables; the variety of building materials—brick, stone, wood and stucco.

Both homes combine many styles, perhaps because both used materials from other buildings. Aldus Higgins brought in pieces from around New England and from Europe, blending antique and contemporary, local and foreign, to create a patchwork quilt of a house.

The blueprints of the estate, now located in the WPI Archives, are works of art in themselves. They show the time and care put into planning the estate by many architects, who worked closely with Higgins, making revisions according to his specifications. The plans cover the minute details of the house and grounds—window frames, mantels, brackets, lighting fixtures, ironwork, and placement of greenery.

Construction was begun in 1920, halted for a year due to financial recession, and "completed" in 1923. The plans, however, show that Higgins was never really finished with his dream house, constantly remodeling and adding details.

The Higgins House can be appreciated on two levels—the overall, wide-angle view and the close-up. Upon visiting the estate for the first time, one is impressed with the grand scope of the buildings and grounds.

On the exterior, the heavy stonework of the octagonal tower, and the vertical lines of the five chimneys and exposed beams give the feeling of great size. Shielding the house from the outside world, massive oaks—older than the house—and tall pines add to the magnitude.

Inside, beginning with the Great Hall, the number (29) and dimensions of the rooms continue the impression of size. The Great Hall alone measures 36 by 22 feet, with a 36-foot-high pitched wooden board and beam ceiling. At one end, a three-story arched window overlooks large expanses of lawn and magnificent formal gardens. Opposite it, the balcony and organ loft rise high over the main floor. The fireplace, with its mantel carved from

a roof section of an Italian monastery, is large enough to burn a six-foot length of timber.

However, it is the attention to detail, the personal touches, added by Aldus and May Higgins, that give the House its appeal—that make you notice something new each time you visit the estate.

On the outside, the five chimneys, all different, exhibit this detail. Their brickwork is in spiral, octagonal and diamond patterns. The central chimney, made of three sections, is protected with a peaked copper hood supported by ornamental ironwork.

On the east side, the brick is laid up between exposed beams in a diagonal pattern, with only the ends exposed in the form of flowers. About ten kinds of brick were used in the construction, but care was taken that they be laid five or six of a kind together before shifting to another type.

A recurring design throughout the house, inside and out, is the anchor with a porpoise intertwined around the shaft. This anchor and porpoise, with the name "Aldus," was the imprint of the 16th-century Venetian printer Aldus Manutius, revered even today for the quality of his work. The anchor symbolizes strength and stability; the porpoise speed and activity. Although Higgins may have chosen this symbol because it bore his name, certainly its meaning is appropriate to his creation—his house.

The anchor and porpoise motif can be seen on approaching the house in a large crest on the outside of the tower wall. Inside the entrance hall, the bricks in the wall and flagstone on the floor are interspersed with decorative tiles, flowers, ships, birds and, again, the anchor and porpoise. The stucco gables on the exterior of the East Wing are imprinted with anchors, porpoises, and May Higgins' symbol, the rose.

Higgins brought iron hinges from England, and designed ornamental ironwork which a Swedish craftsman took two years to complete. On the face of the Great Hall balcony, Higgins installed hand-carved and -painted panels representing the coats of arms of all owners of the land, from the Indians to the Higginses. No detail, it would seem, went unattended.

In contrast to the dark and heavy atmosphere of the main rooms is Mrs. Higgins' suite (now used for visiting VIPs), consisting of a boudoir (sitting room), dressing room and bedroom. This area was redecorated in 1931. The walls of the boudoir are of light wood in panels topped with elegant arches and carved flowers. The floor

Marvin Richmond

The boudoir in Mrs. Higgins' suite, now reserved for visiting VIPs.

is parquet. The brown and white marble fireplace and mantel have the same graceful curves as the paneling.

The panel to the right of the fireplace is a concealed closet door. Inside is a window overlooking the Great Hall, through which Mrs. Higgins could view her guests before joining them.

The aeolian organ in the Great Hall, with its three-tiered console, was a source of enjoyment to Aldus Higgins, although he did not play the organ. (It was played with rolls.) The pipes were installed behind the uppermost balcony, the front of which is decorated with an ironwork pattern of a musical score with the words "Pastime with good company I love and shall until I die, grudge who will but none deny, so God be pleased this life will I."

After Aldus' death in 1948, May Higgins felt no need for the organ and donated it to Saint Joseph's Abbey in Spencer. It was removed from Higgins House and installed at the Abbey by the same craftsmen who had originally installed it.

Higgins was an admirer and collector of paintings and stained glass. He traveled in Europe with Henry Taylor, director of the Worcester Art Museum. Higgins was an artist himself, painting mostly landscapes. The house was hung with paintings by Picasso, Braque, Cezanne and Roualt, which Higgins bought in Europe before their value escalated.

The House was a wonderful place for entertaining, and the Higginses would often host parties for their Worcester friends. At one of these parties, guests were not allowed to enter without an original painting done themselves; these paintings were hung in the garage for viewing, and a prize was awarded for the best.

Michael Carroll

Michael Carroll

Michael Carroll

Michael Carroll

Above: Aldus Higgins previewed his art in this gallery (now a storage room).

After Aldus' death, May Higgins continued living in the House until she died in 1970. She had bequeathed the Higgins House to WPI. However, the 15th- and 16th-century stained glass from European churches that adorned all of the larger windows, as well as the paintings, were not included in the bequest. They were sold at auction by Parke-Bernet Galleries, and the proceeds from the sale were used to pay taxes.

When WPI first inherited the estate, it was at odds as to what to do with it. Some suggestions were to move all administrative offices into it, to tear it down, or to use it for a student center, infirmary, or arts and humanities center.

A planning study was done by Charles W. Moore Associates, to offer solutions for the annual $20,000 upkeep and tax bill of the House, coupled with the problem of inadequate student housing on campus. As a result, some areas of the house were rented to students and faculty while other rooms became available for public functions. The main rooms on the first floor—the Great Hall, library, sun room, dining room and kitchen suite—were prepared for use as a function facility by a committee composed of faculty, staff and their spouses.

In the fall of 1971, 22 students, 16 men and 6 women, moved into the upper rooms—the servants quarters, east wing bedrooms and the tower room. They shared household work and undertook maintenance and repair—waxing floors, washing windows, rewiring lighting fixtures, repairing air conditioning and heating systems, and taking care of the grounds. They also set up the main rooms for events and acted as guides.

During the first two years, Higgins House received heavy use. The Spectrum Fine Arts Series was held there; an Intersession course given by Prof. Edward Hayes resulted in the production of Tudor playwright John Heywood's "The Play of the Weather" in the "Higgins Manor." Sets were built in the spacious basement and moved to the Great Hall for the performance. There were weekly buffet lunches for faculty and staff.

Of the original twelve acres of the estate, about five remained when WPI inherited it. As the campus becomes increasingly congested, the open lawns of the estate look inviting for development. Two attempts by the college, in 1971 and 1981, to use a portion of the land for parking lots caused such protest among students and faculty that these changes have been put on hold.

Presently, the main rooms of Higgins House receive almost daily use for Continuing Education programs, reunion functions, luncheons, banquets and weddings. The east-wing bedrooms are used as offices by the Continuing Education seminar staff and by a trustee of the Institute. The former servants' quarters house four students who watch over the house and set up for functions. A faculty member rents the apartment over the garage.

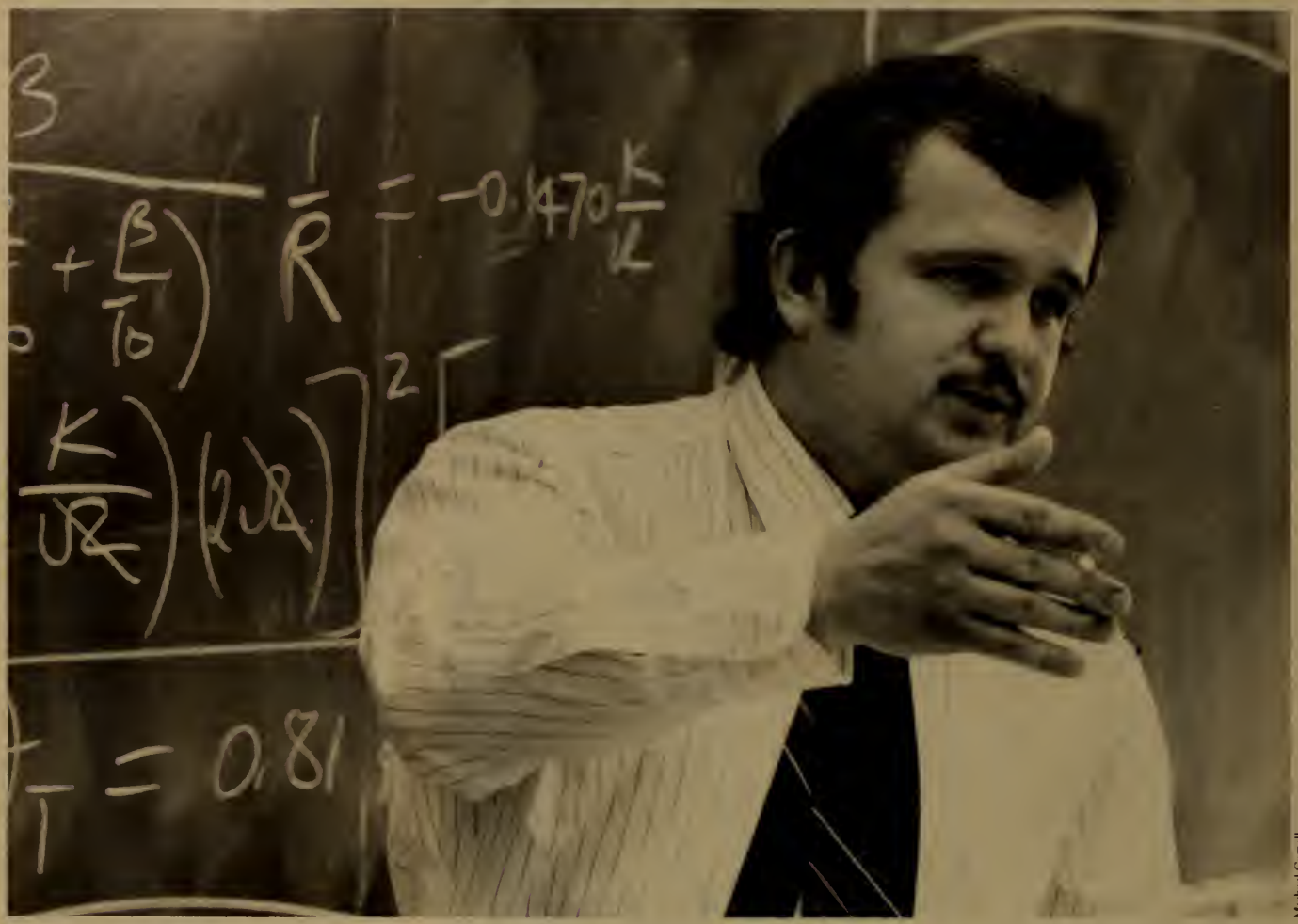
Although it is beneficial for WPI to be able to use the estate in these ways, the heavy use is not without its costs. The beautiful, ornate entrance doors—with the Aldus trademark in wrought iron, leaded windows and wood carvings—lie idle in the basement, having been replaced by more utilitarian models. And some ironwork knobs, latches and decorations have disappeared despite stepped-up security.

The value of Higgins House cannot be quantified. To recreate it today would be impossible, as few craftsmen of the type employed by Higgins still exist. The centuries-old tiles, corbels, beams and stonework could not be replaced, at any price.

On a typical sunny spring day, one can see how the WPI community adores the Higgins estate. In a stroll around the grounds, flowering with azaleas, rhododendrons and magnolias, one will see Frisbee-playing and sunbathing students relaxing from college pressures and staff members eating their lunches in the gardens. Probably without realizing it, they are all grateful that Aldus Higgins dreamed of a castle in Worcester, and that WPI has had the wisdom to preserve it for the pleasure of so many.

Lora Brueck is the WPI Archivist.

Rich Pryputniewicz:



Michael Carroll

A Giant in the Land of Lasers

WPI steps to the forefront as the applications of holography and fiber optics expand.

By Michael Shanley

Rest your arm on the 3,000-lb. steel-topped table in Rich Pryputniewicz's lab and watch as the table sags, then with a hiss quickly readjusts itself.

Custom-built in California, the self-leveling table detects and makes allowances for such nearly imperceptible events as the vibration of Higgins Laboratory itself caused by trucks passing by outside.

Like the rest of the several hundred thousand dollars' worth of equipment in the two labs on the second floor of Higgins, the silver table is a precision instrument. What's happening on top of the table surely demands precision: calculations are being made on objects that can be altered by the weight of a single grain of sand or even a speck of dust.

What's going on in those rooms—where dazzling beams of colored lights bounce off mirrors and snake through tiny glass tunnels—is research into two rapidly advancing technologies: holography and fiber optics.

Six years ago, there were no steel-topped tables in Higgins Labs. There were no tables because there was no Ryszard J. ("Rich") Pryputniewicz. (Pronounced just as it's spelled, Rich likes to say.) Rich built the labs from scratch, getting industry to pay for the equipment in exchange for research.

Before joining the Mechanical Engineering Department in 1978, Rich spent seven years at the University of Connecticut—as a graduate student, a research and teaching assistant and, finally, an assistant professor. That last position was a joint appointment in the School of Engineering and the School of Dental Medicine. In that capacity, he was involved in holographic research that today stands as seminal: the

use of pulsed lasers to make holograms of the mouth, skull and jaw.

"We were working with real people and real teeth," says Rich, "something no one had done before. We were trying to identify the best way of moving teeth with appliances—braces and the like.

"It involved the examination of structural properties, stress and strain on the jaw and the interaction of skull bones—a complex series of measurements. But we were really just trying to answer a simple question: how do teeth move?"

The question couldn't have been answered without holography—a way to take 3-dimensional pictures using light patterns. Holography was discovered in 1947 by Nobel-laureate Dennis Gabor, a Hungarian-born scientist working in London. Gabor was looking for a way to improve the power of the electron microscope (a holography application that, ironically, never quite worked out) when he first proposed a new two-step process of lensless photography. Here's how the process works:

The light beam from a laser is split into two parts. One part illuminates the object. The light scattered by the object interacts with the second part of the beam and that interaction is recorded (photographically) as an interference pattern. This photographic record, or negative, is called a hologram. For the second step of the holography process, the hologram is placed in a light beam that reconstructs the pattern and allows the observer to see the original image in perfect 3-dimensional detail.

Gabor's discovery, which he called holography—from the Greek words "holos," meaning all or whole, and "gramma," meaning message—was for years impractical. That's because the second step in the holography process requires a coherent and monochromatic—or ordered—light source, and no such practical source existed until lasers were developed in the early 1960s.

For the uninitiated, the basics of holography can be difficult to grasp. The hologram itself, for example, is a glass plate. But when you hold it up to ordinary light all you'll see is an unrecognizable series of markings. What you won't see is anything that looks like the object that was photographed. But illuminate the plate with a coherent light source—a laser—and you'll see a perfect image of the object, in all its 3-dimensional glory.

Another tough concept to handle: drop a hologram on the floor so that it smashes into a thousand pieces, and each piece will have the entire image on it. Each piece will contain all the information necessary to reconstruct a complete picture of the object.

To create this double exposure hologram, one exposure was taken of the empty wine glass, another of it filled. The fringe patterns show displacement by the liquid.

Perhaps most fascinating—and, for some, perplexing—is the way a hologram allows you to view the object from different directions. One analogy frequently used is that an illuminated hologram allows an object to be viewed as if through a window—if you move your head to a different part of the window you'll see the object from a different angle.

For scientific and industrial applications, though, more than a pretty 3-dimensional picture is required. What's needed is a picture of how an object *changes*—when it's placed under stress, for example. For that, a second exposure is needed. To help explain the process, let's go back to the dental research Rich and his colleagues were working on.

In order to actually see how teeth move, one exposure is taken of just the teeth. Then a set of braces, for example, are installed, a force is applied and a second exposure is taken. What you'll see now when the hologram is illuminated is a picture of the teeth and jaw with interference or "fringe" patterns that indicate movement or deformation of the teeth and bones. Most of Rich's research, then and now, involves interpreting these "fringes" and translating them into numbers that indicate the degree of displacement or deformation.

This concept of double-exposure holography can be transferred to any other kind of analysis—stress, vibration or heat, for instance. As mentioned before, measurements of astonishing precision can be made: stress on a heavy object caused by sound, wind or even specks of dust. "Holography is capable of measuring displacement on the order of 1 billionth of a meter, strain on the order of 0.2 microstrains," says Rich. "It's especially good for testing tiny components that can't be tested by traditional means. Some people use it for finite element analysis or heat transfer studies—things you can't measure 'by hand.'"

Ask Rich how he got interested in holography and he takes you back many years and across many miles to a suburb of Gdansk, Poland, where he was born and raised.

"I can remember my father buying me a camera when I was very small," he says. "I was taking photographs before I was in the first grade."

Years later, after Rich, his parents and his three brothers had emigrated to the United States and settled in Norwich, CT, he read an article in *Scientific American* about photography by laser.

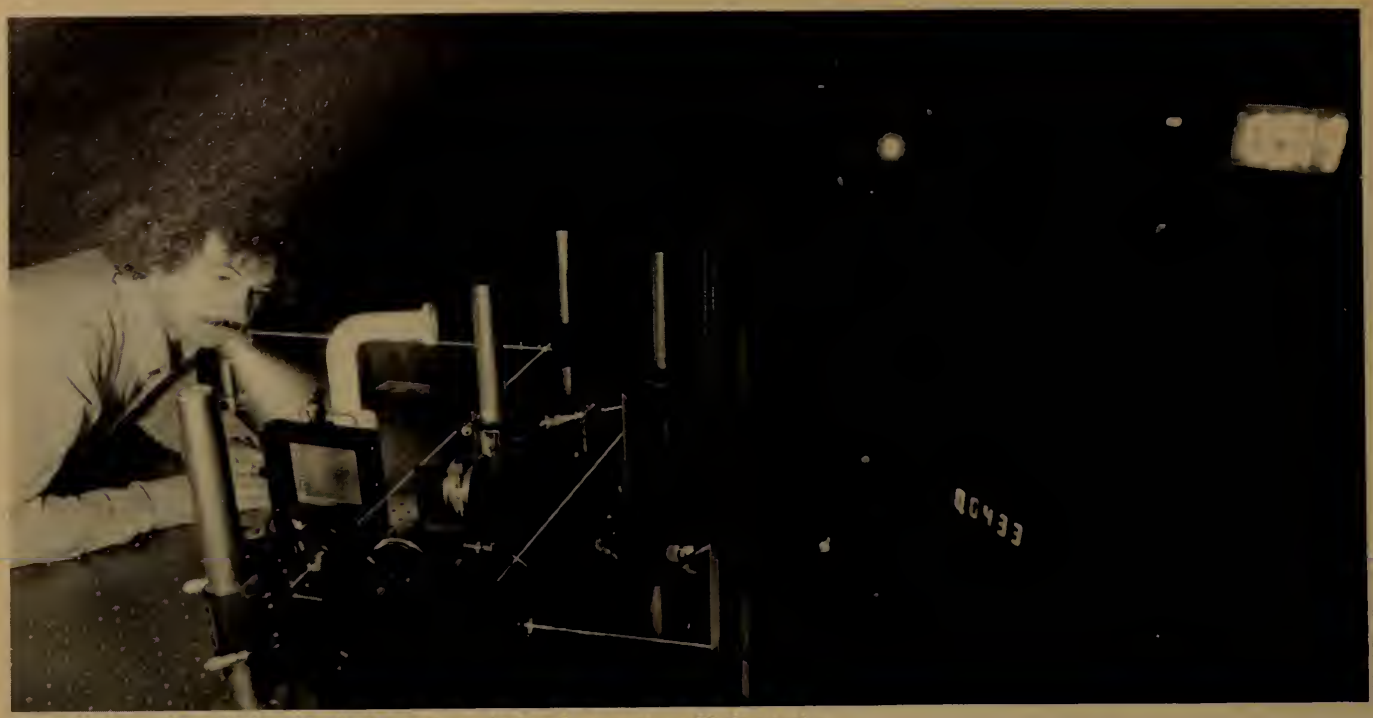
"I started to read on the subject and one thing led to another," says Rich. "At that time, there was just holography with a single exposure—no fringes."

At UConn, Rich met a professor who was also interested in holography, and the two began working together. "It was extremely difficult to record holograms in those days," notes Rich. "The equipment wasn't advanced enough."

As the equipment improved, Rich and his colleagues were in the forefront. They did research on a number of topics, including stress analysis of turbine blades for United Aircraft (now United Technologies).

So it was with a strong background in the use of lasers that Rich came to WPI. When he got here, however, the going was rough for a while. There was virtually no laser research equipment in WPI's Mechanical Engineering Department, and Rich found himself spending endless hours in meetings or doing paperwork in an effort to win research grants. He credits President Edmund T. Cranch, former Dean of Faculty Ray E. Bolz and Mechanical Engineering Department Head Donald N. Zwiep with helping him get through those difficult times.

In hindsight, it was a January 1979 Intersession course that really got things started. During Intersession, a two-week period in January, the WPI community is offered a wide variety of "minicourses"



Michael Carroll

Peter Hefti works with the ultra-high accuracy heterodyne system of holography.

taught by faculty, students, visiting scholars and experts. Interest in Rich's laser holography course was great—70 or so students showed up. Encouraged, Rich integrated the study of lasers into some of his regular courses.

The following year's Intersession, Rich offered another holography course, this time for industry representatives. The response was overwhelming. People—more than he could handle—came from all over the U.S. and Europe. Rich made a number of important contacts at the course. Soon thereafter, grants and equipment began to trickle in. The laser labs began to develop.

The two fully equipped labs as they stand today are testimony to the talent and perseverance of one man. By and large, Rich arranged things so that companies provide him with the equipment he needs, and when the research is done WPI keeps the equipment.

What kind of research, exactly, does Rich do? Good question, but one that can't be answered directly. Virtually all of Rich's work is the proprietary interest of the organizations that fund his research.

In general terms, Rich focuses his research as well as his teaching on the engineering applications of lasers—their use in design optimization studies and fluid flow or in measuring temperature, distance or corrosion. He often works with Prof. Ron Biederman or others from the WPI Materials Engineering group using lasers to determine material properties.

"It's the application of the technology that interests industry," Rich says. "They all want hard numbers, and that we can give them."

The growing number of industries interested in holography now include auto, chemical, food processing, medical, aerospace and shipbuilding, to name a few.

Few companies can afford to do their own holography research—it's just too expensive to equip a lab and support a full-time research crew. For many big firms, however, research money is not a problem. United Technologies, General Electric, General Motors and other industrial giants have major full-time research programs in holography.

Rich has done research for more than a dozen firms, including General Dynamics, Raytheon, Wyman-Gordon, Norton Co., AMP Incorporated and International Harvester.

"For years," says Rich, "few people thought holography would ever be really useful. Now people are starting to come around."

Another burgeoning technology that Rich and his students are studying is fiber optics, which Rich describes as a "pipeline for light."

The fiber is a long, super-thin glass tube that allows light—from a laser, for example—to be transmitted at incredible speeds and with minimal loss. Bursts of laser light are replacing electrical signals as the primary means of telephone communications; optical fibers are replacing old copper wiring. Companies like AT&T, GTE and MCI are installing hundreds of thousands of miles of optical fibers a year. With 300 times the information-carrying capacity of copper wiring, fibers can transmit huge volumes of information: it would take about two seconds to transmit the information in an entire set of encyclopedias.

Glass fibers are also being used to allow doctors to view the inside of the human body and to transmit laser beams for use in surgery. In the factory, fiber optics allow light to be directed through the dirty, dusty atmosphere.

Brian Nason of Saco, Maine, who graduated from WPI in May, will be back this fall to continue the fiber optics work he began as an undergraduate. For his Major Qualifying Project, the ME major studied the use of remote fiber optic sensors for measuring vibrations. He used a cantilever beam as a standard and a loudspeaker to induce the vibration.

"The best thing about it," says Brian, "is that it's non-invasive, non-destructive testing—you don't have to attach anything to the object. And you can measure vibrations as small as one micron, which is one times 10^{-6} meter." Brian hasn't yet defined his graduate topic, but he plans to study a fiber optics application that no one has yet examined.

Another laser lab graduate student is Bob Cruickshank of Scarsdale, NY, who is studying the management of energy sys-

tems. He's using computers in the holography lab to design software programs that would automatically run household machinery—lights, radios, TVs, hot water and heating systems, stoves—anything that consumes energy. The programs would also work for people who want to generate power using alternate forms of energy.

Bob, who hopes to spend six months studying at the University of Sterling, Scotland, this fall, got interested in holography while working as a work-study student and, later, as a teaching assistant in the laser labs. He has spent a lot of time putting together the equipment for laser experiments and has participated in several studies dealing with laser applications.

Ph.D. student Aman Khan of Bangladesh hopes to complete his holography thesis by December. His work involves fundamental research in heterodyne holography, the most exact method known for evaluating fringes. Currently working as an ME instructor, Aman hopes to stay on at WPI. "It's hard to find research facilities that match what we've got here," he says.

Another regular in the labs is Peter Hefti, an opto-electronics specialist from Switzerland who does experimental research for Rich. Peter, who spent eight years working with lasers in Europe, came to WPI two years ago after meeting Rich at a conference in France.

Also doing graduate research are four part-time students working on their master's degrees while holding down jobs in industry. On the undergraduate level, five students will be starting holography or fiber optics projects this fall.

The job outlook for students in these fields is good, says Rich. He often gets calls from companies who want to hire someone who can "handle a laser."

Between overseeing student research, conducting his own research, teaching courses, seeking funding and attending conferences, Rich will have his hands full. But that will be nothing new for this man who says "for me, each day has 25 hours, each week eight days." You'll never catch him standing still. Last year, he toured Australia and New Zealand, lecturing on holography. He frequently travels to symposia or conferences, presenting papers, learning, making contacts. This summer there were conferences in Brazil, Japan and Portugal.

"Conferences get you funding," explains Rich. "There are always industry representatives there. Sometimes it takes a couple of years, but you'll get a phone call saying, 'I remember you made a presentation on such and such. Here's our problem. Is this feasible?' "

Michael Carroll

Brian Nason makes final adjustments to a fiber optics experiment on light transmission.

When he's not teaching a class or rushing off to the airport, you'll most likely find Rich in one of his labs doing research.

"The beauty of research," says the man who has turned down a number of lucrative offers from private industry, "is that you're free to follow whatever path you feel is necessary—you can go with your gut feelings. Always, you're dealing with unknowns, and there are lots of different directions to choose from. Here, I can make the choices. In industry, they make the choices for you."

Despite his hectic schedule, Rich retains a calm, soft-spoken demeanor and an Old World sense of hospitality. Drop by his office and you'll get a warm welcome. You'll be offered coffee and made to feel comfortable. Students who come to his office with questions are treated with respect and addressed as colleagues.

Rich finds time to meet with nearly all those who seek him out. The only ones he has no time for are those who lack commitment. He simply cannot understand people who go through life doing just enough to get by. Not a surprising sentiment, really, from a man who knew not a word of English when he arrived in America but quickly taught himself enough to begin taking college level courses, who wrote a detailed 100-page monograph for a two-week Intersession course, who built two laser labs from scratch.

Rich Pryputniewicz is a man who believes firmly in the possibilities, in the 25-hour day. When it comes to commitment, he sees no middle ground. You're either on the bus or off the bus. In action and word, he urges his students to climb aboard.

Michael Shanley is Director of the WPI News Bureau.

Golf, Tennis, Anyone?

Reunion '84 goes into the archives as the wettest—and one of the happiest—alumni events ever.

Tradition plays a leading role at WPI Reunion Weekends. There's the all-class Reunion Luncheon, the rollicking Old Fashioned Clam Bake, the Reunion Parade, hospitality suites, alumni awards, campus tours, class dinners, fun and games. Lately, some might even add bad weather to this list of traditions. For the second—no, the third—year in a row, we've gotten drenched or drizzled. And if any weather could ruin a get-together of old friends, it would've been the rains and winds of Reunion '84, May 31–June 3.

And yet, few who attended would say it did, we'll bet.

In addition to the traditions of Reunion, golf, tennis, computers, photography, stained glass and the Boston Pops were on the agenda. And even though the rains began on Thursday and poured until Sunday morning, a few hearty souls actually completed 18 holes of golf; others found more favorable tennis conditions at indoor courts.

At the Reunion Luncheon on Saturday, with more than 625 alumni filling Harrington Auditorium, the Class of 1917 Attendance Cup was awarded to the 50th Reunion Class of 1934 for the highest percentage of members attending.

Alumni awards were presented to Robert Fowler, Jr., '36, and C. John Lindegren, '39 (Herbert F. Taylor awards for outstanding service to WPI); John P. Burgarella, '50, Wilfred J. Houde, '59, and David E. Monks, '64 (the Robert H. Goddard Award for professional achievement); and Patricia Graham Flaherty, '75 (the John Boynton Award for outstanding involvement by a young alumnus). Finally, Fr. Peter J. Scanlon was presented the WPI Award for distinguished service to the college by a non-alumnus (see box story, p. 18).

Chester Inman, '14, celebrating his 70th anniversary, was the oldest alumnus attending. Fred Costello, '59, came all the way from Hong Kong; Harvey Rosenfeld, '59, from Holland; and Smil Rueman, '49, from Israel.

A few new features added vitality and variety to Reunion—the golf and tennis tournaments, continental breakfasts and open house at several academic departments, and seminars, like those on photography and computers.

We awoke to a glorious Sunday morning, with eye-opening proof that the sun still shines in Worcester—in spite of the gales of Reunion '84 . . . and '83 . . . and '82.

And as for Reunion '85 . . . Ladies and gentlemen, you may place your bets on the weather.

Jack McManus, Bill Pursell and Stan Sokoloff, all '59.

Open houses, in the EE and, here, ME departments, were a big hit with both alumni and faculty.

Marvin Richmond

Charlie McElroy, '34, receiving the Reunion Class Attendance Cup from Alumni Director Steve Hebert, '66.

Prof. Robert Norton (ME) gives alumni a tour of WPI's heavily used computer facility, the "Apple Lab."

Marvin Richmond

Alex Papianou, '57, leads the singing of the Alma Mater at the conclusion of the Reunion Luncheon.

Marvin Richmond

Six alumni shared a special spotlight at Reunion Weekend: (Seated, L-R) Robert Fowler, '36, Herbert F. Taylor Award winner for distinguished service to WPI; Dr. Edmund T. Cranch; Patricia Graham Flaherty, '75, recipient of the John Boynton Award for outstanding service by a young alumnus; John Burgarella, '50, winner of the Robert Goddard Award for professional achievement. (Standing L–R) Irving James Donahue, Jr., '44, vice chairman, Board of Trustees; Wilfred Houde, '59, winner of the Robert Goddard Award; Harry W. Tenney, '55, Alumni Association president; David E. Monks, '64, Robert Goddard Award winner; and John Lindegren, Jr., '39, Herbert F. Taylor Award winner.

Marvin Richmond

Reunion Luncheon 1984, with 635 in attendance.

Dr. Arthur Burr, '29, who teaches at the University of Texas, compares notes with Jonathan Barnett and Professor Hartley Grandin, both of ME.

On a tour of the campus, a student guide fills alumni and spouses in on what's new.

Marvin Richmond

Dr. Edmund T. Cranch at dedication ceremony of the Class of '44 Carillon in Alden Memorial. The Carillon rang true the entire Reunion Weekend.

To an Unsung Hero

He is a force to be reckoned with. But not just his imposing size or the boom of his voice. There is something about his very presence that says in unquestioning terms that the Rev. Peter J. Scanlon believes in himself and his work.

As Catholic spiritual leader for WPI and Holy Cross, and as Vicar for colleges throughout Worcester, Father Scanlon's name and face are familiar to students of all faiths throughout the area.

Yet, as so many students will tell you, he plays more than a spiritual role on campus. He is a friend and counselor as well—to students leaving the security of family, often for the first time, to those despairing for whatever reason, to anyone who simply wishes to relax and talk. Father Scanlon is accessible.

A native of Worcester, Father Scanlon graduated from St. John's High School in nearby Shrewsbury before attending Holy Cross and later St. Mary's University and Seminary, Baltimore, MD. His first assignment in Southbridge, MA, was followed by work in his home parish, Ascension, Worcester, and later in Rutland, MA, and Immaculate Conception, Worcester. In 1966 his role as chaplain to Catholic students at WPI was expanded when he was appointed Newman Chaplain, working with students at WPI, Becker Junior College and Worcester State. At any one time, he has been involved with up to 12 colleges, as well as serving as chaplain for the Worcester Fire Department and as pastor of Our Lady of Fatima Church, Worcester.

For some students, college can become both the best of times and the worst of times, as academic, career and social pressures take their toll. WPI is fortunate indeed to have committed to the spiritual health of its students a person of Father Scanlon's warmth, compassion and keen awareness of human need.

You can't put a number on his contribution to WPI. But Father Scanlon's work does not go unnoticed, though he'd be the last to turn the spotlight on himself.

So, at Reunion, before many of "his" former students, WPI thought it only fitting to honor Father Peter Scanlon with its WPI Award, given for special service to the college by a non-alumnus. Only five others have been so recognized. Yet even this gesture can be but symbolic of the gratitude and respect that the entire WPI community holds for this large, loving man of uncommon generosity.

Marvin Richmond

The Rev. Peter Scanlon, winner of the WPI Award for distinguished service to the college by a non-alumnus, with his mother, Mrs. Peter Scanlon, and his sister, Peggyann.

Prism of the Sky

Bending sunlight, raindrops
have created a scientific puzzle,
an aesthetic marvel, and a
continuing symbol of
divinity and political might.

RAINBOWS: AN OBSERVER'S GUIDE

Alistair Fraser

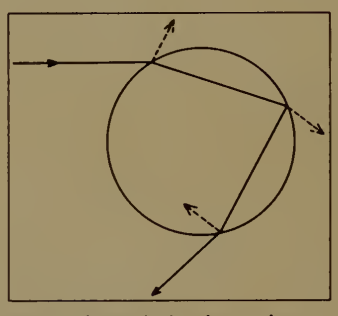
A rainbow is generated by you, the sun, and the raindrops, at the proper relative angles. To begin with, the sun must be directly behind you.

By Raymond Lee, Jr.

Your next rainbow is as close as the nearest garden sprinkler—and as far as the sun. For the rainbow is simply an image of the sun, although a much modified one. Raindrops perform this rearranging of sunlight, and do so by two processes: reflection and refraction.

First, the over-all picture: You can see that the rainbow is part of a circle centered about the shadow of your head. This is true of any rainbow. This circle of light is sunlight reflected by some of the raindrops falling in the distance and it is quite personal: no one else sees the rainbow you see, because no one else is in a position to see the light reflected from the same array of raindrops. But it is not simply reflected. If it were, the sky in the picture above would merely be full of white light.

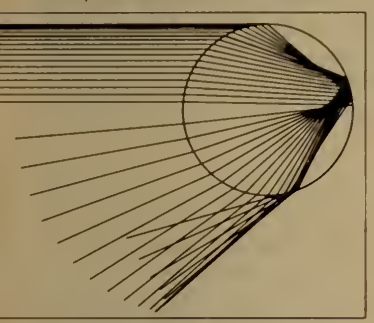
To explain the rainbow, we need to look inside a raindrop. For our purposes, raindrops may be regarded as imperfect one-way mirrors; most light



passes through the drops, but the small fraction forming the rainbow is reflected internally. As sunlight passes from air into the raindrop (or vice versa) it is bent or deviated from its original path, with blue light being deviated more than red. It is reflected from the drop's rear (see diagram), then bent again—refracted—as it passes out. This combination of refraction and reflection occurs at each air-water boundary, and many times within each individual raindrop.

Light emerges from the drop through a range of angles, spraying reflected light over a large part of the sky opposite the sun, and the concentrated

light from many raindrops makes the light bright enough to see. However, it is only light that is refracted on entering the drop, reflected once from its rear, and refracted a second



time on exiting, that forms the main or primary rainbow.

The dispersal of the light displays an elegant geometry, here simplified for clarity. Of course, each drop is penetrated by many rays of light at a time, all over the drop. The sunlight is deviated in many directions, the particular direction depending on both the light's color and where the ray of light enters the raindrop. As shown, a ray which passes through the middle of the drop is deviated by 180 degrees, returning in the same direction it came. But as rays strike the drop at ever more glancing angles, the combined refractions and reflection result in their being bent through smaller and smaller angles.

This process does not continue indefinitely, however. A ray entering at one particular spot will be bent by 138 degrees, the minimum deviation. Rays that enter the drop at more oblique angles are deviated by more than 138 degrees. In contrast to other rays, the minimum deviation ray has a great many neighbors leaving the drop at nearly the same angle. And by nature's alchemy, it is this concentration of light at approximately 138 degrees from the sun which forms the rainbow.

Approached another way, whenever you are illuminated by sunlight, the shadow of your head is 180 degrees from the sun. This makes the bow a 42-degree circle (180 − 138 = 42) centered about the shadow of your head. All rays other than the minimum deviation (or rainbow) ray simply add to the general brightness within this 42-degree circle, which explains why the sky is generally brighter within the rainbow arc.

Why do rainbows come and go so fast? and why do you sometimes see only parts of the rainbow?

It is the combined effect of many drops that gives rise to the bow, and all of them must be at the same angle to the sun with respect to you. Thus, at any instant, only those drops before you which are on a 42-degree circle centered about the shadow of your head can send the concentrated rainbow light to you. These drops may be at any distance from you—your garden sprinkler will do—but must be on the 42-degree circle.

Since the raindrops are falling, there has to be an uninterrupted supply of them for the bow to last longer than an instant. But the edge of a shaft of rain can pass quite quickly across the position where a rainbow might occur, so the bow can appear or disappear just as fast. Or a cloud might block and unblock the sun, bringing the rainbow in and out with its source of light.

Similarly, if any part of the circle where the rainbow can occur is devoid of either drops or sunlight, then that part of the bow will not form. This accounts for the partial bows we often see.

Whether the drops are in the sprinkler spray or in a distant shower, the rainbow is merely sunlight. So chasing the rainbow is as futile as chasing the sun. In fact, moving in any direction is equally fruitless. There is no point in backing up to photograph the whole bow; it won't change size. Rather, it will seem to follow you.

The rainbow's colors arise from the fact that the minimum deviation ray is at a slightly different position for each color, because each color of light can only be bent so far, depending on the color. (The color separation that light undergoes as it is refracted in a prism is an imperfect analogy, but illustrates the process.) Consider red and blue as the colors that bound the rainbow: because blue light at minimum deviation is bent through a greater angle than red light, the red light is closer to the sun. Therefore, red will be on the outside of the primary bow, closest to the sun, and blue will

Alistair B. Fraser

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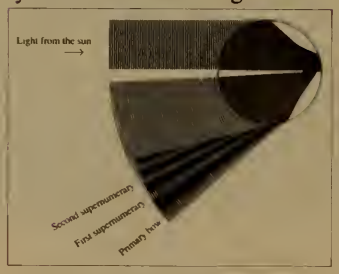
be toward the inside.(Red rainbows occur at sunset, as above, because the sunlight itself is red.)

Although an indefinite number of colors is possible, their sequence across the primary bow is invariant. From the outside to the inside of the primary bow the hierarchy is: red, orange, yellow, green, blue, purple. But even casual observation shows that not all these colors may be evident in any given rainbow, and in fact colors may vary along a single bow. But the order does not vary. If the bow displays only orange, yellow, and blue, they will be in that order.

To explain this fact—one apparently unknown to advertising agencies—let us look at light as a wave phenomenon, recalling that waves have a highly salient property: they can interfere with each other. In fact, light waves can interfere in somewhat the same way as water waves. If you drop two stones into a pool, the expanding rings of waves will intersect. Where the wave crests coincide, they reinforce each other to produce a larger wave than either of the originals. On the other hand, where a wave crest of one ring is combined with a trough from the other, the perturbations cancel out and the water is at its undisturbed level.

Although light waves are electromagnetic, not mechanical, and though they oscillate much faster than water waves, on the scale of raindrops the interference analogy holds. Cancellation of light yields darkness, and reinforcement yields more intense light than



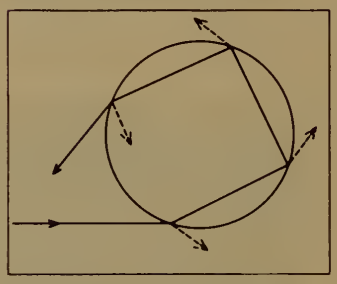
in the original source.

If a raindrop reflects and refracts an advancing front of light waves, much as a curved beach affects water waves, the front folds over on itself, as shown. A dark and bright pattern of interference results, and the first bright band is the primary rainbow. Other bands account for the pastel supernumerary bows sometimes seen within the primary bow, as well as for the dark bands between all these arcs.

Further, the spacing and width of these interference bows depends on the size of the raindrops. As a result, the range of drop sizes in a shower partly determines the intensity of rainbow colors. Generally, the bigger the raindrops, the brighter the rainbow. The smaller the drops—as in a fog—the whiter the bow.

The secondary rainbow, a fainter arc outside the primary, is noticeable for the fact that its color order is reversed with respect to the main bow: the red is inside, facing the main bow, while the blue is outside. The reason is that, in comparison to the primary rainbow ray, the rainbow ray of the secondary has entered a different drop, and sunlight has been internally reflected twice, not once. (See diagram, which uses ray theory for convenience.)

Consider what happens if light is reflected a second time within a drop: the light is canted further upward, and another minimum deviation



results, this one at about 231 degrees. And since each reflection is accompanied by a refraction, every internal reflection means a loss of sunlight out of the drop. (In fact, at each bounce, 94 percent of the ray's energy is refracted out of the drop.) Because the secondary rainbow has two internal reflections, then, it will be less intense than the primary, which has only one.

The color reversal in the secondary occurs because of the larger minimum deviation: sunlight is turned through more than 180 degrees. To get a feel for this concept, pretend that the sun is setting, so that the center of the rainbows is on the opposite horizon. Now imagine that you're holding a pointer aimed behind you at the sun. You rotate it down toward the ground, continue up to point at the opposite horizon, and finally rotate it up further until it forms an angle of 51 degrees with the earth (180 + 51 = 231).

This rotation of the pointer mimics that of the rainbow ray and indicates the position of the secondary bow's red arc. Since blue is always deviated more in the rainbow ray than red, if the pointer rotates upward about 3 degrees more, it will mark the location of the blue arc. This exercise shows us the color boundaries of the secondary: red on the inside, blue toward the outside.

There is only a small separation (9 degrees) between the minimum deviation rays of the double rainbow, but the separation is definite. In comparison to the light-filled areas on either side, this narrow arc between the bows is often noticeably darker, because drops here can send forth no light.

We can demonstrate (and often observe) that the interior of the primary bow is brighter than the background. But the distinction may not be visible, because of a background whose brightness is not uniform, a sun partially obscured by clouds or haze, or a thin shaft of rain. In each case, the low brightness of the primary bow means that only the rainbow's pattern of colors, not its inherent brightness, will be noticeable. For the secondary and supernumerary bows, even the colored patterns will be invisible if the contrast between them and their backgrounds is low. And since

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these bows tend to be dim, even in the best circumstances their colors appear quite pastel. This explains why secondary and supernumerary bows, though they are always there, are less often seen.

Even the primary bow cannot be seen if the sun is much higher than 42 degrees above the horizon (assuming the horizon is dead level). To see why, imagine that a circle the size of the primary bow is centered about the shadow of your head. When the sun is higher than 42 degrees, no part of this circle is above the horizon, which means there are no raindrops that can send light to you at the rainbow angle. Of course, all sunlit drops are still refracting and reflecting light, and some of that light is being bent at the minimum deviation angle. But now all this light passes above your head.

Of course, you don't have to have a level horizon to see a rainbow. Our ubiquitous water sprinkler would generate a rainbow at the bottom of the Grand Canyon if the spray were sunlit. Conversely, if the horizon falls away below you, then a more than semicircular rainbow may be visible. In fact, from a plane or a very steep hill, it is even possible to see the entire rainbow circle.

Rainbows are most often seen in summer, because the necessary mix of rain and broken cloudiness is more common in summer. Even the lower sun altitudes in winter do not compensate for these reduced opportunities for rainbow watchers.

At any time of year, however, you may be surprised at how often rainbows can be seen, and at their variety. The rainbow may appear with shimmering iridescence near the horizon. Or it may look like a gauzy veil draped across the upper reaches of the sky. But the rainbow is more ethereal than any veil—it has no substance, it is sheerest light.

Raymond Lee, Jr., a graduate student in meteorology at Pennsylvania State University, is writing a book about rainbows with his adviser, Alistair B. Fraser.

Alistair B. Fraser

Ed Thorsett

If you can't wait for a storm, try stalking a rainbow in the misty atmosphere surrounding a waterfall.

Photographing Tips

(1) Do not believe your light meter, which will be fooled by the diffused and scattered light. In order to make the rainbow colors more saturated, you have to underexpose slightly. Generally, one half to one full f-stop will work. Your eye is much more sensitive to those colors than the film is.

(2) Bracket your shot. Make several exposures on either side of the chosen f-stop.

(3) You'll generally get the best results if the storm is in front of you, so that it creates a dark background. The darker the clouds, the better the contrast and the brighter the rainbow.

(4) Cloudy skies tend to make color film go bluish, so that any landscape in the foreground will go off-color. A skylight filter is a faint, rosy-tinted filter that helps screen out some of that excessive blue, and it will help.

(5) Some people recommend a haze filter or a UV filter, but I have never noticed any great effect with either one. A polarizing filter is actually bad, as it can reduce the rainbow, or even make it vanish.

(6) People tend to be so impressed by a rainbow, that they feel just capturing the rainbow on film will produce a beautiful picture. Then when they get the picture back they're often disappointed. I think some kind of foreground interest helps immensely, because it makes the rainbow one element—though it may be the major element—in the total composition. If you shoot just the rainbow, it may very well come out looking like nothing more than a lens flare. The rainbow needs contrast with something in the real world to look its ethereal best.

(7) Shoot quickly. When the ideal condition goes, the rainbow goes, and there's no warning.

—Ed Thorsett

GOD, THE RAINBOW, AND THE ARTIST

In Judeo-Christian culture, artists have tended to ignore the natural rainbow in favor of the mythological one.

©Saskia, Ltd.

Albrecht Dürer's* Adoration of the Trinity *(1511, Kunsthistorisches Museum, Vienna) shows the rainbow used as sheer convention, as a straightforward sign of divinity. Both God and Christ are supported by the rainbow, a rainbow so solid that their garments fold over it. This carpentered bow bears scant resemblance to natural rainbows.

The rainbow as symbol of divinity was hardly new with Christianity. In Greek myth, the goddess Iris travelled the rainbow as Zeus's messenger, meddling in human affairs and often bringing portents of war and death.

HBO Art History Department

In* Last Judgment *(1473, Muzeum Narodowe, Gdansk) Hans Memling depicts the rainbow of Revelation 4:3, with Christ as Judge of the World. Below, the Archangel Michael weighs the souls of men as they are stripped naked for judgment. There were hundreds of paintings of this subject, intended to frighten sinners into repenting before it was too late.

Memling's rainbow is moderately realistic. He clearly knew the rainbow was a circle (in itself an emblem of divine perfection), and he even includes what may be a supernumerary bow. The colors he paints are possible. The rainbow's relation to the illumination is not, however; nor is the way that it swoops forward from a base at the distant horizon.

Research by Raymond Lee, Jr. and Alistair B. Fraser

Tate Gallery, Publications Department

Several centuries later, William Blake's **Four and Twenty Elders casting their crowns before the divine throne** *(c. 1805, Tate Gallery, London) also draws on* **Revelation.** *Surrounding Christ's throne are 24 elders of the angelic court that will sit with Christ in judgment.*

Notice the rainbow—a double rainbow, even. In other drawings, Blake paints the rainbow's colors in plausible order. But here, the colors are backward, Why are they wrong in this instance? Possibly he painted them so on purpose, as part of his intellectual feud with Newton, who had experimentally determined the color order in the rainbow. Blake saw Newton as a man of science and scientific law, as opposed to himself, a man of spirit. In a letter to a friend, Blake writes, ". . . may God us keep/from single vision and Newton's sleep."

National Gallery, London

In John Constable's **Salisbury Cathedral from the Meadows** *(1831, Private Collection, currently on exhibit at the National Gallery in London), the rainbow embraces Salisbury Cathedral. Constable prided himself on his observation of nature and was an exacting cloud painter; he had also studied rainbows. But this bow has subtle faults: the inside darkness is possible but unlikely; the shadows should point to the bow's center; and the sun's altitude is wrong. The storm threatening the cathedral may symbolize the turbulent church politics of Constable's day. Arching above the cathedral, the rainbow hints of hope and divine protection.*

Birmingham Museum of Fine Arts

"My heart leaps up when I behold/ A rainbow in the sky". Those were the words of William Wordsworth in 1802, a time when divinity and nature were linked in poetry and art. In John E. Millais's **The Blind Girl** *(1856, City Museum, Birmingham, England), the little girl obviously sees the rainbow, while her companion obviously* **feels** *it. It is as if the rainbow (a double one) is giving the blind girl spiritual food—and in the background we see ravens, in Christian art a symbol of God's providence (an allusion to the ravens which fed Elijah).*

Architect of the Capitol

Constantino Brumidi's **The Apotheosis of George Washington** *(1865), on the Rotunda dome in the U.S. Capitol, descends directly from medieval and Renaissance* **Last Judgment** *paintings such as Memling's. George Washington, looking faintly queasy about his deification, rides the rainbow, apparently passing judgment. Below, Lady Liberty scourging the enemies of freedom.*

The Fotomas Index, London

In what has come to be called **The Rainbow Portrait** *(attributed to Isaac Oliver, c. 1600, Private Collection, The Marquess of Salisbury), the rainbow becomes a divine talisman, in the hand of Queen Elizabeth I. The meaning would be clear to her contemporaries: Because she holds the rainbow, she has been divinely vouchsafed the right to rule. Indeed, the motto (barely visible) says, "No rainbow without the sun." That is a perfectly satisfactory statement of meteorological fact, but also a statement that the right to rule comes from Christ (the sun).*

Christopher Vaucher

Even without political and religious motives, it's not easy to get the rainbow right, as witness Eric Sloan's **Weather Mural** *(1976) at the Air and Space Museum in Washington, D.C. Sloan specializes in meteorological illustration yet, like many before him, gets it wrong. Any rainbow is sheer sunlight, and all sunbeams and all shadows point to the center of the rainbow, like spokes on the wheel. Sloan's sunbeams, however, slant away from the center of the bow.*

Over the centuries, the rainbow has emblemized beauty, peace, a link between Earth and heaven, a link between now and eternity. And being such a powerful symbolic device, it is naturally used to huckster. In any given shopping day the alert observer, or the not so alert observer, can see a hundred commercial rainbows—and most will have oddly mixed colors. Short of the sun itself, the rainbow has been exploited commercially with more visual nonchalance than almost any non-living object. Witness: There are more than 100 Rainbow Motels and Hotels in the U.S. and Canada, more than 200 Rainbow Bar and Grills. Cigarette ads. Follow the rainbow of CBS Sports. Jesse Jackson's "Rainbow Coalition." You'll find dozens of rainbows in any bookstore. The Hewlett Packard **HP45** *graphics computer is portrayed as the pot of gold at the end of the rainbow.*

The irony is, as the Observer's Guide explains, that the rainbow flees when pursued. It is unattainable. The commercial artists get even the symbolism wrong.

Alistair B Fraser

Alistair B Fraser

Alistair B Fraser


Hewlett Packard

Alistair B Fraser

What's at the end of the rainbow puzzle?

The rainbow has always inspired awe and puzzlement, sometimes joy and worship. But just as often, the bow has been seen as a harbinger of doom. For the Norse, the rainbow was Bifröst, the bridge between heaven and earth. Bifröst was built by the Norse gods for their daily travels to earth, where they sat in judgment of men. When Bifröst is stormed and collapses in the climactic battle with the gods' enemies, it signals the twilight of the gods—and of men.

This fantastic quality colored early scientific study of the rainbow. For example, the Indian astronomer Varahamihira (fl. ca. 550 A.D.) could explain, presumably without qualms, that the rainbow is due both to variegated rays from the sun and to "the exhalations of serpents."

Early Greek science was also tinged with myth, but in the sixth century B.C., the Ionian scientist Anaximenes correctly pointed out that sunlight forms the rainbow. Yet he incorrectly asserted that the light reaches an observer because the rays strike an impenetrable cloud and return to the eye. Because rainbows are often seen against clouds, some version of this seemed plausible. So the notion of the reflecting cloud would persist for centuries, in the face of better explanations.

From Aristotle (384–322 B.C.) came antiquity's most extensive treatise on the rainbow, the authority of which continued largely unshaken into the 17th century. As a champion of common sense, Aristotle claimed that real objects and phenomena, not fantasies, stimulate our senses.

This common sense approach led him—correctly—to agree with Anaximenes that sunlight forms the rainbow. But it also made him propose—incorrectly—that the bow was reflected from a monolithic cloud. He also theorized that the bow lies at a particular distance from the eye. This erroneous but influential notion may have made it seem, over the centuries, that the rainbow was a physical object.

Equally plausible, yet equally faulty, was Aristotle's contention that there are two kinds of mirrors—large ones that reflect forms, and invisibly small ones that can cause colors. The surface of a cloud, he thought, reflects a rainbow because it consists of minute mirrors.

***The title page from a 1512 commentary on a reworking of Aristotle's* Meteorology.**

Aristotle, Descartes, and Newton—among many others—tried to unravel the rainbow's secrets.

This notion, combined with his own rather murky color theory, led to the conclusion that the varying mixtures of darkness and light from the mirrors resulted in a rainbow of red, green, and violet. This tricolor rainbow became a staple of later literature and art.

After Aristotle's death, most rainbow theory consisted of reaction to his work, not all of it uncritical repetition. Among Roman writers, Seneca the Younger (3 B.C.–65 A.D.) correctly noted that the rainbow has an indefinite number of colors, not just three. However, he disagreed with some people's idea that raindrops, not a monolithic cloud, cause the bow.

Eleventh-century Islamic writers familiar with the ancient texts made important contributions. Among these writers was Alhazen (ca. 965–1039), who investigated optics and refraction in some detail. Still, he followed the Aristotelian insistence that only reflection gives rise to the rainbow. He also explained its colors with a theory similar to Aristotle's. While Alhazen did not advance rainbow theory directly, his quantitative, experimental approach to optics would later bear fruit.

European rainbow theory advanced rapidly in the 12th and 13th centuries, partly because Latin translations of Aristotle were now widely available and partly through the founding of major universities. Often sanctuaries for practitioners of unoriginal scholasticism, the universities also produced some quite original thinkers.

Among them was the Englishman Robert Grosseteste (ca. 1175–1253). Citing tests the observer might make, he was the first to state unequivocally that refraction is crucial to understanding the rainbow. However, his abandonment of Aristotle was wholesale, and he seemed ambivalent about reflection's role in rainbows. The result was a faulty geometry for the bow. On balance, however, his use of refraction and observation were vital.

Still unresolved was the precise role that rain or cloud droplets play in the rainbow. Whether they act as a continuum or as discrete transparent globes was variously fretted over and ignored.

Then Theodoric of Freibourg (d. ca. 1310) published a voluminous tract on the rainbow which seemingly answered this vexing question—and which was the first to rely on measurements from laboratory experiments. Like others before, Theodoric illuminated a hollow glass sphere filled with water and produced a spectrum; unlike anyone else, he concluded that the globe's optical properties are much like those of a raindrop. The rainbow, he said, results from the combined effect of individual drops in a shower.

Although Theodoric acknowledged that Aristotle's work had some worth, he rejected the latter's theory of a continuous, reflecting cloud, for "according to the same Philosopher, . . . one never should

depart from that which is evident from the senses." Theodoric correctly perceived both refraction and reflection within the drop, and illustrated their combined effect with lucid diagrams. He even attempted to explain the double rainbow, with results almost as satisfying. But definitive explanations of why the bows are arcs and why they have a nearly fixed angular size eluded him. In the end, he invoked time-honored Aristotelian explanations to solve his difficulties.

In the following three centuries, the rainbow problem was quite popular, and Aristotelian ideas were energetically reworked by scores of scholiasts. At the same time, there was a growing restiveness with Aristotle's ideas—though Theodoric's pioneering work was infrequently cited.

Finally, in 1637, there came a clear and complete break with ancient notions about the rainbow, when René Descartes (1596–1650) proposed a new scientific methodology, offering his research on the rainbow as an example of this new approach. (Analytic geometry was another example.) Apparently unknowingly, he had repeated Theodoric's experiment, reaching the same conclusions about the refraction and reflection of light passing through a drop.

But unlike Theodoric, Descartes had techniques that allowed him to evaluate refraction quantitatively. Using these techniques, he was the first person to know (in a quantitative sense) how light is bent as it passes through a raindrop, and he showed that it is bent through some minimum angle. Theodoric could draw diagrams of the phenomenon; Descartes could attach numbers to it. Thus he could answer the persistent question of why the bow is a circular arc of light at a fixed angular distance from the sun. But then, determined to press for a full solution, he confidently offered a flawed explanation of the rainbow's colors.

Descartes was justifiably proud of his accomplishment, but contemporary reaction ranged from slights to indifference. He had committed scholastic heresy, by abandoning Aristotle. Still, during the balance of the 17th century, several European scientists extended and refined his solutions, and at last a satisfactory explanation for the rainbow's colors emerged. In 1666, Isaac Newton (1642–1727) performed experiments with prisms that were to revolutionize scientific thinking about color.

But his eagerly proffered outline of the work was rejected by several prominent scientists. Newton was stung, despairing to a friend that he had given up "so substantial a blessing as my quiet, to run after a shadow." Prudently, he delayed publication of details for 38 years (until 1704), by which time he had a a different, if not less hostile, audience. Eventually the rigor and repeatability of the Newtonian and Cartesian experiments gave both respectability, and no one took serious issue with them again until the early 19th century.

Now that the primary rainbow seemed well enough explained, attention shifted to more exotic bows. Speculation grew about higher-order bows (caused by multiple reflections within the raindrop). Reports of unusual varieties of rainbows—those reflected in water, seen in dew, or the nearly colorless ones seen in fog—increased dramatically. Even more disconcerting were the increasingly frequent reports of several narrow, pallid bows framed by the primary arc. Such rainbows had been known for centuries, but the main bows had seemed more important. Newton's theory could not account for supernumerary bows at all.

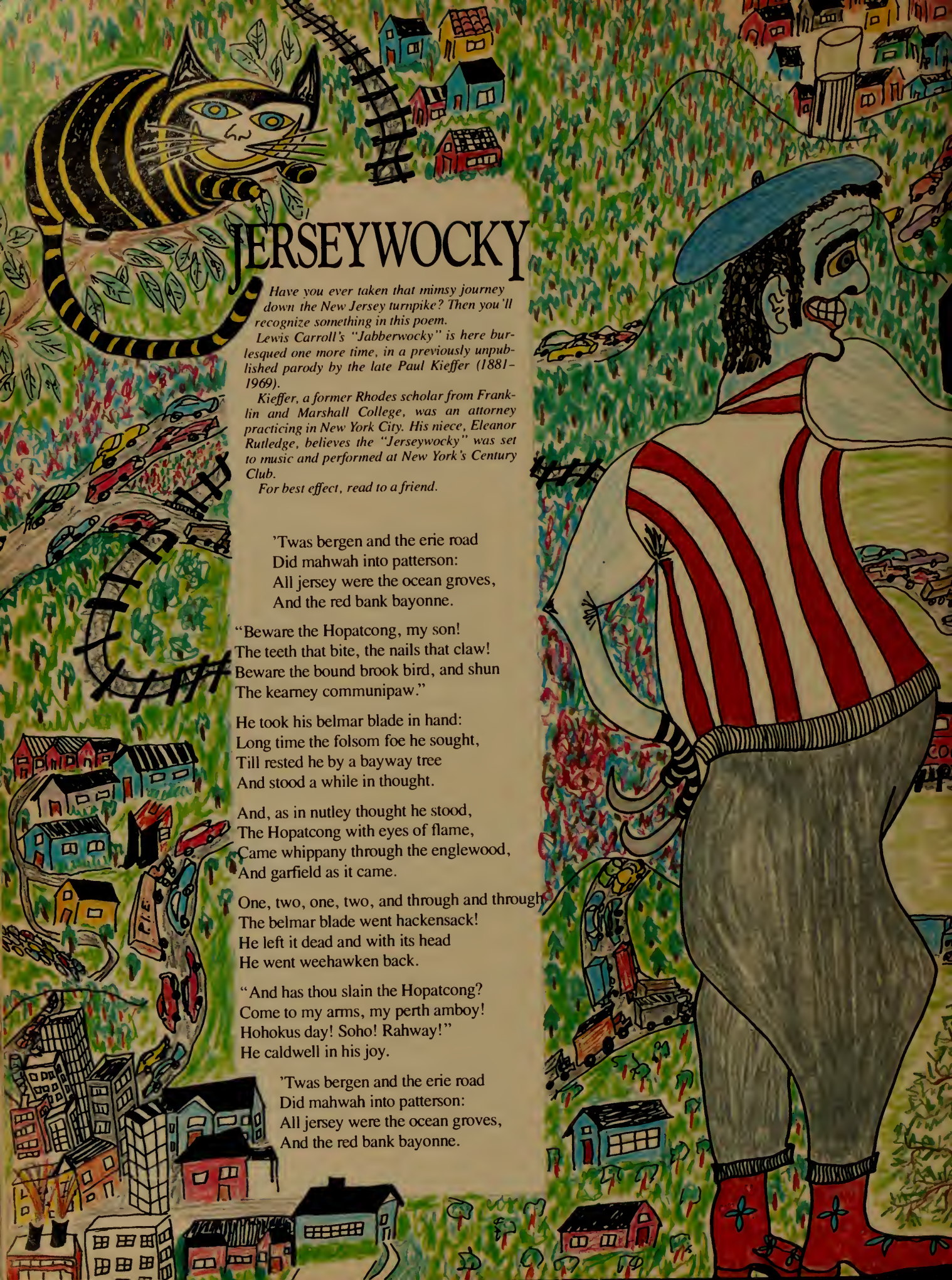
The man who partially resolved the new quandary was Thomas Young (1773–1829), and his solution required a reconsideration of the nature of light itself. After Newton, prevailing opinion in the 18th century held that light consisted of mobile infinitesimal corpuscles. But Young approached the phenomenon as wave motion, analogous to water waves. With this theory, he could explain not only the main rainbows, but also a number of puzzling optical phenomena, including supernumerary and fog bows: The waves of light interfere with one another inside the raindrop, rather like the interfering wakes of boats. Moreover, Young's investigations of color perception helped inaugurate the quantitative study of rainbow colors.

In the opening decades of the 19th century, Thomas Young's rainbow theory won acceptance only gradually, but it did underlie the important work of a fellow Briton, George Airy (1801–1892). Airy extended Young's interference theory with newly developed mathematical techniques, accounting for almost all rainbow features and even explaining small variations in the angular sizes of rainbows, formerly baffling. Because the theory also made clear the approximate nature of earlier work, it met with some resistance from doctrinaire Cartesians, which subsided as experimenters found close agreement between Airy's predictions and careful measurements. Nonetheless, Airy's theory is itself only an approximation, and later 19th-century investigators pursued refinements and alternatives.

In the 20th century, optics has offered increasingly abstruse physical explanations for the rainbow. However, the physiology of vision and the psychology of perception are also key to perceptions of the natural bow, and are outside the realm of most physical theories. Physical theories may explain the intensity of rainbow light, but details of its perception remain in question.

Equally important, nature's experiments with rainbows are not so carefully controlled as those in laboratories. Twentieth-century physical theories, elegant and powerful though they are, have not yet explained all the variability of natural rainbows. Rainbows are raggedly bright, some parts more colorful than others. They can shift, from a double to a single and back. The number of colors is legion, and shifts, as well. How? It is poignant that, after all the effort and energy expended over the centuries, we still have as many questions as our ancestors did.

—Raymond Lee, Jr.



JERSEYWOCKY

Have you ever taken that mimsy journey down the New Jersey turnpike? Then you'll recognize something in this poem.

Lewis Carroll's "Jabberwocky" is here burlesqued one more time, in a previously unpublished parody by the late Paul Kieffer (1881–1969).

Kieffer, a former Rhodes scholar from Franklin and Marshall College, was an attorney practicing in New York City. His niece, Eleanor Rutledge, believes the "Jerseywocky" was set to music and performed at New York's Century Club.

For best effect, read to a friend.

'Twas bergen and the erie road
Did mahwah into patterson:
All jersey were the ocean groves,
And the red bank bayonne.

"Beware the Hopatcong, my son!
The teeth that bite, the nails that claw!
Beware the bound brook bird, and shun
The kearney communipaw."

He took his belmar blade in hand:
Long time the folsom foe he sought,
Till rested he by a bayway tree
And stood a while in thought.

And, as in nutley thought he stood,
The Hopatcong with eyes of flame,
Came whippany through the englewood,
And garfield as it came.

One, two, one, two, and through and through
The belmar blade went hackensack!
He left it dead and with its head
He went weehawken back.

"And has thou slain the Hopatcong?
Come to my arms, my perth amboy!
Hohokus day! Soho! Rahway!"
He caldwell in his joy.

'Twas bergen and the erie road
Did mahwah into patterson:
All jersey were the ocean groves,
And the red bank bayonne.


BARRY GORDON
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LEAVING HOME

Entering college marks a watershed, for parent and child alike. I am proud of the young woman I've raised—but the house seems awfully quiet.

By Elise Hancock

I have a graduation picture on my desk. The girl is pretty—at least to a mother's eye—with dimples and wavy hair and straight white teeth. She has cut away the background of the photograph, drawn a graduation cap on a piece of paper, and inserted her head into the cap so the picture shows herself about to march down the aisle. The effect is subtly witty, and I gather she is pleased and excited about the end of high school, the beginning of college.

I can't be sure, though. Her letter didn't say. She's in France and has been all year, as an exchange student with a family near Paris. She comes home in July, then leaves for college.

In my mind are many other pictures. There used to be a little blond girl, muscular and solid when you held her. Some people's children seem wispy, and you fear you would crush their ribs if you hugged them hard. Katherine was not like that. Hugging her was like hugging a puppy, solid and warm and smelling faintly of sweat and the day's happy dirt. In my mind, I see her sitting on the floor, two years old or so, one chubby leg cocked in the air. She is struggling to put on her own sneakers—red sneakers. She liked red shoes. She looked up at me, beaming, and said, "Mother, what nice thing are we going to do today?"

Such a happy expectation. But that was the way she was, and some nice thing usually did come along. She might play in the sandbox, for example. Or the sprinkler. Or dress up the neighbor's kittens and take them for a walk in a doll carriage. Or she might find a wonderful new rock—do all children collect rocks? When she was about nine there were rocks lining our walls, rocks on the windowsills, rocks everywhere. They looked like just plain rocks to me, but she knew where she'd found every one. When she was old enough to do Christmas shopping, age three or four, I took her to the cigar store where the man helped her select the one perfect cigar for her grandfather. It took quite ten minutes to settle on the one with the aluminum case, and she was so pleased.

When she was in about fourth grade, I remember, she read a newspaper story about a high school principal who had kicked a middle-aged retarded man out of the school, where he'd been sweeping the halls and carrying water for the football team for years. The principal thought students should not know such a person. But Katherine has a brain-damaged relative, and she wrote the principal a letter about how it would do the students good to learn compassion, and how sweeping the halls had probably been the high point of the retarded man's day. (I'm sorry to say the fellow never answered her letter.)

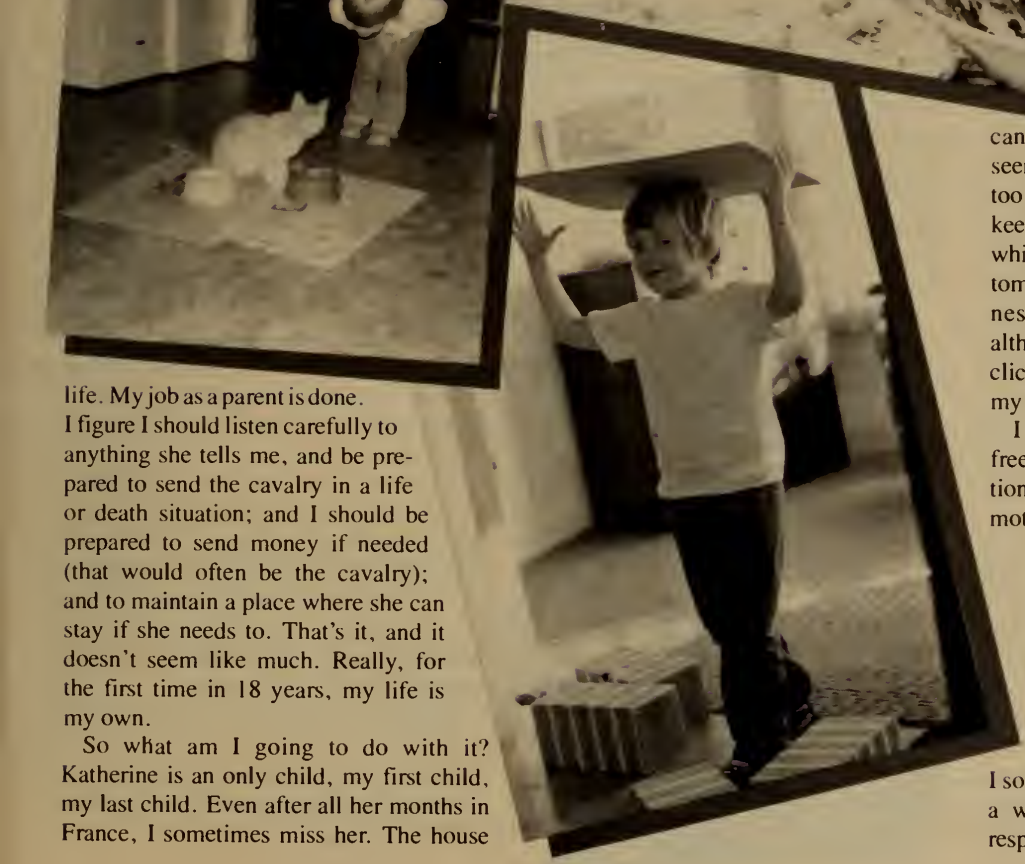
Whatever she did, she did intensely. In the summer, she liked to climb trees, ride bikes, catch fireflies. She'd run and run and run, and come in at night all sweaty and glowing with scraggly hair. I used to figure if she wasn't dirty she'd had a bad day. In the winter she liked to dress-up and give plays, and we kept a big chest full of old clothes and wigs and pieces of cloth, even a pair of rubber gorilla feet. She liked to make burpsy-boomer, which was any concoction of drinkable liquids—cranberry juice and root beer, for instance. The odder, the better. She liked to play store, for which we had a collection of old coffee cans and Cheerios boxes and such. And she liked stories. I read to her every night at bedtime, for years and years, from *Good Night, Moon* on into Laura and Narnia and the Borrowers. She would sit in my lap, in the rocker where my mother had once rocked me, and she'd be warm and heavy and smell like soap, and she'd grow heavier and heavier and heavier till I slid her limp into bed.

I still have artwork done by that child, laborious crayon outlines of people, big circles with little stick bodies. And a few of her toys, which visiting children are pleased to use—puppets and books and a few dolls and Playskool things. Even a few rocks. But the child herself is entirely gone. I can remember the warm weight in my lap, I can even feel it, but the child herself is gone. And that's what I find myself thinking about as Katherine prepares to go to college.

This wavy-haired college freshman is a wonderful person, warm and humorous and intelligent and everything a parent could possibly ask—except tidy—but she's not the little girl. Where did she go, so quickly?

And—corollary question—where did my youth go? A minute ago I was a young mother. Now I'm the mother of a college student. That makes me middle-aged, and I haven't gotten used to it yet.

So whose milestone is this? Katherine's, obviously. It is the beginning of her adult



life. My job as a parent is done.

I figure I should listen carefully to anything she tells me, and be prepared to send the cavalry in a life or death situation; and I should be prepared to send money if needed (that would often be the cavalry); and to maintain a place where she can stay if she needs to. That's it, and it doesn't seem like much. Really, for the first time in 18 years, my life is my own.

So what am I going to do with it? Katherine is an only child, my first child, my last child. Even after all her months in France, I sometimes miss her. The house can seem too quiet, too orderly. Nobody keeps me up to date on the latest films, which the young seem to know by tom-tom. Isn't this what they call the empty nest syndrome? Yes, I suppose so, although I hate to admit that any such cliché applies to a fine and unique soul like my own—and it's also freedom.

I don't like to admit to a sensation of freedom, either. To women of my generation, that is an ugly emotion unsuited to mothers, who are supposed to adore every moment of mothering. Still, I feel it.

Katherine's father has conscientiously tried to do what a father should do, but it is hard to play much of a personal role from a thousand miles away.

In fact, Katherine has been my responsibility since she was three, and the weight could be heavy. I sometimes used to wish that I could have a weekend, just one weekend, with no responsibility. To come in when I pleased.

To go out impulsively. To not cook if I wasn't hungry. That would be heaven, I thought.

Now I can have that heaven.

Our life was not idyllic. Katherine and I made her Halloween costumes together, yes, and all those things I've told you about. We had a marvelous time, much of the time. But in the several years after my marriage broke up, the child was—one would politely say demanding. Not her fault, of course: her world had turned somersaults. Still, she was difficult. At no time has she been punctual doing homework. As a teenager, she kept a bedroom into which it was not possible to walk. Really. We finally just shut the door. (How she emerged from that mess looking like an unrumpled rose I'll never understand.)

But I couldn't shut the door on the kitchen, and she was supposed to do the dishes. One time she assured me she *would* do the dishes, yes, she definitely *would* do the dishes, if only I would stop nagging. The problem was that I was such a nag. So I agreed to stop nagging. Three days later, when there was no dish or pot to cook or eat on in the house, I mentioned the matter. She told me I was nagging and she'd do it later—and I exploded. I was so angry that I scuffled and dragged her down the stairs, into the kitchen, and scrubbed her face with rancid potato peels from three days back. And then of course I helped her wash her face, and we both cried, and she helped me do the dishes.

Another time I got so angry that I bit her—wonderful. I'm not proud of that. I've often been inattentive. Also, I wish she hadn't spent so much time alone or with sitters; but I had to work, sometimes at night. I still don't see what else I could have done. Also, I wish I could have provided more in the way of art and music lessons, but I couldn't leave work all the time to chauffeur.

Well, no use thinking about it now. Done is done, and she has turned out well. Over the years, I have sometimes comforted myself with the thought that honest love might compensate for many flaws, and maybe it did. I also think I was lucky enough to be working with good genetic material, and that she herself has been tough and brave.

Of course, in a way the little girl isn't gone after all. Which is a new thought to me. Somehow I've been thinking as if her essence had been warmth and rock collecting and mudpies, and I feel that way. Caring for a small child is so tactile, even sensual: I remember two-year-old Katherine with all my senses, whereas the young woman is modest and I never even see her naked, let alone hold her as you would a baby. But the important part of the two year old endures: that sanguine, affectionate, concerned, involved, intense person is still there.

Katherine is one of life's winners—at least to the mother's eye, but I think truly. She has tact, compassion, and friends, both among her contemporaries and older friends (such as a former teacher). She is going to a most competitive college, and I think she'll thrive there. She may not play an instrument, but she already knows an enormous amount about films. She goes to museums for pleasure. Whatever she does with her life, she will do it with generosity and attention. I have visited her in France, and in her year there she has obviously gained in maturity, poise, and self-discipline.

We parted on a Sunday, in London, after a few days of riotous play-going. I was packing to catch a plane at Heathrow, she to catch the boat-train at nearby Victoria. "Well," she said, "goodbye, Mother, thank you for the *wonderful* time," and she hugged me hard, kissed me goodbye, picked up her suitcase, and left for the continent.

And after it was too late, it suddenly struck me that she, 17 years old, had never taken the boat-train before. My baby! Why hadn't I gone with her? The answer was obvious: she knew where Victoria was, and we both knew she didn't need help. She hadn't even asked for money! Here was an independent adult.

What a happy circumstance. How proud I am.

Yet I wish I could have the little girl too, at least for a visit. Or long enough to snuggle her, anyway.

WPI CLASS NOTES

WPI Alumni Association
President, Harry W. Tenney, '56
Senior Vice President
Paul W. Bayliss, '60
Vice President
Richard B. Kennedy, '65
Secretary-Treasurer
Stephen J. Hebert, '66
Past President, Peter H. Horstmann, '55

Executive Committee
Members-at-Large
Henry P. Allessio, '61
Walter J. Bank, '46
William J. Firla, Jr., '60
Patricia A. Graham Flaherty, '75

Fund Board
Allen H. Levesque, '59, Chair
Edwin B. Coghlin, Jr., '56
Richard A. Davis, '53
C. John Lindegren, Jr., '39
David B. Denniston, '58
Francis W. Madigan, Jr., '53

1917

Brig. Gen. **H. F. Safford,** retired from the U.S. Army, writes that he is celebrating his 90th birthday this August.

1929

Percy Newton belongs to a retirement golf league and plays up to five times a week "in season." He also has more than six acres—with a big lawn and garden—to keep him busy. In the winter he bowls.

1930

Myrton Finney writes, "I have the good fortune to see my children frequently. I have four grandchildren." Myrton retired from Bell of Pennsylvania 14 years ago.

Wilson Rice says he's so busy in retirement that he hasn't found time to join the Golden Agers. He's been restoring wooden antiques and helping to repair a Masonic temple and a church. He's traveled to Arizona, Florida, Maine and Cape Cod, where he's done a little fishing.

Arthur Zavarella was one of thousands of amateur radio operators from New England who responded to greetings from astronaut Owen Garriott as the space shuttle *Columbia* approached the coast of North America in December.

1932

Last October, **Francis Blouin,** retired from the Navy, participated in Tokyo as a member of the U.S. delegation in an international conference, "Security of Sealanes of Communication."

1933

Kenneth Gleason writes that he had a great time seeing the Phi Sigs who returned for last year's 50th reunion. He lives in Newton, MA.

1935

Leonard Humphrey currently serves as village engineer in Chevy Chase, MD. He is concerned with street lighting, storm drainage and remodeling the village office building.

Donald MacMillan was recently elected chairman of the board of the Upper Blackstone Water Pollution Abatement District Commission. He is the last remaining original member of the three-man commission, which was formed by Worcester and Auburn to build a $26-million plant. Mr. MacMillan, who took an environmental engineering course at Springfield Technical Community College, retired as a senior product engineer in the electrical cable division of U.S. Steel Corp. in 1972.

1936

Leonard Johnson of Amesbury, MA, spends his time boating, gardening, traveling, visiting children, consulting, administering a foundation, maintaining his property, reading and corresponding. Retired for ten years, he is also conducting genealogical research.

1938

Last August, **Robert Abbe** attended his 13th Phi Sigma Kappa national convention since 1952. It was held in New Orleans. One of his granddaughters now lives in Florida, so there will be one or two trips south each year.

1939

Henry Blauvelt still works for the Public Service Electric and Gas Company in Newark, NJ. He writes, "**Warren Harding, '42,** works on the same floor and we compare notes." Last winter the Blauvelts visited the **Tom Wingardners, '40,** at their retirement home in Marco Island, FL.

1940

Kenneth Fraser recently retired from Markel Corp. and now works as a special products manager for National Wire & Cable Corp.

Zareh Martin, who writes that he "can't retire," has started his own consulting firm in value engineering.

Harry Terkanian is now retired from Raytheon and residing in Lexington, MA.

James Thurston has retired from the Waites Co., Worcester. He lives in Damariscotta, ME.

1941

William Carroll serves as district sales manager for Wiginton Fire Sprinkler, Naples, FL.

Dr. **Charles Smith,** professor of mechanical engineering at Rose-Hulman Institute of Technology, Terre Haute, IN, spoke on engineering education at an international symposium held April 16–19 in Cologne, West Germany. His presentations at the World Conference on Education in Applied Engineering and Engineering Technology were "How Does One Teach Design: Lectures, Projects, Cases?" and "On Writing Engineering Cases."

1942

In December, **James Robjent** retired from Scott Paper Co. He resides in Waterville, ME.

1943

Robert Bierweiler, a registered professional engineer in 16 states, is currently the chief engineer at Natgun Corporation in Wakefield, MA.

Class of 1934, 50th Reunion

Forty-six members of the class checked in at our class headquarters at the Sheraton-Lincoln Inn on Thursday, May 31. That evening President and Mrs. Edmund T. Cranch welcomed us at a reception in their lovely home. Following this, we moved to Higgins House for our 50th reunion dinner party as guests of WPI.

On Friday, the rainy weather put a damper on most of the planned outdoor activities, like golf and tennis, though we took part in seminars, tours and indoor tennis during the day. At noon, we enjoyed a pleasant buffet luncheon in Morgan Hall.

Friday evening we gathered at the Sheraton-Lincoln for our class banquet. John Keenan was MC. Also speaking for the class were Charlie McElroy, reunion chairman, and Everett Sellew, class president. Our guests were Mr. and Mrs. Robert Reeves. Bob is vice president for Student Affairs at WPI. He gave us a lively run-down on recent events on the Hill and outlined what is being planned for the future.

On Saturday morning, following a continental breakfast hour at Morgan Hall, we attended the 50-Year Associates meeting at Kinnicutt Hall. At this meeting, Prof. Donald Zwiep, head of the ME Department, gave a fascinating talk with outstanding color slides on his recent year as president of ASME, including an extended trip to the Orient, Hawaii, Japan, China and Indonesia. At the traditional Reunion Luncheon on Saturday in Harrington Auditorium, John Keenan presented our 50th reunion gift of $141,721.91 to the college. This included corporate matching gifts.

Our class won the Class of 1917 Attendance Cup with an attendance of 48.3 percent of our members able to attend the reunion.

See you at our 55th!

Howard A. Whittum
Class Secretary, 1934

He has written several articles for professional journals. The Bierweilers have two children and two grandchildren and reside in Needham.

Calvin Holden retired from PPG Industries last December. He is considering doing some consulting. Meanwhile he helps his wife with her antique business and is still heavily involved in Scouting.

1944

In February, **Irv Gerber** left Gerber Sales Corp., his electronic manufacturers' representative business which covers New England. He writes, "After 37 years, I'm selling my interests to the employees, but will continue to handle some special projects for the company." Irv was in the electronics industry for 40 years. And he's not really retiring. For the next two years he'll be attending the Bennett School full time, learning to design and build period furniture. He says he's always "had a love affair with woodworking," and that he's merely "trading electrons for sawdust."

1946

Howard France holds the post of president of Altair Equipment Co., New Hope, PA.

Joseph Pofit of Ludlow, MA, continues with Crane Co. in Indian Orchard.

1947

Harold Cole, now retired from Raytheon, is currently residing in Saco, ME.

1948

In March, **Arne Kellstrom** joined Hoerbiger Ventilwerke AG in Vienna, Austria. Following a training period, he is scheduled to go to Singapore to help develop the firm's Southeast Asia market. In 1983, he retired from Ingersoll Rand after more than 35 years of service. His last post was as vice president and general manager of the oil and gas compressor division. Before he joined the Vienna firm, the Kellstroms took a short vacation in Greece.

1949

Robert Bareiss has been elected to the board of directors of the Technical Association of the Pulp and Paper Industry (TAPPI). He is director of process-control technology at St. Regis Corp. in West Nyack, NY. He holds degrees from WPI and Boston University.

Eugene Briggs holds the post of plant manager at Baker Equipment Engineering Co., Richmond, VA.

George Carlson serves as laboratory supervisor at BIW Cable Systems in Plymouth, MA.

Norman Cotnoir, formerly with Brown & Sharpe Mfg. Co., North Kingstown, RI, has retired.

Sidney Madwed, president of Attitude Developers and Consultants, Bridgeport, CT, was guest speaker at the January meeting of the Fairfield Board of Realtors.

Dan McQuillan is semi-retired as a general management consultant and corporate director of McQuillan Associates in Venice, FL. He is treasurer of McQuillan Fisheries Inc., Deep Ocean Fishing.

In April, **Henry Oletz,** facilities-budget engineer for Wyman-Gordon Co., North Grafton, MA, received the Reginald Washburn Award from The Worcester Boys' Club Alumni Association. The award is given to a board or corporate member of the club who has given extraordinary service to the organization. Oletz, who attended Clark, has a master's degree from Northeastern.

Edward Pepyne continues as an attorney and a professor of law at the University of Hartford in Connecticut. He has five degrees and has held education-oriented jobs with public schools in Massachusetts, Connecticut and Rhode Island and at Michigan State University. For 12 years, he was an educational-program consultant for Aetna Life & Casualty.

1950

The **Bill Bowens** recently returned from "a great trip to Australia, New Zealand and the Fiji Islands."

John Orcutt is manager of technical awareness at Combustion Engineering in Stamford, CT.

John Seguin is an account executive for Norton Co. in Newport News, VA. His daughter, Susan, works for the Tax Council in Washington, DC. Jane is a senior in high school. Son Steve works in computer sales for NCR, Norfolk.

1951

In March, Dr. **Donald Sands** was named vice chancellor for academic affairs at the Lexington campus of the University of Kentucky (UK). A professor of chemistry, he had been associate vice president, then associate vice chancellor for academic affairs since 1981. Also, he has served as associate dean and acting dean of the UK College of Arts and Sciences. He holds a doctorate from Cornell. Before going to UK in 1962, Sands was senior chemist, Lawrence Radiation Laboratory, Livermore, CA.

Donald Spooner has been appointed manager of the advanced technology program for Kodak's U.S. apparatus division, Rochester, NY. He started with the company in 1952. Prior to his promotion, he was managing engineer of product engineering with the advanced technology program. He has an MSME from MIT.

1952

Walter Connor, former manager of Raytheon's equipment development laboratories in Wayland and Sudbury, MA, has been named as general manager of the firm's electromagnetic systems division in Goleta, CA. With Raytheon since 1968, Connor had previously served as manager of the communications systems directorate, directing all technical, business and marketing aspects of Raytheon's military communications systems. Earlier he was responsible for development of ground-based tactical communications systems. He belongs to the IEEE, the Armed Forces Communication and Electronics Association and the Association of the U.S. Army.

1953

Brady Buckley serves as president of Buckley-Owens Machinery Corp. in Fayetteville, NY.

Robert Eisenberg continues as regional sales manager for TRW in Mahwah, NJ.

John Flood is vice president and general manager of Eckel Industries in Cambridge. He still enjoys sailing his Pearson 10M, as well as competing in the Marion Bermuda Race and sailboat races on Buzzard's Bay.

Herbert Narbeshuber is general manager of Bauer Gear Motors Inc. in Somerset, NJ.

1954

Robert Luoma serves as senior engineer for GE in Sunnyvale, CA.

William Zerlin holds the post of applications engineering manager at Solitron-Microwave in Pt. Salerno, FL.

1956

Dr. **Roger Tancrell** has been named a consulting scientist at Raytheon's research division in Lexington, MA. Since joining the company in 1968, he has held increasingly responsible positions: the position of consulting scientist is the highest scientific level attainable at Raytheon. The holder of seven patents, Tancrell has a master's degree from MIT and a PhD from Harvard.

John Taylor does air-traffic control research at Boeing and teaches at Cogswell College.

A. Ronald Thomas, manager of the materials-management project at Public Service Company of New Hampshire (PSNH), wrote "Introduction to Bar Coding," which appeared in the December issue of *Utility Purchasing and Stores* magazine. He is currently involved in the design and implementation of an integrated materials system in support of purchasing, accounts payable and stores functions for transmission, distribution and production. As manager of the PSNH materials department, he helped develop central warehousing and delivery.

1957

Leon Morgan has been elected to the board of directors of the Connecticut Society to Prevent Blindness. He is senior vice president of finance and accounting at United Illuminating Company in New Haven, and a registered professional engineer. He belongs to the Kiwanis Club of New Haven and the Quinnipiac Club.

Collins Pomeroy is division staff manager with NYNEX in White Plains, NY. Last year he received an MS in advanced management from Pace University.

1958

Michael Gutman has been named vice president of product engineering at Apollo Computer, Chelmsford, MA. Prior to joining Apollo, he spent ten years with Digital Equipment Corp. (DEC), where he served as product manager for storage products, engineering manager for memory products and manager of DEC's small systems engineering group. He has a BSEE and an MSEE from WPI.

Bernard Podberesky serves as general manager of strategic planning and materials for GE's nuclear business in San Jose, CA. "My third daughter starts college in the fall," he says.

1959

Donald Carignan continues as president of Instrument Technology Inc. in Westfield, MA. The firm specializes in remote-viewing systems for viewing hostile environments, such as the inside of nuclear reactors. Don is also chairman of the standards committee for the American Nuclear Society on remote inspection. His consulting activities have taken him to the International Atomic Energy Agency in Vienna and other places around the world.

Michael Hertzberg heads Consulting Engineers Inc., a firm located in Waitsfield, VT, and concerned with engineering for architects, industry and government agencies in many fields, including plumbing, heating and energy management. He is a registered professional engineer in Vermont, New Hampshire and Massachusetts, a past president of the Consulting Engineers Council of Vermont, and past national chairman of the American Consulting Engineers Council (ACEC) interprofessional and business practices committees. A past member of the ACEC planning cabinet, he is a recent past national vice president of the council. He is active in community affairs in Waitsfield and likes polo and skiing. The Hertzbergs have two daughters.

Last summer, **Edward Koch** left Raytheon to become a principal in Rhodes Engineering, Middletown, RI.

Dr. **Allen Levesque** is now a senior engineering specialist for Digital Communication Systems, Sylvania Systems Group, in the communications systems division of GTE Products Corporation, Natick, MA. Last winter he and a co-author completed a book on digital communications scheduled for publication next year by Wiley-Interscience. Al enjoys hiking and has done many of the AMC trails in New Hampshire and Vermont. The Levesques have a daughter who graduated last year from Smith, another who is a student at Merrimack College, and a son in high school.

Robert Pill is president of the Ralph Pill Electric Supply Co., Boston, which has eight branches in Massachusetts, New Hampshire and Maine. His wife, Cynthia, a licensed clinical social worker, is studying for her doctorate at Simmons. The Pills, who have three children, enjoy travel, skiing, sailing and tennis.

George Schreiner is currently a project engineer for Raytheon, managing the development of a trainer for the Patriot missile system. Earlier he had been with Honeywell for nine years. He has an MS from Northeastern. He and his wife, Betty, have a daughter, Meghan, 1, and three sons.

Two years ago, **Bob Smith** retired as a lieutenant colonel (USAF) and as chief of management information systems at Rome Air Development Center. Since then, he has been director

Class of 1944, 40th Reunion

On Thursday, May 31, The Great Class of 1944 convened its 40th reunion *in a downpour of rain*: Sixty-one members, along with 50 wives and one daughter, were present.

Our reunion started off with a Boston Pops Concert, a first for a WPI reunion.

Friday saw an all-reunion golf tournament—*in the rain.* This was followed by an early evening cocktail party hosted by Dr. and Mrs. Edmund T. Cranch—*Will it ever stop raining?*

After retiring to Higgins House for a Class of '44 Clambake, we returned to the Hospitality Suite for more fun and talk. *The Civil Engineers started designing an ark.*

Saturday morning saw the class assembled—*in the rain*—for campus tours. There was a dedication of the new carillon in Alden Memorial tower, a gift from our class to the school. *The ME's gathered materials for the ark.*

At Reunion Luncheon, Erling Lagerholm made the presentation of the Class Gift—$232,030, including matching corporate funds and interest—*Why is it still raining?*

That evening the Class of '44 held its 40th reunion banquet at the Yankee Drummer Inn. Dr. and Mrs. Cranch, honorary members of the Class of '44, were in attendance.

George Vogel, Jr. and his wife were also our guests. George is the son of the late George Vogel, Sr., '44, who lost his life in military service shortly before George was born. The Class of '44 wanted George to know what a fine person his dad had been.

Jim Donahue was MC. Amid all the highjinks of the evening, he convinced us that he and Dr. Cranch were the only two people in the U.S. still working—and Jim wasn't too sure about the president. *When will it stop raining?*

The reunion came to an end on Sunday morning with a brunch in Morgan Hall, where we all said our final farewells. *And the sun came out!*

FOR SALE: ONE PARTIALLY BUILT ARK

—Buzz Gerber '44
Reunion Chairman

Lt. Col. Normand Noel Promoted to Colonel

In formal ceremonies held recently in Providence, RI, Lt. Col. Normand L. Noel, '61 CE, was promoted to full colonel in the United States Marine Corps Reserve. Major General John J. Salesses, assistant base commander, Camp Lejeune, NC, officiated, while Mrs. Tess Noel, Col. Noel's mother, pinned on the eagles of her son's new rank.

At the same ceremony, Col. Noel was awarded the Navy Commendation Medal for meritorious service. He is a veteran of 24 years of Marine Corps service, having served with the First, Second and Fourth Marine aircraft wings.

After receiving his BSCE from WPI, Norm served three years' active duty as a platoon commander in the regular Marine Corps. Upon completion of active duty, he decided to continue his affiliation with the Corps through the Marine Corps Reserve. In 1966, he graduated from the University of Connecticut with a master's degree in business administration. He was elected to Beta Gamma Sigma, the national honorary business society.

For the last 13 years, Norm has been associated with Gilbane Building Company of Providence, RI. Starting as manager of business development in New England, he went on to open new offices for Gilbane in Washington, DC, and Houston, TX. He led the effort in winning major new projects for Gilbane such as the District of Columbia new court facility, the Orlando International Jet Port and the Strategic Oil Storage Program for the United States.

Having now switched over to the development side of the house, he is currently a project developer with Gilbane Properties in Providence. He resides in East Greenwich.

Col. Noel receiving his eagles

of administrative services for Measurement Concept Corporation in Rome, NY. Bob, who has an MBA from Xavier University, officiates at soccer and lacrosse games at high school and college levels.

Wilford Sutthill, a superintendent for GPGA, Beulah, ND, is involved with the start-up of the nation's first full-scale coal gasification plant.

Tom Waage and his son, **Richard, '86,** are slated to participate in the 1984 Bermuda race. Two years ago, they took fifth place. Daughter Cindy also is a good sailor. The Waages live in Bricktown, NJ. Tom is president of the family business, Waage Electric Inc.

Robert Walker holds the post of sales manager with Fischer & Porter Co., Warminster, PA.

Ernest Woodtli continues as head of production engineering at Hughes Aircraft Co., Tucson, AZ. His wife has a PhD and teaches at the University of Arizona, where their son plays basketball on scholarship.

Fred Lutze, Class Secretary

1960

Paul Allaire is now senior vice president and chief staff officer of the Xerox Corporation in Stamford, CT.

Last fall **Martin Beck,** a manager at the Cabot Corporation in Billerica, MA, was elected chairman of the Northern Middlesex Area Commission. He also serves as director of the Massachusetts Federation of Planning Boards and as vice chairman of the Massachusetts Association of Regional Planning Agencies. He is a former chairman of the Pepperell Planning Board and a member of the town growth policy committee and the state hazardous waste committee.

Paul Byron serves as a senior resident inspector for the U.S. Nuclear Regulatory Commission in Glen Ellyn, IL.

James Mahan is marketing manager in the slurry pump division at Goulds Pumps in Baldwinsville, NY.

Dr. **Derek Morris** is now an associate professor of electrical engineering and computer science at Stevens Institute of Technology, Hoboken, NJ. From 1960 to 1983, he was a member of the technical staff at Fort Monmouth, where he did communications and computer research. While at Monmouth, he led a research project in artificial intelligence and helped develop Ada, the new government high-order computer language. He has an MSEE from Newark College of Engineering and a PhD from Stevens. Besides teaching at Monmouth College, he has been a consultant to private industry on software design and hand-held graphics.

Ed Russell, general manager of GE's International Lighting, was a speaker at a recent GE general management conference.

Louis Varuzzo has been promoted to senior engineer at the IBM East Fishkill (NY) plant. He joined the firm in Poughkeepsie in 1960 as a technical writer and had served as development engineer and advisory engineer. He is the recipient of a People Management Award and a Quality Excellence Award.

1961

Amory Aldrich holds the post of vice president of the Bank of Boston.

Henry Allessio is now a partner with Easton Consultants Inc., in Stamford, CT. The firm does development and marketing consulting.

Richard Ledoux works as director of manufacturing in the medical electronics division at Honeywell Inc., Pleasantville, NY.

1962

Daniel Brosnahan is regional marketing support manager for Prime Computer Inc., Parsippany, NJ.

Jay Hochstaine is lead engineer for Analytics in McLean, VA.

Richard Sharkansky, who is managing patent attorney for Raytheon in Lexington, MA, has an MSEE from WPI and an LLB from Suffolk University Law School.

1963

Dick Dann, staff editor of *Machine Design* magazine, has won a Jesse H. Neal Certificate

Marvin Richmond

Reunion '84: The Springfield Kiltie Band, a tradition at WPI Reunion.

of Merit for his four-part series of editorials helping readers to understand the social and cultural forces that shape designs in the auto, aerospace, machine tool and farm equipment industries. Of 641 entries submitted, 15 were awarded the Certificate of Merit. The Neal awards are regarded as the most prestigious editorial awards in business press publishing.

Dick Kashnow, general manager for GE Quartz and Chemicals, took part in a recent GE general management conference.

Michael Kulig is plant manager for Monsanto Co. in Bridgeport, NJ.

Bob Maynard and **David White, '75,** of R.H. White Construction Co., Auburn, MA, presented a special program at the Worcester Engineering Society annual banquet held in Shrewsbury in February. The title of the program was "The Construction of Mt. Wachusett Ski Area—A Team Effort."

Warren Standley continues as a project manager with TRW Inc. He and Barbara have four children and reside in Acton, MA.

Bill Zinno holds the post of manager of materials at Dresser Clark, Olean, NY.

1964

MARRIED: S. William Wandle, Jr. and Caroline Haworth on February 18, 1984, in Chelmsford, MA. Graduated from Bates College, she has a master's degree from URI and a doctorate from the University of North Carolina. In private practice in Westboro, MA, she is also employed by the Framingham public

Class of 1959, 25th Reunion

If a laugh-meter had been in use during Reunion Weekend, the Class of 1959 would have won top honors hands down.

The highlight of the weekend was the dinner dance Saturday evening, where Jack McManus gave full vent to his talents as an MC and stand-up comedian. (Watch out Johnny Carson! Not to mention, Alan Alda—Jack is a dead ringer!)

Other highlights of the dinner dance were reminiscences given by Joe Bronzino and Bill Curran, as well as by faculty and staff members Merl Norcross, Carl Koontz, Donald Zwiep, Bill Grogan, '46, and Bill Task.

Additional weekend activities included a warm welcome from Dick Bratt and Dave Sawin in the hospitality suite, photography and stained glass seminars, a personal-computer program and campus and city tours. Also, various open houses, a panel discussion on WPI today, and a New England Clambake. Saturday featured the Reunion Luncheon and a 25th reunion reception at the home of Dr. and Mrs. Edmund Cranch.

Sidelights: Fred Costello flew all the way from Hong Kong. Mike Hertzberg came down from Vermont to present the class gift of $128,715. And several other classmates got here from Florida, Texas and California. The class set a record for total attendance.

Kudos to the following committee members for a fun-filled reunion: Dick Bratt, Joe Bronzino, Don Ferrari, George Fotiades, Norm Hiatt, Tom Humphrey, Bob Kieltyka, Jack McManus, Norm Monks, Tom O'Connor, Phil Puddington, Ed Salunier and Dave Sawin.

Al Levesque
Reunion Chairman

Marvin Richmond

Reunion '84: Maggie and Al Larkin, '44.

Reunion '84: Alice Carlson, Ella and Donald Wilson, '24, and Carl Carlson, '29.

school system. He is with the U.S. Geological Survey.

Peter Baker is involved with a "start-from-scratch" mediation center and counsels those convicted of drunk driving.

Peter Dornemann has been appointed director of marketing at Bellofram Corporation, Burlington, MA. He holds an MBA from the Wharton School of the University of Pennsylvania and has extensive experience in strategic planning and new product development. Most recently, he was director of marketing at Digilab in Cambridge.

John Gulliksen is now vice president of product development for Koehler Mfg. Co., Marlboro, MA.

Currently, Dr. **Al Potvin** serves as director of medical instrument systems research at Lilly Research Laboratories, Indianapolis, IN.

Frank Stone was recently named Eastern regional manager responsible for sales and service at Inland Specialty Chemical Corp. Prior to joining the Costa Mesa, CA, firm, he was vice president of engineering for Automata Inc., Reston, VA, and manager of printed circuit products for Enthone. He holds an MS in chemistry from Southern Connecticut State College and has published several papers on processing PC boards.

Robert White is now director of engineering at Data Translation, Marlboro, MA. **Fred Molinari, '63,** is president of the company.

Reunion '84: Class of '64 members at their Higgins House Reunion Dinner.

Reunion '84: Harold Humphrey, with Eleo and Walley Abel, '39.

1965

Philip Baker was recently named director of the video games division of Imagic, a Los Gatos, CA, computer firm. He holds 21 patents.

Edward Cheffetz is president of Intelligent Graphic Systems Corp., Bloomfield, CT.

1966

Robert Levine has been named vice president of Huck Manufacturing Company's international division, located in Irvine, CA. With responsibilities on five continents, he writes, "I do quite a bit of traveling around the world." He enjoys golf and tennis.

Peter Lukesh is section manager for Raytheon Co. in Bedford, MA.

Frank Pfeiffer has been promoted to professor of management at Nichols College, Dudley, MA. He joined the Nichols faculty in 1973 and holds a doctorate in business from UMass, as well as an MBA from Boston College. Since 1979, he has been chairman of the business management department.

Roy Warfield is a propulsion system representative for Pratt & Whitney Aircraft, East Hartford, CT. He and his wife, Donna, reside in San Diego, CA.

1967

John Downes holds the post of district sales manager at Fafnir Bearing in Southfield, MI.

John Feldman has joined Raytheon, Lexington, as manager of industrial hygiene and materials safety. Previously, he was a manager of environmental programs for GE.

Steven Frymer serves as a senior civil engineer for the Massachusetts Department of Public Works. He has two children, Rebecca, 5, and Sam, 2.

Greg Goulet, who heads Fawn Realty, Nashua, NH, has served as treasurer and director of the Greater Nashua Board of Realtors; president, treasurer and director of the Southern New Hampshire Multiple Listing Service, and as a member of many state and local realtor committees. Last year, Fawn set up a commercial-investment division and this year it will enter the field of real-estate securities sales.

Joseph Slocik is a senior engineer of advanced transformer development at GE. He has written several technical papers and has submitted nine patent dockets. The Slociks have two children and reside in Pittsfield, MA.

With Ford Motor Company since 1972, **Alan Suydam** was named supervisor of Mustang and Thunderbird body structure and sound package development in January.

1968

BORN: to Mr. and Mrs. **Richard Kung** a daughter, Catherine Ann, on September 24, 1983. . . .to Charlotte and **Bill O'Neil** a daughter, Megan Kathleen, on October 24, 1983. Megan has a brother, Sean.

Cobb Goff is a photographic engineer for Kodak in Findlay, OH.

Frank Kuszpa has been named director of operation and maintenance at the University of Hartford. Formerly he was assistant director. Before going to the university, he worked for St. Lawrence University, the Canton (NY) public school system, Hobart and William Smith

Reunion '84: Student Ed Ortler and George Gove, '18.

Colleges, Vassar, Brandeis and Monmouth College. He was also director of facilities operations at Columbia, director of engineering at Danbury Hospital, and an engineer for Pratt & Whitney Aircraft for eight years. He has an MSME from RPI.

Paul Larini was recently appointed director of competition and conservation services at State Mutual in Worcester. He has a master's degree from Northeastern. In 1971, he joined State Mutual, being promoted to manager of individual reinsurance services in 1978. In 1981, he earned the Society of Actuaries professional designation of associate.

Timothy Schaffernoth was recently promoted to manager of industrial process and environmental engineering at Rist-Frost Associates, Glens Falls, NY. A licensed professional engineer in New York, he holds an MSCE from the University of Maine. He has written for the *Journal of the American Water Works Association* and belongs to a number of technical associations.

Dr. **Wayne Turnblom** is a market intelligence associate at Eastman Kodak, Rochester, NY.

1969

Reunion **September 22, 1984**

BORN: to Mr. and Mrs. **Donald Esson** a son, James William, on June 2, 1983. . . .to Dr. and Mrs. **Paul Shea** their first child, Patrick Thomas, on July 27, 1983. Shea, who has a master's and a PhD from URI, is a division engineer for Du Pont in Victoria, TX.

Maj. **Warren Anderson** is command control specialist at Hickam AFB, Hawaii.

John Gavitt, who just returned from a long business trip to Japan, says, "Will be heading for Italy next."

Alexander Malcolm has been promoted to vice president for research and development at Briox Technologies, Worcester. He is responsible for technical resources, new product development, joint ventures, licensing and acquisitions.

Al Pauly is a senior research engineer at Michelin America's R&D Corp., Greenville, SC.

John Poblocki has been named vice president of real-estate acquisitions at Mutual Benefit Financial Service Company, Providence, RI. His duties include the formation of joint venture syndication and the acquisition of real estate for investment and syndication product. Prior to joining the firm in January 1983, he was executive vice president of Kates Properties. He has a master of arts degree in community planning from the University of Rhode Island.

Last year, **Robert Reidy** joined Nelson-Scribner Associates, Norwood, MA, a manufacturer's representative firm headed by **Stu Nelson, '66.**

James Rossi, a project engineer with Stone & Webster, was co-author of "Combined Cycle Coal Gasification: Options for Power Plants," which appeared in the February issue of *Power Engineering.* At Stone & Webster he is responsible for technical and administrative supervision of synthetic fuel projects. Also, he has supervised power generation projects for the firm. Previously, he was associated with General Dynamics, Quincy Division, and Pratt & Whitney Aircraft.

John Simpson is now with the Naval Coastal Systems Center, Panama City Beach, FL, where he does R&D of life support equipment and systems for the U.S. Navy.

John Starsiak serves as assistant patent examiner at the U.S. Patent and Trademark Office in Arlington, VA.

Martin Surabian is currently a project engineering manager with Bechtel Power Corporation. He says, "I have a baby daughter, Karen Talin."

B. Lee Tuttle, an assistant professor of mechanical engineering at GMI Engineering & Management Institute, wrote "The Emerging Role of Thermal Analysis in Aluminum Foundry Process Control" for the December issue of *Light Metal Age* magazine.

1970

BORN: to Mr. and Mrs. **Roger Henze** a son, Kevin Andrew, on July 8, 1983.

Dr. **Maria Allo** is now assistant professor of surgery and director of surgical intensive care at Johns Hopkins Medical Institutions, Baltimore, MD.

Garreth Cooke works as a design engineer for GE in Wilmington, MA.

Dr. **Robert Markot** is on the technical staff at Automation Technology Products in Campbell, CA.

1971

Barry Belanger is currently a senior system design engineer at GE's medical systems group

Lt. Col. Poplawski—Still Flying High

If Henry Poplawski's ('39) life were made into a movie, no one would believe it. He is now a retired lieutenant colonel in the USAF. But, during World War II and the Korean conflict, Poplawski flew high.

Take that time back in '42, when his mission was to fly General "Vinegar Joe" Stilwell across Africa to India and China, where he was to take command of Allied ground forces in the China-Burma-India theater.

"Stilwell wanted an air view of Jerusalem, so we flew ground contact with a 300-ft. ceiling up a mountain road to the city," says Poplawski. "When the general thanked me for the impressive view, I didn't tell him we'd been at stalling speed all the way!"

How did an aspiring engineer (he spent only one year at WPI) end up chauffeuring "Vinegar Joe?" Poplawski says, "I couldn't afford to go back to Tech sophomore year because of the Great Depression, so I joined the Air Corps."

In 1941, he was a civilian pilot helping Pan American Airways set up a trans-Africa, Middle East, India route to China. On Dec. 7, he was asleep in an RAF billet, "when my batman woke me up saying, 'You're in it now, Yank.'"

Soon after the Stilwell mission, he took a job as test pilot at Glenn L. Martin Co. in Baltimore, MD. The firm had the Air Corps cancel his recent induction. "I believe I was the only first lieutenant reserve officer not recalled to duty during World War II."

In 1948, he received his BS in aeronautics from the University of Southern California. As a captain during the Korean conflict, he helped set up the USAF Guided Missile School at Lowry AFB, Denver, CO. In 1966, he retired from the Air Force following aerospace intelligence assignments. In 1977, he retired from the civil service.

Currently, Poplawski and his wife, Claytrice, travel on space-available military flights. "Flying," he says, "will always be in my blood."

Henry Poplawski at his 45th reunion in June.

in Milwaukee. He is working on his PhD in biophysics at the Medical College of Wisconsin.

Joseph Bellino serves as mechanical engineering manager for GE in Orlando, FL. He and his wife, Patricia, have two children and reside in Longwood.

Paul Bienick is assistant superintendent of engineering at Stone & Webster in Shippingport, PA.

Thomas Copp is now vice president of manufacturing at Quabbin Wire & Cable Co., Ware, MA. He and his wife, Mary Jane, and son, Tim, 3, live in Amherst.

Daniel Donahue holds the post of senior engineer at Green International in Somerville, MA. He has an MS from Tufts.

Dr. **Baljit Gambhir**, a senior supervisor for Shell in Houston, TX, has a PhD from WPI.

Jack Greenshields is a business manager for AceticAcid/Menthol for the Monsanto Industrial Chemicals Company in St. Louis.

Larry Hyman teaches service respresentatives new product development in Dow's consumer products department. His wife, Ann, has a BA from the University of Michigan and works for Dow as a legal abstractor.

Donald Peterson now holds the post of vice president of finance at Northern Telecom Inc. In October, he, his wife, Maureen, and two children moved from Toronto to Nashville, TN.

In December, **Robert Pettit** was promoted to manager of engineering at Doron in Binghamton, NY. He started with the firm in 1973. Previously, he was project engineer, senior systems engineer and systems engineer.

Abbas Salim is now a technical consultant for solar photovoltaic power systems R&D at Saudi Arabian National Center for Science and Technology in Riyadh, Saudi Arabia.

Fran Scricco, general manager-commercial for GE's video products, was a speaker at a recent GE management conference.

John Sperandio is temporarily with the Veroala School in Malta.

Michael Zarrilli continues as vice president and district head of Manufacturers Hanover Trust in New York City. He and Diane have two children and reside in Cos Cob, CT.

1972

BORN: to Mr. and Mrs. **Joseph Harkins, Jr.** a son, David Edward, on November 5, 1983. David joins sister Kimberly, 7, and Joseph III, 3. . . .to Mr. and Mrs. **Neil Herring** their second child, Amelia, in July of 1983. Last summer, Neil began a new job as director of planning and development with Damon Corp., Needham Heights, MA. He is responsible for corporate acquisitions and new projects for the Medical Services Group.

Currently, **Charles Bacon** serves as senior educational technologist for Data General in Westboro, MA. He and his wife, Nancy, reside in Westminster.

Dr. **James Colangelo** is in private practice of medicine with Northeastern Nephrology Associates.

Arthur Geetersloh holds the post of president at New England Forest Products Inc., Greenville, ME.

Dr. **William Goodhue** is research scientist for thin-film technology at UTRC in East Hartford, CT.

Rae Johnson is now manager of engineering and manufacturing for P/A Industries in Bloomfield, CT.

Robert Shawver serves as principal engineer at WSSC, Laurel, MD. This year he will graduate from the University of Maryland Law School.

Joe Spurlock now teaches in the Forest Hill school district, Cincinnati, OH.

1973

MARRIED: Dean Bertoldi and Kristine Ciambriello in Trumbull, CT, on October 21, 1983. She graduated from Paier Art School and is assistant art director at Phoenix Mutual Life Insurance, Hartford. He also attended Paier and Clark University and is with Feathers Design, Rowayton.

BORN: to Kathleen and **Timothy Jurzynski** their first child, Thomas Edward, on August 27, 1983. Tim is a quality control manager at Naugatuck Glass Company. The family resides in Seymour, CT. . . .to Lynn and **John Luikey** their first child, a son, Justin Knight, on September 28, 1983. . . .to **Bruce** and **Allison Huse Nunn** their third child, April Anne, on February 7, 1983. Brother Willy is 7 and sister Heather nearly 6.

Capt. **David Bedard,** who is with the U.S. Army's Redstone arsenal in Alabama, is working for his master's degree.

Paul Brown works as a facilities engineer for DEC in Westminster, MA. Last year, he received his MBA from WPI.

Steven Buba is a sales representative for United Restaurant Equipment Co., North Smithfield, RI.

Robert DiGennaro holds the post of engineering supervisor at GTE Spacenet in McLean, VA.

Rick Garagliano is a senior project engineer at Dynachem Corp., Irvine, CA.

Dr. **John Goulet** has been promoted to associate professor at Thomas College in Maine. Before joining Thomas in 1983, he had been an assistant professor at Colby College since 1976. With a PhD from RPI, he is involved with computer science and mathematics.

John Homko serves as a senior development engineer at Pencept Inc. in Waltham, MA.

Currently, **Terrence Luddy** works as a spe-

Reunion '84: The Class of 1944 members.

cial agent for the FBI in New Haven, CT. He has a JD from Western New England College School of Law, Springfield, MA.

Donald Moquin is a senior structural engineer at Canam Steel Corp., Needham, MA.

David Pouliot is a principal engineer for Lockheed Electronics.

Richard Sargent is a senior project engineer with Allis-Chalmers Corp., Cambridge, MA.

Gary Smolen is employed as an associate engineer by Northeast Utilities in Hartford, CT.

John Taylor now works for Integrated Industrial Systems in Wallingford, CT.

1974

Reunion **September 22, 1984**

BORN: to **Charles** and **Anne McPartland Dodd, '75,** their second daughter, Laura, last December. Emily is now three. . . .to Diane and **Michael Kozakiewicz** a son, Brian, on May 22, 1983.

Gary Bellinger is a senior chemical engineer at Waters Associates in Milford, MA.

Last winter, performer **Steve Dacri** appeared at the Magic Castle in Hollywood. This summer he is slated to appear in Dallas and Boston, and next fall in New York and Las Vegas.

James Briggs works as design manager at Naval Facilities Engineering Command, Philadelphia. He is a registered professional engineer in Connecticut.

In March, **Gene DeJackome** ran unopposed for a third term as selectman in Orange, MA. Currently, he is manufacturing supervisor at Monsanto in Springfield. He belongs to the Kiwanis and the Knights of Columbus.

Lawrence Hayden is now a senior software programmer at Pfizer Co., Groton, CT. He is also an instructor of data processing and a computer programmer at Connecticut College and Thames Valley Regional Technical College.

Gerald Masi recently became vice president of Westpac Shelter Corp., Santa Barbara, CA.

William Murwin is a senior data communications specialist at State Mutual in Worcester.

Kevin Naughton works for Main Engineering in Boston.

Craig Tyler continues as a military sales engineer for Times Fiber Communications, Wallingford, CT.

Gary Velozo holds the post of general supervisor at Polaroid Corp., Norwood, MA.

David Washburn serves as an environmental engineer for the U.S. Fish and Wildlife Service in Newton, MA.

1975

MARRIED: Richard Bloom and Linda Ann Bergantini in Providence, RI, on April 8, 1984. She graduated from Katharine Gibbs, attended Providence College and is manager of word processing at Fleet National Bank in Providence. He is president of Independent Glass Co.

Mark Antonio recently received his PhD in chemistry from Michigan State University, East Lansing. He also has an MS from Fairleigh Dickinson University, Madison, NJ. A chemical engineer with Sohio Research Center, Cleveland, OH, he belongs to the ACS and is co-author of several papers published in professional journals.

Erik Brodin is supervisor of industrial engineering at General Motors in Norwood, OH.

Bradley Coleman serves as a senior process engineer at Fluor Engineers in Irvine, CA.

Charles Embree holds the post of manager of the Northeast area field service at Brown Boveri Electric in Middletown, CT.

Edward Greenebaum, with two former colleagues from Huth Engineers, has become a partner in GMZ Associates, an engineering firm in Lancaster, PA. The three believe their firm is unique because it combines structural and civil engineering with landscaping. Greenebaum has worked as a structural engineer, specializing in building and bridge design. He also has a geography degree from Clark.

Maureen and **Fred Greulich** and their baby, Lindsey, reside in Endwell, NY. Fred is training for the position of plant product manager at Frito-Lay's Kirkwood, NY, plant.

Steven Harvey holds the post of municipal bond analyst at Standard & Poor's Corp., New York City.

George Hill is a senior systems programmer for Access Technology in South Natick, MA.

Christopher Keenan is a staff engineer at Exxon Chemical Co. in Linden, NJ. He, his wife, Donna, and their child live in Clinton.

Robert Murray works as a senior mechanical design and development engineer for Raytheon in Sudbury, MA.

Capt. **Michael Parker** (USA) has assumed command of Company B, 123rd Maintenance Battalion, 1st Armored Division, Fuerth, West Germany. Previously, he was at Fort Hood, TX.

Capt. **Douglas Sargent** has been decorated with the U.S. Air Force Commendation Medal at Thule Air Base in Greenland. He serves as chief of programs and engineering with the 1012th Air Base Group.

Mike White continues as a research metallurgist for Pfizer in Wallingford, CT. He resides in Hamden.

1976

MARRIED: Loretta Deming and Robert Goeller III on December 31, 1983, in Glastonbury, CT. A project engineer at Clairol Appliances, Stamford, CT, she has an MSME from MIT. Goeller graduated from St. Lawrence University and serves as a senior project manager at Hatzel and Buehler Inc., Stamford. . . .**Charles Putnam** to Andrea Olsen in Connecticut on February 4, 1984. A registered nurse at St. Joseph Hospital, Stamford, Andrea graduated from Southern Connecticut State College. Charles is a senior engineer with Davis and Geck in Danbury.

BORN: to Ellen and **Michael Menesale** a daughter, Megan. Twin daughters, Ann and Sara, are now three. After seven years with U.S. Steel, Michael is now a technical manager with Loos & Co. Inc., Pomfret, CT. The firm is involved with aircraft cable and wire rope.

David Altieri writes: "After visiting Seoul, Korea, on an assignment for Honeywell, I visited Japan and Hawaii."

Stephen Anstey is a field engineer for GE Ordnance Systems, Cape Canaveral, FL.

David Berry is currently an engineering student at Cape Cod Community College in Barnstable, MA.

Formerly with *The Call* circulation department, **Richard Chamberlin** was recently named a patrolman with the Woonsocket, RI, police department. Besides WPI, he attended the University of Rhode Island.

No longer with Allan H. Swanson Inc., **Robert Cormier** and an associate have started a new firm, Cuoco & Cormier Inc., civil engineers and land surveyors, in Nashua, NH.

Jeff Gravdahl is treasurer of A. Moe & Co. Inc., Philadelphia.

Constance Kuzmier is a management consultant with Rath & Strong, Lexington, MA.

Reunion 84: Al Swetz, '59, with Marlene and Robert Bober, '59.

Craig Plourde has been elected vice president of the Connecticut Bank and Trust Company, Hartford, CT. He joined the bank in 1976 as a senior programmer and was later made a senior systems engineer. In 1981, he was appointed teleprocessing project leader, and more recently he became manager of teleprocessing software support.

Robert Winter is district manager for Raymond International Builders in Westville, NJ.

1977

BORN: to Mr. and Mrs. **Christopher Baker** their first child, Rachel Ann, on November 20, 1983. . . .to Robert and **Mary Hainsworth Hickey** their second child, Alice Frances, on January 30, 1984. Robert is a project officer in the Economic Development Administration. Mary is on leave of absence from ARCO Chemical, where she is employed as a development engineer.

Bruce Baran, who recently received his PhD in physics from Northeastern, currently works for Adaptive Optics Associates in Cambridge, MA. His wife, **Carol Sigel Baran,** is a systems engineer for Higher Order in Cambridge.

Richard Blauvelt now works as regional sales manager for the Ron Beckett Agency in Lynn, MA. Last November, he resigned from True Trace in Whittier, CA, to return to New England.

David Bolin works for Hoffman-LaRoche, Nutley, NJ.

James Buffi has a new post as marketing engineer with Texas Instruments in Attleboro, MA. Last year, he received his MBA from Bryant College in Smithfield, RI.

Marc Gantman, who received his MBA from Wharton in 1982, is currently a management consultant with the BDM Corporation in McLean, VA.

Domenico Grasso is in the PhD program in environmental engineering at the University of Michigan. His wife, Patty, is a pediatric resident at the university's Mott Children's Hospital.

Tom Grautski holds the post of manager of materials control at Estee Lauder in Melville, NY. He and his wife, Andrea, reside in Ronkonkoma.

Jon Hammarstrom is director of quality assurance, U.S. operations, for Rodime Inc. in Boca Raton, FL.

Kevin Healey works for Carlson Group Inc. in Cochituate, MA. He and Christine and their two children reside in Bridgewater.

Mark Jankins is now an assistant professor at the College of Charleston (SC). Last year, he received his PhD from the University of Maryland.

Roger Lemos serves as a consulting engineer for Energy Planning and Management, Framingham, MA.

Richard Mazmanian recently joined Mott Associates in Towson, MD.

Stuart Merrell is employed as a design and estimating engineer at Reisner Metals in South Gate, CA.

Joseph Miceli works as a research scientist at Kodak in Rochester, NY. He received his PhD in optics from the University of Rochester last year.

Paul Murphy, a medical student at Tufts College of Medicine, recently took courses in physical diagnostic medicine at Falmouth (MA) Hospital.

In January, **John Osowski** took over a new post as process engineer at Mobil's manufacturing facility in Jacksonville, IL.

Recently, **Mark Popham** was named a project engineer in the environmental division of Anderson-Nichols & Co., Clinton, MA. A registered sanitarian, he is on the board of directors of Millers River Watershed Council. Mark, his wife, Brenda, and two children, Andrew, 3, and Sarah, 1, reside in Orange.

Mark Puputti is in charge of mechanical design for new products at Gilbert Engineering, Phoenix, AZ. He and his wife, **Brenda Boucher-Puputti, '80,** reside in Mesa.

Marc Richard is a senior engineer with Linkabit Inc. in Lexington, MA. He has an MSEE from MIT.

Rick Seidnitzer works for Donald J. Pilon in Springfield, MA.

Fred Sowa is a packaging machinery manager with Chesebrough-Ponds in Clinton, CT.

Christin Walker, who serves as an application engineer for GE in Pittsfield, MA, has an MSME from RPI.

1978

MARRIED: Bryce Granger to Rosemary McKinley on August 27, 1983, in Worcester . . . .**John Kuchachik** and Cheryl Peltier on June 11, 1983. Cheryl, executive secretary to the vice president of Wintex Inc., Waltham, is a Becker graduate. John has a new job as data center facilities manager at Fidelity Investments in Boston. The Kuchachiks reside in Ashland.

BORN: to Mr. and Mrs. **John DiBiasi** a son, John Edward, on January 9, 1984. . . .to Mr. and Mrs. **David Fisher** a daughter, Katherine Irene, on October 6, 1983. . . .to **William** and **Patricia Tracy Walton** a son, William Tracy, on June 29, 1983.

John Anderson serves as a senior software engineer at Technicare Corp. in Solon, OH.

Jerry Bujaucius is now a senior production engineer (flight controls division) for Chandler Evans of West Hartford, CT. He continues as professor of manufacturing engineering technology at Hartford State Technical College.

William Gagne is an operations specialist for Metcalf & Eddy in Boston. He has an MSCE from WPI.

In January, **Gilberto Gonzalez** was named quality assurance engineer for Goodyear in Valencia, Venezuela. Previously, he had been a project engineer for Colgate-Palmolive.

Peter Hayden holds the post of national accounts sales manager for AT&T in Columbus, OH.

Daniel Jackson is a graduate student and research assistant in the EE department at the University of Illinois in Urbana.

August Jasminski works as a project engineer for Gilbane Building Co. in Providence, RI.

Lamin Jobe is principal engineer for the Department of Water Resources in Banjul, the Gambia. He received an MS from Cornell in 1982.

Dennis Kelly is a senior mechanical engineer at Bechtel, Gaithersburg, MD.

Making a Pitch For the Majors

Pouring it on

"Aspiring pitchers are like actors," says Paul Josephson, '77 CE. "They have to be seen at the right time by the right people in order to get ahead."

Josephson, who is with the Atlanta Braves' farm club this year, and who was previously with Oakland, Detroit and Montreal clubs, enjoys being in a highly competitive field. He likes the pressure.

"I'm a short-relief pitcher," he explains. "They call me in late in the game because I usually have good control in tough situations."

During the five-month season, Josephson warms up or pitches almost every day. "I usually play in 50 to 60 out of 140 games," he says. "The team stays in motels paid for by the club during spring training, but when the season starts, we pay for our own lodging and food when not on the road. We travel in chartered buses and don't usually make overnight stops. In the Southern League, that can mean a 16-hour bus trip one way!" Occasionally, if the distance is too great, or if games are scheduled too close together, the team flies.

Having played in different parts of the U.S., Josephson says he prefers the New England climate because of the change of seasons. (He's a resident of Shrewsbury, MA.) "It's too hot in Florida," he says, "particularly in the summer." One thing he does like about the South is southern cooking. "It's especially good in Memphis and Phoenix."

After the season is over, Josephson goes back to Shrewsbury and works for Drake Associates, a firm concerned with surveying and construction. "I like to keep my hand in engineering." In fact, he's looking into the possibility of taking an MBA or computer correspondence course, so he can study even when he's on the road.

Meanwhile, he pitches between March and September. "I'm not getting rich," he admits. But there's always the chance that the right person will see him on the right day and he'll get the chance to live his dream—playing major league baseball.

Michele Mass is vice president of I. Mass & Sons in New York City.

Kevin O'Donnell works as a research scientist for Kodak Research Labs, Rochester, NY. Last year, he received his PhD from the University of Rochester.

Robert Rossier is an environmental systems engineer at Electric Boat in Groton, CT. He holds an MS in ocean engineering from URI.

John Roumas is a member of the technical staff at RCA in Burlington, MA.

Clifford Schulze is in contract sales at Grinnell Fire Protection, Canton, MA. He and his wife, **Sharon, '80,** have two children and reside in Bridgewater.

Gary Sowyrda is a supervisor with Exxon Co. USA in Tyler, TX.

Doreen Woodman Taylor works as a technical marketing representative at Hewlett-Packard in Waltham, MA.

Stephen Tourigny is a senior process development engineer at Norton Co. in Worcester.

Craig Vickery currently works as instrumentation development engineer in the electro-optics group at Pratt & Whitney Aircraft, East Hartford, CT.

Ricardo Wever writes, "Regards from Aruba." Currently, he is a control application engineer for Lago Oil & Transport Co., in Sanicolas.

Wayne Wnuck, who is with Consultants & Designers, East Hartford, CT, is a consulting engineer for UTC's power systems division in South Windsor.

1979

Reunion **September 22, 1984**

MARRIED: Don Griglack and Sherylann Kozel in Danbury, CT, in January of 1983. Sherylann, a teacher, is a graduate of Western Connecticut State College. The couple resides in New Orleans. . . .**Kevin Hughes** and Patricia Ferron in Worcester on October 1, 1983. Patricia graduated from Becker and is a dental assistant. Kevin serves as a systems programmer for CVS in Woonsocket.

BORN: to Cheryl and **Daniel Hurst** a son, Jeffrey Daniel, on February 2, 1984. Dan has transferred to the engineering division at Kodak.

John Bourassa now works for United Industrial/AAI Corp./AAI Engineering Inc.

Iginio Capaldo is employed by Mevenca in Venezuela.

Recently, **Vance Carter** was reassigned to Kamishaly, Syria, with Schlumberger Overseas S.A. Previously, he was located in Turkey.

Gary Doyle serves as a senior associate engineer at IBM in Essex Junction, VT.

Fred Fisher is an engineer I for DEC in Maynard, MA. He has an MSCS from UConn.

Stephen Fisk is a mechanical coordinator and field engineer for Daniel O'Connell's Sons in Holyoke, MA.

Javier Frances is the self-employed president of a firm in San Salvador, El Salvador.

John Grimwade works as a field engineer for Babcock & Wilcox in Chicago.

Christopher Harkins is a senior development engineer for Kodak in Rochester, NY. He and his wife, Patricia, have two children and live in Hilton.

Mohammad-Hoghooghi is a consulting engineer and project director with Iran Generation and Transmission Company in Tehran.

Kilmer Joyce works for Harris Graphics in Dover, NH.

Daniel Kennefick is employed as a maintenance engineer at Du Pont in Louisville, KY.

Lawrence Leduc works as a process control supervisor for Georgia-Pacific in Painesville, OH.

Veronique Leproux is a research engineer with Rhone-Poulens Recherches in Antony, France.

Kathleen McKeon is a graduate assistant in

the math department at Michigan State University in East Lansing. She received her MSMA from MSU in 1981.

Currently, **Peter Nelson** serves as manager of information systems for the Massachusetts Department of Revenue in Cambridge, MA. He received his master's in regional planning from UMass in 1982.

Dick Perry was supervisor of the Torrington Co. production team that took handmade prototypes of the Atari Trak-Ball unit to high-volume production, making the units available for the year-end holiday selling season. Dick is with Torrington's new precision components division.

Ronald Salett serves as a principal engineer for DEC in Maynard, MA. He and Donna have two children and live in Framingham.

Dave and **Joyce Poulton Sheridan** moved back to the USA in June of '83 following three years in Italy. Dave resigned his Army commission and now works for Isotronics Inc., New Bedford, MA. He says he does "trouble-shooting" and works with R&D and engineering in the production of hermetic hybrid circuit packages. Joyce is again a weapons system analyst for Vitro Corporation in Newport, RI.

George Tompsett is a project manufacturing engineer for Hamilton Standard in Windsor Locks, CT.

Kathy Fitzgerald Warburton works as a systems engineer for Motorola in Englewood, CO.

Allen Zubatkin holds the post of manager of materials (quality assurance) at Gould in Andover, MA.

Reunion '84: Diran Deranian, Pete Dobie and Hal Pierce, all '29.

Reunion '84: Russ Wiley, '29, and Carl Carlson, '29.

1980

MARRIED: Thomas Lewis to Cynthia Copeland in Litchfield, CT, on December 23, 1983. Cynthia graduated from Smith College and is editor of a children's magazine for Quinn Publishing, Springfield, MA. Tom has been studying for his PhD in chemistry at MIT. . . . **Robert Oriol** to Christa Lauridsen in Greenwich, CT, on March 31, 1984. Christa graduated from Middlebury College and is a senior software consultant for Manufacturer's Business Systems, Worcester. Robert is a project leader at Boston Systems Office. . . . **Michael Parulis** and **Margaret Newcomb, '82,** on October 30, 1983, in Auburn, MA. Margaret is a cost engineer for Stone & Webster's Millstone III nuclear power plant in Waterford, and Michael works for General Dynamics-Electric Boat in Groton, CT . . . .**John Wilbur** and Deborah Ivanoski in Quincy, MA. She graduated from Laboure Junior College and is on the nursing staff at Brockton Hospital. He is a planning supervisor for GE in Lynn.

John Apostolou serves as sales and development representative for Du Pont in Nashville, TN.

Allison Avery works as a support engineer for Stone & Webster, Boston.

Verne Backus is a process-product engineer for Sprague Electric in Barre, VT.

Louis Bernasconi is vice president of Automatic Test Equipment Service, Nashua, NH.

Robert Blake, who works as a market research analyst for United Illuminating Co., New Haven, CT, is also studying for his MBA at the University of New Haven.

William Emmet II serves as an analytical engineer at Norden Systems, Norwalk, CT. Last year, he received his MS from Cornell.

Gary Fischer is on the technical staff of AT&T Bell Labs in North Andover, MA.

Richard Goldman has been named as legislative aide to State Senator George Gunther of Stratford, CT. In the summers of 1981 and 1982 he had served the senator as a research assistant.

Edward Johnson is a district sales engineer for Torrington Co., Indianapolis, IN.

Robert Kennedy is a program leader for Westinghouse Electric in Orlando, FL.

Gregory Knese is purchasing manager at Henry Knese Inc., College Point, NY.

Stephen Lawry, whose promotion to Captain, USAF, becomes effective in August, will be moving to a new assignment as AFROTC instructor in Philadelphia. Last year, he was selected as "Outstanding Company Grade Officer of the Year" at the Air Force Weapons Laboratory.

Joseph LeBlanc is scheduled to receive his PhD in chemical engineering from the University of Massachusetts in December.

Peter Leonard works as a design engineer for KG Engineering in Woonsocket, RI.

Karen Liukkonen has been promoted to specialist I, for investments, money market operations, treasury and financial services, at John Hancock Mutual Life Insurance Co. In her new post, she is responsible for daily short-term investment decisions and credit analysis of investment alternatives. She joined the firm in 1982 as a credit analyst in money market operations and has a master's degree in finance from Babson.

Michael R. Lombardi continues as an assistant project engineer for Stone & Webster Engineering, Boston. He and his wife, Susan, a graduate of Providence College, currently reside in Manorville, NY.

Raymond Lucchetti, Jr. has joined Digitech Industries, Ridgefield, CT, as a senior technical sales specialist. He is responsible for supporting all international distributors and will assist the domestic sales operations in system sales, design custom software packages and contribute to new product development. Previously, he was a staff engineer at Bunker Ramo Information Systems, banking terminal systems.

Deborah Luper, a development engineer for Western Electric, Allentown (PA) works, was a co-author of "Automatic Plating of Bipolar Integrated Circuits," which was published in the January issue of *Plating and Surface Finishing.*

William Mangano is a systems analyst at State Mutual in Worcester.

In May, **Brian McCarthy** graduated from SUNY-Downstate Medical School in Brooklyn, NY. He is now with the Department of Orthopedic Surgery at Albert Einstein College of Medicine.

Matthew McSherry works for Newport News Industries, Newport News, VA.

John Noonan, a project engineer at SSV&K Consulting Engineering in Stratford, CT, is also studying for his MBA evenings at UConn.

Rosemary Murphy O'Brien is working for her MS in chemical engineering at Tufts.

Brenda Boucher-Puputti is a member of the

Reunion '84: Carl Hammarstrom and Charlie Frary, both '34.

technical staff at GTE Laboratories in Tempe, AZ.

Paolo Rambelli is a patent agent with Jacobacci-Casetta & Perdni in Torino, Italy.

Clifford Read is a product support engineer at Foxboro (MA) Co.

Doreen Sa Vieira serves as a microlithography applications engineer at Perkin Elmer, Wilton, CT.

Keith Sylvestre works for Northeast Utilities, Enfield, CT.

No longer with the Army, **George Tobin** is now performing consulting work for project managers at Semcor Inc. in Farmingdale, NJ. He's also been writing restaurant reviews for local newspapers and is working for his MBA at Monmouth College.

Chuong Vu is a software designer for Microcom Inc., Norwood, MA.

James Warner, who holds an MSCS from WPI, has been named vice president of Cortex Corp., Wellesley, MA. He started with the company in 1978 and later became principal designer and developer of application packages. Previously, he was senior analyst at United Computing Systems and project analyst at Honeywell Information Systems. Cortex Corp. develops software productivity tools for users of DEC hardware.

John Whiteside is a consulting engineer for DEC in Nashua, NH. He has a PhD from the University of Rochester and a BA from Brown, as well as a master's from WPI.

Raymond Yando teaches mathematics at Ludlow (MA) High School.

Elaine O'Neil Yarnell has been promoted from new-products coordinator to department head of packaging in the oxidation department at Clairol in Stamford, CT.

Michael Yevak serves as a new product engineer at Texas Instruments in Attleboro, MA.

1981

BORN: to Valerie and **Raymond Aubert** their first child, Ryan Michael, on February 23, 1984. Raymond continues as a mechanical design engineer for the transmission group at GE Ordnance Systems in Pittsfield, MA.

Alan Amaral is a software engineer for Sanders Associates in Nashua, NH.

George Bernota, a field engineer with Schlumberger Technical Services, Singapore, is now working for the firm in Bombay, India, at Sanghi Motors.

Gary Brown serves as supervisor of manufacturing at Allied Corp., Hopewell, VA.

Randy Byrne holds the post of product manager at Haake-Buchler in Saddlebrook, NJ.

William Carlson, who received his MSEE from Purdue in December, is now working for his PhD.

Eleanor Cromwick serves as assistant engineer for Turner Construction, Boston.

Michael Di Costanzo is currently with Union Oil Company's process development group working on Union's shale oil process. He is located in Fullerton, CA.

Phil Gallagher continues as foreman at General Dynamics-Electric Boat in Groton, CT.

Joseph Gianetti manages customer contact for Commonwealth Gas Co. in Southboro, MA.

Mary Goodrow works as a manufacturing engineer at Data General Corp., Milford, MA.

Anestis Halkidis is with Atex in Bedford, MA.

Richmond Harris serves as a senior project engineer at Stride Rite Corp., Cambridge, MA.

Donald Howard is a project engineer for Hamilton Test Systems in Windsor, CT. He and Karen have one child and live in Longmeadow.

Russell Ingalls works as a field engineer for Westinghouse at the Portsmouth (NH) Naval Shipyard.

Robert Leonard holds the post of director of research at P.A. Hunt Chemical Corp., East Providence, RI.

Joseph Lino is with Charles L. Lino Associates, Clifton Park, NY.

Glen Martin is a supervisor at USCI in Billerica, MA.

Michael Morang has been promoted to senior systems analyst within the systems organization at State Mutual in Worcester. He joined the firm as a systems analyst in 1981.

Anthony Napikoski continues as assistant engineer at United Illuminating in New Haven, CT.

Joseph Norman III serves as an account executive with Merrill Lynch Pierce Fenner & Smith in Lawrenceville, NJ.

David Normen is employed as an analytical engineer at Hamilton Standard in Farmington, CT.

Robert Oftring is treasurer of Oftring & Co. in Worcester.

Judith Paquette is an analytical engineer at Hamilton Standard in Farmington, CT.

Rick Passaro works as a sales engineer for Eaton/Cutler-Hammer, Farmington, CT. He sells electrical and electronic motor controls in Massachusetts and Connecticut.

Marylou Place holds the post of assistant to the vice president of engineering at Ade Corporation, Newton, MA. She resides in Cambridge.

Stephen Russo works for Automatix, Billerica, MA. He resides in Bedford.

Joseph Schomaker is a field service engineer with Westinghouse in Hartford, CT.

Robert Segarra is an industrial engineer with Chesebrough-Ponds, Oriskany Falls, NY.

James Shannon serves as a field engineer at Hughes Aircraft Co., Fullerton, CA.

Greg Stanford has completed his MSCE at Carnegie-Mellon, Pittsburgh, and is now a structural engineer for Greiner Engineering in Baltimore, MD.

Brian Stoffers serves as a senior R&D engineer at Xyolgics in Burlington, MA.

Adage Inc., manufacturer of color raster and vector refresh computer graphics work stations, has appointed **Jeffrey Wade** sales engineer for the Western region. In his new post, he is responsible for serving accounts in the Los Angeles area and Orange County, CA. Since 1981, he has been a product specialist with Adage. He belongs to the IEEE.

Andre Walker is a junior chemical engineer with Duracell Inc., Norcross, GA. He and his wife, **Anne Caulfield-Walker, '82,** reside in Stone Mountain.

Mati Weiderpass works in the general staff headquarters of the major command responsible for the deployment of the Pershing II missile system. During his free time, he is working on his master's degree through Boston University. He writes: "I also frequent the Austrian and

Reunion '84: Roy Iffland, '39, with Don Berth, '57, '59, who is WPI Vice President, University Relations.

Swiss slopes for ski adventures and look forward to sharing some of those adventures with other alumni. Most recently, I attended the Winter Olympics in Sarajevo."

Catherine Girouard Wilson, who is pursuing her MBA at Arizona State University, is a supplier quality engineer for Motorola in Scottsdale, AZ.

John Wilson is now working at Du Pont's Savannah River plant in Aiken, SC. He and his wife, Robin, have two children and live in North Augusta.

Lt. **Katherine Coghlan Wurm** is stationed at Hanscom AFB, MA.

1982

MARRIED: Michael Iassogna and Linda Patavino on September 24, 1983, in Bridgeport, CT. Linda graduated from Fairfield University and is an accountant with Du Pont in Wilmington, DE, where Mike is a project engineer. . . .**Thomas Potter** to Jeanne Young on March 17, 1984, in Taunton, MA. Jeanne graduated from Dean Jr. College, Franklin, MA, and is a medical assistant. Tom is with the U.S. Navy's nuclear submarine program. . . .**John Tirrell** and Anne O'Loughlin in East Weymouth, MA. Anne graduated from Quincy Junior College. John is with Stone & Webster.

Thomas Amoruso is a project engineer with Addressograph/Farrington in Hudson, MA.

Luis Anez is transportation supervisor for Lagoven. He resides with his wife, Anabella, in Caracas, Venezuela.

Sean Anzuoni works on large optical systems at Itek Corp., Lexington, MA.

Robert Arnold is a math teacher at Gorton Junior High School in Warwick, RI.

Paul Atkinson works as an assistant engineer for Northeast Nuclear Engineering Co., Waterford, CT. He is located at the Millstone III nuclear power plant in the start-up engineering department.

James and **Joyce Trela Auman** continue with Hamilton Standard, Windsor Locks, CT, where he is an analysis engineer and she is a project engineer.

Anni Autio is now a word processor/engineer with Chas. T. Main.

Kenneth Beck is self-employed with Acupac Packaging in Mahwah, NJ. He started the firm, which is a contract packager of cosmetic pharmaceutical products, in 1982.

Scott Berry is a graduate research assistant at George Washington University/NASA in Hampton, VA.

Michael Bickford works for Westinghouse Electric and is located in Amherst, NY.

Timothy Brennan is with the Naval Ordnance Station in Indian Head, MD.

Kingsley Brown serves as a power systems engineer with McGraw Edison Co. in Canonsburg, PA.

Scott Brown is a manufacturing engineer with Raytheon in Waltham, MA.

Thomas Brucker is an associate programmer for IBM in Kingston, NY.

Edward Canfield works for IBM in Poughkeepsie, NY.

Phillip Collingwood holds the post of production manager at Guilford Gravure Corp., Green Cove Springs, FL.

John Corey serves as a software development engineer at Hewlett-Packard in Cupertino, CA.

Ernest Cormier is the self-employed president of Nicacia Software in Stamford, CT. The company designs and programs game and educational software.

Charles Coward III serves as a junior development engineer at AMP Inc. in Harrisburg, PA.

Lt. **Cory Cronan** is an analysis officer with the U.S. Army at White Sands Missile Range, NM.

Terry Crook serves as an electronic systems service engineer for Hamilton Standard, Windsor Locks, CT. She is also working on her MS in engineering management at Western New England College.

Lawrence Donohue is an industrial engineer for Stanhome in Easthampton, MA.

James Dorsey works as an associate engineer for Codex Corp., Mansfield, MA.

Gregory Doyle is a highway engineer with the Federal Highway Administration in Trenton, NJ.

Leon Droby works for New York Telephone in New York City.

Richard Ferron is now with the research and development division of Babcock and Wilcox Co. He is located in Alliance, OH.

Douglas Frey is a resident officer in charge of construction contracts for the U.S. Navy.

Majid Ghamami is a chemical engineer for the Khorasson Regional Water Authority in Iran. He has an MBA from AIC.

David Gillespie works for United Illuminating Co., New Haven, CT.

Robert Godiksen works as a sales engineer for L. B. Swan Assoc., Hartford, CT.

Currently, **Paula Green** serves as a market development engineer at Union Carbide's Linde Division in Tarrytown, NY.

Louis Greuling is employed as a field engineer by Pullman Power Products of Avila Beach, CA.

Gerard Grippo works for General Dynamics in Quincy, MA.

Deborah Gustafson has relocated with Digital Equipment Corp. to New Hampshire.

Robert Houlihan is an electrical construction engineer with Stone & Webster in Waterford, CT.

Paul Howard is a project engineer with Anderson-Nichols & Co. in Clinton, MA. He and his wife, Michele, have one child and live in Holden.

Richard Hudson serves as an assistant construction coordinator with Camp, Dresser & McKee, Boston.

Last year, **Florencio Icaza,** who resides in Panama, was promoted to chief engineer of IRHE's thermoelectric power plant.

Bradley Jarvis, who works for Raytheon in Northboro, MA, is also associated with Methographics Research Corp., Bedford, MA.

Douglas Jones is a member of the technical staff at Bell Labs in Holmdel, NJ.

Jeffrey Kern works as a systems designer for Singer-Kearfott, Wayne, NJ.

Michael LaFleur is now an electronic engineer designing fiber systems at Kelco Fiber Optics in Norwood, MA.

Thomas Malin serves as a design and development engineer for Raytheon in Sudbury, MA.

Douglas Melanson serves as a systems engineer at IBM, Milwaukee, WI.

Stephen Morgan works as a systems analyst at Pratt & Whitney Aircraft, Columbus, GA.

Dan Multer works for Communication Concepts in Branford, CT.

Thomas Nicolosi holds the post of process engineer at MACOM PHI in Torrance, CA.

Glenn Oakley is a structural engineer at Dewberry & Davis, Fairfax, VA.

Guy Osborne serves as quality assurance engineer at Lacey Mfg. Co. in Bridgeport, CT.

Steven Oxman is a computer scientist for NATO/USA group.

Richard Petrucci, a designer for Stone & Webster, Boston, is currently working at a nuclear power station in Waterford, CT.

Fred Roys is slated to move to Andersen AFB, Guam, in August, where he will fly B-52s.

Randall Rubinstein is a manufacturing engineer with Hottinger Baldwin Measurements in Framingham, MA. He has an MBA from WPI.

Bahman Sahba is an engineer and supervisor of R&D at Posi-Seal International in North Stonington, CT. He is also an engineering consultant. He has an MSME from WPI.

Arne Salonen is employed as a city planner by Gillespie-Delorenzo in San Diego, CA.

Charles Santore has been serving as an engineering aide with the Department of Public Works in Stamford, CT, and studying for his MSCS at Pace University, White Plains, NY.

David Schedin holds the post of product sales engineer at Teradyne Connection Systems Inc. in Nashua, NH. He and his wife, Nina, reside in Hollis.

Ingrid Slembek continues with DEC in Littleton, MA, and is working for her MSCS at WPI.

Jan Sorensen is involved with independent machine sales in Copenhagen.

Wolfgang Strobel is product manager for Gerber Scientific Products, Manchester, CT.

Liz Sydney is assistant analyst in the maintenance and construction department for New England Power Service in Westboro, MA.

Carsten Thomassen works as a management consultant at Arthur Andersen & Co., Copenhagen, Denmark.

George Valaitis works for IBM in Owego, NY.

Thomas Villani is a student at the University of Connecticut School of Dental Medicine.

Peter Yee is on the technical staff at Hughes Aircraft in El Segundo, CA.

"Thread Gourd—Darn Carefully!"

If most mechanical engineers told you that gourds were once used for darning stockings, you'd think they were pulling your leg. If Howard Atkins, '34 ME, tells you that, you'd better listen. Atkins is not what you'd call an average ME. He's what you'd call an extraordinary farmer-entrepreneur. And he knows his gourds!

"My apples, too," he laughs. His 600-acre Bay Road Fruit Farm in South Amherst, MA, produces more than 100,000 bushels of apples annually.

Another important crop is pumpkins. "There are two major types of pumpkins," Atkins explains. "The sugar variety, which is for pies, and the Halloween variety, which is larger, coarser and more suitable for decoration."

Along with the apples and pumpkins, he grows peaches and pears, all of which are sold through his own retail store, Atkins Farm Fruit Bowl. "And a few years ago," he reports, "we added a baking facility."

Atkins's "we" is not editorial. His sons, Dale and Dan, represent the fourth generation of Atkins fruit farm producers. Back in 1887, Howard's grandfather, George, bought an orchard with 100 trees. In 1952, the third generation (Howard) took over the operation, progressively increasing his orchards.

In 1970, Atkins was elected to the board of directors of Agway Inc., a farmers' cooperative, in a district covering the states of Connecticut, Massachusetts and Rhode Island. "My greatest honor," he says. He was also elected to the board of Curtice-Burns, a food processing corporation. The two organizations do about $900 million worth of business annually.

Howard Atkins and his wife, Ruth, have partially retired to their all-season home in Sugar Hill, NH. But full retirement is not in the cards. Each year Howard increases his orchard acreage. "I love the land," he says.

Photo courtesy of The James Library Inc.

Howard Atkins, '34 ME

1983

MARRIED: Daniel Fretz and Roberta Dion in Norfolk, MA, on March 17, 1984. Roberta graduated from Worcester State College and is a cartographer. Dan works for RCA Automative Systems. . . .**Roger Sacilotto** and Susan Woodyard on April 15, 1984, in Danvers, MA. Susan, who graduated from Marion Court Secretarial School, Boston, is a secretary at Massachusetts Computers Associates Inc., Wakefield, where Roger is a systems engineer. . . .**Edward Walls, Jr.** to Andrea Statile in Woodbridge, NJ, on October 29, 1983. Andrea graduated from the University of Delaware and is an account coordinator with MED Communications in Woodbridge. Edward is a chemical technician at Arkay Research Center in Randolph.

Douglas Acker is studying for a PhD in chemical engineering at the University of Florida in Gainesville.

Sonia Adrianowycz continues as a chemical engineer with the U.S. Navy at Navelex in Washington, DC.

Roy Arsenault is a member of the technical staff at Rockwell International in Lakewood, CA.

John Atkinson is a staff consultant for Arthur Andersen & Co. in Hartford, CT.

Donna Bagdonovich serves as a chemical engineer with the U.S. Army Natick R&D Center, Natick, MA.

Paul Bozoian is with WPI's Alden Research Laboratory in Holden, MA.

Michael Brousseau works for Sikorsky Aircraft, Stratford, CT.

Sean Cafferty is inventory control supervisor for Lillian Vernon, Elmsford, NY.

Philip Chapnik continues as a grad student in the PhD program at the Institute of Optics at the University of Rochester.

David Crawford has been commissioned a second lieutenant in the U.S. Air Force upon graduation from Officer Training School at Lackland AFB, TX, and assigned to Randolph AFB, TX.

Janina Natrillo DeMasi continues as an electrical engineer at Sikorsky Aircraft, Stratford, CT.

James Despelteau is an associate member of the technical staff at RCA's government systems division in Burlington, MA.

Neil Dubois works for the Naval Underwater Systems Command in New London, CT.

Lt. **Jon Ericson** has completed a signal officer's basic course at the Army Signal School in Fort Gordon, GA. Recently, he was acting chief operations officer for the Signal Corps at Dugway Proving Grounds, UT. He has been associated with the Atmospheric Science Laboratory in White Sands, NM.

Pamela Fearn serves as a process engineer at ITT in Shelton, CT.

Sheryl Hess works as a junior mechanical engineer at Sikorsky Aircraft, Stratford, CT.

Timothy Horan is a second lieutenant with the U.S. Army stationed in Fisbach, West Germany.

John Janosik continues as a senior programmer at Financier Inc., Westboro, MA.

Thomas Kemeny is an associate engineer with Westinghouse Electric in Madison, PA.

Elaine Kokernak is a software engineer for DEC in Marlboro, MA.

Andrew Krassowski has been named associate systems engineer at Bristol Babcock in Waterbury, CT.

Kenneth Kubilins has been taking undergraduate pilot training with the USAF at Vance AFB, OK.

John Lynch works as a sales engineer at Fenwal in Ashland, MA.

Kenneth McFall holds the post of area manager at NE Chemical Co., Merrimack, NH.

Keith Messier is employed as an advanced manufacturing engineer with GE in Erie, PA.

John Moore is studying for his MSME at RPI.

Stephen Nevalsky has accepted an electrical-design engineering post at Texas Instruments in Lewisville, TX.

Christine O'Connor serves as associate engineer at Raytheon, Waltham, MA.

Leslie Rooney is employed as a junior chemist at Herbert & Schuster in Quincy, MA.

Alan Rosenberg is an airframe engineer at Sikorsky Aircraft, Stratford, CT.

Carol Schober is a systems programmer analyst with Pratt & Whitney in East Hartford, CT.

Richard Scott serves as a process and development engineer at UNC Naval Products Division, Uncasville, CT.

Tim Scott works as a scientific analyst at Xon Tech, Van Nuys, CA.

Stephen Smith is a components engineer in GE's ordnance division, Pittsfield, MA.

Donald Soubie works as a development engineer at the U.S. Army Chemical Research & Development Center, Aberdeen Proving Grounds, MD.

Wendy Stebbins is a design engineer for GE Ordnance Systems in Pittsfield, MA.

William St. John has been named marketing engineer at Hewlett-Packard Co., Colorado Springs, CO.

Richard Thomas works as a systems engineer at Singer Co., Kearfott division, in Wayne, NJ.

Christopher Trainor serves as a project engineer at Ingersoll Rand, Wichita Falls, TX.

Jeffrey Twomey is a digital systems engineer with GE in Daytona Beach, FL.

John Visbaras is a member of the professional staff at American Management Systems in Arlington, VA.

Ellen Warms serves as a system analyst at IBM in Endicott, NY.

Anne Warner is a software engineer at DEC, Nashua, NH.

Deb Weinstein works for GE in Binghamton, NY.

William Wheeler, a U.S. Navy officer, is at the Nuclear Power School in Orlando, FL.

Curtis Whitehead serves as a software engineer at DEC in Andover, MA.

Arthur Wu has been studying at RPI.

School of Industrial Management

James F. O'Regan (WPI '49, SIM '59) has been honored by WPI for professional achievement with the Albert J. Schwieger Award. He is president of Feecon Corp., Westboro, MA.

Lloyd Pote, '61, a selectman in Sturbridge, MA, since 1981, has been active in other town affairs. He has served as chairman of Sturbridge's finance committee and as a member of the town's personnel policy committee and its recreation committee. Other interests have been the United Way and the Rotary Club. He is a founder and past president of CPC Engineering Corp. . . .**Robert Kendick, '65,** is plant manager at Bay State Abrasives in North Manchester, IN. . . .In February, **Alden Jacobson, '66,** coordinator of Vermont Machine Skills Training in Springfield since 1980, gave a talk on the electronics training program before the local chapter of the International Management Council. He graduated from the University of Kentucky and retired from Cincinnati Milacron-Heald as manager of engineering following 26 years of service.

Jack Shields, '69, group manager for Digital Equipment Corp., was the guest speaker at the National Honor Society awards dinner held at St. John's High School in Shrewsbury, MA, in April. He is a graduate of the program for management development at Harvard's Graduate School of Business Administration. . . .**Carl Harris, '75,** has been appointed sales engineer for Pressmasters Inc. of Newburyport, MA, and Cheshire, CT. The firm supplies metal stamping equipment and tooling for the New England states. Harris graduated from Worcester Junior College and has completed an Applied Management Science course at UNH. Before joining Pressmasters, he worked 18 years in the tool and die industry and held managerial positions in the contract stamping and fabrication industry in Worcester and New Hampshire.

Reunion '84: William Firla, '60, Walter Bank, '46, and WPI Director of Admissions Roy Seaberg, '56 share a laugh.

Natural Science Program

Deborah Pietro Seal, '78, is manager of media distribution and computer training in the New York State Education Department Center for Learning Technologies in Albany. . . .**Martin Conway, '79,** was the commencement speaker at Granby (MA) High School. He taught math and science at the school for nine years. Also, he had served as a class advisor, drama coach, ski club advisor and chess club advisor. Currently, he teaches math at Longmeadow High School. . . .**George Radcliffe, '80,** chairman of the science department at Cathedral High School, Springfield, MA, is also a part-time instructor in the chemistry department at Elms College, Chicopee. . . .**Karen Madsen, '81,** is a chemistry teacher at Eastside Catholic High School, Bellevue, WA. . . .**Carol Andrich Mishler '83** teaches science at Reading (MA) Memorial High School.

COMPLETED CAREERS

Everett L. Bragdon, '16, died in Alden, NY, on April 4, 1984, at the age of 90. A native of Westbrook, ME, he graduated as an electrical engineer from WPI.

He spent his entire career as an electronics writer for newspapers and magazines. For 18 years, he was radio and television editor of the *New York Sun* and *New York Herald.* Also, he was trade news editor and corporate house organ editor for NBC and RCA Corporation, from which he retired in 1959. He was the author of *The Radio Amateur's Handbook.* He belonged to Theta Chi and Skull.

Max W. Tucker, '17, formerly with the U.S. Patent Office, died on November 2, 1983, in Easton, MD. A native of Washington, DC, he was born on Oct. 16, 1893. He received his BSCE from WPI.

During his career, he served with the U.S. Coast and Geodetic Survey and as a captain with the U.S. Army Cavalry in New Mexico. He joined the Patent Office as an examiner in 1919, retiring from his supervisory post on the Board of Appeals in 1955. Mr. Tucker graduated from the old Washington College of Law. He belonged to Civil War roundtable organizations in Washington and Alexandria. He was also a trustee of the Alexandria Public Library, a member of the Congregational Church and a past president of the Washington chapter of the Alumni Association. He was the father of **George K. Tucker, '51.**

Percival P. Drury, '18, died on March 16, 1984, in Seminole, FL. He was born in Spencer, MA, on Aug. 9, 1896, and received his BSCE from WPI.

During his career, he was with Turners Falls Power & Electric Co., Samuel H. Pitcher Co., Liberty Screw Products Co. and Quabaug Rubber Co. He was with the U.S. Army in 1918 and in World War II. He belonged to Tau Beta Pi.

Baalis Sanford, '20, of Holden, MA, passed away recently. A Clinton native, he was born on Jan. 26, 1899.

In 1920, he graduated as a chemist from WPI. He had been employed by Anaconda Copper Mining Co. and New England Aniline Works. For many years he worked for Norton Co., Worcester, where he had been a research chemist, superintendent of organic products and technical secretary to the works manager.

Mr. Sanford was a Mason, a former finance committee member for the Town of Holden and a past president of the Tech Old-Timers. He belonged to SAE.

Harry W. Tenney, '20, a retired administrative assistant from Westinghouse, died November 19, 1983, in Centerville, MA, at the age of 84. He was born in Leominster, MA, on April 19, 1899.

After receiving his BSEE from WPI in 1920 until 1964, when he retired as assistant to the vice president in the elevator division in Jersey City, NJ, he was with Westinghouse Electric Corp. While with the company, he was assistant director of research and received the Westinghouse Order of Merit award.

Mr. Tenney, who belonged to Sigma Xi, Tau Beta Pi and Skull, was a life member of the IEEE and was affiliated with the Rotary, the Masons, the Osterville Men's Club, the Congregational Church and the Cape Cod Horticultural Society. Formerly, he served as president of the Pittsburgh chapter of the WPI Alumni Association. He was the father of **Edwin Tenney, '59,** and **Harry Tenney, Jr., '56,** president of the Alumni Association.

Robert M. Eldred, '21, an aviation pioneer and retired aeronautical engineer for Scott Aviation, Buffalo, NY, died February 17, 1984, in Lewiston, NY, as the result of an automobile accident. He was 84.

A native of Springfield, MA, he was born on Aug. 28, 1899, and graduated as a mechanical engineer from WPI in 1921. Prior to joining Scott, he was with Bell Aircraft for many years and helped with the production of the first American jet fighter during World War II. He had also been employed by Fredric Flader Inc.

In the 1930s, he worked on aircraft design with Granville Brothers Aircraft at the old Springfield Airport. The company manufactured business, pleasure and racing planes bearing the Gee Bee insignia.

Mr. Eldred, a World War I Army veteran, belonged to ATO, the Buffalo Aero Club, the Masons and the Engineering Society of Buffalo. He was a former treasurer of the Western New York chapter of the Alumni Association.

Harland G. Foster, '21, of Collinsville, CT, died at his home on January 11, 1984.

He was born on March 5, 1899, in North Brookfield, MA. For 36 years, he was with White Laboratories in Kenilworth, NJ, from which he retired as office manager. He belonged to Phi Sigma Kappa.

Leodore E. Maynard, '22, passed away in Laconia, NH, on March 5, 1984, at the age of 86.

He was born in Putnam, CT, on July 15, 1897, and received his BSEE from WPI in 1922. For many years he was with Boston Edison Company, from which he retired in 1962. He was a member of Lambda Chi Alpha.

Clarence W. McElroy, '24, died in Concord, MA, on March 8, 1984. He was born on Sept. 3, 1902, in Chicopee Falls.

After receiving his BSEE, he joined the Boston & Maine Railroad, from which he retired as superintendent in 1967. He belonged to Lambda Chi Alpha and the New England Railroad Club. An avid soccer fan, he was a member of WPI's first soccer team.

Cmdr. **Warren P. Gleason, '26,** USNR, died at his home in Grindstone Neck, Winter Harbor, ME, on February 20, 1984. He was born in Worcester on Oct. 14, 1902, and graduated as an electrical engineer from WPI.

He was with Factory Insurance Association until 1942, when he entered the U.S. Navy. In 1946, he retired from the Navy as a full commander, but remained with the Navy as a civilian fire protection engineer in charge of the First Naval District in Boston. He retired from his civilian post in 1967.

A member of many Winter Harbor town committees, he was also a trustee of the Maine Coast Memorial Hospital. He belonged to Phi Sigma Kappa and the national and Massachusetts societies of Professional Engineers, and he was a charter member of the Society of Fire Protection Engineers.

Archie J. Horne, '26, past president of Horne & Hastings Inc., Worcester, died in Worcester on March 11, 1984, at the age of 81. Born in Scotland, he received a BSME from WPI.

During his career, he was a manager for R.C. Taylor Trust, an assessor for the City of Worcester, a development manager for W.H. Sawyer Co., a sales engineer for Chain Belt Company and Norton Co. and a mortgage officer for Worcester Federal Savings and Loan. The founder, chairman of the board and past president of Horne & Hastings, a regional brokerage and appraisal firm in Worcester, he began his real-estate career in 1933.

Mr. Horne was a past president of the New England chapter of the American Institute of Real Estate Appraisers (AIREA), as well as a former Northeast regional vice president and member of the governing council of the organization. He was awarded the Professional Recognition Award and held the MAI (Member of the Appraisal Institute) designation. An instructor with the AIREA for many years, he taught appraisal courses at Tulane, University of San Francisco, University of Wisconsin, UConn and WPI. He also taught at the Massachusetts Assessor School at UMass in Amherst. He belonged to the Society of Real Estate Appraisers and held an SREA designation.

Besides serving as a former registrar of voters in Worcester, Mr. Horne was past president of the Greater Worcester Board of Realtors. In 1967, he was named the local "Realtor of the Year." He was a past master of his Masonic lodge and belonged to the Commandery, Knights Templar and the Eastern Star. In 1959, he received the Silver Beaver Award in recognition of his many years of service with the Boy Scouts, both in the U.S. and abroad.

He was past president of the Massachusetts Land League, and a member of the American Right of Way Association and the Worcester Kiltie Band Association. A former member of the National Guard, Mr. Horne also belonged to Theta Chi, Tau Beta Pi, the Poly Club and the Tech Old-Timers. He had served as vice president of the Class of 1926 and as a member of the WPI Fund Board.

W. Bigelow Hall, '28, a retired general patent counsel for United Shoe Machinery Corp. (now USM-Corp., Emhart), died in Florida on January 9, 1984. He was born in Fitchburg, MA, on Nov. 3, 1906.

After studying electrical engineering at WPI, Mr. Hall graduated with his LLB from Washington College of Law in 1933. Prior to joining United Shoe in 1939, he was with the U.S. Patent Office and Minneapolis Honeywell. He belonged to the American Bar Association, the American Patent Law Association and the Boston Patent Law Association (former president).

Active in community affairs, he had chaired the Needham School Committee and the Community Fund. He was a Mason and a member of Phi Gamma Delta.

Harold C. Bates, '29, longtime plant engineer for Westinghouse Electric Corp., in East Springfield, MA, died on February 5, 1984, at the age of 78. A native of Claremont, NH, he received his BSEE and professional engineering degree from WPI.

During 40 years with Westinghouse, he had been a tester, works engineer, layout engineer and maintenance engineer. In 1966, he retired. After retirement, he was employed as a sales representative by Electrical Motor Repair Co. He was a registered engineer in Massachusetts.

Mr. Bates belonged to the Methodist church, the Masons and the Eastern Star. He was a charter member of the DeMolay and was invested with the DeMolay Legion of Honor.

Uno A. Matson, '29, a retired member of the technical staff at Bell Telephone Labs, North Andover, MA, died in Exeter, NH, on March 11, 1984. He was 76.

In 1929, he received his BSEE from WPI. For 43 years he was with Bell. During World War II he was involved with defense work at Bell Labs in New York City and Murray Hill, NJ. He had two patents on transmission systems.

In 1955, he transferred to the Merrimack Valley plant in North Andover, where he worked on microwave and radar communications. He retired in 1974.

Mr. Matson was a cellist, pianist, local composer and church organist. He was a charter member of the Merrimack Valley Philharmonic Orchestra, a member of the Nashua (NH) Symphony and a founder of the Whittier Chamber Orchestra in Haverhill.

A member of Theta Chi, Sigma Chi and Tau Beta Pi, he also belonged to the American Guild of Organists and the Newburyport Art Association. He was a life member of the American Federation of Musicians.

H. Edward Perkins, Jr., '33, passed away at the age of 72 at his winter home in Tavares, FL, on April 12, 1984. A native of Woodstock, VT, he received his BSEE from WPI.

He had been employed by Perkins Machine & Gear Co. and Winchester Repeating Arms Co. From 1947 to 1962, he worked for Olin Mathieson Corp., where he rose to associate director of R&D. In 1971, he retired as design supervisor from Sikorsky Aircraft, Stratford, CT. Following retirement, he and his wife, Mildred, built a summer home on 525 acres in Bridgewater Corners, VT.

Mr. Perkins, a member of the ASME and Lambda Chi Alpha, was a professional engineer in Connecticut.

Joseph A. Bober, '34, of Milton, MA, died last November. He was born in Manchester, NH, on Sept. 1, 1912. He graduated as a civil engineer from WPI.

During his long career with the U.S. Army, he served as chief of the Corps of Engineers in Boston and as chief of the planning and control branch in the real-estate division of the Corps in Waltham, MA.

Charles C. Bonin, '38, WPI trustee emeritus, died on Hilton Head Island, SC, on April 13, 1984. He was 67.

A worldwide authority on the construction of arch dams and the design of generating stations, he was posthumously awarded an honorary doctor of engineering degree by WPI during commencement ceremonies on May 19. When he learned of the upcoming honor just three weeks prior to his death, he said, "I cannot conceive of anything finer happening to me at this point in my life."

Born in Covington, KY, Charlie graduated as both a civil engineer and a professional civil engineer from WPI. After joining Ebasco Services Inc. in 1938, he served the firm as cadet engineer, civil engineer, project manager for the Far East, Far East representative, chief civil engineer and engineering manager. From 1965 to 1977, he was chairman, president and chief executive officer of Chemico, an Ebasco affiliate, in New York City.

While directing Ebasco projects in Japan, Charlie was directly responsible for the design and construction of the Kamishuba Arch Dam, the first arch dam ever constructed in the Orient. He was concerned with the design of more than 200 thermoelectric, hydroelectric and nuclear-generative stations worldwide. His many publications in this field were accepted as instructional and authoritative.

In 1969, he held the largest number of state licenses of any registered engineer in the nation, one from each of the 50 states and from Puerto Rico, the District of Columbia and the Canal Zone. Charlie told friends at the time, "It's not a stunt. I get these licenses because we do business in those states."

He developed the operating procedure for the Northwest Power Pool to meet critical war-time needs, and formed the first consulting and design engineering company in India. Under his leadership, Chemico designed and built plants in Japan, India, Taiwan, Malaysia, China, Pakistan, Saudi Arabia, South Africa, Libya, Algeria, Egypt, Yugoslavia, UK, Venezuela, Mexico, the Soviet Union, Iran, Finland, South Korea and France. During a ten-year period, Chemico grew from a $50 million a year business to a $500 million a year business.

From 1977 to 1982 he had a private consulting business and continued his engineering practice, primarily in energy-related fields. During the same period, he was a founder and first president of Lighthouse Realty, negotiating the sale of the firm to Marathon Oil. Recently, he was a consultant for Pinehurst Corporation and for the principals of the Delta Group.

A fellow of the ASCE, Charlie also was a member of the national and South Carolina societies of Professional Engineers, the Seismological Society of America, Japan Atomic Industrial Forum, the U.S. Committee on Large Dams, and the S.C. Society of Civil Engineers. He also belonged to Phi Sigma Kappa fraternity, Tau Beta Pi, Skull and the Poly Club.

In 1966, he received the outstanding leadership award from ASME. He was the recipient of both the Goddard Award (1966) and the Taylor Award (1963) from WPI. Active in alumni affairs, he had served as a member-at-large of the Executive Committee and as vice president of the Alumni Association, and as a member of the President's Advisory Council.

In spite of a busy professional and social schedule, Charlie always found time for his family. He had a real zest for life and enjoyed playing golf and bridge and cooking for guests at home.

At Hilton Head, forever modest, Charlie was viewed by friends and business associates as "one of the great men on the island." A former realtor-associate, Rick Turner, said, "Charlie was a leader and helped so many young executives. He did what was best for everyone, more servant than a master."

Rick Turner's words were not empty. He and five other young realtors whom Charlie had guided to success were his pallbearers.

George B. Cattermole, '38, of Hamburg, PA, passed away on May 16, 1983. A native of Passaic, NJ, he was born on Jan. 17, 1917. Studying electrical engineering at WPI, he graduated from the U.S. Naval Academy and held an MSEE from the U.S. Naval Postgraduate School.

From 1939 to 1969, he was with the Navy, from which he retired as a captain. Among other places, he served at the Defense Atomic Support Agency in Washington, DC. Later, he became a self-employed farmer in Hamburg.

Mr. Cattermole belonged to Phi Sigma Kappa, IEEE and the IRE, and he was active with the Boy Scouts and Little League.

Lennart Brune, '40, owner of Brune Abrasive Service Co. Inc., Denver, PA, died in Philadelphia on November 16, 1983. He was 66, a native of Pittsfield, MA, and a mechanical engineer.

Since 1948, he had owned the Denver abrasives firm. Formerly, he was with the Carborundum Co., Niagara Falls, NY. He belonged to ATO and the United Church of Christ.

F. Warren Crowley, '41, died recently in Toms River, NJ, at the age of 64. He was born in Clinton, MA.

He had been employed by the Factory Insurance Co. Two years ago, he took early retirement from Alexander & Alexander Insurance Brokers in New York City, where he was vice president and manager of the loss department. He had been with the firm for 25 years.

Mr. Crowley belonged to St. Patrick's Church and the Knights of Columbus.

Dr. **Myer Krulfeld, '46,** of Bethesda, MD, passed away last fall. He was born in Boston on March 12, 1915.

After receiving his BS in chemistry from WPI, he earned a PhD from the University of Illinois. During his career, he was an assistant instructor in chemistry and physics at WPI and a research chemist at the U.S. Naval Research Laboratory in Washington, DC.

He belonged to Tau Beta Pi, Sigma Xi and the American Chemical Society.

Edward G. Tamulevich, '46, died at his home in Paxton, MA, last December. He was 59 and a Worcester native.

He received his BSME from WPI. He worked for the vacuum melt division of Wyman Gordon in North Grafton and for the Textron plant (superintendent) in Lowell, MA, prior to joining Norton Co., Worcester. He retired from Norton in 1980 after serving as supervisor of building maintenance for 10 years.

He was a member of Phi Kappa Theta, Our

Lady of Vilna Church (Men's Club past president), Lithuanian Charitable Society and Lithuanian War Veterans Organization. Also, he was active with the Bishop's Fund and the Knights of Lithuania. He had been chairman of the former Paxton Board of Public Assistance. In World War II, he was a Navy lieutenant in the U.S. and Panama.

Clay B. Wade, '46, of Decatur, GA, died November 20, 1983, at the age of 57. He was born in Morehead City, NC.

After graduating as a civil engineer, he joined the Southeastern Underwriters' Association in Raleigh. In 1950, he was transferred to the home office in Atlanta. Later, he became staff engineer and assistant chief engineer. In 1969, he was named administrative assistant. Most recently, he was an insurance services administrator with the association.

Mr. Wade had served as chairman of the finishing-processes committee of the National Fire Protection Association. He was active on American Insurance Association committees, and belonged to the Georgia Mineral Society and the Cobb County Gem and Mineral Club.

Karl H. Kalbfleisch, '51, died February 22, 1984, in West Haven, CT, following a long illness. A native of Newton, MA, he was born on Aug. 31, 1925. He graduated as an electrical engineer from WPI.

Following graduation, he was employed by Norton Company in Worcester, where he was involved with industrial-diamond work in the R&D department and with the dia-electric heating process, a forerunner of microwave ovens. In 1967, after he was injured in an electrical accident, he joined the Communications Center in Guilford (CT) Town Hall and was named communications supervisor and director of ambulance services for the town in 1976.

Mr. Kalbfleisch was a lifelong radio hobbyist. His call sign, W1XYB, was on his auto license plate. He belonged to ATO. During World War II, he was in the Navy V-12 program and studied at Tufts and Bates. Earlier, he attended MIT. He had served WPI as an admissions counselor.

George F. Whittle, '52, a design engineer and retired Navy commander, died at his home in North Scituate, MA, on January 2, 1984.

He was born in Passaic, NJ, on Jan. 20, 1930, and received his BSME from WPI. Prior to founding Whittle Associates, a New England design and plastic sales and engineering firm, he had been employed at Waterbury Manufacturing Co. and the Raytheon Co. A Navy veteran of 23 years, he trained as a jet pilot in Pensacola, FL. He had served as a scoutmaster for the BSA for many years. He belonged to Phi Gamma Delta.

Thomas R. DeLuca, Jr., '53, of Haverhill, MA, died September 6, 1983. A Haverhill native, he was born on June 24, 1931. He graduated from WPI as a chemical engineer in 1953.

During his career, he was an officer in the U.S. Navy, an engineer for Du Pont and the Bristol Company and a mathematics teacher in West Newbury, MA, Andover, Danvers and Chelmsford. He belonged to PKT and PDE.

Henry F. Spadoni, Jr., '55, president of JDS Inc., Springfield, MA, died in Westfield on January 22, 1984, at the age of 51. He was a native of Hopedale, MA.

He received his BS in chemical engineering from WPI. Following employment with Monsanto and John H. Breck Inc., he served as president of Customer Savings Corp. and as a founder of Morgan Homes, before he formed JDS Inc. in 1979.

He was a past president of the Home Builders Association, former member of the Rotary Club, and he belonged to the Chamber of Commerce and St. Thomas the Apostle Church.

He belonged to the Packaging Institute, as well as to Phi Kappa Theta and PDE. He held an MBA from Western New England College and had served with the Army.

Roland E. Mason, '59 SIM, of Worcester passed away recently. He was born in Worcester on August 14, 1923.

He had been plant manager for Form Roll Die Corp. in Worcester.

George H. Comeau, '60 SIM, died at his home in Whitinsville, MA, on October 25, 1983, at the age of 70. A native of Schenectady, NY, he attended the School of Industrial Management at WPI.

Before retiring in 1976, Mr. Comeau had been superintendent of the ATF-Davidson division of White Consolidated Industries (formerly Whitin Machine Works). He graduated from Notre Dame and also attended Harvard Law School.

He belonged to St. Patrick's parish. For many years, he was active with a local Boy Scout troop.

Gerald J. Lyons, '68 MNS, former head of the mathematics department at North Quincy (MA) High School, died December 10, 1983, at his home in Barnstable, MA. He was 63 years old.

He was born in Quincy. In 1968, he graduated with his master's degree in natural science from WPI. He graduated from Harvard and received degrees from Boston University and Hartford University in Connecticut.

In 1982, he retired as head of the math department at North Quincy High School, where he had taught since 1970. Formerly, he had taught at the Manter Hall School on the Cape and in Boston and at Thayer Academy in Braintree.

John J. Foran, '75 SIM, died February 20, 1984, in Worcester at the age of 63. He was a native of Worcester.

In 1940, he graduated from New England School of Accounting. In 1980, he retired as chief accountant in the grinding wheel division of Norton Co., Worcester, where he had been employed for 33 years.

Correction

In the May 1984 issue of the *Journal*, we mistakenly reported that Paul B. Morgan (Jr.), '30, had retired as chairman of the WPI Board of Directors. Paul S. Morgan is the correct name of the retiring chairman. Our apologies to all concerned.

LETTERS

Notes on TOP TEN

Editor:

The author endeavors to show that all numbers were not created equal [Robert Kanigel, "What's the No. 1 Number?", May 1984]. Some rate as stars, while others remain in the background. He states, "Number nine carries the flavor of something almost true but not quite, of something missing incomplete. Number nine has little to recommend it."

In these days of the computer the author has probably forgotten his grammar school tables of 9's and the method of checking additions, subtractions and multiplications.

The claim of number nine for 1st place over the other numbers is based on the interesting makeup of the table of 9's and the unique use of a number, in this case 9, to check the accuracy of addition, subtraction and multiplication.

No other table of numbers shows the uniformity of having the sum of the digits equal to the number itself.

No other number has similar characteristics that by subtracting a number from the multiplier, in case of nines 1, the 2nd digit is the amount to equal the number, i.e. multiplier: $3 - 1 = 2$ & $7 = 27 = 9$, $4 \times 9 = 36$, $7 \times 9 = 63$.

No other number has the same uniformity on the reversal of the digits in its table of numbers 18 to 81, 36 to 63, 45 to 54, etc.

Probably the outstanding feature which sets it apart from other numbers is the discarding the sum of nine as a check on the accuracy of accounting in addition, subtraction and multiplication.

Chester N. Inman, '14 ME
Worcester, MA

The "real" world's not the only thing that's changed.

Come on back to discover who and what have changed how and why since the reign of your class at WPI.

HOMECOMING 1984

And Reunion for the classes of '64, '69 and '74.

September 22, 1984