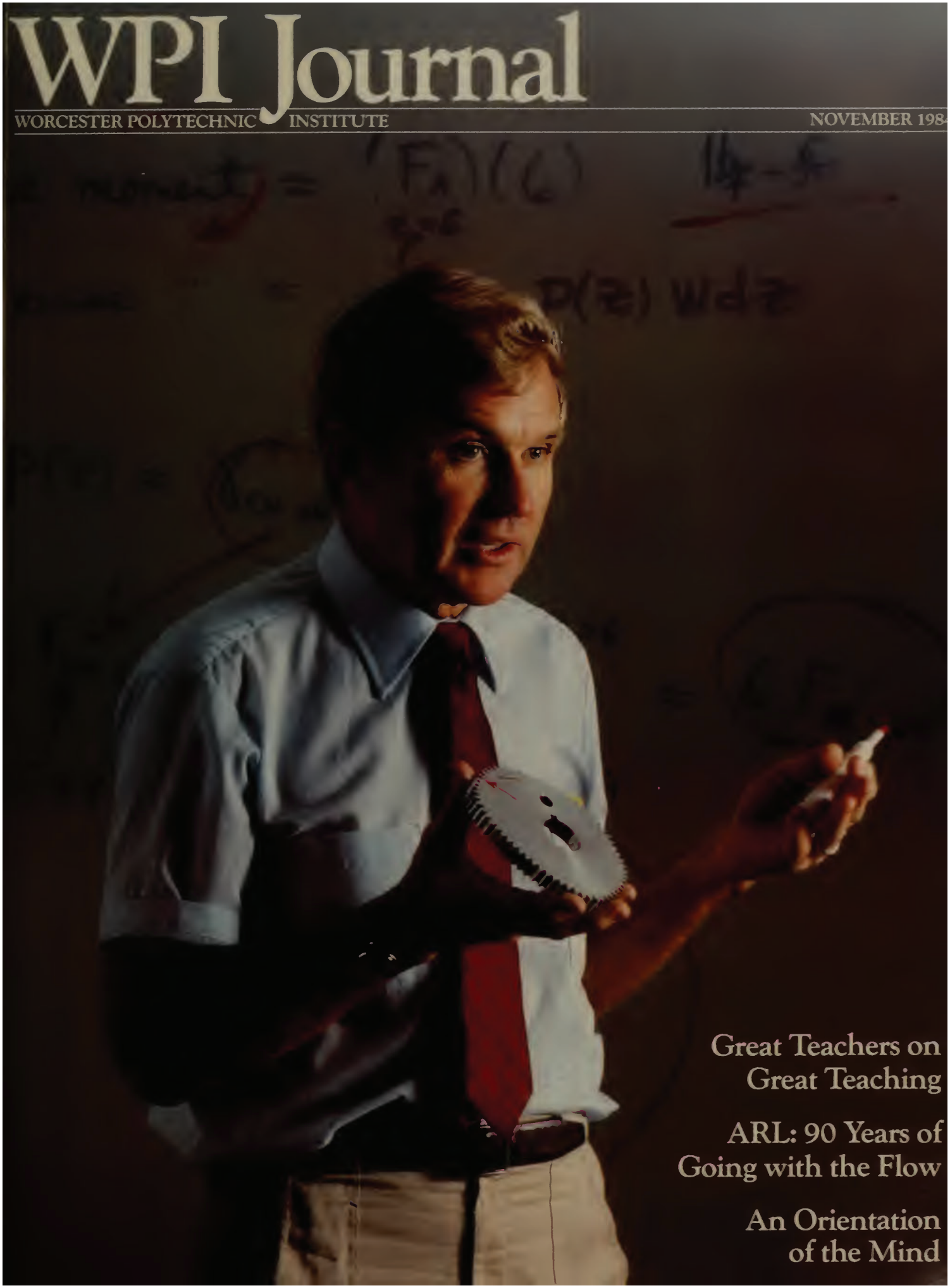
WPI Journal

WORCESTER POLYTECHNIC INSTITUTE NOVEMBER 198-



Great Teachers on Great Teaching

ARL: 90 Years of Going with the Flow

An Orientation of the Mind

WPI Journal

WORCESTER POLYTECHNIC INSTITUTE

VOLUME 88, NUMBER 2 NOVEMBER 1984

The WPI Journal (ISSN 0148-6128) is published quarterly for the WPI Alumni Association by Worcester Polytechnic Institute in cooperation with the Alumni Magazine Consortium, with editorial offices at the Johns Hopkins University, Baltimore, MD 21218. Pages I-XVI are published for the Alumni Magazine Consortium (Franklin and Marshall College, Hartwick College, Johns Hopkins University, Rensselaer Polytechnic Institute, Worcester Polytechnic Institute) and appear in the respective alumni magazines of those institutions. Second class postage paid at Worcester, MA, and additional mailing offices. Pages 1-16, 33-48 ©1984 Worcester Polytechnic Institute. Pages I-XVI ©1984 the Johns Hopkins University.

Staff of the Alumni Magazine Consortium: Editor, Mary Ruth Yoe; Design and Production Coordinator, Amy Doudiken; Designer, Allen Carroll; Editorial Assistant, Claire E. Brown.

Advisory Board for the Alumni Magazine Consortium: Franklin and Marshall College, Richard Kneedler; Hartwick College, Merrilee Gomillion; Johns Hopkins University, B.J. Norris and Elise Hancock; Rensselaer Polytechnic Institute, Lynn Holley and Robert M. Whitaker; Worcester Polytechnic Institute, Donald F. Berth and Kenneth L. McDonnell.

Acknowledgments:
Typesetting, BG Composition, Inc.; Printing, American Press, Inc.

Diverse views on subjects of public interest are presented in the magazine. These views do not necessarily reflect the opinions of the editors or official policies of WPI. Address correspondence to the Editor, *The WPI Journal*, Worcester Polytechnic Institute, Worcester, MA 01609. Telephone (617) 793-5609. Postmaster: If undeliverable please send form 3579 to the address above. Do not return publication.

CONTENTS


Page 4


Page 8


Page I


Page 34

Cover: Professor of Mechanical Engineering Carlton Staples is a "class act" (see page V). Photo by William Denison. Opposite: What better way to spend a sunny Saturday afternoon in the autumn. Photo by Michael Carroll.

NEWS FROM THE HILL

Thanks a million!

For the first time ever, the WPI Alumni Fund raised more than $1 million in gifts, surpassing the million-dollar goal established by the Alumni Fund Board.

In celebrating the triumphant climax of this year's annual campaign, Fund Board Chairman Gerald Finkle, '57, exclaimed, "It's always a pleasure to bring good news! So it's with gratitude that I report this milestone in the history of the Alumni Fund. More than 5,800 alumni contributed a total of $1,007,873 to WPI, setting new records for both dollars and donors." This is an astounding 19-percent jump over the amount raised in the 1982–83 Fund Year. The year's average gift of $173 and the 40.97-percent participation rate are both well above the national averages.

Another highlight of the Fund was an increase from 78 to 123 in the number of donors who contributed $1,500 or more and in so doing joined the President's Advisory Council. What is more, the anniversary classes of 1934, '44 and '59 contributed more than $520,000, $350,000 more than any other Fund program. And the Class of '59 had a whopping 94-percent participation rate! In terms of participation among non-anniversary classes, the Class of 1938 had the highest rate; six out of 10 alumni contributed from this class. The classes of 1940 and '37 were only a few percentage points behind. The Class of 1980 boasts the most donors, followed by the classes of 1973 and '74. And the largest class gifts from other than anniversary classes were received from the classes of 1942, '38 and '39, in descending order.

Additional good news is that for the fifth time in six years, WPI has won the U.S. Steel-CASE (Council for the Advancement and Support of Education) Award for Sustained Excellence in alumni giving, the premier award in this field. Only Gustavus Adolphus College boasts a better record, and only the alumni giving performances of Dartmouth College, the University of Michigan and Siena College equals the generosity of WPI alumni.

Gerald Finkle, '57 ME, Fund Board Chairman.

"The credit for this string of successes," notes Finkle, "rests with the loyal and generous support of our alumni and the efforts of the 1,200 graduates and student volunteers who personally contacted the WPI alumni body. Thanks must also go to past volunteers and Fund Board members, whose work laid the groundwork for this year's success."

Dr. Edmund T. Cranch, president of WPI, offered an interesting perspective when news of the Fund's landmark achievement reached his office: "You know, when we approach corporations and foundations for support of WPI, the breadth and depth of our alumni involvement, as evidenced by the uninterrupted Alumni Fund giving, is often the deciding factor in winning such support. This alumni involvement is a ringing endorsement that proclaims to students, parents and prospective donors alike that to belong to the WPI community is to join a special group indeed."

In May 1984, Alumni Fund Managing Director Sharon C. Davis resigned to become Director of Development of the Bancroft School, Worcester. During her six-year tenure at WPI, the college was awarded five of its total of seven prestigious CASE-U.S. Steel awards. She is succeeded by Craig L. Esposito, former Associate Director of Development at Harvard University.

Washburn reborn: Yankee ingenuity lives on.

In 1869, when the Washburn Shops opened its doors to students at the new Worcester County Free Institute of Industrial Science, the building was, as benefactor Ichabod Washburn had intended, a place where young men could learn a trade in an environment that schooled them in the most modern techniques of factory production. In fact, under the direction of Milton P. Higgins and George I. Alden (later to co-found the Norton Company) the Shops became a prosperous business as well as the embodiment of Mr. Washburn's dream. For almost 85 years, the Shops brought additional income to the college, with students designing and producing drawing tables, lathes, bench grinders and even hydraulic elevators.

Meanwhile, Templeton tinmaker John Boynton had offered to give his life's savings to establish a school with goals complementary to those of Worcester's Ichabod Washburn. He had long foreseen the need for a school where bright young men could be educated to take their places in the management ranks of America's industrial might.

Throughout the last twelve decades, Boynton and Washburn—the men and the distinctive buildings they erected—have stood tall on the hill overlooking downtown Worcester from the west. And the Two Towers tradition that these sagacious men's intentions established, though modified somewhat to accommodate today's educational, professional and societal needs, continues to define the mission of

the college through the WPI Plan.

Though the original facades of both Boynton Hall and the Washburn Shops and Laboratories still stand, both rugged old structures have been reborn. In 1978, following a complete renovation, Boynton was rededicated. And as we went to press, contractors were putting the final touches on a massive revitalization and expansion of the Washburn complex, at a cost of about $4 million.

WPI has named a new Washburn lecture hall in honor of life trustee Milton P. Higgins, in recognition of the leadership he has provided the college for nearly three decades. A past president of Norton Company, he is the son of Aldus Higgins, '93, who bequeathed his estate—the Higgins House—to WPI.

Rededication has been set for October 18–20 and is to include a symposium on such topics as national productivity, engineering education and the technology needs of higher education. A panel of national authorities on these subjects will participate. Completion of this construction project marks the final element of WPI's $17.5 million Capital Program.

Look for more details on Washburn and the rededication of this second of WPI's Two Towers in the February 1985 issue of the *WPI Journal*.

Daniel Duffy Associates

President Cranch Will Resign to Head Wang Institute

Just hours before press time, Dr. Edmund T. Cranch announced his decision to resign as president of WPI to become president of the five-year-old Wang Institute of Graduate Studies in Tyngsboro, MA. The resignation is effective June 30, 1985. Cranch will succeed Dr. An Wang, founder and current president of the Institute and head of Wang Laboratories Inc.

Cranch will lead one of the nation's newest graduate schools. An independent, non-profit educational institution, Wang Institute pursues a dual mission: to provide the professional graduate education necessary to meet the demands of industrial software development, and to help alleviate the acute nationwide shortage of highly skilled software specialists.

Cranch has already contributed to Wang Institute as a member of its Board of Trustees, as an ex-officio member of the school's National Advanced Advisory Committee, and as a former member of the Institute Advisory Committee.

In an open letter to the WPI community, Cranch said, "I am certain you can appreciate the internal turmoil and wrestling I went through in making a decision. In the end it was my instinct to pursue another institution building challenge . . . which prevailed."

Cranch joined WPI as president in 1978. A search committee, headed by Trustee vice chairman Irving James Donahue, Jr., '44, will be named soon, according to Trustee chairman Howard G. Freeman, '40.

The next issue of WPI *Newsbriefs*, to be published in late November, will contain more complete details of the Cranch decision, but we did want to bring you this historic news as soon as possible.

At a reception hosted by Dr. and Mrs. Edmund T. Cranch on August 26, these alumni families and their Class of 1988 son or daughter posed for a photo outside of Boynton Hall. In all, 151 freshmen of the 683-member class are related to WPI alumni. Congratulations to these members of the growing WPI community—new and old-er.

Things May Never Be The Same Again

When the Class of 1988 arrived on campus this fall, many of their questions—and their qualms—had already been put to rest, thanks to perhaps the most imaginative orientation program in the nation.

By Kenneth McDonnell

"Hi, Mom. It's me . . . Oh, OK . . . Yeah . . . How's Dad? . . . Aw, that's great! . . . Yeah . . . Me? Well, not so good, actually . . . Yeah . . . Y'see, I got a 37 on my first physics exam . . . But the class average was only 52 . . . Yeah, I know I was good in science in high school, but things are different here. It's not like I thought it would be. Maybe I made the wrong choice of majors. There's so much pressure here—in class, and out, too—from my friends. You know."

So goes the first phone call to the folks at home. Or, consider another freshman's first weekend back at home when, upon announcing to Dad that he's "going out for a while," the Old Man lays down the law, letting Junior know in no uncertain terms that midnight remains, as it had been in high school, the young man's curfew.

"But, Dad," Junior counters, "at college I can take care of *myself!*" Finally, after 10 minutes of the young man's best attempts to change his father's mind, the coffin is nailed shut: "This discussion," father shouts, "is over!"

Realistic situations? Or are we viewing episodes intentionally overdramatized to make a point?

Probably more the latter, if the truth be known. For what they are, actually, are role-play exercises, staged by members of The Masque, WPI's student drama society, for the benefit of incoming WPI freshmen and their parents. These and other mini-dramas—some live, some videotaped—along with a host of other presentations, no-holds-barred discussions and academic department exposure, are the makings of WPI's award-winning Orientation—"O" for short. And when they are played out before curious and often apprehensive freshman families—well, they can have a real impact on students' and parents' adjustment to that ineffable commodity called higher education.

"The whole idea behind Orientation," says Bernard H. Brown, Dean of Students and the creative force behind the program, "is not only to introduce the newest members of the WPI community to the college itself, but perhaps more importantly, to give them a glimpse of the kinds of *changes* that both students *and* parents can expect as a result of entering WPI—or any other college, for that matter."

A "veteran" father who sent his second son to WPI this fall gives other parents his perspective on the WPI experience.

Addressing the details of what it takes to succeed at WPI is not a trivial endeavor. For Brown, the logistics—handling the 200-plus freshmen and their parents who come for one of the three sessions in June, housing them overnight in campus residence halls, recruiting and training his 35 student Orientation leaders, and arranging for faculty and staff involvement—take time and unending attention to detail.

Yet it's the Orientation leaders, or "O-Team"—an elite corps of upperclassmen, some of them only a year into their own college careers—who are the lifeblood of Orientation. For the 36 or so hours that freshman families are on campus, members of the O-Team play host, facilitate group discussions and become resident experts, each leading a group of 30 or so visitors through the nearly 25 presentations, discussions, receptions and tours that are packed into the program.

"Sure," says the O-Team's Sean McShea, a sophomore industrial engineering major from Worcester, "it's a big commitment. We spend six months in training and working at Orientation, but we're all friends when it's over, and the excitement Orientation generates in freshman families makes it a good experience for us—even when you have to give up the last weekend of the summer."

Adds O-Teammate Lori Freeman, a chemical engineering senior from Stoughton, MA, "It's neat when the fresh-

"Orientation gave me the feeling that the faculty really care about my future."
—From a student.

"It was fun to stay in the residence hall where my daughter will be living."
—From a parent.

men actually get here for classes. Often they come up to me and say, 'I remember you from Orientation. Can you help me with . . .' this or that concern that's still new to them."

The O-Team embraces a cross section of the student population—campus leaders, fraternity members and independents, athletes, students from all academic departments. Meanwhile, "official" information and answers to concerns academic and institutional flow through a well-orchestrated, intensive series of seminars, workshops and informal chats led by deans, faculty and professional staff. Humanities Prof. Kent Ljungquist, for example, explains to parents and later to students what the Humanities Sufficiency is all about. Prof. Joseph Bagshaw introduces incoming Biology and Biotechnology students to his department. Janet Richardson, Associate Dean of Students, leads a session dubbed "The Living End and The Three R's: Rights, Roommates and Responsibilities." Director of Graduate and Career Planning William Trask addresses what the job market may hold four years hence. In all, some 25 faculty and 15 staff members introduce their particular specialties to the freshman families.

Says Dr. James E. Groccia, Director of the Student Counseling Center, "Orientation is a vital cog in the academic wheel, for both educational and psychological reasons." Educational, he says, by introducing students and parents to the system. Psychological, by forming an attachment to the college. With the help of O-Team members, Groccia leads separate workshops with students and parents on the transition from high school to college life.

"This transition," he asserts, "is one of the most crucial in any person's attachment-separation life cycle." Research has shown, he adds, that most college dropouts have failed to form a meaningful psycho-social attachment with the institution they leave.

Groccia's Orientation sessions address the concerns which he and his Counseling Center staff deal with most frequently: loneliness, family changes, academic and peer pressures, and the ups and downs—the exhilaration and the anxiety—which can grip nearly all college students, especially freshmen leaving behind all that is familiar to commence upon the next phase of their lives.

Typically, he says, students spend only 20 to 25 percent of their time in classes and labs. The other 80 percent finds them studying, pursuing extracurricular interests, watching *General Hospital*. And it's often the choices they make now, in the midst of pressures tugging at them from all sides, that can help sculpt the quality of their lives for years to come.

Meanwhile, back home, changes are in the works, too, though often they are not so obvious. "The family is a system," says Groccia. When one of its parts changes—in this case, a daughter or son leaves for college—the rest of the parts will probably change to varying degrees. "Don't be surprised," he advises students, "if Mom and Dad's and your siblings' relationships change when you leave. They may plan events like vacations without you from now on. Or maybe they'll make your room into a study or guest room they always wanted." Remember, he adds, starting college means a lot more than just coming up with the tuition.

To be sure, Orientation has a lighter side, a characteristic that foretells what for most students is a vital but subtle part of college life's "learning curve." For example, there's one O-Team member's good-

O-Team members pose outside Higgins House last spring.

"In the future, please tell parents and students how much *we* got out of it."
—From a parent.

"Now, I'm more confident about attending WPI in the fall."
—From a student.

natured recollections of his first roommate's foibles. Then there's the *WPI Tonight Show*, a wildly funny take-off on Johnny Carson's late-night television mainstay, hosted by professional comic Tom Parks. Here, "guests" such as Student Government and Interfraternity Council representatives, a Campus Police officer and a residence hall advisor play along with Parks's antics while giving their Harrington Auditorium audience a rundown of their organizations' functions and how students can get involved. It's an ingenious way of entertaining, informing and easing freshmen into the mainstream.

"In each of Orientation's four years," says Brown, "we've tried to bring in innovative ways of getting lots of information to lots of students and parents in a short period of time, hopefully without thrashing them with boring lectures."

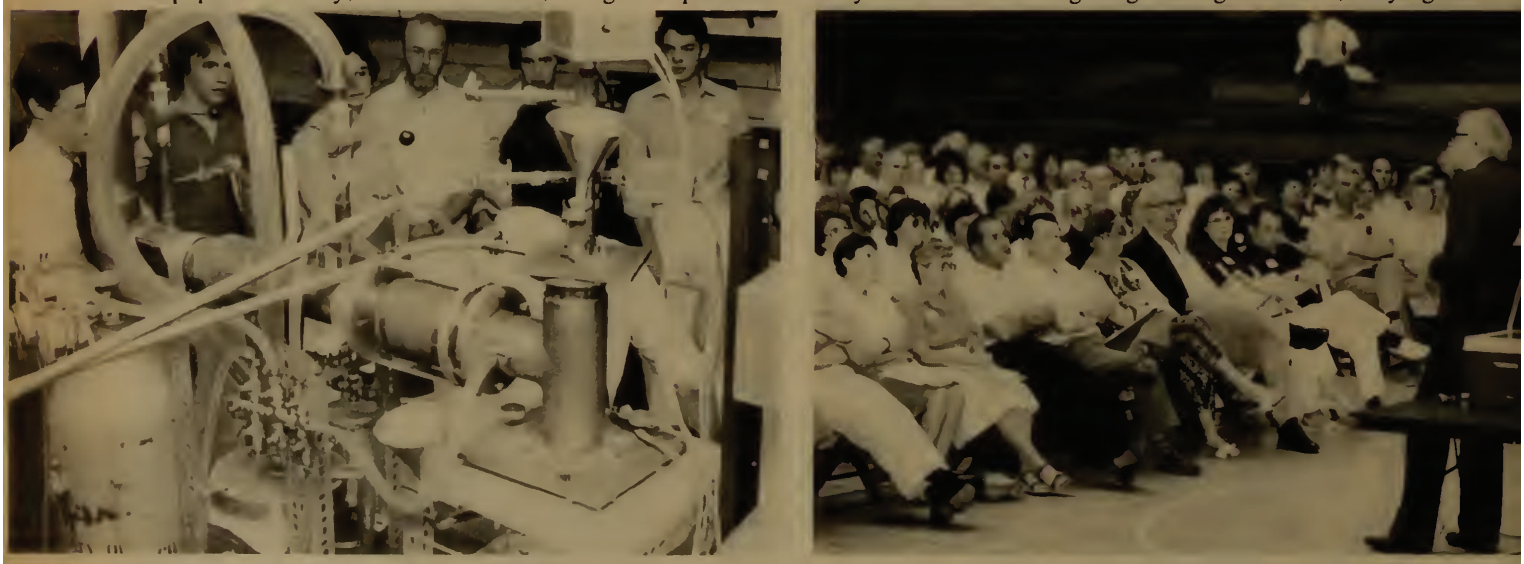
Yet all is not fun and games. In his fast-moving talk on WPI's computer science curriculum, for example, Prof. James Coggins advises students against running out to buy a personal computer just because they're about to enter WPI. "Spend your time now trying to write a decent paragraph, or learning to read the newspaper critically," he tells them, "because I just don't have the time, the patience or the inclination to teach you how to think." In another session, Dean John van Alstyne tells parents in hard, cold terms that even for the most gifted students, WPI is not likely to be a cakewalk. He relates war stories of courses failed, of dreams become disillusion, but stories, too, of students who have crossed sometimes staggering hurdles after stumbling at the start. Later, he tells students the same things. For both groups, the talk both humbles and inspires.

"You don't accomplish anything," van Alstyne contends, "by glossing over the facts. All we can tell them is that WPI will be tough, that social and perhaps romantic pressures will as likely as not distract them from the real reason they're here. But we can also assure them that there are people here to help." For students and parents alike, Orientation is a chance to begin forming a network of resources as well as to meet peers, faculty and the larger WPI community. "Parents need to know almost as much about WPI as their sons or daughters do," van Alstyne says. "They need to know our terminology, like MQP, IS/P, IQP, as well as our grading system and degree requirements." Only twice in four years, he says, have parents told him that his no-nonsense seminar turned them off to WPI.

Cheryl Delay is a sophomore mechanical engineering major from Bennington, NH, and a first-time O-Team member. Of the entering freshmen she got to know through Orientation, she says, "They're great! but so . . . well . . . young, I guess." And as soon as the words are out of her mouth, she blushes with the realization that she, too, was one of the "so young" just a short year earlier.

"You can see changes in the freshmen during the weekend alone," adds Karen Reardon, a junior from East Bridgewater, MA. Karen, like about a quarter of the O-Team, has served for two years as an Orientation leader. "Some freshmen arrive scared and apprehensive," she says, "but by Sunday afternoon, they can't wait to come back in the fall."

There's a special esprit de corps that develops on the O-Team. It's a closeness built on mutual respect and the result of days, weeks and months of what can only be called rigorous training. In January, as any good coach does, Bernie Brown begins gathering his team, relying on



Meeting the faculty: Professor Lenn Kupferberg gives freshman families a tour of a Physics Department lab (above left), and Dean John van Alstyne speaks to parents on academics at WPI.

"It was exhausting, but well worth not missing a thing."
—From a parent.

"Totally awesome!"
—From a student, of course.

interviews and the input of professors and counselors who know the recruits. And in spite of the fact that the team plays for free, more than 80 students applied this year for the 35 spots on the roster.

Brown makes his selections, and the team gets down to business, meeting weekly with faculty, deans and staff and in March retreating for a long weekend off campus at nearby Barlin Acres. Here, the tightness of the group really takes hold, as students with a variety of backgrounds, personalities and academic interests role-play situations likely to occur in Orientation, learn how to handle the tough questions they may face, talk candidly about themselves, share the cooking and other chores, and, of course, socialize together. It's here also that the coach begins to see which individuals will work best together—be it for one of those videotaped mini-dramas, for a question and answer session, or for leading a discussion group with students or parents.

Later, in the spring, Brown requires that each team member complete Oral Communication Specialist Kay Draper's four-week course at WPI. This serves as a final but non-trivial warmup for the role of host that he'll play throughout Orientation. Mrs. Draper's class is a piece of O training that members almost without exception recall fondly. Says Jean Kelly, a senior mathematics major from Natick, MA, "Even though we didn't always realize it, we were using every bit of that training."

Nearly all colleges offer some sort of freshmen orientation. The focus can be on academic advising and registration. It can be topical: one large university, for example, spent three days addressing with students and parents their roles in a world hounded by the threat of nuclear annihilation. Or it can touch on some combination of scholastic, social and secular elements.

But WPI orientation, says Brown, is different. "It has to be, simply because the WPI Plan—its curricula, its grading, its project emphasis, its calendar—is so different from conventional educational programs."

Look at the reaction from other colleges to WPI's orientation design. Last year, at the national conference of the 300-school National Orientation Directors Association, WPI was awarded top honors for orientation program materials. Karen Reardon accompanied Brown and three other O-team members to the conference. After an airing of a videotape of the *WPI Tonight Show*, she recalls, "We were flooded with questions about our format. Most often, though, people wanted to know how we 'entertain' students and parents." Apparently, she adds, a good many schools look at orientation as a perfunctory ritual.

As often as not, says counselor Groccia, it's parents who get the most out of Orientation, a program that has become, for all practical purposes, required fare for entering freshmen and strongly recommended for their folks. After all, he says, there is a special partnership parents have built with the daughter or son they are sending out into the world, often for the first—and last—time.

Yet in his talks with parents, Groccia urges them to encourage in their son or daughter, for the next four years, what he calls *positive selfishness*. "Say to your child: 'Here are four years and $40,000. Go and learn something. Don't worry about us; we'll take care of ourselves. Take on some new challenges. Start a profession. Feed your head. Become somebody.'" For most students, he asserts, this may be their last opportunity to be positively selfish. "For some parents, it may be their first chance to allow it."

Getting to know you . . . on Beechtree circle between Orientation sessions.

90 Years of Going with the Flow

Alden Research Laboratory Celebrates a Grand History and Prepares for the Challenges of the Future

By Michael Shanley

The instrument room, which overlooks the huge modeling area, is used for studies like the one of a Taiwan power system. From left are the minicomputer and digital voltmeter; the video terminal, which displays real-time temperatures in the model; and the automatic controllers for building atmosphere and sump water temperature.

The white Styrofoam balls stretch from the shore to the horizon, rows and rows of them perched atop the calm water of the bay in perfect symmetrical order.

Attached to each of the 500 or so balls is a temperature sensor. In the soft sand beneath the surface of the water, a series of blue and red wires run from the sensors to the shore. On the beach the wires meet to form a spaghetti-like tangle that vanishes beneath a wooden walkway before reappearing in the control center that overlooks the bay.

Inside the control center the wires attach to a computer system that scans 18 sensors per second. A video terminal displays the temperature at each sensor while another part of the automatic data acquisitions system provides a continuous series of temperature printouts.

At issue here is the effect the discharge of warm water from a nuclear power plant will have on the water of the bay. Tidal currents that reverse direction and change in intensity as they near the shore complicate the picture.

Perhaps the oddest thing about this bay, though, is that no fish swim in it. Nor is it ever rained on. Direct sunlight never hits it. Even at its deepest point the water is just 9 or 10 inches deep. The entire bay, in fact, measures just 81 by 167 feet. What's more, it's all indoors, inside one of the huge test facility buildings at the 20-acre Alden Research Laboratory (ARL) in Holden, MA, five miles from the main WPI campus.

ARL, which this year celebrates its 90th birthday, has for years enjoyed worldwide renown for its construction of elaborate physical models made of concrete, fiberglass, wood, sand, steel or plastic. The lab has simulated the workings of power stations, rivers, dams, spillways, breakwaters, shorelines, intakes and pumps to provide clients—usually a utility or an international engineering firm—with the information they need to determine how best to proceed with a proposed project or how best to solve an existing problem.

The water temperature study mentioned above offers a good example. The client is Taiwan Power Company; the bay is on the north coast of Taiwan. ARL was hired last year to look at the temperature patterns created by the discharge of 10,000 cubic feet per second of warm water into the bay. Of primary importance is recirculation. With roughly a two-kilometer distance between the point of discharge and the point of intake, it is vital that the water coming back into the plant not be too warm. As ARL Assistant Director Dominique N. Brocard explains, there is a lot at stake.

"Even a one degree Fahrenheit increase in the temperature of the water coming into the plant could cost as much as $2.5 million a year, because the efficiency of the plant would drop dramatically," he says.

In addition to scanning the temperature sensors, the computer system ARL is using for this study controls the inflow and outflow to the model to simulate the tidal currents. The hour-long tests, which cover one "real world" tide cycle, proceed with virtually no human interference.

After the lab has completed its tests, Taiwan Power will be able to choose from several options. Perhaps they will need to reverse the intake and discharge points, change the speed of discharge, move it farther offshore or build a dike between intake and discharge points.

While the work ARL does now is decidedly high-tech, models built in the past were no less impressive. In the late 1950s, for example, ARL built a 1 to 50 scale model of the Niagara Falls power project. The 600-foot long, L-shaped model was commissioned by the New York State Power Authority to check the effects of a proposed system that would take in water above the falls, carry it in twin conduits four miles under the city, and, finally, dump it into a canal that would carry the water to a projected power station.

In 1969, ARL modeled a 17-mile stretch of the Hudson River for Con Edison to determine how the warmed water from the Indian Point nuclear reactors would flow as the tides changed. That was the first of a series of models studying Indian Point, including one that is currently set up to study the movement of fish in the affected area.

ARL has also modeled the Patuxent River on Chesapeake Bay, the Mississippi and Colorado rivers, the Euphrates in Turkey, the Rio Grande in Brazil and the Palo Seco near San Juan, Puerto Rico, to name just a few.

In addition, ARL engineers do field work, traveling across the country or around the world to conduct on-site studies.

The lab is also known for its flow meter calibration facilities, which are among the largest and best in the world. Even minor inaccuracies in a flow meter (used to measure the amount of fluid passing through a pipe) can translate into huge sums of money, so precise measurement is a must. Meters big and small, old and new, are sent from all over the world to be checked out at ARL, where the calibration is accurate to within one quarter of one percent.

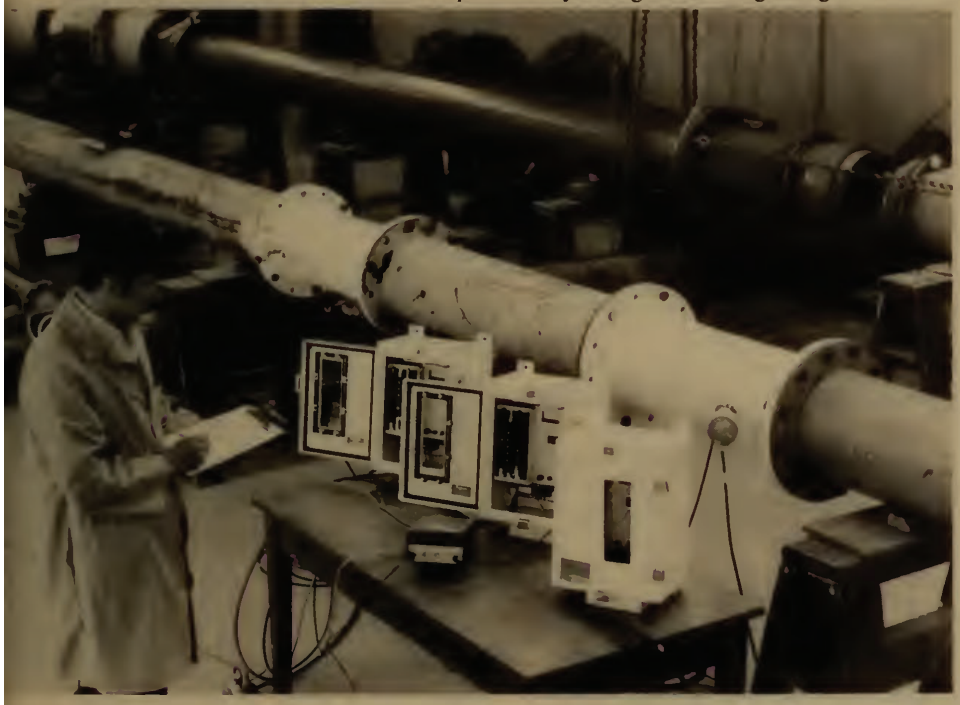
Despite its great scope of activity and its world renown, however, ARL remains something of an anomaly. For example, the lab is well known to hydraulic and fluid mechanic experts in places like California, New York, Egypt, Scotland, the Soviet Union, South America and Japan, but many students spend four years at WPI and leave without ever having visited—or even having heard about—the place. Albert G. Ferron, '57, who heads the flow meter operation at ARL, tells the story of one embarrassed client who called to get some calibration work done. "He was a WPI grad, but he never knew ARL existed," says Ferron. "Ironically, he had been referred to ARL by an RPI grad."

Another curiosity: ARL is perhaps WPI's most visible arm—its name is known across the globe, at least in certain engineering circles. Yet few people associate WPI with fluid mechanics.

The main WPI campus and the lab have always enjoyed an unusual relationship. At times, the lab seems to have been looked upon as a brilliant but troublesome stepchild that no one was quite sure what to do with. And although ARL is very much a part of the school, it is a "self-supporting research department," and ARL Director George E. Hecker emphasizes the 'self-supporting.' "We're totally dependent on research contracts," he says. "Without them, we simply wouldn't exist."

The term research here means not just "pure," National Science Foundation-type grants, though the lab does get some of those, but also applied research—studies conducted for clients—which make up the bulk of the work.

But to really understand what Alden Research Laboratory is today, it's necessary to begin at the beginning.



ARL calibrates flow meters to within one quarter of 1 percent by weighing the water for a specified time. Here two ultrasonic flow meters (the light-colored pipe) are calibrated.

Professor C. M. Allen at work in the lab's original building, circa 1898.

When George I. Alden stood atop that knoll in the Chaffins section of Holden one day in 1893 and looked out on acre after acre of woods, he knew he had found the spot. Alden, then head of the WPI mechanical engineering department, had for some time realized the need for a fluid mechanics research laboratory and was looking for the right place to begin one.

By the following year, he had arranged to have the site donated by Trustee Stephen Salisbury, complete with water rights to a 150-acre pond. He had also gotten the state of Massachusetts to kick in about $10,000, a good sum of money in those days. In 1894, in a small building moved to the site by horse and wagon, an experimental laboratory was established.

Alden, who would go on to help found the Norton Company and serve as its president and chairman, soon turned the lab over to one of his former students, Charles M. Allen. Alden would always support the lab, however, financing several projects during his lifetime and, through his trust fund, making possible a number of additions and renovations in later years.

At first, much of ARL's work involved the testing of water wheels, pumps, engines and turbines using the Alden Absorption Dynamometer, a water-cooled disc brake Alden had invented. Other testing equipment included a 36 x 16-inch Venturi meter—the first of its kind in the world—that had been on display at the 1893 Chicago's World Fair (and would, incidentally, be used until the 1970s) and a Fairbanks standard scale for weighing water.

Allen, who would direct the lab for more than 50 years, had a knack for laboratory work. He preferred to test theories by experiment and never really trusted anything that could be proven only on

ARL's rotating boom is a national historic mechanical-engineering landmark.

paper. He was also, as they say, a real character.

"He was physically impressive," recalls Lawrence C. Neale, '40, who worked for Allen and would later become ARL's third director. "He had snow-white hair from an early age and a peaches and cream complexion. He was about six feet tall, and weighed 200 pounds—he used to check scales by standing on them.

"He always, I mean *always*, carried a small tool kit with him—screwdriver, S-wrench, pocket knife, Stilson wrench, pliers, 6-foot rule. Mrs. Allen would sew special leather pockets into all his suits so the kit wouldn't wear through."

Allen was responsible for construction of the lab's rotating boom, built in 1908 as a circular test apparatus for hydraulic experiments and for rating current meters. The boom, now a national historical mechanical engineering landmark, was originally built of wood, but soon was replaced by a stronger steel model. It has been used over the years to test aircraft propellers, artillery shell ballistics, ship logs (which measure speed through water), minesweeper paravanes (devices that sever mine moorings) and water turbines.

Allen was the man who developed the salt velocity method of measuring water flow, a process of electrically recording the speed of a cloud of salt through a known amount of water in a measured length of pipe. The method would become an international standard.

"The amazing thing about Allen," says Larry Neale, "is that no one ever saw him do any calculations, except in his head."

Testimony to that is the way he developed the salt method. "You know," he was quoted as saying, "I've watched sheep going down a road, some run fast in the middle of the road and some dawdle by the side to eat grass—then they change and the ones in the middle get to the edge and those at the edge get to the middle, but the whole flock moves along at a steady rate. That's what water does in a pipe."

He was also among the first to use scale models to study fluid flow, constructing miniature dams and rivers for cities, towns and power companies.

One of Allen's favorite pastimes was appearing before various civic groups to lecture on "The Use and Abuse of Gasoline," a comic yet instructional presentation that featured spectacular demonstrations of fire breathing and exploding pans.

"I used to drive him to all the lectures," says Neale. "I think I counted once that I had seen it 19 times. He never tired of it, though."

Allen's right hand man throughout the 1930s and '40s was Leslie J. Hooper, '24, a brilliant young hydraulic engineer who, in 1950, would succeed Allen as director. Together, they authored a number of important technical papers.

It was Hooper who, beginning in the early 1940s, oversaw what would become a long association with the Navy. Much of the work, classified at the time, involved the testing of missiles, torpedoes, mines and rockets. High-speed cameras were used to record the projectiles' behavior. In later years, ARL would test Mercury and Gemini flight capsules to see whether they floated and how stable they were.

The early 1950s at ARL were devoted almost exclusively to Navy work. Then, in the late '50s, thermal discharge studies began, first for fossil fuel plants and, later, for nuclear plants. This work, in progressively more sophisticated form, would be an ARL mainstay through the '60s and '70s. Physical and mathematical modeling of waterways would also continue.

The late 1960s were a pivotal time for ARL. In 1967, Hooper stepped down and Larry Neale became the lab's third director. Military work pretty much came to an end. The nation was undergoing a fundamental change. Protests over the war in Vietnam were raging, and no longer was it fashionable for colleges to be associated with building the tools of war. Gone were the days when a college could proudly send out a news release (as WPI did) heralding the fact that it was helping the Navy design "more deadly and accurate weapons of offense and defense."

The following year, 1968, the new flow meter facilities were dedicated and calibration work expanded. In that field, ARL was now virtually in a class by itself; few if any could match it in size or quality.

Also around this time, the lab, which had always been part of the Mechanical Engineering Department, became an independent department.

By the 1970s, ARL's reputation had spread and the lab now had more work than it could handle, much of it because of expanded plans for nuclear plants and, at the same time, growing concern about the environment. There was a rash of thermal-discharge model studies. During those peak years, as many as 60 people were on the ARL payroll—a far cry from earlier decades when from six to 12 employees staffed the lab.

Also during this period, the lab underwent a subtle but fundamental change, the seeds of which were sown as early as the late 1960s. Few probably noticed it at first, but an era that had begun in 1894 was ending. No longer could things be run informally. The days of contracts okayed with a handshake or a phone conversation were gone.

Larry Neale, who resigned as director of ARL in 1975 after a nearly 40-year tenure at the lab, has memories of the past that illuminate the present. "I remember vividly the years when three or four of us would sit around the fireplace in rocking chairs discussing the day's work. We were often paid out of Allen's personal checking account or from checks from clients.

"And in those days, everyone did everything—concrete work, carpentry, digging, you name it. There were times when everybody except Mrs. Lawrence, the secretary, was down pouring concrete."

The change to a more structured organization (the lab now consists of four divisions: Applied Fluid Mechanics, Open Channel Hydraulics, Flow Measurement and Machinery, and Research and Devel-

opment) was less the product of a conscious decision on anybody's part than a response to the demands of a changing world. Equipment was more sophisticated and more expensive. Clients were demanding formal proposals and complex contracts. Time became more of a factor. So did liability. This last issue would escalate until, for a time last year, there was serious thought given to making ARL an independent organization.

George E. Hecker, who took over as director when Neale left, explains: "Because so much of the work we do is applied by the client to a 'product,' if you will, we could be held responsible if something should go wrong. And, in the case of a nuclear power plant having to be shut down, for example, the cost implications would be tremendous." Ultimately, reasonably priced liability insurance rates were secured and the crisis was averted.

By about 1980, the pendulum had swung again and research contracts at Alden declined. A number of things contributed to the slowdown. Cost overruns and public fear over the Three Mile Island incident had virtually halted the construction of new nuclear plants. In fact, few power plants of any kind were being built.

"The recession forced a reduction in power demand," says Neale, now chief hydraulic engineer for the Boston firm of Charles T. Main. "Fewer factories were running, and there was little new construction. There was simply no need for new power facilities."

Neale also points to increased competition on the international market. "There is model study work now being done in developing nations like Pakistan and Argentina that could be done faster and better at Alden. But these countries want their own people to learn how to run things."

ARL is located on 20 wooded acres in Holden, MA, five miles from WPI.

Pure research contracts continue to fund a fraction of the lab's activity but, as Hecker points out, ARL is at somewhat of a disadvantage in this area: "NSF and others who fund basic research lean toward facilities that are staffed with a full-time academic faculty." ARL's competition in this category comes from schools like the Iowa Institute of Hydraulic Research at the University of Iowa, the St. Anthony's Falls facility at the University of Minnesota, California Institute of Technology and Massachusetts Institute of Technology.

Student participation at ARL, too, has declined. For years, all civil and mechanical engineering majors did lab work out at Alden as part of their required course of study, but student interest in hydraulics and fluid mechanics has always been cyclical. In the 1950s a general decline in interest in the laboratory aspect of education cut the numbers. Then, during the early to mid-'70s when the lab was very busy, there was renewed student interest. As many as 15 graduate and 30 undergraduate students were doing work at ARL. Currently, there are just one graduate student and a handful of undergraduates.

The current decline in students at Alden is, at least partly, traceable to a changing world.

"Students have a lot more choices now," notes Neal. "With electronics, computers and other new fields, there's simply more competition for a student's time."

William W. Durgin, who was at ARL for about 12 years before leaving to become a full-time ME professor at WPI, points out the contributions students have made over the years.

"Students conduct studies and contribute ideas that are of great help. They helped WPI carve out a special niche. And, from a practical point of view, students working on master's theses can do a big chunk of work for a small amount of money. But the greatest asset is the vitality and boundless energy of students."

Another change at ARL is a greater emphasis on computer modeling of flows. A more powerful main computer was recently installed to allow sophisticated simulations like the one done of the Lantao Bay in Hong Kong.

Field studies have also increased, especially for flow measurements in power plant cooling systems and hydro-power stations. Many such measurements use the dye dilution method, a process ARL recently improved to the point where accuracy is on the order of one percent. Such pinpoint measurements allow plants to improve efficiency, which takes on greater importance now that few new plants are being built.

In the physical modeling area, interest in renewable energy sources has resulted in several ARL studies of "low head hydro" projects, which produce electricity from rivers with large flows but relatively low height water drops. In this category would be the many regulating dams on the Ohio and other great U.S. rivers.

Flow measurement at ARL, which traditionally has represented about 25 percent of the lab's work, is still going strong. Al Ferron reports he is booked several months in advance.

As for the future, one thing's for certain: coming trends are virtually impossible to forecast. Some predict a serious power shortage in the next decade if new plant construction does not pick up.

"There are great fluctuations in this business," says Assistant Director Brocard, "and we often end up having either too little or too much work. But that's one of the exciting things about it."

As ARL turns 90 and looks toward its centennial, no one is really sure what the lab will be like 10 years down the road. Whether you consider that to be exciting or disconcerting is akin to seeing the proverbial water glass as either half full or half empty.

It's clear, however, that the lab has always rolled with the punches and changed with the times. The smart money says the glass is half full.

Michael Shanley is Director of the WPI News Bureau.

A Lab By Any Other Name...

If you think you've noticed something peculiar about references to Alden Lab over the years, you're right. The place has had four different names: Hydraulic Testing Laboratory (1894), Alden Hydraulic Laboratory (1917), Alden Research Laboratories (1965) and Alden Research Laboratory (1977).

FACULTY FAVORITES

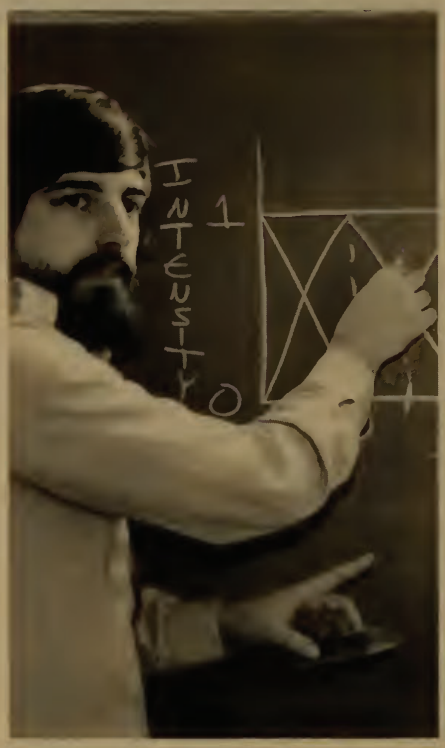
We all read in our spare time—newspapers, magazines, books, billboards. For most of us, the paper we thumb through would add up to a small mountain were we to collect it over the years. And when it comes to books, there may be one or two whose reading leaves us with a special message that we carry with us—for life.

Ever wondered which volumes affect professors in this way? We did, so we invited WPI's faculty to tell us about their favorite books. What we found was that the books faculty read on their own time are as often as not far afield from their professional specialty, yet their selections may tell us a lot about these folks as people outside the classroom or laboratory. The assortment embraces fiction and non-fiction, technical and biological works.

One thing is clear: the faculty whose book reviews follow were moved by their readings. We offer these critiques for your own reading pleasure as well as, perhaps, to offer you candidates for your own reading list.

Computer Power and Human Reason: From Judgement to Calculation

by Joseph Weizenbaum
W. H. Freeman and Co.,
San Francisco, 1976



James M. Coggins

The Computer Science Department offers a course entitled *Introduction to Artificial Intelligence*. When people first hear this, their reactions often take the form of either amusement or skepticism. People unfamiliar with computers are amused and ask, of course, whether we accept people with natural intelligence. People with some computing experience express similar amusement until they realize that I am serious, then they display a strong skepticism. "How can the idiot machine ever do anything remotely resembling intelligence? I have programmed computers before, and I know that there's not a breath of intelligence in those things."

Computer Power and Human Reason is a book written by an Artificial Intelligence (AI) researcher (Weizenbaum is a professor of computer science at MIT) arguing against some of the directions being taken in AI research. Weizenbaum does *not* doubt the potential of computers to behave intelligently. His careful discussion of the power of computers is at least enough to convince the reader that there is more to computer science than programming languages, programming techniques and advanced programming, a common misconception among WPI students (and faculty, if the truth be told).

Weizenbaum's conflict is over the ways in which AI technology should be applied to human problems. His position is, at one level, that computers should not be used in certain situations (psychotherapy, for example) even if they can be programmed to simulate a human in that situation, because many of our problems are uniquely human in origin and need uniquely human solutions. We are what we are partly because we must grow up, because we have two legs, because we have a thumb, and because we hold certain views of the world. Weizenbaum argues that no computer, no matter how advanced, can or should be expected to act with the wisdom and understanding needed to satisfy uniquely human needs.

On another level, however, Weizenbaum seeks to awaken scientists and non-scientists alike to what he calls the "imperialism of instrumental reason." The thought process that we denote by the terms "decide," "deduce" and "compute" has become the accepted mode of "rational" conversation and argument—one based on calculation. To express "beliefs" or "feelings" or to make "choices" or to have "hunches" is no longer an acceptable basis for ideas—we have begun to denigrate human judgment. If we limit our consideration to calculation, then the computer will soon join us as a calculating, rational thinker. Weizenbaum argues that we must not ignore or dismiss the process of human judgment as a basis for valid ideas. (For further reading, see "The Causes of Wars" by Michael Howard in the *Wilson Quarterly*, Summer 1984, in which the author attributes war to a "superabundance of analytic rationality".)

Computer Power and Human Reason is not an easy book to read, but it is an important one, though Weizenbaum's tendency to wax metaphysical sometimes obscures cogent points. This is not the work of some irrational pseudo-philosopher, but of the creator of ELIZA, one of the earliest AI programs. Nor is it the work of an anti-technology pseudo-intellectual. Weizenbaum has no doubt that computers can in principle behave "intelligently." His argument concerns the desirable limits of the application of this technology.

—James M. Coggins
Assistant Professor of Computer Science

Too Long a Sacrifice: Life and Death in Northern Ireland

by Jack Holland
Penguin Books, New York, 1982
Hardcover published by
Dodd, Mead & Company, 1981

In the early 1960s synthetic fabrics and Japanese steel undermined the linen and shipbuilding industries of the six provinces of Ireland that are still part of the United

Michael Carroll

Patrick P. Dunn

Kingdom of Great Britain and Northern Ireland. Realizing the need for industrial modernization, Terrence O'Neill, elected Prime Minister of Northern Ireland in 1963, began mobilizing talent regardless of race or creed, building bridges to the Catholic minority of Ulster. After all, he explained, "If you give Roman Catholics a good job and a good house they will live like Protestants because they will see neighbors with cars and television sets."

For many of the Protestant majority, O'Neill's "language of modernization" meant "sell-out." Followers of the Presbyterian Minister Ian Paisley responded with a campaign to execute known members of the Irish Republican Army. No IRA member was executed, but an elderly Protestant woman was killed, a drunk shot, and a bar blown up before the violence subsided.

In response to O'Neill's initiative, Irish Prime Minister Lemass signed an agreement to pursue matters of common economic interest. And back in Northern Ireland efforts were made to end discrimination against Catholics in employment, housing allocation and political redistricting.

In England, meanwhile, Labourite Harold Wilson, who had once called the ruling Unionist Party in Ulster "quasi-fascists," was Prime Minister. To Paisley and his followers, it seemed as if the IRA dream of a united and independent Ireland with an overwhelming Catholic majority might yet be realized. They organized to counter local civil rights rallies, culminating in the August 1969 "Battle of the Bogside," which brought in British troops.

The IRA played no role in these conflicts—indeed in the Catholic ghetto "IRA" stood for "I Ran Away." But from the ashes of burned-out Catholic ghettos arose the Provisional IRA, with its symbol, appropriately, a phoenix. Thus began the current round of "troubles" in Ulster.

Author Holland, of mixed Catholic and Protestant heritage, chronicles and analyzes events from 1969 to 1982. A journalist by training, he blends personal experiences with interviews and written accounts. In the end he condemns the violence wrought on the population by all sides of the struggle.

While not ignoring history, Holland stresses how the current situation differs from the past. The IRA of history was a rural-based guerilla army recruited from poor farmers steeped in conservative Irish culture. The soldiers of the Provisional IRA are urban youth, educated, many with service in the British army, underemployed, frustrated, and with liberal to leftist political ideals. They confront a Protestant majority whose identity has been weakened by economic decline and English betrayal (home rule in Northern Ireland was abolished in 1972).

Holland concludes, "It would seem reasonable to suggest a look at other kinds of political and economic relationships between Belfast, London, and Dublin which would satisfy the national aspirations of the vast majority of the Irish people while at the same time giving protection, and some degree of autonomy, to the local, northeastern Protestant population." For, as Yeats wrote over a half century ago, it has already been "too long a sacrifice . . . O when may it suffice?"

—Patrick P. Dunn
Associate Professor of History

Michael Carroll

Laura Menides

Everything That Rises Must Converge

by Flannery O'Connor
Farrar, Straus and Giroux,
New York, 1965

Flannery O'Connor was working on her volume of short stories, *Everything That Rises Must Converge,* when she died in 1964 at age 39. Like her two novels *Wise Blood* and *The Violent Bear It Away,* these stories are remarkable—imaginative, comic, even bizarre, yet spiritual and deeply, humanly true. Surely they rank among the masterpieces of American literature.

The title story of *Everything That Rises Must Converge,* like most of O'Connor's fiction, takes place in the American South shortly after desegregation had become the law of the land. The story at first seems a simple tale of a clash between generations, a typical mother-son conflict, she clinging to old-fashioned ways and he college-educated and modern. The son finds his mother burdensome, and we readers are apt to find her so as well: her silly talk of her new hat, her exercise classes with other "girls over fifty," her fond memories of her genteel, white Southern upbringing, her condescending attitude toward blacks, whom she calls "darkies," her conviction that things were better for the black race before desegregation. The son, Julian, thinks (and again we tend to agree) that she needs a lesson, and that justice has triumphed when she undergoes a series of humiliations on a newly integrated bus, culminating when a black woman comes aboard wearing a hat identical to his mother's. Julian's gloating becomes excessive, however, as does the anger and verbal abuse which he directs at his mother.

We begin to question our earlier identification with him—we might even be ashamed of it—as we see how limited and

insensitive he is, how pompous, how superior he thinks himself, how condescending toward his mother, and how cruel. Julian's own realization comes late, at the dramatic ending of the story, when, stripped of his sense of superiority, he is ready to enter "the world of guilt and sorrow."

Without being the least bit preachy, O'Connor's story has a profoundly religious effect on readers, for it suggests not only the Fall of Man, but also the need for grace and redemption. Like all great literature, it makes us feel and think deeply; it helps us discover what it means to be human.

—Laura Menides
Assistant Professor of English

The Poems of W B Yeats

Edited by Richard J. Finneran
Macmillan, New York, 1983

William Butler Yeats (1865–1939) is arguably the most important poet to write in English since the Great Romantics, whose ideas he perpetuated and developed further. Unlike the Great Romantics, however, Yeats remained fully vital as a citizen and poet throughout his life.

Perhaps Yeats's greatest achievement was always to remain open to new sensations, new opinions, new ideas. Early (as in "A Coat") and late (as in "The Circus Animals' Desertion"), he proclaimed the need to return to everyday human experience—"the foul rag and bone shop of the heart"—as the basis of a poetic art that would not lose touch with the common reader.

He mastered all the techniques of his trade in his twenties, and by mid-career he had brought to perfection the rhetoric of 19th-century Romantic poetry—mythological allusions (both to Irish and classical sources), nature descriptions infused with a sense of spirit, and the universalizing of his own experience. Yet his greatest strength was always to suspect and subvert that very rhetoric. Thus he avoided the fate of the later Wordsworth or Tennyson, for whom the sound of the language came to outweigh its sense.

Yeats's life spanned a turbulent period in history—from the end of our Civil War to the outbreak of World War II. As a young man, though, he grew up at the end of the Victorian era, when many expected the new commerce and technology to ensure world stability. World War I came as a terrible disillusion. As he wrote in his great war poem, "Nineteen Hundred and Nineteen":


Michael Carroll

Lance Schachterle

The night can sweat with terror as before
We pieced our thoughts into philosophy,
And planned to bring the world under a rule,
Who are but weasels fighting in a hole.

Yeats recognized that by nature he was contemplative rather than actively outward-going, leading him to fear the constriction of too narrow a range of experience. Thus from 1900 on, he forced himself to pursue a life of public activity and service. His poems on the Irish Civil War provide a moving record of his despair over the apparent death of Irish patriotism ("September 1913"), his recognition that his loss of hope was premature ("Easter, 1916"), and his shock over the outrages of the Civil War itself ("Meditations in Time of Civil War"). And when the Irish Republic was proclaimed in 1922, he accepted the burdensome responsibility of becoming a member of the first Senate, where he applied his considerable skills in prose to arguing public policy in areas like copyright, coinage and divorce. In 1923 he won the Nobel Prize for literature. Reputedly his first question was: "How much does it pay?"

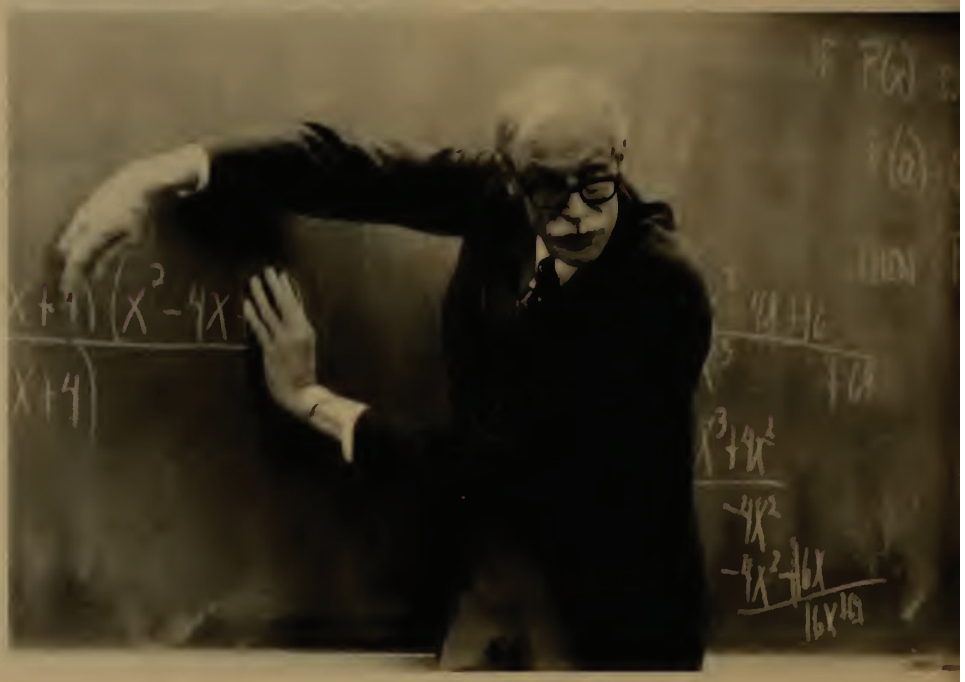
This new edition of all of Yeats's published poems—and many he did not collect in his various reprints—provides accurate, clear texts with helpful notes by both Yeats and the editor, Richard J. Finneran. The poems are presented in the order which Yeats himself devised for his own various collected editions, an important feature since Yeats often juxtaposed lyrics to contrast or expand upon his central themes. This handsome and reasonably priced volume thus provides the full record of Yeats's career as a poet, and many helpful explanations of his personal references to historical and political figures. It is a wonderful way to get to know the work of Ireland's greatest poet.

—Lance Schachterle
Professor of English

The Big Sky

by A. B. Guthrie, Jr.
William Sloane Associates, New York, 1947

Most historical novels contain all the elements of a painting by Pieter Brueghel—



John Van Alstyne

lots of color, action, and people. A. B. Guthrie, Jr.'s *The Big Sky* is painted in more subtle hues. This is the work of a consummate storyteller, one who can sustain the reader's interest even though the emphasis is more on creating a mood than on providing action. The novel deals with that extraordinary band of mountain men who explored and understood a virgin West before the coming of the wagon trains. But it is more than just a story. It is an elegy for a wilderness of both utter beauty and stark raw nature, written by a man who was reared in Montana in the early part of this century.

The story begins in 1830 when the protagonist, Boone Caudill, flees his home in Kentucky and heads west to trap beaver. In St. Louis, he meets one of the first mountain men, Dick Summers, and together they head northwest into the Rocky Mountains. There is a fascination in the contrast between the raw, uneducated, angry young man, at odds with life forces seemingly beyond his control, and the older experienced hunter, wise in the ways of survival, who has found a way of life that has given him an inner serenity. There is no happy ending here. The time of the mountain man spanned only slightly more than two decades in our country's history. By 1843, the time setting for the final chapters, both men knew the days of freedom from civilization were fast coming to an end.

Perhaps because of the contemplative nature of this work, *The Big Sky* never attained a success commensurate with the almost universal critical acclaim it received when it was published in 1947. Guthrie's next book, *The Way West*, packed with the people and action of a wagon train heading for Oregon, won the Pulitzer Prize in 1950. Yet for me at least, *The Big Sky* is a book to be cherished and reread by anyone with a love of nature and an interest in the history of our country.

—John van Alstyne
Dean of Academic Advising

Confessions of an Actor Laurence Olivier

An Autobiography

Simon and Schuster, New York, 1982

Ask anyone of this century to name *the* actor of the century, and I would wager most people would say Laurence Olivier.

Confessions of an actor. Intriguing. Yet other actors have confessed: John Barrymore (whew!), Shelly Winters (did she ever!), Marlon Brando (who told his story to someone else), Shirley MacLaine (again and again), and many more (though few as sensationally as these named). Yet none, I dare say, would compare in greatness to Olivier! Therefore we could assume that his confessions would (Hopefully? After all he was married to the notorious Vivien Leigh) be greater than the others': He must have drunk more than Barrymore, sworn more than Winters, caroused more than Brando, been reborn more than MacLaine.

Michael Carnill

Susan Vick

Yet his confessions seem rather ordinary. Nothing truly sensational leaps from his pages. Maybe history would be spicier had he told someone else who then could have written the "confessions" for him. But, oh! What we might have lost had Olivier succumbed to the lure of the luxury and ease of having someone else write (sensationalize?) his book for him. For, in the process of writing this book, Sir Laurence struggles—to express his ideas, his emotions, to recall his memories accurately. No one has led him away from him. What he gives us is pure Olivier—maybe not spicy, maybe not easy reading, and some of it, perhaps, downright drudgery to get through (not much of it). Yet his words ring so true that we may rejoice to hear confessions that so clearly and directly come from the greatest actor of our time.

I'm asked the question, from time to time, by people outside the theatre profession: "Is Olivier really that good?" It's hard to believe he's as good as we all say he is. Yet we may have begun to take his great talent and wonderfully developed skills for granted: hard not to do with someone who as an actor has been in our films, on our stages, and upon our picture tubes for almost as long as many of us have been alive.

My question has never been: "Is he that good?" I always knew that he was. I'd been haunted by his Heathcliffe since I first saw "Wuthering Heights" in virtually the same year I found out the truth about Santa Claus. I've driven over a hundred miles to see his Max de Winter in "Rebecca" without commercials on the big screen. His "Richard III" sparked my intense and eternal interest in Shakespeare. And his performance in "Marathon Man" kept me out of the dentist's chair for too many months!

My question always has been: "Can someone who can absorb and project so many characters so completely be a complete person of his own?" Indeed he can. Look no farther than his confession of a debilitating almost six-year stage fright so great that, when he performed Shylock, he did "something that I knew went against the conscience of all of us who had worked so long for a genuine company spirit: I asked them not to look me in the eyes in any of my scenes." Enjoy the richness of his faith in, and love for, his dear friends, and relish the stories of them:

> I got my dearest old friend on the phone one day and asked him, "Ralphie [Richardson], be an angel and think a minute for me"—there's a friend. "Should I go to Hollywood and play Heathcliff in 'Wuthering Heights'?" Ralph obligingly thought for a moment and then said, "Yes. Bit of fame. Good." For some reason I had the greatest misgivings about the offer, but after that mini-colloquy I didn't have them any more.

He was not above a prank or confessing to the resultant reprimands by theatre managers early in his career, nor does he find anything unsophisticated in arriving at astonishingly simple conclusions: "Shakespeare could look after himself and look after, too, the actor who trusts him."

Olivier lets us know that the greatest can also be the most human. My question has been wonderfully answered with a resounding: "Yes!" And although Sir Laurence takes us through some dry spells, the profound insights into life, love and the acting profession which he gently yet persuasively offers us throughout his

Confessions give stunning proof of the power of *true confessions.*

—Susan Vick
Assistant Professor of Drama-Theatre

Powerline: The First Battle of America's Energy War

by Barry M. Casper and
Paul D. Wellstone
University of Massachusetts Press,
Amherst, MA, 1981

and

Love Canal: Science, Politics and People

by Adeline G. Levine
Lexington Books, Lexington, MA,
1982


Michael Carroll

John M. Wilkes

In recent years there has been a considerable increase in the general level of awareness about potentially serious side effects of technological development. Yet while the environmental and public health portions of these studies have started to reach a reasonable level of sophistication, the social impact sections are generally quite crude. It is therefore noteworthy that social scientists have begun to conduct case studies of well-known incidents. Sociologist Adeline Levine's study of *Love Canal* and the account of political scientists Casper and Wellstone of the siting of a *Powerline* in rural Minnesota are two such accounts.

In keeping with the traditional interests of social scientists, each account focuses on the development of a politically significant social movement at the grass roots level. Each resistance was sparked by a perceived threat to the homes of those directly involved. Both trace the process by which average citizens become politicized and gradually learn how to mobilize influence. There the similarities end, however, as the groups involved and the settings differ greatly. One wins; the other loses. One resists the creation of a potential threat, while the other finds out that they are victims after the fact.

Powerline involves a resistance movement by rural farmers who are led slowly to set aside their law-abiding instincts to mount an all-out effort to stop the proposed construction of a high voltage D.C. powerline across their cropland. The fury of the farmers takes them from open debate and mass demonstration to passive resistance and harassment, to open confrontations with the police and outright acts of sabotage. In a final desperate effort to take back control of the apparatus that seemed to be oppressing them, they run a candidate for governor—and garner a third of the statewide vote. Though they fail to stop the line, they so alter the social and political atmosphere in the state that the authors consider it unlikely that another such line could be built in Minnesota during the remainder of this century.

Bibliographic sketches of key resistance movement figures give the account special shock value and integrity. We learn that some of the leading farmers totally committed to preserving the land as a sacred trust are actually technically trained individuals—with sojourns at places like Raytheon and the Bureau of Mines—and some with advanced technical degrees dotting their resumes. They are really technical dissidents raising a challenge to the way of life they left behind.

Love Canal chronicles the troubles of the residents of a working-class neighborhood in Niagara Falls, who awaken to the fact that their school is built on top of an abandoned chemical dump "sold" by the Hooker Chemical Company to the city for a dollar and a waiver of responsibility. Subsequent construction of houses, roads and sewers had perforated the original clay cap, and a witch's brew of toxic chemicals was leaking through the neighborhood underground.

On finding that they might already have received serious exposures to carcinogens, as well as suffered a range of immediate physical discomforts, and a miscarriage rate several times the national rate, the residents organized an increasingly mediawise political campaign to get enough of an indemnity from the state to allow them to abandon their contaminated and worthless homes. The main portion of the account involves the process by which they organized themselves to press their demands on a political apparatus greatly concerned about setting precedents that would involve the state in a quagmire of open-ended legal and financial commitments. The cost has exceeded $68 million to date.

These dramatic cases gave social scientists ample opportunity to explore classic sociological and political themes. They also presented a golden opportunity to assess the promise of classical social science methods and perspectives for the study of technology. Yet their opportunity is at best only partially realized. It is unfortunate that the structure of Casper and Wellstone's account does not provide much latitude for post-hoc analysis of technology issues not anticipated by the authors. The *Powerline* case had great potential, but methodological problems limit what can be done with the account beyond its immediate purpose of chronicling the development of the opposition movement.

Levine's greater familiarity with the canons of qualitative analysis, and the observer's role, along with her self-conscious application of cross-validation techniques, helped her to produce a more balanced account of the incident in its social context. (Casper, who we discover had run for state office on the movement's party ticket, was not as careful in this regard and became a full participant in the movement.) The result is that Levine produces a more credible and objective account, despite the fact that both Casper and Levine side with the citizens' groups in the end, and both focus their primary attention on their respective movements, tactics, successes and failures.

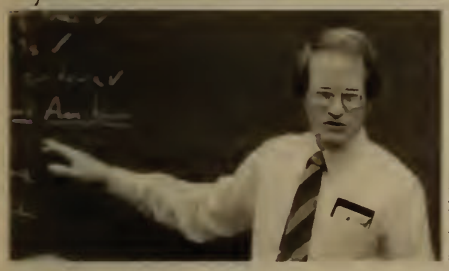
These books demonstrate that the qualitative side of social science has much to offer those interested in technology assessment and impact analysis. Unfortunately, much of this promise will remain a potential rather than an actual contribution unless concerned technologists with inside information about the basis for technical decisions start to produce high quality accounts of this kind or team up with social scientists determined to test and cross-check their perceptions systematically.

—John M. Wilkes
Assistant Professor of Social Science & Policy Studies

WHY TEACH?

Teaching is a red-eye, sweaty-palm, sinking-stomach profession, says an experienced university professor. What keeps him teaching?

By Peter G. Beidler



Bernhard J. Suess

Peter G. Beidler, Lucy G. Moses Professor of English at Lehigh University, was named 1983's Professor of the Year by the Council for Advancement and Support of Education (CASE). A Chaucerian scholar, he is back at Lehigh this fall after a year's sabbatical in Canterbury at the University of Kent where, among other things, he wrote a book about Henry James's *The Turn of the Screw*.

Why do I teach, my friend asked? I had just told him that I did not want to be considered for a certain university administrative position. He was puzzled that I did not want to realize my full potential by becoming a serious candidate for what was obviously a "step up," an opportunity to achieve what all American boys are taught to want when they grow up: money and power.

It may be, of course, that I teach because I never did grow up. It may be that, as I approach too rapidly my 45th birthday, I find a strange comfort in spending my life among other adolescents who have not yet jumped onto the great upward treadmill. I confess that my favorite students are first-semester freshmen: a little afraid, awed by the prospect of *really* learning, thrilled to be treated like adults for the first time in their lives, yet willing to admit in a candid moment that they really do not *feel* like adults. I like those first-semester freshmen because, at least early in the semester, no one has yet told them about things like rush, all-night parties, guts, and how to get through college without learning much.

It may be, then, that I teach because I feel at home in the company of people who feel a sense of wonder—almost fear—about learning, who have not yet quite grown up, and who are not entirely sure they will be safe when they have. But surely that is not the only reason I teach. I have grown up. I have no desire whatever to be a first-semester freshman again. I am happy to leave the uncertainty and frustration of being 18 to those who are 18. Why, then, do I teach?

My friend did not really want to know why I want to stay in teaching. He had more important things on his mind. But *I* want to know. And if I cannot write it down, I do not know it. So here goes.

Let me try to be what I tell my freshmen writers to be: organized. First, I shall discuss some of what are not the reasons why I teach. Then, I shall try to sort out some of what are the reasons.

I teach not because teaching is easy for me. Teaching is the most difficult of the various ways I have attempted to earn my living: bulldozer mechanic, carpenter, university administrator, writer. For me, teaching is a red-eye, sweaty-palm, sinking-stomach profession. Red-eye, because I never feel ready to teach, no matter how late the night before I stay up preparing. Sweaty-palm, because I am always nervous before I walk into that classroom, sure that I will be found out for the fool that I am. Sinking-stomach, because I usually walk out of the clasroom an hour later convinced either that my fly must have been unzipped the whole hour, or that I was even more boring than usual.

I teach not because I am a natural-born public speaker. I tend to mumble my lectures, fumble my facts, jumble my jokes, and stumble my interpretations.

I teach not because I think I know answers, or because I know a body of information I feel driven to share with others. I occasionally take a look at my teaching notes for a work I taught several years earlier and am appalled at what I see. Did I really say *that* about the pink ribbon in "Young Goodman Brown"? *Surely* I did not tell my Chaucer students that Chaucer's Prioress is frustrated because as a nun she could never have babies. To think that my students sometimes actually take notes on what I say in class!

I teach not because I look handsome in front of a class. I look like someone who had Ichabod Crane for a father and Prudence Pimple for a mother. I have bad posture, thick glasses, and thinning hair that sticks out at funny angles. As my sons never tire of telling me, I wear untrendy clothes, even (shudder) flares. Robert

Redford would look natural in front of a class. I look like something that the mower just kicked out from a damp lawn. Someone videotaped me once as part of a "teacher self-improvement" project. I wanted to improve, but I could not bear to watch to the end of the video replay over in the media center. It was no fun seeing myself as others had to see me.

Why, then, do I teach?

Come to think of it, there are lots of reasons why I teach. I teach because I like the pace of the academic calendar. A crass way of putting it is to repeat what one sardonic teacher replied when asked why he taught: "I teach for three reasons: June, July, and August." I like June, July, and August myself, but less because they get me out of teaching than because they offer a change of pace, an opportunity to mix rest, reflection, research, and writing, all key ingredients in my recipe for teaching. It is not that the summers are less effort. It is that they are different effort.

I teach because teaching is a profession built on change. Even when the material I teach is the same, *I* change from semester to semester, and, more important, my students change. No two classes of students are alike. If I read *Moby-Dick* one way this year, I'll read it another way in two years. If I do read it the same way, William and Sally in 1984 will be replaced by Thomas and Heather in 1986, and different students make the novel a different experience for all of us who are talking about it.

I teach because I like the freedom to make my own mistakes, to learn my own lessons, to stimulate myself and my students in ways that seem right to me at the time. As a teacher, I am my own boss. If I want—as I did several years ago—to try a creative writing course in which my students analyze *Redbook* magazine to see what kind of fiction the editors are buying, I can do it. If I then want to urge my students to try to write for publication in *Redbook*, I can do it. I do not have a boss telling me that I must teach my students to write like William Faulkner. And if, as in the current semester, I want to teach a freshman composition course in which my students learn to write not by reading someone else's textbook, but by writing their own, well, who is to say I may not do it? The course may be a colossal failure, but we can learn—and our students with us—from colossal failures.

I teach because I like to ask questions. Although I am often uncertain about whether I know worthwhile answers, and am usually undistinguished as a lecturer giving students information, I think I have gotten better at asking questions which are good for students who struggle to answer them. The world is full of the right answers to bad questions. I teach because in doing so I sometimes brush up against good questions. This fall, for example, I asked my freshman writing students to write an essay not about the food in the university dining room, but about the loneliness only a freshman in the first week away at college can understand.

I teach because I like to learn. Indeed, I stay alive as a teacher only so long as I am learning. One of the major discoveries of

my professional life is that I teach best not what I know, but what I want to learn.

There was a time some years ago, for example, when I wanted to learn about the role of the American Indian in our American literary tradition. I learned by teaching a course on the subject, by taking some students with me on a pathway of discovery. That particular pathway, incidentally, was to lead me to a postdoctoral fellowship in anthropology at the University of Arizona, and later to a sabbatical year living with my family on the Hopi Indian reservation in northeastern Arizona. And, just last year, the pathway led to my taking another class of students back with me to the Hopi reservation to interview some Hopi people. None of that would have happened had I not set off on a quest for knowledge by teaching a course on something I knew almost nothing about.

I teach because I enjoy finding ways within an ivory-tower profession to get myself and my students out of the ivory tower from time to time and into the so-called "real world." I have already mentioned the *Redbook* course and the Hopi course. Perhaps another example will show better what I mean. In 1976 I taught a course called "Self-Reliance in a Technological Society." It was in some ways a normal enough ivory-tower kind of course. My 15 students read writers like Emerson and Thoreau and Huxley. They kept journals. They wrote term papers.

But there was a less normal aspect of the course. My students and I also set up a corporation, borrowed money from a local bank, purchased a run-down house on Vernon Street near the university, and spent "lab sessions" during the semester practicing self-reliance by completely renovating the house. Then, at the end of the semester, we sold the house, repaid our loan, paid our corporate income taxes, and distributed the profits among the students. Certainly this was not your average English course. To some people it seemed more appropriate to a vocational-technical high school than to a respectable institution of higher education. But 15 future

PETER BEIDLER ANSWERS A FEW QUESTIONS ABOUT TEACHING

How much freedom do you give your students to cut your classes?

Not much. I generally require attendance. Occasionally something magical happens, and I want my students there both to experience the magic, and to make the magic happen. I let students call me by my first name, but I don't let them whisper among themselves or read newspapers in class. That is an insult to me and to the other students, and I see no reason to encourage insulting behavior. I let them sleep in class, if they will. It is their job to get to class; it is my job to make it worth their while staying awake.

So teachers should be entertaining?

Entertaining is fine, if it comes naturally to a teacher, and if he or she can be entertaining without forgetting that teaching is essentially a serious business, demanding serious thought about difficult subjects. I have always liked teachers who were enthusiastic about their subject better than those who entertained in less honest ways.

How do you prepare for your classes?

Long and late. I try to think of every question that will bring from my students answers they will remember. But I try to keep in mind also certain basic points or subjects I want to make sure my questions bring out.

What effect do you think television has had on education?

A generally depressing one, I am afraid. It is not merely that young people who are watching television are not reading or making their own entertainment. It is more that television trains viewers to receive rather than give, to observe rather than participate. Oh, I am aware that there are many fine "educational" programs on TV. Education is not something one observes, however; it is something one *does*. And just as I seldom lecture in my own classes, so I seldom see a television program that involves viewers in the wonderfully active process of learning. I'd rather a child wandered for one day in the wilderness than watched a documentary on the migration patterns of deer.

Are there any unpardonable sins in teaching, any sins which students ought not to forgive?

Lots. One is laziness. Students know when a teacher is not working hard at teaching, and rightfully resent it. Another is being bored and boring. Learning is the most exciting thing in life, next perhaps to falling in love. A third sin grows out of the other two: Teachers who think that teaching is merely a question of conveying what they have learned are probably both lazy and boring. Teachers who have forgotten what the thrill of discovery feels like ought to go—at least temporarily—into a new field where they are forced to experience that thrill firsthand.

Do good teachers also need to be good publishing scholars?

Teaching and scholarship are intimately related. Both teachers and scholars need to know how to ask good questions and offer sensible answers. Both need to know firsthand the thrill both of discovery and of introducing new concepts to strangers. The best teachers I have had—Wayne Booth and Burke Severs—have also been the most solid and steady scholars. Most teachers who get stale in the classroom are also stale as scholars. They have stopped discovering.

lawyers and accountants and English teachers and industrialists, many of whom had never had a tool in their hands before, suddenly found themselves reading Thoreau's *Walden* with fresh eyes. They knew why Thoreau went to the woods, how he built his cabin, and why he felt so good about his experiment that he wanted to tell the world about it. They also knew why, in the end, he left the woods and the cabin to try other ventures. He had tasted the waters of Walden Pond. It was time to move on to other nectars.

I teach because teaching gives me many nectars to taste of, many woods to enter and then leave, many fine books to read, and many ivory towers and real world experiences to discover. Teaching gives me pace and variety and challenge and the opportunity to keep on learning.

I have left out, however, the most important reasons why I teach.

One reason is Vicky. My first doctoral student, Vicky was a somewhat noisy, enthusiastic, energetic young bubble who had trouble seeing past the thrill of literature to the rigor of academic scholarship. But she plugged away at her dissertation on a little-known 14th-century poet. And, while still in graduate school, she hammered out a couple of articles and sent them off to learned journals. And she started applying for jobs, entering a sluggish market in which the few job openings were both depressing and avidly sought after by the hordes of bright young PhDs who found them so depressing. Vicky did it all herself, with only an occasional smile or nudge from me, but I was there when she finished her dissertation, got word that those two articles were accepted, and landed her job. And I was there a couple of months ago when I got her letter saying she had won a National Endowment for the Humanities fellowship to spend a year at Harvard working on a book further developing some of the ideas she had germinated as a graduate student.

Another reason is Patti. Smart, opinionated, and brash, Patti raked in the A's, started up a local chapter of a national English honor society, went on to law school. Now a lawyer for the Department of Environmental Resources, she is still smart, still opinionated, and still brash as she gives industrial violators of the Clean Air Act a hard time. I was there the day she came into my office and told me about Rob.

There is Greg. Sensitive and creative, Greg majored in English as a stepping stone to becoming a novelist. I was there last fall when he wrote asking whether, bored with clerking in a bookstore, he would be making a mistake to apply for a teaching assistantship in a graduate English program somewhere. It does not matter that I told him if *I* really wanted to be a novelist, I would go to sea for a year. It does matter that I was there when he started asking himself the right questions.

There is Julie. Julie was sure she was not a good student, but her kids were growing up and she asked if she could sit in on one of my classes (but not for credit) to see if she was college material. I told her she could, provided she came to all classes, did all the work, and took all the tests. I was there when, right after the first test, she came in and, weeping, apologized because she knew she had failed it, even though she had studied for it night and day for two weeks. It does not matter that I later had the task of telling her she had gotten a low D, not an F, or that on the next test she got a solid B. It does not matter that in the end she decided against college after all. It does matter that I was there when she asked.

There is Jeanne. Jeanne used to sit cross-legged on the other chair in my office. She started to run away from college, but some of her classmates brought her back because they wanted her to be around when we all finished the self-reliance house on Vernon Street. I was there when she came back. I was there when she graduated.

There is George, who still sends me sardonic Christmas cards showing, for example, Santa Claus caught in a mouse trap in the pantry on Christmas eve.

There is Lois, who married a bee farmer and has three babies and is delighted that she majored in English.

There is Jacqui, a cleaning lady who knows by intuition more than most of us ever learn by analysis, who has just decided to finish high school and go to college.

There is Nadine, who needs to borrow $1,000 from each of 10 people to keep that little publishing company afloat.

These are the real reasons I teach, these people who grow and change in my presence. Being a teacher is being there, being present at the creation, when the clay begins to breathe. I take no credit for the moment of life, but I can think of nothing more exciting than being somewhere nearby when the breathing begins.

A "promotion" out of teaching would give me money and power. But I have money. As a teacher I get paid for doing the kinds of things I enjoy most: reading books, talking with people, making discoveries, and asking questions like, "What is the point of being rich?"

And I have power. I have the power to nudge, to fan sparks, to ask troubling questions, to praise an attempted answer, to condemn hiding from the truth, to suggest books, to point out a pathway. What other power matters? Who besides a teacher has so much power?

There is one other enticement that teaching offers besides money and power. It is love. Not only the love of learning and books and ideas, but also the love a teacher feels for that rare student, that one student who walks into the life of a teacher every year or two or three, that student whom teachers get to see begin to breathe. It is not romantic love, though it can easily be mistaken for that. It is not filial love, for these are not one's children. Perhaps love is not the right word for that sense of magic I refer to.

Whatever it is called, I teach because, being around people who are beginning to breathe, I occasionally find myself catching my breath with them.

CLASS ACTS

A look at four professors and their professorial methods—with borrowings from Socrates and closed-circuit TV—makes one thing plain: Good teachers are hard to define, easy to recognize.

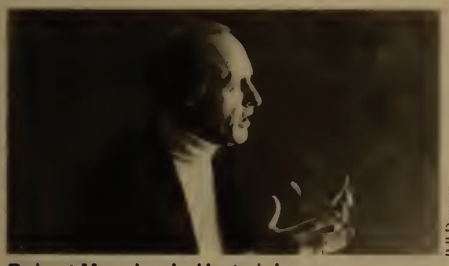
By Joe Levine

Bill Denison

Walter Eppenstein, RPI

Bill Denison

Carlton Staples, WPI



Bill Denison

Robert Mansbach, Hartwick

Bill Denison

Nancy McDowell, Franklin and Marshall

WALTER EPPENSTEIN

He turns *Physics II* lectures into polished productions.

Sometimes a movie is produced so well that people say afterward, "I would have enjoyed it for the camera work alone." Walter Eppenstein's weekly *Physics II* lecture is that kind of show. It plays at Rensselaer Polytechnic Institute every day except Friday, and regularly draws a crowd of 500. It features the short, dark figure of Professor Eppenstein, conducting demonstrations at the front of the theater. It also features him on the two giant television screens hanging in the front wings. And on the four hanging from the ceiling way in the back, and the two that span the middle. Portions of him—his fingers, pointing a Venus No. 2 pencil at a series of equations—can also be glimpsed on four enormous overhead projector screens.

Eppenstein is not an egomaniac, he's a realist. In a lecture hall large enough to hold 500 people, a blackboard and a pointer simply won't do. Students need to be able to follow every step of the extremely complicated equations; to be able to watch experiments involving minute pieces of equipment. Eppenstein's projection of himself from every corner is done surely in the interests of accessibility.

But the sophisticated video equipment is, in another very important sense, a reflection of the man himself: he created it.

"You can't simply go out and buy educational equipment of this kind, because quite often it doesn't exist," Eppenstein says. "You have to design it yourself."

Thus even the one-time visitor to *Physics II* is assured of seeing Eppenstein's most important contributions to his field: the equipment with which he's teaching. He designed, and pioneered the use of, the large-size overhead projector, now commonly used in science lecture courses at colleges around the country. He was the first lecturer in his field, 25 years ago, to make use of "transparencies," projector slides of clear plastic, bearing equations written in brightly contrasting colors. He also developed a popular series of experiments for lecture hall use, and then miniaturized all the equipment so that it can be filmed by a closed-circuit television camera.

His students don't take the technology for granted. "The lectures and demonstrations are really easy to follow, and that's the most important part of the course," says Robert Seretny, '87. "He's even got a lot of the lecture material on file in the library, so that you don't miss anything taking notes."

Step into a lab section of *Physics II*, and you can see more of Eppenstein's handiwork. Each student's lab station is equipped with a microcomputer for instant tabulation of data; the microcomputers are in turn hooked up to a central Apple terminal that can analyze data for the class as a whole.

"We still make students run some experiments without computers, so they don't lose touch with what it is they're actually doing," Eppenstein says. "But obviously the computers save a great deal of time."

Eppenstein is that rarity among tenured faculty at any university: the professor who has devoted himself entirely to quality teaching. His research and publications are numerous, but nearly all are concerned with improved teaching methodology in

his field. In the list of his journal publications, titles such as "The Use of An Overhead Projector in Demonstrations before Large Groups" and "More Visual Aids for the Physics Lecture" abound.

"I've always felt that students should get the best possible teaching, because they're certainly paying enough tuition for it," he says. "Our department is a good one, in that it has some people who specialize in research and some who specialize in teaching. I've always happened to be good with teaching and people, so I've stuck with those interests."

Eppenstein, on first meeting, seems more the absent-minded laboratory physicist than he does the departmental hub of communication with students. He is short, bespectacled, and speaks with a German accent. He grew up in Turkey, after fleeing Hitler's government, and was educated at Robert College, an American institution there. He was originally an electrical engineering student; he got into physics when the college had a teaching position open in that department.

"Things just sort of happened that way," he says. "I have no regrets."

He came to the States in 1947 and took a job at RPI that same year. Since then, he has been increasingly involved with the quality of student life—and not just through his work on teaching aids.

"At this point, I wear a lot of hats," he says, somewhat ruefully. He is the director of *Physics II* ("One thousand students and 19 instructors need an arbiter for their differences, and I'm it."); director of advising and counseling for all physics students (last spring, he received RPI's Darrin award for counseling); special advisor to transfer students; supervisor of industry internships; and, to top it all off, associate chairman of the Physics Department.

"Budget-wise, that means I'm supposed to spend half my time on administrative stuff and half on academic," he says. "In reality, it works out that I spend three-fourths of my time on each."

Eppenstein, an evangelist for his field, is especially concerned about the ever-widening split between the sciences and the humanities. "These days, the average science student has some background in the humanities, or at least the ability to acquire some—but students in the humanities have less and less training in the sciences and, consequently, less ability to get any if they want to."

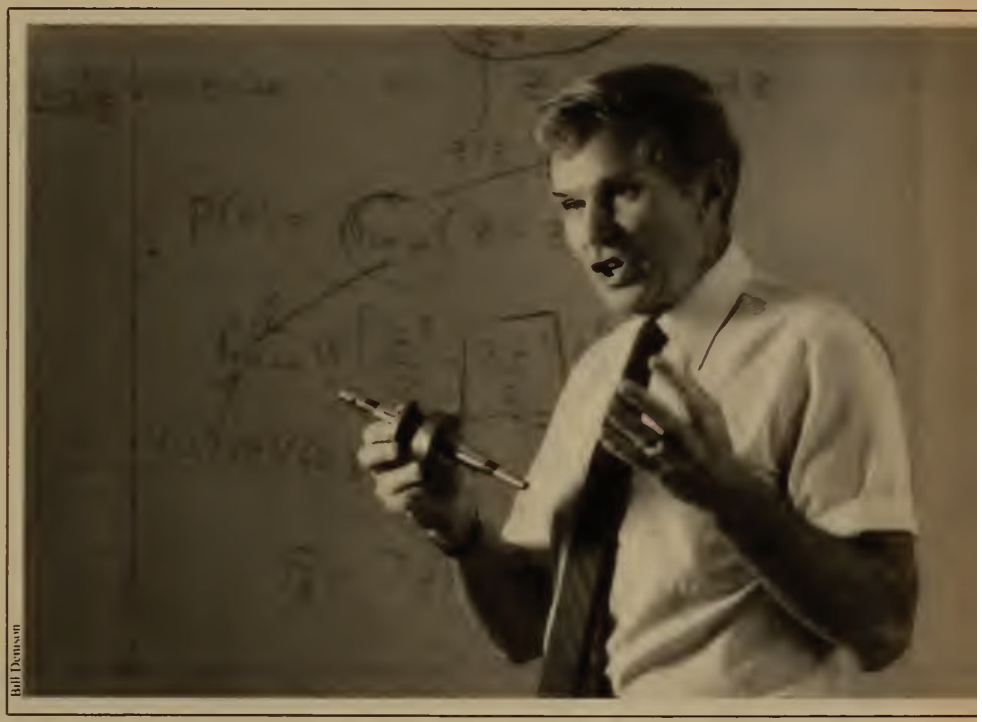
Along with other faculty at RPI, he has tackled the problem at its roots, outside the confines of the university, in the local public-school system. They've proposed to the National Science Foundation that the traditional high-school curriculum be reversed, and the idea is being tested at a high school in Troy. "We're having them teach physics in ninth grade, chemistry in tenth, and biology in eleventh, on the theory that this forms a better knowledge base," Eppenstein says. "We're also computerizing the lab experiments the way we have here, so students get a feel for that kind of equipment at a very young age."

But perhaps the most successful strategy the RPI physicists have employed in winning youthful converts is The Magic Show. "Every January, we give demonstration lectures to high-school students—we bussed in 1,500 of them this year," Eppenstein says. "The shows consist of typical physics experiments, but ones that look fairly spectacular to audiences." There are laser displays, nitrogen-dipped rings leaping off magnets at the flick of a switch to fly up to the ceiling, and rockets shot off across lecture halls. The shows have an immediate practical value: "Quite frankly, they keep the kids awake," he says. But they also bring some color and excitement into a discipline which, Eppenstein feels, too often neglects to convey what is exciting about itself.

"When I was younger, I always tinkered and built things on my own, but there was no teacher who ever really stirred my interest," he says. "I wish I'd been exposed to these kinds of demonstrations, but it was war time and the quality of the education just wasn't that good. When you learn a lot of things by memorizing, you tend to forget them, but you remember these shows years later."

CARLTON STAPLES

He is happiest when he can teach hands-on projects.


Bill Denson

Like medical students scratching their heads over their first flesh and blood patients, the aspiring engineers in *Mechanical Design Applications* have run into a problem beyond the scope of theory. A memo from "The Boss" directs each of them to submit a design for the same kind of speed gear reducer unit—a machine part which slows down a spinning shaft—that "The Company" has been buying for years for use in its pulverizing mills. (It seems the supplier has upped his prices.) The Boss wants the entire unit designed in the shop, with the exception of the worm and the worm wheel gears; these can be purchased from the buyer's catalog. The Boss means business: it is Friday, and he wants the designs on his desk at Worcester Polytechnic Institute by Monday afternoon.

"Oh, come on," groans Paul Furtado, '85, as he sweats over the drawing on his desk. "Sometimes I think half of what we've learned since freshman year doesn't apply in this course."

The Boss is not unsympathetic to this problem.

"I know it's a frustrating course for them," says Professor Carlton W. ("Spike") Staples. "It's the first time they've had to deal with practical problems after all the theory. They've gotten so used to plugging in formulas and getting exact solutions that they've forgotten how to use common sense."

Spike Staples is a softer boss than the hard edges of his name might suggest, and "Monday afternoon" readily becomes Wednesday for those having troubles with the speed reducer unit.

"He's tough and fair, and all that, but at heart, he's really a pussycat," one student says. "I don't think you'll find anyone who doesn't like him."

At 59, Staples still has a military crispness to his bearing (he saw active duty in World War II and Korea), but it is offset by the mild, amused air of a teacher who for 36 years has watched students grapple with their first "open-ended" problems. "Design is a gray world; it's not an exact science," he reflects after class. "So many of the decisions a designer has to make are on the basis of gut feeling. I can help students intelligently approach the choices they have to make, but I can't choose for them. In that sense, they're on their own, and it's tough."

On Friday, Staples takes the class through the different steps of designing the speed gear unit. There is no single right way to do it, and the important thing seems to be knowing what to think about when you choose. Efficiency and budget are the big concerns in a business situation, and Staples, whose own designs for industry run from bottle labeling to textile manufacturing, is not about to let his aspiring engineers forget either concern. Like their professional counterparts, the students are required to keep engineering notes, explaining all their decisions.

For instance, a shaft has to be fitted through the hole in the hub of the worm gear. The hole is a stock size (remember, the worm gear is being ordered from the catalog) *larger* than the corresponding shaft needed to transmit the necessary amount of torque. There are a couple of alternatives: the engineer can either "machine down" the shaft, leaving just a shoulder that would fit the hole; or he can "bush" the hole down to mate with a smaller shaft (a bushing is a liner that fills the space between the shaft and the hole).

"Does anybody want to venture an opinion on which way to go?" Staples prods the class. They are all silent, perhaps fearful of the horrible foul-ups in the pulverizing mills that result from wrong choices. "Look, both are viable alternatives," he

reassures them. "Come on, somebody."

A student raises his hand. "I'd use the bushing."

"Good. Why?"

"It's cheaper than machining down the shafts."

"Good. Why else?"

Genuine puzzlement this time. "Two separate parts reduce the stress concentration," Staples answers himself, after letting the class sweat for a minute or two.

Similar choices follow. How should the bushing be secured to the shaft—glue, or mechanical fitting?

"Whichever you choose, do not say 'glue,'" Staples says sternly. "'Glue' is a term that has horrified everyone. Say 'Loctite,' or 'Permabond,' and it's more acceptable."

A key-fitting allows for easier disassembly in the event of problems. But should it be a Woodruff key, a Gibb Head, or a square key?

And so on. The choices multiply. Staples brings new ones to the class's attention periodically, pacing the room and answering questions as the students labor over their designs.

"I've grown increasingly disenchanted with myself as the great lecturing ham," he says later. "These are essentially work sessions. I'm there to guide students, to interject information as they need it, instead of trying to stuff a whole mass of it into their notes and memories—where it will disappear after 24 hours."

Staples is happiest when he can teach entirely through hands-on projects, answering questions as they come up. "We all know that learning by doing is best," he said. "Unfortunately, it can't always be that way, because you still get down to a certain base of information that has to be transferred into students' brains before they can work effectively. They've got to understand the formulas they're using, or it could be very dangerous—we'd have a hell of a lot of incorrect applications of theory."

One place where he can completely avoid being "boxed in" by the need to lecture is WPI's Project Center in Washington, D.C. Twice in the past 10 years, Staples has spent a semester at the center, supervising Interactive Qualifying Projects. The IQPs give students a chance to tackle the "real-life" problems—often non-engineering in nature—of companies, federal agencies, and special-interest groups. Staples is quick to point out that many engineering students will end up doing exactly this kind of work. "If you look at the high-management positions in a lot of companies," he says, "they're often filled by people who have gone the engineering route, without even necessarily getting an MBA." The common denominator with mechanical design is the problem-solving approach, and Staples says that students doing their IQPs often realize for the first time the full value of courses like *Mechanical Design Applications*.

"Maybe they'll never do any practical board designing, but they've learned to use the engineering process," he says. "They know how to develop empirical relationships which allow them to plug data into an information base. It's a transferable skill."

Staples, who prefers working with undergraduates because "you can do more for them," was voted WPI's Outstanding Teacher in 1979 by both students and faculty.

"I prefer teaching to working in industry because teaching doesn't box you in," he says. "It's always different. Students change, they never approach things the same way as the last bunch, and they make me change strategies and assignments. I like to say that this has been an experimental course for the last 36 years."

His strongest suit as a professor is the obvious personal enjoyment he brings to the work. He thinks solving problems is fun.

"You should really like this course," the syllabus promises students in his *Design of Machine Elements* class. "Come on in and enjoy the logic and freedom of design." The "freedom" of open-ended design problems—the uncertainty and seeming imprecision which irritate and frazzle new students schooled in rigid mathematical formulas—is what turns him on.

"I think you added wrong there," a student says crossly while Staples is demonstrating stress factor calculations on the blackboard.

"So I did," replies The Boss, unfazed. He corrects the mistake.

"A lot of professors do that," whispers Walt McConaghy, '85. "Just remember, he's designed gears you'd need a PhD to understand."

ROBERT MANSBACH

His classroom is a battleground for opinions on controversial topics.

It's the kind of story most of us label a soap opera situation and then promptly forget, glad we're not the ones who have to pass judgment:

Dr. Daniel Fremont had first treated Francine for a broken jaw when she was 11 years old. He suspected child abuse, but could not prove it, and concluded that reporting it would only cause the girl more problems at home. Seven years later, Francine, pregnant as the result of a casual affair in college, visited Fremont, now a practicing obstetrician and gynecologist, and asked him for an abortion. Fremont learned she had indeed been abused and molested by her father when she was a child. He performed the abortion because she seemed mentally on a fine edge.

A number of years after that, Fremont's best friend, Tom, a devout Roman Catholic, fell in love with Francine, and she became pregnant. He convinced her to marry him and have the child, and he persuaded Fremont to take her on as a patient.

However, Francine told Fremont privately that she didn't want the child and was afraid she might harm it; she asked for another abortion, and begged him to tell Tom it was for medical reasons.

Fremont refused, the couple was married, the child was born; a year later, Francine killed it with a blow to the head. When Tom understood the full story, he made an unsuccessful attempt at suicide. He later asked Fremont, "Why didn't you tell me about Francine?"

The Hartwick College students in Professor Robert Mansbach's *Biomedical Ethics* course—most of them future nurses—couldn't just forget this story, because it was the sort of situation they might one day encounter professionally. It was also their mid-term exam.

They had to answer, not once but three times, the question of whether Fremont had acted ethically in his dealings with Francine. Had he acted ethically in the view of a Roman Catholic teleologist—that is, were his actions consistent with his vision of an ultimate goodness that is God, even if the situation had shifted to challenge his natural law principles? Had he acted ethically in the view of a Kantian deontologist—that is, did he keep inflexibly to certain principles, regardless of the final consequences? And, most important, had he acted ethically in the view of the students themselves?

"The reason for studying Kant and Roman Catholic natural law is so the students will see that there are people out there who have formulated approaches to problems like these," says Mansbach, a 54-year-old Lutheran pastor. "I'm not asking them to choose one of these approaches, just to learn how to go about building their own. If they come out of the course with the self-knowledge to do that, I'm satisfied."

Self-knowledge, Mansbach says, begins with recognizing that one may already be a deontologist or a teleologist. "I write down some of the things students say at the beginning of the course—value-laden statements like 'This is wrong' or 'I couldn't do that'—which they've never really examined before. I try to help them see that underlying these statements is usually a fairly consistent ethical approach."

Mansbach is tall and stooping, with an air of gentleness further suggested on this rainy day by gray tweeds and a forest-green turtleneck. He looks a bit like the actor McLean Stevenson, and pokes the same kind of quiet fun as Stevenson's character on *M*A*S*H*, Col. Henry Blake, who presides unflappably over the polemics of his eccentric crew.

"How about that rain, Professor Mansbach?" a passing student says in the cafeteria.

"Forty days and forty nights," the pastor replies amiably.

Mansbach needs his easygoing style. His classroom is a battleground for opinions on controversial topics, and his job is both to fan the flames and to keep the battles bloodless. In the class discussion of

the Fremont case, he divides his students into two groups, those who think that the doctor acted ethically, and those who disagree. Each group must decide upon the principles and goals underlying its position, then present them to the opposition. Discussion leaders emerge by a process of natural selection as the groups hammer out an internal consensus. Mansbach plays the role of facilitator as he walks back and forth between the two camps.

He leans over the circle of Fremont's supporters, who are having trouble finding a starting point for their set of arguments. "Why don't you consider each of his decisions as separate cases, and isolate the principles involved in each of them?" he suggests. To the students engaged in condemning Fremont: "The law requiring anyone with knowledge of child abuse to report it was not yet in effect. He wasn't legally bound to do anything."

Once the debate gets under way, however, Mansbach throws a wrench in the works at every available opportunity, even at points when the students seemingly get sidetracked onto other issues.

"What I want to know is, how can you be so concerned about his role in the baby's death if you don't consider abortion as a kind of murder?" a woman in a red sweater demands suddenly.

There is an uneasy silence, punctured by a groan from the back of the room. "Uh-oh," someone whispers.

"Come on, now," a blond woman in the pro-Fremont camp says. "we're not discussing whether the government can tell a woman what to do with her body."

Most eyes turn to Mansbach in a mute appeal for rescue from this digression.

"Gee, I don't know," he says thoughtfully. "Are you saying, then, that a fetus is a part of a woman's body? Like an arm or a leg?"

For the next 15 minutes, he lets the class debate the complexities of the abortion question. At a particularly heated moment, however, he finally holds up his hand. "It looks as if you're all saying that you'll have to decide how you feel about abortion before you tackle the issues in this case."

The back and forth of the classroom discussion is what Mansbach thrives on, and it seems to be the most important reason he is a full-time professor and only a part-time pastor. (He still shares the pastoring duties at three Oneonta churches.)

"Students really bring something to the equation," he says. "In a sermon, obviously, the structure is such that your audience doesn't respond then and there, and that's probably too bad for both you and them. There's no chance for argument and debate. Your listeners may be stirred to great thoughts when they get home, but you don't hear about it. It would be the same thing in class if all I did was speak and all they did was listen."

He's well aware, however, of the fine line between heated discussion and chaos, and sometimes the line has to be drawn. At a particularly heated moment, he finally holds up his hand, calling for a pause.

"There has to be structure," he says later. "Real freedom of thought is instilled through structure. The students have to get used to dealing calmly with views that are foreign and even repugnant to them, so they can analyze and fully understand what is being said. You don't work through disagreements in real life by taking the attitude that the other person is just plain wrong and not worth hearing out."

Mansbach, who won Hartwick's Bunn award for outstanding teaching in 1984, rarely intrudes his own views in class discussions, although he recognizes that "it's probably good if my students know what I think every now and then." He seems concerned that they will feel he's trying to sell them his own values. "I tell them in the beginning that I'm a Christian and a Lutheran, and that it will probably give weight to my teaching," he says. "I admit that I'm deontologically inclined, because I may have some underlying presuppositions which I'm not fully aware of, and I want them to be forewarned."

He saves his preaching for outside the classroom, but even there, he has a scrupulous respect for viewpoints that differ from his own. "There's been quite a resurgence of religious involvement in American political life," he observes. "I might not agree with some of the specific viewpoints of the ultra-conservative Protestants, for example—and I certainly think they have to be careful about what they try to impose on other people—but on the other hand, I don't think the framers of the Constitution ever assumed that religion should be completely separated from taking part in discussions on the wider arena of life."

In *Biomedical Ethics*, Mansbach's task is to help students face the overwhelming issues of modern medicine without becoming callous. "My hope is that, whatever their views, they don't end up as ethical egoists," he says. "Those are the people who say, 'How can I achieve the greatest possible good for Me?' Some people become that way when they can't develop perfect solutions to problems that they see happening again and again."

These days, Mansbach feels confident about combatting such disillusionment. "It's funny how things seem to go in cycles," he says. "When I came here in the fall of '68, students were very much concerned with the Vietnam War, the draft, and race relations. Then, for a period after that, it seemed as if they turned inward for a while, perhaps because they were disappointed that there hadn't been as much change as they'd expected. Now I feel as if there's a swing back the other way, particularly on questions of relations between the individual and the state, such as gender and age. It's not the burning concern of the Sixties, but it's there."

Over the years, the issues in *Biomedical Ethics* haven't lost any of their complexity. Back in the classroom, Mansbach throws another complex "soap opera situation" at a student.

"Oh, Lord!" She throws up her hands. "I don't know what I'd do."

"Well, you wouldn't move to Hawaii," Mansbach responds. "You'd deal with it."

NANCY McDOWELL

An anthropologist, she pushes students beyond their cultural biases.

Not long after Nancy McDowell began to live among the Bun, a primitive tribe on the Yuat River of Papua New Guinea, she committed the classical anthropological *faux pas*. For two days, the chief, who lived a few huts away from her, had been beating his wife, and McDowell could no longer stand the screams. So she imposed her own values on the situation.

"Basically, I ran in, stuck myself between the two of them, and called him every name I could think of in several languages, some which he could even understand," recalls the anthropologist, who wears glasses and usually exudes the kind of gentleness that puts nervous students at ease. "He didn't kill me, because they still have a fear of white people which is a holdover from colonial times. But I figured I was finished in that village, that they'd kick me out, or even worse, put on some sort of good-behavior act for me."

They did neither. The day after she had "interfered," a group of the villagers came to her and told her they were glad that, by attacking the chief, she had finally shown her true colors.

"They said they had been wondering when I was going to start acting like a white person," she says. "They'd been worried about what I would do when I saw them fight, but now they knew I was just going to call them a bunch of names. I was white, but at least I wasn't some bureaucrat who was going to run and tell the government." She laughs. "The result was that I got to see a lot more fighting, which is certainly their natural behavior, and I'll tell you, it wasn't always the men who won. If a woman was angry enough, and she could grab something first, the man often got the worst of it."

There's a lot in this story that the students in McDowell's course, *Women And Society*, could learn from. On a warm September afternoon, they are discussing *Women In The Forest*, a study of the Amazon Mundurucu women, by the husband-and-wife team of Robert and Yolande Murphy. The book describes, among other things, how promiscuous women in the tribe were punished by the men through a form of gang rape. McDowell encourages the class—thirteen women—to come at the text the way she approached the Bun chief: swinging.

"Reactions to any of this?" she asks, to open the discussion. "Did it make anyone angry?"

A girl in a red-and-white-striped polo shirt raises her hand. "It put me on the defensive immediately," she says. "It seemed as if the women were just there to serve the men without getting anything in return. I think they'd be better off without the men at all."

To an observer at this point, there seems every chance that the class could turn into group therapy, with everyone agreeing with one another. But McDowell, winner of Franklin and Marshall's Lindback

Award for teaching, has no intention of leading everyone to the same conclusions.

"I don't mind it this early in the semester if they articulate a lot of personal feelings and experiences," she says later. "And in this kind of situation, I throw out a lot of things that I know will appeal to strong feminist sentiments, because it gets people talking. I also direct things toward certain viewpoints in the class—if this one has a background in women's studies, or that one is a Marxist."

The result is an atmosphere in which seemingly anything goes, but McDowell also has an agenda toward which she steers the discussion.

"I have certain points which I want to cover," she says. "Believe me, it's much more exhausting to follow a class discussion than it is to lecture. I have to keep tabs on what's been said. Usually, the important stuff gets brought up naturally, but afterward, I always check my notes to see what we missed, and I make sure we cover it next time."

Or as JoAnne Comerford, '85, puts it, "Even if somebody says something which doesn't seem to totally pertain to the discussion, she'll usually manage to tie it in."

In the class on *Women In The Forest*, the first student's feelings trigger a variety of reactions which, tempered by McDowell's occasional interjections, do, ultimately, lead to focused discussion. The idea that the Mundurucu women could do without the Mundurucu men proves particularly fruitful.

"I know the Mundurucu women were officially decreed inferior in the society, but I had the impression that they didn't accept that at all," a red-haired woman says. "They seemed so separate that they didn't even feel dominated."

Another student is reminded of her own experience of living for six months with a Turkish family. "I envied the women there," she says. "We all had to do the housework while the men went away during the day, but it was fun, because we were together. You didn't think about wanting to do what the men did, because you had your own thing. Of course, you were supposed to lower your eyes when the men passed by, and I wouldn't do it, but the other women had the attitude of, 'Well, he doesn't do much for me, I'd just as soon look at the ground.'"

When the laughter dies down, McDowell draws the academic connection.

"You know, the American world view in anthropology always assumes hierarchy in the cultures it studies," she says. "We imagine that one group is always occupying a position superior to the next, and we can never accept the idea of separate but equal."

She isn't just poking at American anthropologists with this observation; it's directed at the class as well.

"We have to at least be aware that we may be projecting a lot of our own values here," she says. "Remember that the Mundurucu women are appalled when the anthropologists tell them that in America, water comes to the house through a pipe. Where do the women meet every day, then, if not to gather the water? And there's no farina shed? What a terrible place!"

She does zero in on the book's authors, though, suggesting that the husband-wife collaboration may have ended up reflecting more of the husband's biases, even though it was ostensibly the wife's project.

"Robert Murphy was a well-known scholar who had already published several books, while Yolande was a graduate student working on her dissertation," McDowell says. "You have to wonder why the first philosophically oriented chapter to occur in the book is about the tribe's male ideology. One reason could be the presence of her husband. The other is the reality of anthropology graduate projects: when you study a tribe, you'd better come home with the male ideology, and not a consideration of basket-weaving or any such women's stuff."

At these times, McDowell seems to be wearing her opinions on her sleeve, but she's just playing devil's advocate—again, because it loosens tongues.

"Students have a tendency to think that just because something's in print, it must reflect the truth," she says. "I'm just pushing them to be critical. I guarantee that by the middle of the semester, each of them will have been in my office trying to figure out what it is I really think. Hopefully, they still won't know in January."

McDowell herself had to figure out what she really thinks in a climate of strong opposition. As a graduate student, she was yelled at by no less an authority than the legendary Margaret Mead, herself a veteran of the Yuat River region. The pioneer anthropologist told McDowell that before going to leave with the Bun she should completely rethink her project. McDowell ignored the advice, and later, when she needed a break after 14 straight months with the villagers, a somewhat softened Mead gave her the money for a leave.

McDowell's work on the Bun consists of fascinating, almost psychoanalytic deductions about their collective behavior: she argues that the tribe is obsessed with independence, and that they are suffering inadequacy feelings as a result of being unable to repay debts to the regional government.

"Anthropology isn't a science," she says, "and I think it would be a terrible thing if it were turned into one, because the scientific method, with all its statistics and correlations, would kill our best insights. At the same time, we have to be willing to test and refine our ideas."

In a sense, the students in *Women In Society* confront the equivalent of McDowell's wife-beating chief and learn some of the same lessons. They charge at something they see, reacting to their emotions, and after the initial confrontation, come away with what should be a tempered outlook. McDowell thinks both parts of the experience are important.

"We're dealing with sophisticated issues and readings in this class," she says. "Feelings are a good starting point, but ultimately the students have to be able to do more than just talk about things their grandmothers have said."

By Ivars Peterson

No-Fault Earthquakes

How can engineers and architects be certain that a building's structure and materials are earthquake-proof?

Experience can be an expensive teacher; scale models are cumbersome and not always precise. The answer: computer modeling.

The ground shivers, sending tremors through a skyscraper's steel and concrete framework. The structure shudders. Its columns, beams, and braces stretch and strain. Seconds later, the vibrations die out, and the earthquake is over. Often, the building is still standing; sometimes, it has collapsed.

This scenario seems out of place in a small city like Worcester, Mass. There are few tall buildings; earthquakes rarely strike. Yet, such events occur regularly in an engineering laboratory at Worcester Polytechnic Institute (WPI). There, a computer plays the roles of both earthquake and building, and researchers pore over pages of computer-generated data that represent the way a structure reacts to an earthquake.

In civil engineering, says WPI's P. Jayachandran, you generally can't test a full-scale building to ensure that it can survive all but the most severe earthquakes or storms. Adds William E. Saul of the University of Idaho, "Obviously, you can't build a structure that's 40 stories high and then subject it to vibrations until you knock it down. You have to do it with a computer model. You destroy the computer model within the computer to see what the building can take."

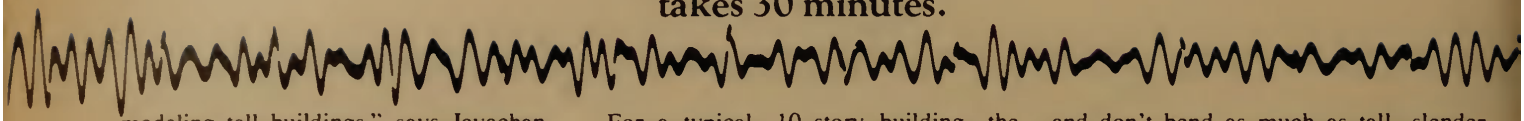
Another reason that computer modeling makes sense, says Jayachandran, is that "you cannot generate earthquakes in the lab very easily." Even a "shaking table," on which scale models of buildings can be mounted and then jolted, has limitations. (At the common 1:4 scale, a 40-story model would still be 10 stories high, and models cannot reproduce all the properties of real buildings.) "That's why the computer analysis is so useful," he says. "You can try a lot of different things in a matter of days." Without computer simulations, structural engineers would have little information about whether their designs would work under earthquake conditions.

Jayachandran and Saul are among the growing number of researchers working in the fields of earthquake and wind engineering. A few decades ago, both specialties were minor parts of civil engineering. But the development of new materials, which allows the construction of ever-taller structures, and great increases in computer speed and power have changed the situation. Now, frequent international conferences bring together researchers from all parts of the United States and countries like Australia, China, the Soviet Union, Japan, and India to discuss the latest developments in these fields.

"We are looking for improved methods of calculation—improved methods for

Wide World Photos

A computer models both building and quake, then collects detailed data: to simulate a 10-second earthquake takes 30 minutes.



modeling tall buildings," says Jayachandran. At the same time, there is a great need for experimental data, based on real earthquakes and real buildings, to check the validity of computer calculations.

Computer programs now being used to simulate earthquake effects are remarkably sophisticated, says Jayachandran, and generally take months to learn how to use. The initial step involves creating a computer model of the building. "The computer programs are very general," he says. "You can model many different materials—timber, concrete and steel, aluminum, and copper."

First, the structure is broken down into a set of small pieces, which often individually correspond to a building's columns, girders, and braces. Each of these "finite elements" has its own mathematical expression that describes both its relationship to other pieces and the way in which forces, such as those generated in an earthquake, act on it. "We create a skeleton of the building—what's called a 'finite-element mesh,'" says Jayachandran. Once the mathematical skeleton is in place, the building can be subjected to an earthquake.

That earthquake can be "synthetic" or "real." In the latter case, the computer uses ground motion data recorded during an actual earthquake. The most widely used data come from the 1941 El Centro, Calif., tremor. For many years it was one of the few recorded earthquakes providing enough information for engineering applications, and it pops up as a kind of standard in innumerable engineering studies.

"Sometimes we make a mathematical model of the earthquake itself," says Jayachandran. During an earthquake, different amounts of energy go into the various frequencies of vibration that make up the ground motion. Using this information derived from seismic data, the computer mathematically generates a series of random pulses that combine to produce the synthetic earthquake.

Ivars Peterson writes on policy and technology for Science News.

For a typical, 10-story building, the WPI computer (a DECSYSTEM-2060 that serves the entire university) takes about 30 minutes to decide the building's fate. In that time, it calculates the strength of the forces acting on each piece of the structure and how much each piece is displaced, repeating the operation about 1,000 times during the course of the simulated earthquake.

For the building as a whole—as well as for any floor, or any particular girder, column, or brace—the program provides a record of how the structure responds every one-hundredth of a second during an earthquake that may last 10 seconds. Says Jayachandran: "You really get a pile of output."

Another set of computer programs translates this mass of data into graphs, to highlight the key features of a building's response to an earthquake. Recently, Jayachandran has been thinking about displaying the data on computer screens and photographing them in sequence to produce motion pictures of a building's vibrations. "The technology is available," he says. "We just don't have the facilities now at WPI to do it."

On a more elementary level, architecture students at Rensselaer Polytechnic Institute (RPI) can already watch the exaggerated sway of a building wobbling under an earthquake's influence. Two years ago, Richard W. Quadrel of RPI's architecture department developed an interactive computer graphics program that allows undergraduates to investigate how the shape and structure of a building affect its stability and motion during an earthquake.

"In a simplified study of earthquakes, what we're primarily concerned with is the horizontal shaking of the ground in one particular direction," says Quadrel. "The program takes the major factors and allows you to play with them a little bit to see what the results are on the building." As might be expected, he says, short, squat buildings, even with very little bracing against earthquakes, are more likely to survive, because they are less flexible and don't bend as much as tall, slender buildings.

Meanwhile, Jayachandran is looking for ways of running his much more complicated simulations on smaller computers, so that small building and design firms can study, in greater detail, how their building designs respond to earthquakes, as required by an increasing number of building codes. "Architectural and consulting firms," he says, "usually can't afford to buy a computer like a DEC-620."

Measurements on real buildings during earthquakes and data from laboratory experiments also provide valuable information. "Until recent years, it was difficult to get any kind of accurate earthquake measurements on real buildings," says Idaho's Saul. Now, dozens of tall buildings in California, for example, have special instruments that record the building's motion during an earthquake. (In some areas, buildings greater than a certain height must now have at least three engineering seismometers.)

"From that you get an idea of how real buildings behave," says Jayachandran. "But I think we need more instrumentation

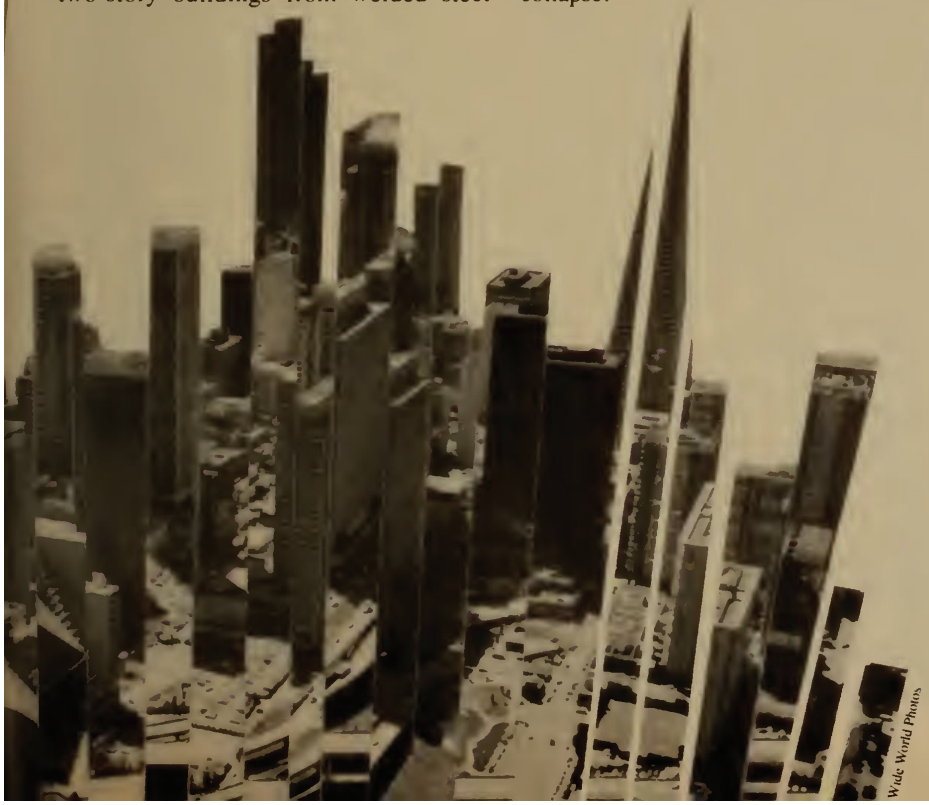
on the East Coast and in the Midwest to see how the earthquakes in those locations affect buildings." One of the difficulties in earthquake engineering is that earthquakes are infrequent and highly individual.

Some of the most elaborate laboratory work is going on at the University of California at Berkeley in the Earthquake Engineering Research Center. There, a 50-ton shaking table, 20 feet long and 20 feet wide and carrying structures up to 30 feet tall and as heavy as 50 tons, recreates the ground motions of actual earthquakes that have hit California and Japan. Working from mathematical models, researchers at the University of Michigan, Ann Arbor, use a cyclic loading mechanism to simulate earthquake effects. A hydraulic device creates the loads and applies them to scaled-down structures. "Some of these results will help us verify our mathematical models," says Jayachandran, who plans a smaller version of the Michigan device for his WPI lab.

Jayachandran and his students have also done some laboratory work. Last year, they built scaled-down models of one- and two-story buildings from welded steel columns and beams. They didn't use a shaking table, but simply applied forces to the models to test the effectiveness of braces.

Out of all this, researchers have already learned a great deal about how tall buildings, in particular, respond to earthquakes. A building that survives an earthquake tends to be tied together so that it works as a unit. At the same time, the building cannot be too stiff, nor too flexible. A stiff building is very expensive to build, and it usually cannot absorb very much energy. A flexible building, on the other hand, may sway too much during a storm or a quake. It could survive an earthquake, but its interior would be left in a shambles.

"You have to balance all these things when you design a building," Jayachandran says. "It's an optimization problem in *n* dimensions." The answer, he says, is to build structures with joints that can absorb energy. "It's essentially the energy-absorbing capacity of buildings that allows them to take large earthquakes and not collapse."



Wide World Photos

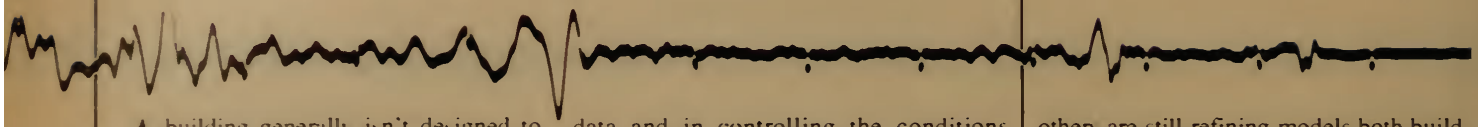
A building should be stable enough to allow people to get out with sufficient warning. The acceleration should be limited so that people do not feel ill during windstorms. The building deflection—how far it sways from its normal position—should be less than levels at which walls and windows crack. The joints between beams and columns must have enough energy-absorbing capacity to withstand large vibrations. In addition, Jayachandran notes the skyscraper design must be aesthetically pleasing, inexpensive, and feasible to build.

"When a building is designed and built, the engineer is responsible for the building behaving properly in windstorms or in earthquakes," says Jayachandran. "You have to follow all the different building codes, and you have to optimize the cost, too." Sometimes conflicting requirements must be resolved. Raising a building on columns, for example, saves it from floods, increases the amount of heat exchange—and produces a "soft story," a weakness when there's an earthquake. However, the same unity and continuity of structure that allow a well-designed building to perform well in a hurricane will also allow it to resist earthquakes.

With such complicated sets of requirements, computers become invaluable tools for earthquake and wind engineers. Building codes themselves have changed considerably in the past decade, as new materials like tough steel alloys and stronger concrete have been developed, and as computer simulations have provided the information needed for revision. Thus, design is a much more complex process now than in earlier decades, says Saul, but the final results are more predictable.

Meanwhile, new techniques for analyzing the way structures respond to "loads," like earthquake forces, continue to be introduced. The earliest type of modeling for earthquake effects dealt with extremes: researchers estimated the largest loads that were likely to act on a building, applied those forces, and measured the final result. But the approach that Jayachandran and

A Model Built on Sand



A building generally isn't designed to float. But within minutes, the shaking of an earthquake can turn a firm, sandy soil saturated with water into a liquid-like mixture that no longer supports a building. "There are some very impressive photographs of five- or six-story buildings in Japan that were vertical before an earthquake and horizontal after," says civil engineer Ricardo Dobry of Rensselaer Polytechnic Institute. "These buildings were asked to work as boats for a few minutes, and they couldn't."

Dobry, one of six civil engineers at RPI doing research in earthquake engineering, specializes in the field's "geotechnical" aspects: in particular, the liquefaction of saturated sand and the failure of earth dams, dikes, and embankments during earthquakes. "The phenomenon of soil liquefaction sounds very esoteric," he says, "but it happens over and over again. Most big earthquakes cause a lot of liquefaction."

The problem is that when an earthquake shakes wet sand, the grains of sand roll and slide to get into more stable positions. The sand settles, increasing the water pressure inside the mixture because excess water can't escape quickly enough from among the sand particles. At a critical pressure, the sand grains physically separate, and the mixture of sand and water begins to behave like a liquid.

"Dams that consist of piles of loose sand are very sensitive to earthquakes. They liquefy, they flow, and they fail easily," says Dobry. Although loose sand no longer goes into the construction of earth dams, a number of older dams of this type are still in use. In contrast, dams constructed from clay soils don't fail catastrophically, even when they are poorly built, because clay particles cling together better than sand particles.

Most of Dobry's work takes place in a sophisticated laboratory at RPI where he subjects cylindrical samples of soil to vibrations, studying the liquefaction behavior of the specimens. Computers play an important role both in collecting data and in controlling the conditions under which experiments are done. With the recent installation of new computer equipment, Dobry says, the researchers expect to be able to produce signals that shake the soil samples just as they would be shaken during a real earthquake.

Dobry is also working with the U.S. Geological Survey and a researcher at the University of Texas in Austin to develop a computer model that predicts how soils behave under various conditions. Right now, the team is measuring the properties of soil layers taken from places like the Imperial Valley in Southern California, which was shaken by a 1979 earthquake. These soil characteristics become part of a computer model, and the computer calculates the effects of seismic waves as they propagate through the soil.

"The model tells you if liquefaction is occurring at a particular layer," says Dobry. "Then, you go and check for evidence of liquefaction at those sites. In the future, if we happen to have an earthquake at an instrumented site, we will be able to verify our predictions."

In the case of earth dams, says Dobry, "we are trying to see if our techniques could have predicted the near-failure of the San Fernando dam in 1971." During an earthquake, one of the dam's slopes liquefied and flowed, threatening more than 100,000 people in the Los Angeles area. "It was almost catastrophic," he says. "The earthquake ended just as the dam was starting to go. Most of us estimate that after 5 or 10 seconds more of shaking, it would have gone."

Computer models will become increasingly important, says Dobry. Currently, liquefaction field studies are time-consuming and expensive and, therefore, can't be done for every project and every site. A reliable computer model would need data from only a few, simple, cheap field measurements to come up with a good picture of how soil at a particular location would behave during an earthquake. However, says Dobry, that kind of modeling is still far away.

—Ivars Peterson

others are still refining models both building and earthquake, then puts them through the computer to calculate everything that happens, in split-second intervals, for the earthquake's duration.

A new technique that shortens the time it takes to run a simulation on a computer is coming, says Saul. Instead of looking at accelerations and deflections, the researcher looks at vibrational frequencies.

In one sense, a building is somewhat like an inverted pendulum, and a bridge is a little like a guitar string. The signal—in this case, an earthquake's vibrations—enters the structure and interacts with it. Out of this interaction comes a modified signal. In other words, the structure is considered to act like a filter. Just as audio engineers can learn about electronic components within an amplifier by comparing sound waves fed into an amplifier to those coming out, structural engineers may someday be able to apply a similar method of frequency analysis to buildings.

This technique, adapted from methods used in electrical engineering, is faster than the full computer simulations now run, says Saul. Some of the more advanced engineering firms already use it in a simplified mathematical form. However, when it comes to more sophisticated uses, working with more complicated structures, it's very much an area of research. The displacement of well-established methods by something in which the mathematics is different, says Saul, is not easily accepted by building officials and others. "Until we learn more about the method, it will not be generally accepted."

"We are constantly improving our computer programs," says Jayachandran, to provide better information for engineers who must ensure that their buildings survive the hazards of wind and earthquake. "Although there are few tall buildings in small cities like Worcester, computers allow me to study and do things that are of general use to the whole country," he says. "All I need are a computer and books. I can study buildings anywhere in the world."

"...of the waters of the Earth"

A look back at the pioneering career of hydrologist Ray K. Linsley, Jr., '37

Back in 1937, when Ray Linsley graduated from WPI with a B.S. in civil engineering, the field of hydrology was in its infancy. Save for a volume written in 1919, in the mid-'30s there weren't even any textbooks on the subject. He would soon help change all that with publication of four highly regarded texts. He would influence the field in other dramatic ways as well. But first, for the uninitiated, a primer on the sometimes arcane world of hydrology.

Hydrologists, Linsley explains, plan, design and operate engineering projects for the control and use of water. "They deal with questions like: What flood flows can be expected over a spillway, at a highway culvert, in an urban storm drainage system? What reservoir capacity is required to assure adequate water for irrigation or municipal water supply during drought? What are reasonable boundaries for a floodplain?" Obviously, geography, geology, and meteorology play leading roles in this global drama. And as much as in any other field of engineering, he says, hydrologists must deal with the interconnections between the laws of nature and the needs of people. "Judgment," he adds, "is crucial."

The earliest evidence of hydraulic projects (hydrology is a specialized field of hydraulics—the science of fluid flow) dates to about 3000 B.C., when a diversion dam is said to have been built by King Menes to redirect the Nile so that Memphis, his capital, could be constructed on a fertile riverbed.

Yet it wasn't until about 1930, says Linsley, that a quantitative approach beyond simple measures of rainfall and streamflow was undertaken. "It was as if they used a shotgun to plot data on graph paper," he says, "and then drew a line through the mess." Birth in the '30s of the Tennessee Valley Authority (TVA)—giving the Army Corps of Engineers the job of controlling floods and creating the Soil Conservation Service to reduce soil erosion—changed the entire scope of hydrology. "Today, of course," he adds, "the computer has taken over, and we can work more from historical climatic and geological records to model the foreseeable future of a given region."

Recently, for example, his firm, Linsley, Kraeger Associates Ltd., a three-person Santa Cruz, CA, consulting group, was called in to redesign the spillway for a dam near Santa Cruz, using a hydraulic model to come up with a simple way of increasing capacity without requiring major reconstruction. He has also recently conducted large projects for the Dominican Republic, developing a hydrologic basis for design of a hydroelectric plant; and for the Jubail (India) Industrial Park, working on the storm drainage system of a desert site that, when it does receive rain, suffers torrential downpours. And as an expert witness, he has testified in a Supreme Court case in which the State of Wisconsin claimed that Illinois was not adhering to a ruling of their right to divert waters from Lake Michigan.

Linsley's first job out of WPI was a three-month engineering stint with a New York City firm. Repulsed by the congestion of the city, however, he took a post in Knoxville with the TVA, forecasting river flow. This early taste of hydrology, and his entrance into this emerging field at its beginning, poised him on the springboard of greater things to come.

In 1940 he joined the U.S. Weather Bureau as a hydrologist, working first in Washington, DC, and then in Sacramento, CA. "I thought about law school then," he says, but with the war and later a family of four children to raise and educate—well, advanced degrees simply took a back seat to the demands of everyday life. But, this never seemed to impede his career.

During the war, he taught Air Force air weather officers flood forecasting. "I enjoyed teaching," he recalls, "but I saw right away the need for better hydrologic instruction at the college level." This resulted in *Applied Hydrology* (with Max Kohler and Joseph Paulhus, McGraw Hill, 1949), still the standard work in its field.

The end of the war saw Linsley promoted to Chief Hydrologist at the Weather Bureau. Then, in 1950, Stanford University offered him a faculty position, which led to his becoming chairman of Stanford's civil engineering department and later associate dean of the College of Engineering. At Stanford he built the nation's first graduate hydrology program. Two of his students would later go on to head graduate programs of their own at Utah State and the University of Washington.

Linsley taught a course at Stanford on the economic and societal impacts of hydrology. Student response, he says, was

continued on inside back cover

The Fastest Hand in the East

Dr. David Cyganski, '75 BSEE, assistant professor of electrical engineering and this year's recipient of WPI's Outstanding Teacher Award, doesn't have a middle name. But, if he did, it could well be "Enthusiasm." Just watch him at the chalkboard sometime.

By Ruth Trask

When it comes to discussing students and education, two of David Cyganski's favorite themes, he jumps right in with both feet. "The educational process shouldn't be an exclusive competition for just a winning few," he asserts. "It should be easily accessible to everyone."

Cyganski minces no words when he discusses what he feels is wrong with education in general today. "Too many teachers and too many textbooks make learning difficult," he says. "A student may have an aptitude for a subject such as science, but no real interest. It is the teacher's job to develop that interest by simplifying the subject matter and making it more meaningful."

According to Cyganski, most textbooks concentrate too much on "pure" theory, with the subject's practical application surfacing only at the end. "I like to turn things upside down," he reports. "I tell my classes *why* they need to know something before they ever open a book."

In a nutshell, Cyganski's basic philosophy of teaching is, "If it's worth knowing, it can be put simply. And no matter how abstract a subject may be, it should, somehow, be connected with everyday life."

His students appreciate his fresh approach to teaching. Says John O'Donnell, '85, of Fitchburg, MA, "Prof. Cyganski makes me feel comfortable during class. He knows how to get across the most significant aspects of the material without getting overly technical. Also, he has a good sense of humor, is easy to listen to and generally gives off good vibes!"

While still a student in high school, Cyganski tutored his classmates. "I was no athlete," he explains. "Helping out my fellow students with their studies was a good way for me to make friends." Being involved with education at such an early age on a one-on-one basis, he decided long ago that nothing is easy until it is explained and understood, and that slow learners should be given an opportunity to develop their own potential at their own rate.

Always a top student himself, Cyganski nonetheless has had to relearn things that he feels are not adequately taught in high school and grammar school. "Sometimes it's almost impossible to recover from the mental crippling received at the hands of a bad teacher," he says. "That is why some students have such difficulty at WPI." They may do well on their aptitude tests, which he says measure mere "history," but they may not be able to achieve at the college level because they lack a basic understanding of the subject at hand.

William Denson

Cyganski, who says he's spent his whole life "learning how to learn," has spent a lot of time learning at WPI. He received his BSEE with high honors from WPI in 1975, his MSEE in 1977 and his PhD in 1981.

"The Plan is what drew me to WPI originally," he reports, "plus my interest in electronics. There was plenty of latitude in the Plan, so I could choose a wide variety of courses. I could also pursue some interests outside of engineering, which I enjoy as well."

After graduating with his BSEE, he says, "I decided to stay at WPI to work for my master's simply because I liked the school. It was a natural thing for me to do."

Why he continued on for his PhD is a different story. "While I was with Bell Labs in North Andover in 1978, I was asked to teach some evening graduate courses at WPI," Cyganski says. "At the time, my wife, Janet, was studying at Worcester State. It made sense for me to leave Bell Labs, teach here, and work for my PhD."

He laughs, adding, "People give me strange looks when they discover I've gotten all my degrees at WPI. I'm not sure, myself, if I'd do it again. But, I feel that I got a very good education here. In the end, it doesn't really matter where you get your PhD. That kind of knowledge comes mainly from libraries and original papers."

Cyganski's professional and research interests at WPI are varied. Recently, under a National Science Foundation grant, he and Professors Kevin Clements, the late Donald Eteson, '48, Dan Wolaver and Gary Krumpholz, '78, developed a system to help integrate the use of the computer into engineering education. Last summer, a research contract for collecting and analyzing data on harmonics in power systems, which he will co-investigate with Professors John Orr and Alexander Emanuel of the EE Department, was accepted by Eastern Utilities Associates.

Emanuel, himself a former WPI Teacher of The Year, says that Cyganski is not only an excellent teacher, but an outstanding researcher. "Two years ago," he says, "Dave took over research [sponsored by New England Electric Systems] which I originated, focusing on determination of current wave-shape and intensity in overhead power lines, based on magnetic field measurements." The problem to be solved was extremely difficult and required a clear understanding of field theory as well as the use of tomographic reconstruction techniques. The development of unusually involved software was only a part of the chore, which demanded experience, discipline and faith in oneself, says Emanuel. "Thanks to Dave's knowledge, perseverance and talent," he adds, "this project is now well under way."

Another colleague and co-researcher, John Orr, says that Dave's pleasure is obviously in accomplishing the research work itself, rather than in showing off his own ability. Regardless of the origin of an idea, his references are always to "our" work, Orr explains. "Also," he says, "Dave has the 'fastest hand in the East' when it comes to writing on a chalk board." According to Orr, he can produce pictures, equations and explanations at an incredible rate.

In 1982, in recognition of his accomplishments in research, Cyganski was named the first Joseph Samuel Satin Distinguished Fellow at WPI. "The fellowship enabled me to do further research in the area of robot vision," he says, "an opportunity for which I am most grateful."

Currently, he is deeply involved in the field of robot vision. "Robots have to be smart," he says. "They not only have to be able to 'see' objects, they must be able to identify them. They must be made more sophisticated."

To this end, Cyganski has done extensive research and has written many papers on the subject. "We are on the threshold of a breakthrough in robotics at WPI," he asserts.

When not teaching, advising or doing research, Cyganski serves on faculty, administrative and departmental committees at WPI. He currently serves on the Computer Advisory Committee and is chairman of the Committee on Academic Policy.

At home, his interests turn toward ham radio. "I've loved ham radio since grammar school," he confesses. "I have talked with people all around the world. It's a wonderful hobby."

When he was in high school, he made his own receivers, antennas and other circuits. "Now, I'm more or less a weekend operator trying to keep up my skills."

Recently, while aboard the *Queen Mary*, which is currently a ship-hotel docked at Long Beach, CA, his hobby served as an unexpected "open sesame" to off-limits portions of the ship. "When the radio room crewman, a ham radio operator himself, learned that I, too, was an operator, he invited me right into the radio room and let me use the equipment," he reports. "It was great!"

Other pastimes are running home computers, reading science fiction and collecting comic books. And, speaking of running, he jogs every day.

Still, teaching—and student advising—are always right up there heading the list of Cyganski's interests. He counsels graduate students with their theses and undergraduates with their MQPs and IQPs. He seems to truly enjoy helping others. Most of all, he likes taking the mystery out of learning.

William Grogan, '46, dean of undergraduate studies at WPI, sums up Cyganski in a single, succinct sentence: "Dave is a dynamic, natural-born teacher and a brilliant researcher, but above all, he has a deep personal concern for his college, his colleagues and especially, his students."

This year, if a teaching Olympics had been held at WPI, David Cyganski would have walked off with the gold.

WPI CLASS NOTES

1920

Reunion **May 30–June 2, 1985**

1925

Reunion **May 30–June 2, 1985**

1930

Reunion **May 30–June 2, 1985**

1933

Norm Clark reports that he recently attended a very special reunion, the 100th anniversary of Dudley YMCA Boys' Camp at Westport, NY, the oldest organized boys' camp in the U.S.

Raymond Crawford of Oakham, MA, writes, "In my fifth year as a selectman. Am now chairman of the board." He also has a two-acre garden, and writes a garden column for *The Hamburg* (NY) *Sun*. In 1969, he retired as a group leader and senior scientist in the research department at Allied Chemical. He has taught general chemistry at West Seneca (NY) High School and taught as a substitute in North Brookfield, Quabbin and Wachusett high schools in Massachusetts. Currently, he serves as Oakham correspondent for *The Barre Gazette* and as president of the Oakham Historical Association. "No time to grow old," he says. He has one daughter, three granddaughters and one great-grandchild.

After working 50 years as an actuary in various companies in the East and Midwest, **Frank Dodge** retired with his wife in 1983 to Venice, FL. He says they are at last finding time to do some of the many things that couldn't be done in a working lifetime.

No wonder Ev and **John Henrickson** did so well in the golf tournament at our 50th reunion. We hear they are playing four to five times a week on different courses as members of a "Grasshopper" group, and that their handicaps are 17 and 11 respectively. They, along with 54 other couples who are residents of Sun City Center in Florida, are members of a dinner dance club that meets monthly. These activities, combined with sessions with grandchildren and a yearly visit to John's home town of Holden, "make for a top-notch life of retirement."

Harry Jensen is living proof of the fact that no matter how busy a person may be during his professional career, he probably will be just as busy in retirement. Since he left Sikorsky Aircraft as vice president of engineering in 1978, Harry has found his time fully occupied with fishing, along with maintenance of his boat and his homes in Connecticut and Florida. He also does a little consulting when it doesn't interfere with the fishing. He and his wife, Kay, have eleven grandchildren. He is hoping to steer the oldest grandson to WPI next year.

Wes Reed finds, as do so many of us in retirement, that he just doesn't seem to have enough time to spend doing the things he anticipated, such as traveling, or pursuing his hobby, which is collecting antique musical instruments. Instead, he's busy on committees and boards, as well as maintaining his 20-room house and its grounds, which he describes as "four acres of recalcitrant grass, trees and brambles."

We are sorry to hear that **Art Smith** is seriously ill. He is now at Crestfield Convalescent Home in Manchester, CT.

Al Brownlee, Class Secretary

1935

Reunion **May 30–June 2, 1985**

1937

Harold Cox writes that his daughter, Alice Mignerey, is now a full professor of nuclear chemistry at the University of Maryland.

Roland Farrar, Sr. serves as president of Inspection Service, Palm Harbor, FL.

1939

Richard Muller has retired. He had been with Tucker Associates, East Longmeadow, MA.

Leo Rourke is retired from Tenneco-Newport News (VA) Shipbuilding.

1940

Reunion **May 30–June 2, 1985**

Robert Gibbs is a staff engineer in electronics at Bridgewater (MA) State College.

Edward Goodrich, formerly employed by the state of Ohio, has retired. He writes that he and his wife, Larue, spend five months of the year in St. Petersburg, FL.

1943

Arthur Medine, Jr. has retired. He had been superintendent of engineering in the grinding wheel division at Norton Co., Worcester.

Richard Whitcomb, research associate at the National Aeronautics and Space Administration Langley Research Center, recently delivered the fifth H.S. Stillwell Memorial Lecture at the University of Illinois at Urbana-Champaign. His topic was "NASA Research on Laminar Boundary Layer Control."

1944

Following a successful career in industrial consulting, especially with Hustler Inc. ("No. 1 CB antenna supplier when the boom was on."), **Ralph Allen** is now located in Ft. Lauderdale, FL, where he "restricts" himself to local assignments and gets home every night. Early in his career, he was with ITT, Sanders Associates, Schlumberger Ltd. and RAE Corporation.

Gordon Anderson serves as senior staff engineer with ISO Commercial Risk Services Inc., Parsippany, NJ. He is still primarily

involved with evaluation and public fire protection.

Lou Baldini writes that he is licensed in 33 states doing work for two national clients listed on the New York Stock Exchange. He is vice president and chief electrical engineer with IC Thomasson Associates in Nashville, TN. Once a year he goes to Mexico or Alaska on a fishing trip.

Ned Bigelow, manager of the electronic structures unit for GE in Schenectady, NY, says that he commutes to the R&D center by canoe. In his leisure time, he sails Windsurfers and a Shark "whenever possible." He holds 38 patents and has published about 50 articles.

Norman Blodgett reports that the hottest item his Worcester law firm (patent, trademark, copyright law) is handling at the moment "seems to be computer programs." The Blodgetts bought the Oak Hill Inn at Cape Cod in 1960. "My old 1910 Crosby catboat is anchored out front," he writes.

After 25 years in Washington, DC, with the Navy Department, **Philip Brown** retired in 1978 to Amherst, MA. While in Washington, he served as chief geotechnical engineer for the department and was concerned with construction and maintenance of naval stations, port facilities, etc. in the Pacific, Europe and Southeast Asia during the Vietnam buildup. In retirement, he is doing some consulting and is trying to learn to play golf.

Newton Burr, management consultant for Profit Management Development Inc., Barrington, IL, writes that he has consulted in milk, ice cream and cheese plants all over the U.S. and Canada. Clients have included Hood, Borden, Meadow Gold and Land o'Lakes. Previously, he ran his family's milk plant for 18 years. When the plant merged with Brock Hall Dairy, he worked for that company for five years.

Don Buser, former manager of design engineering at Allied Corp., retired last year. Earlier, he had been with Ford, Bacon and Davis, Chemical Construction Corporation and Standard Oil of New Jersey. In 1955, he contracted polio, which left his mobility severely limited. "Thanks to the automobile I've led a reasonably normal life." He has a master's degree from Polytechnic Institute of Brooklyn.

Sherman Campbell continues as manager of R&D at Champion Products Inc., Perry, NY. He is concerned with innovations on screen printing of textiles. Besides being active with his local church, he serves as treasurer of the Chamber of Commerce. He enjoys National Ski Patrol activities and golf.

Last year, **Richard Carson** retired as chief project engineer for Texaco Inc., Houston. His responsibilities included management of design and construction of a co-generation system, which was completed just before his retirement. He had been with Texaco for 37 years. Over the years, he has been involved with Boy Scout work, sailing and trailering.

John Chandler is not only vice president of York International (Borg-Warner), but he also is the registered federal lobbyist for the company. He says he finds lobbying "extremely interesting." Throughout his career in Washington, DC, he has been active with the Shipbuilders Council of America, the Navy League, the Society of Naval Architects and Marine Engineers and the American Society of Naval Engineers, among others. He is chairman of the orthopedic committee of the Kiwanis Club and president of the University Club of Washington, DC.

Charles Cooper, engineering manager of Lawson-Hemphill, Central Falls, RI, has been granted three patents. Earlier he had been with Scott Testers and Augat Inc. For several years, he ran the family business. He served in the Navy during the Korean conflict, the Berlin crisis and the Cuban missile crisis. He is a retired captain in the U.S. Naval Reserve.

Last year **Stewart Dalzell** retired as a quality engineer from Stanley Tools, New Britain, CT. Prior to retirement, he had been involved with church and YMCA work in the Kensington area. The Dalzells now reside in Humarock, MA, where they recently "rebuilt our summer home on the water."

Vladimir Dimitroff is senior control engineer for GE's medium steam turbine department in Lynn, MA. He joined GE in 1947. Currently, he is moderator of his local church and belongs to an organ club, which he has served as president.

Peter Dooley, who worked for 30 years for Carborundum in three different divisions, retired as plant engineer in the textile division. He now does consulting work in machine design and prototype construction of machine elements in his own development shop. He is located in Lewiston, NY. Involved in Presbyterian church work, he is also active with Masonic activities, including Shrine Hospitals for Crippled Children.

Einar Eriksen holds the post of manufacturing manager at Waldes Kohinoor Inc., Long Island City, NY. Previously, he was with Automation Engineering Laboratory, Stamford, CT. Early in his career, a leak in a village gas main destroyed a plant that he owned. While operating his own business, he built and installed the mechanical equipment for the first penicillin production facility in South Korea. For recreation, he performs with a group called the Blaue Jungs, "singing German sea chanteys for anyone who wants to listen."

1945

Reunion **May 30–June 2, 1985**

Albert Myers has been appointed to the newly created post of corporate vice president of purchasing at Lear Siegler Inc. in Mt. Clemens, MI. For four years prior to his promotion, he had been vice president of the firm's commercial products group. He has also held executive manufacturing positions with General Motors, Franklin Electric and H.K. Porter Co. Lear Siegler, headquartered in Santa Monica, CA, produces aerospace, automotive, material handling and commercial-industrial products.

1947

Edward Swierz was recently named senior bridge engineer on the headquarters staff of the state highway commissioner within the New Hampshire Department of Public Works and Highways at Concord. For the past 14 years, Swierz, who is a professional engineer, has served as bridge engineer. In his new post, he will be responsible for renewed emphasis on state bridge inspection and for developing a long-range bridge replacement policy and program for the department. He began his career as a bridge designer in 1947, and was named chief of design of interstate bridges in 1961 and assistant bridge division engineer in 1968.

1949

Thomas Coonan III writes that he is still with Du Pont's polymer products department in Chicago. He has three children in college.

Dr. **Wellen Davison,** professor of mechanical engineering at Western New England College, Springfield, MA, has been named vice president for Region I (New England) of the ASME. With Western New England College since 1958, he has served as chairman of the ME department for 12 years. Previously, he was a design engineer in refrigeration and air conditioning for Westinghouse. He has an MSME from RPI and a PhD from the University of Connecticut. A member of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, he also belongs to the Association of Energy Engineers, the American Society of Engineering Education, Sigma Xi and Pi Tau Sigma. He is a registered professional engineer in Massachusetts.

William Jacques, now retired following 33 years of federal service, spends half the year in Winchendon, MA, and half in Vero Beach, FL.

William Reeves is manager of engineering data support at GE Ordnance Systems in Pittsfield, MA.

1950

Reunion **May 30–June 2, 1985**

1953

MARRIED: Bill Nagel and Jeanne Weber on June 16, 1984, in Newtown, PA. They write they would enjoy hearing from old friends at 767 Chesham Turn, Southampton, PA 18966.

George Abdow and his brother, Ronald, now own and operate 15 Big Boy restaurants, including four in Worcester, and one in Avon, CT, which opened in July. They also own the Ivanhoe Restaurant in West Springfield and P.J. Scott's, another new venture in Chicopee. Since opening their first restaurant in 1959, business has grown from 270,000 customers to 7 million last year. Their Big Boy restaurants employ 1,275 people, including 450 full time. The business section of the Springfield paper, the *Morning Union*, ran a feature article about the Abdows last June.

1955

Reunion **May 30–June 2, 1985**

Brian Kelly, vice president of operations for Bell of Pennsylvania, was the keynote speaker at the 1984 conference of the Pennsylvania

Municipal Authorities Association in Hershey in August. His topic was "High Technology in the Telephone Industry." At Bell, he is responsible for construction, design, billing, installation and associated staff functions.

1956

Henry Dumas has joined Eastern Air Devices, Dover, NH, where he serves as sales manager. He will be responsible for directing Eastern's sales representative organizations. Previously, he was vice president of sales for General Scanning Inc., Watertown, MA. Eastern Air Devices is a major manufacturer of motors, fans and blowers.

The Emhart Corp., Berlin, CT, has appointed **David Gilda** as vice president of engineering for its hardware division. Formerly, he was manager of resident engineering and quality control at the GE small-appliance division in Allentown, PA. He had been with GE since 1968. At Emhart, he will direct and coordinate research and development of new products, product engineering and quality control programs.

Albert Palmero is a senior project engineer for Superior Electric in Bristol, CT.

Peter Stephens works as a marketing representative for the wholesale and industrial business at Exxon Co. USA, Houston.

1958

In June, Titan Chemical Inc., co-founded by company president **Harvey Berger**, began operations in Sunnyvale, CA. The firm manufactures a safety degreaser and industrial cleaner called Oil-Flo Safety Degreaser, which dissolves surface contaminants such as grease, oil, tar and asphalt. The product emulsifies the grease or smudge so it can be rinsed away. Berger was president of Diversified Electronics, selling his interests in 1981. Currently, he is director of Gifford Computer Systems. He graduated from Harvard Business School.

Paul Dalton writes that he is still with Monsanto after 26 years. Currently, he is director of technology for the fabricated products division.

William Gess, Jr. has a new post as senior consulting engineer for the Undersea Electronics Products Department at GE in Syracuse, NY.

Phil Lenz has been promoted to senior district sales engineer in the New England district of Armco's Construction Products Division. He will direct promotion and sales efforts in the state of Connecticut. In 1969, he started his Armco career as a sales engineer with the former New England Metal Culvert Co. in Cheshire, CT. In 1974, he was named district sales engineer in Wallingford. He is a registered professional engineer and belongs to the ASCE and to the Connecticut Society of Professional Engineers.

Bill O'Neil left GE last fall following 23 years of service. He is now self-employed in the computer business with two former GE employees.

Roy Pearson is employed as marketing manager at Pratt & Whitney Aircraft, East Hartford, CT.

1959

Recently, **Thomas Hill** was elected chairman of the 235-member Marlboro (MA) Democratic Committee. He is senior program manager in charge of special programs at Avco Systems Division in Wilmington. A former president of the Richer School Home and

George Washington Was Here!

William Slagle, Jr., '33, the newly elected president of the Royall House Association in Medford, MA, is a man who likes to look at the past while keeping his eye on the future.

Says Lillian Bombaci, publicity chairman at Royall House, "Bill is one of the most efficient, capable and cheerful leaders we've ever had. He's instituted many new programs."

Bill's latest "domain" is one of the oldest houses in America. "We can't prove George Washington slept here," he says, "but we know that he conferred in 'The Marble Chamber' when the house was General John Stark's headquarters."

The estate goes back to 1631, when Gov. John Winthrop was granted 600 acres on which he built a brick farmhouse with a broad view of the Mystic River. Bricks brought as ship's ballast from England in 1637 can still be seen in the house's original sections.

In 1732, Col. Isaac Royall, a Maine native who amassed a fortune in Antigua, B.W.I., purchased the house and transformed it into a choice example of Georgian architecture.

"In my opinion, nothing else like it exists in America today," Bill says. "The house is faced with different materials on each of its four sides. It has 12 fireplaces, which in the colonel's day were tended by 27 slaves.

"Royall House is an integral part of American history," Bill explains. "A Boston Tea Party lacquered Chinese tea box was formerly kept on display here and is now in the D.A.R. Museum."

Examining Royall House painting in generals' conference room

Bill is retired from the Army Corps of Engineers (31 years) and the Massachusetts Division of Water Pollution Control (16 years). He is an active member of the West Medford Congregational Church, having served as church clerk for the past 18 years. He is also a past president of the Medford Council of Churches.

School Association and a past president of the city's home and school associations, he belongs to several professional engineering associations.

Wilfrid Houde has just taken over as president and chief executive officer of ViMart Corp., Los Gatos, CA, a firm which he helped found last year. The company's laser disk display captures brief segments of 180 entertainment, educational and personal productivity software programs. A potential buyer would tap a command on a simple key pad to view software on a TV monitor in a computer store. Included among the titles are 40 of the most popular software packages for Atari, IBM, and Commodore computers, as well as Apple Computer, where Houde recently served for five years as vice president and general manager of the personal computers systems division.

John Wary is with Linde Photocure, Indianapolis, IN.

1960

Reunion May 30–June 2, 1985

1963

Roland Kuehn was recently appointed to the school committee in Franklin, MA. Previously, he was a member of the town finance committee. He holds a master's degree in management from Northeastern University and is employed as manager of process and energy engineering for Hollingsworth & Vose, a paper company in East Walpole.

Charles Menzigian serves as a senior engineer for AT&T Communications in San Francisco.

1964

Dr. **David Laananen** is an associate professor at Arizona State University in Tempe.

John Macko, formerly a government liaison manager for Pratt & Whitney Aircraft, West Palm Beach, FL, retired this year. He plans to "take a mid-career sabbatical traveling through the USA and Europe."

Eugene Niemi, who has a BS from BU, an MS from WPI and a PhD from UMass, has been promoted to full professor of mechanical engineering at the University of Lowell (MA). He is a registered professional engineer.

1965

Reunion May 30–June 2, 1985

Thomas Arcari, Sr. of Plainville, CT, has been promoted to senior engineer at Northeast Utilities. In 1969, he started with the firm as a civil engineer in the transmission and distribution group at the general offices in Berlin. In 1981, he was advanced to licensing engineer in the generation facilities licensing branch of the nuclear engineering department. A registered professional engineer in Connecticut, Massachusetts, New York and Maine, Arcari holds an MSCE from UConn.

Walter Chang has been elected vice president of General Electric Technical Services, a worldwide subsidiary of the General Electric Co. He is responsible for market development for aircraft gas-turbine products in the People's Republic of China. Prior to receiving his MSME from WPI, he graduated with a BSME from Southeastern Massachusetts University. He has been with GE for 16 years in the aircraft engine group.

Roy Cornelius, Jr. is director of support services for Newton (MA) public schools.

David Geiger was recently named manager of the Torrington Company's standard plant, Torrington, CT. Previously, he was manager of personnel/labor relations for Torrington operations. In 1965, he joined the company as a manufacturing project engineer at the standard plant. He holds a master's in management from RPI.

Paul Pearson and his family started hiking on a beginner's course a couple of years ago. This year, they will each be competing independently within their separate classes. "This is a different type of activity which we enjoy very much," he writes. He and his wife also play duplicate bridge. Last fall, Paul was recognized by the American Contract Bridge League as having fulfilled the requirements for the rank of life master.

Dr. **"Buddy" Watson** serves as a commander of the Civil Engineer Corps for the U.S. Navy. He and his wife, Titia, and two daughters reside in Port Hueneme, CA.

1966

Paul Bujak is principal engineer for Goodyear Tire & Rubber Co., Akron, OH.

Gary Dyckman has been elected vice president of Cygna Energy Services and has taken on the responsibility of general manager of the firm's Boston office.

Richard Healer is principal systems engineer at the Foxboro (MA) Company. He and his wife, Carol, have two children and reside in Dover.

Dan Maguire has been named a vice president in the Chicago office of Turner Construction Company. In 1968 he joined Turner's Boston office. In 1977 he was assigned business development responsibilities in the Chicago office, and in 1978 he was instrumental in developing the Chicago territory's Special Projects Division, which he manages. He has an MBA from the University of Chicago.

Harry Ogasian is a senior electronics engineer at Hamilton Standard in Windsor Locks, CT.

Joe Pastic, with the U.S. Agency for International Development, Department of State, is currently on assignment in Cairo, Egypt.

Chester Patch III is now contract manager for Becon Construction Co., Houston, TX.

Michael Salvini holds the post of vice president of manufacturing for North American Wire Products, a producer of high-grade carbon and spring wire.

John Tata holds the post of vice president of marketing at City Stationers Inc. in Leominster, MA.

1967

Allen Griswold holds the post of product manager at Ferranti O.R.E. in Falmouth, MA.

Walter Johnson is a member of the engineering faculty at State University of New York in Binghamton. He is also employed by IBM in Owego.

Gary Rosen has been appointed executive director of Junior Achievement of Central Massachusetts. Since 1967, he has taught chemistry at Worcester's Doherty Memorial High School. Also, he has served as coordinator of the school's SITE internship program (Students Involved in Their Education), a career education program which allows selected twelfth-grade students to supplement their traditional academic courses with unpaid internships in the community.

Dick Shaw, a high-tech electronics engineer, gives belly dancing performances on weekends. "I don't do hootchy-kootchy," he says. His dance relies on style and grace. "It's a hobby," he explains. He has a master's degree from Bryant College.

Gary Willis of Mansfield, MA, was recently elected a vice president of the Foxboro Company. He was formerly general manager of the company's analytical operations in Plymouth. In 1975 he joined the firm as a major-product coordinator with the power sales organization. Subsequently, he held increasingly responsible posts. He is a senior member of the Instrument Society of America and belongs to the Scientific Apparatus Makers' Association.

1968

MARRIED: Richard Mayer to Joan Spalding in Tamworth, NH, on June 30, 1984. Joan, who holds degrees from the University of Minnesota and the University of Michigan, is an independent film and video producer for Cultural Images Group. Mayer serves as project manager for James Rivers Graphics in Hadley, MA. He has an MBA from Western New England College.

William Belisle is now self-employed with Belisle & Associates in West Garden Grove, CA.

John Kokoszka works as manager of process engineering with GE's Noryl products in Selkirk, NY.

William McCann, Jr. holds the post of senior engineer at Boston Edison. He writes, "I'm currently on loan to INPO in Atlanta, GA."

Joseph Owens III, who received his PhD in physics from Tufts, is an associate professor at Florida State University in Tallahassee. He and his wife, Linda, have two children.

Cary Palulis has been promoted to international accounts manager for the Edwin Cooper Division of Ethyl Corp.

Marshall Taylor has been elected senior vice president of development of Ryder System Inc. Previously, he was vice president of planning and treasurer of Ryder, a $2.4 billion (revenue) transportation, distribution and business services company. With the firm since 1974, he has held a number of posts, including manager of capital planning, director of corporate planning, assistant treasurer, treasurer and vice president. Before joining Ryder, he was with

Ben Mazer for Worcester County Newspapers

Jerry Finkle at Wachusett Molding

Happiness Is Your Own Business

Back in 1961, a big manufacturer of cosmetic containers offered Gerald Finkle, '57 ME, the post of division head. He turned it down. "I decided," says Jerry, "if they were so impressed with my abilities, that I should have enough confidence in myself to start my own business."

Finkle, who had had engineering experience with Elliott Co. and Nylon Products Corp., decided that the fledgling plastics industry looked promising. "At the time, few companies knew how to convert metal and glass parts to plastic," he explains. "It seemed like a good place to start."

So, with $18,000 in capital, which provided him with a 1,600-square-foot building and a single molding machine, Jerry Finkle launched Wachusett Molding Company in West Boylston, MA. Today, because of his commitment and dedication, the company has expanded to 50,000 square feet, 31 machines and 75 employees, who manufacture as many as 40 million parts a week.

After the first ten years, the firm became prosperous. Finkle declares, however, that the most rewarding part of building his business has been the sense of accomplishment, not the monetary value. "I love my work," he says. "I found out early on that I didn't enjoy working for somebody else. I like being my own boss."

The future of Wachusett Molding, he says, is in the manufacture of medical/pharmaceutical components such as vials, tubes, kits and personal-care products. Already, the West Boylston plant is too small. Last winter, he opened a second plant in Worcester.

Finkle, who heads the WPI Alumni Fund Board, is past president of the Central Massachusetts Amateur Radio Association, a member of the American Radio Relay League, a past master of his Masonic lodge and a senior member of the Society of Plastic Engineers. He and his wife, Cynthia, have three sons.

Mobil Oil Corp., where he was responsible for systems and financial analysis. He has an MBA from Babson. Active in civic affairs in the Miami (FL) area, he serves as treasurer and as a member of the executive committee of the Coconut Grove Playhouse.

1969

MARRIED: Kenneth Amend to DebraAnn Bisceglia on June 23, 1984, in Worcester. A collateral specialist for Shawmut Bank, she graduated from Worcester State College. Kenneth graduated from Ursinus College, holds a master's degree from WPI, and teaches at St. Peter-Marian High School in Worcester.

Stephen Legomsky continues as associate professor of law at Washington University Law School in St. Louis, MO.

Daniel Lorusso is principal consultant with Lorusso Associates in Pittsfield, MA.

Matthew Neclerio holds the position of president at Paramount Electronics Manufacturing Co. and Paramount Sales & Consulting Inc., Pompano Beach, FL.

John Szostek is now sales and marketing manager at TBV Inc., in Sutton, MA. The company manufactures specialty ball valves. The Szosteks and their 4-year-old son, Jason, and baby daughter, Corin, reside in Rehoboth.

Paul Wolf is manager of traffic engineering and systems planning at the Northeast Ohio Area-Wide Coordinating Agency. He is also a vice president of the Great Lakes Region Federation of Jewish Men's Clubs.

1970

Reunion **September 28, 1985**

Pramod Koradia was recently appointed to the post of manager of Selexol technology for Norton Company's chemical-process products business in Akron, OH. He is responsible for research, development and quality control for the Selexol solvent process for purifying natural and synthetic gases. With Norton for 14 years, his most recent position was manager of product research at the pilot plant facility at Norton's Chamberlain Laboratories in Stow. He has an MS from WPI, belongs to the AICE, and was co-inventor of several patents relating to a catalyst having application in emission control.

John Malley is now generation planning engineer for New England Power Service Co.

Robert Smialek is vice president of American Protection Insurance Co., vice president of Kemper International Insurance Co., and an officer with principal companies in the Kemper group. He has an associate's degree in management, risk management, and loss control management and a CPCU from Insurance Institute of America.

Bohdan Sywak serves as a regional staff industrial engineer for DCASR (U.S. government) in Philadelphia. He has an MBA from Temple University.

1971

MARRIED: Raymond Biszko and Lauri Anne Elaine West on April 29, 1984, in Fall River, MA. She attended Jackson College, Providence College and the American Institute of Banking. Prior to joining the management of Raymond's firm, she was a manager of Fleet National Bank. Raymond is president of Advance Engineering Inc. and vice president of Guaranty Construction Co., both located in Tiverton, RI. . . . **Gregory Dickson** and Susan Hearn in Midland, MI, on July 14, 1984. Greg is manager of industrial hygiene at Dow Chemical Co.

George Bakevich serves as general manager at Interstate Nuclear Services Corp., Springfield, MA. A certified financial planner, he holds an MS in nuclear engineering from the University of Utah.

Jeoffrey Berg works as a staff engineer for Polymer Engineering in Boulder, CO.

Neil Collins recently formed a consulting firm, Empire Engineering, in Syracuse, NY. The company provides power systems engineering, economic and management consulting services to the utility industrial business sectors. He holds an MGS and an MBA from WPI and is a graduate of WPI's School of Industrial Management.

Alan Kaechele holds the post of manager of product marketing at Spectragraphics in San Diego, CA.

Douglas Keily is international project manager at Combustion Engineering in Windsor, CT.

John Landahl, who has an MBA from Nich-

ols College, Dudley, MA, is a civil engineer with the U.S. Army Corps of Engineers, Washington, DC.

Vincent Pace, who has an MSEE from Drexel and a JD from Temple University, serves as a patent adviser for the Naval Air Development Center in Warminster, PA.

Marshall Shepard works as a project engineer at Torrens Industries in Fyshwick, Australia.

Larry Sniegoski has changed his surname to "Snow."

David Winer is a project engineer at Orion Research Inc. in Cambridge, MA. In May he received his MBA from Boston College. He also has an MSEE from Northeastern.

1972

In April, **Charles Brine** co-organized and co-chaired a joint U.S.-Japan Seminar on Chitin Chitosan and Related Enzymes, sponsored by the National Science Foundation and its Japanese equivalent, JSPS. In September, he co-edited an Academic Press hard-bound volume of the proceedings. These activities follow his participation as a session chairman of the Second International Conference on Chitin and Chitosan, held in 1982 in Sapporo, Japan. He is the inventor on 16 U.S. and foreign patents on this broad subject, several of which (regarding biodegradable surgical sutures) have been licensed for worldwide commercial development. He earned an MS and a PhD and did postdoctoral studies at the University of Delaware.

Robert Colp, who is currently "on loan to Aramco in Saudi Arabia," expects to return to Massachusetts in December.

Michael DiBenedetto, a supervisor of power resources at Blackstone Valley Electric Company, spoke on the topic "Energy Sources—Present and Future" at Woonsocket (RI) Junior High School in May.

Andrew Lee has been elected to a three-year term on the board of directors of the Northeastern Loggers' Association. The association includes loggers and others employed in the forest industry from Maine to Minnesota and south to Maryland and Missouri. Lee has owned his own timber harvesting business, Lee Forest Products Co. Inc., since 1981. Previously, he was a commercial real estate manager in suburban Boston. He has served on the Plymouth Town Forest Committee and on the Massachusetts Forest Cutting Practices Act Interim Committee.

1973

MARRIED: Capt. **David Bedard,** USA, to Angelika Turner in Warwick, RI, on May 31, 1984. Angelika was educated at Qualifizierter Abschluss in Germany. Bedard, formerly stationed at Hunstville, AL, is now in Wurtsburg, Germany. . . . **Michael Zack** and Sherry Umberfield in Westerly, RI, on May 27, 1984. She graduated from Holyoke College, Holyoke, MA, and Northwestern University and is assistant vice president of New England Mutual Life Insurance Co. Zack, who also holds a degree from Northwestern, is chief executive officer of Launder-Rite Inc., Wakefield, MA.

David Brown, who is with the Sturtevant division of Westinghouse in Hyde Park, MA, has received the company's highest engineering award. He is one of 30 Westinghouse scientists and engineers selected to receive the George Westinghouse Award for outstanding engineering achievement. He was cited for helping to develop a fan armoring system that resists erosion and can be easily replaced in the field. With the firm since 1973, he joined the Sturtevant division in 1979. He has an MSME from Villanova.

Robert Levi holds the post of energy services engineer at Borg-Warner Air Conditioning Inc., San Leandro, CA. He is also pursuing his MBA part time at California State University in Hayward.

Kenneth Lexier was recently named assistant superintendent of schools in the Skowhegan, ME, school district. Previously, he was a school principal in the Wells-Ogunquit area, and a reading specialist in Uxbridge and Attleboro, MA. Also, he had taught math and reading in the Worcester, MA, secondary schools and had been an instructor in the WPI and Assumption graduate schools. Currently working for his MBA at the University of Southern Maine, he holds an MA from Assumption and a doctorate in education from BU.

Wallace McKenzie, Jr. has been appointed communications director by (MA) State Representative Steven Angelo for his 1984 election campaign. He has been active in Saugus political affairs for many years, is a member of the local finance committee and has served in the Town Meeting and on various town advisory boards. A consulting manager for Management Decisions Systems, Waltham, Angelo has an MBA from RPI.

Richard Stockdale is a senior software engineer at Digital Equipment in Littleton, MA.

John Wolkonowicz serves as manager of competitive strategy for Ford Motor Co., Dearborn, MI. He is a graduate of MIT's Sloan School of Management.

George Yesowitch holds the post of manager of special projects at Liquid Air Corp., San Francisco.

1974

BORN: to **Jim** and **Lexy Chito Ferraris, '77,** their third daughter, Christina Lynn, in May. Lexy is with GE in Plainville, CT, and Jim works for the Trane Co. in Avon.

Recently, **Paul Colby** received his PhD in physics from the University of Wisconsin at Madison. He is now a research associate in the physics department at Duke University, Durham, NC.

Linda Fritz has been appointed an assistant professor of physics at Franklin and Marshall College. Previously, she was an assistant professor of physics at Northeastern and a research assistant at Stanford University, where she received her PhD in 1981. She has written ten papers on her research findings for presentation at professional conferences or for publication in journals.

Michael Kosmo recently joined Schofield Brothers, Framingham, MA, as a project manager. He is a registered professional engineer and has eight years' experience in site planning of residential, commercial and industrial projects. He will supervise site planning projects and coordinate regulatory agency approvals. Formerly, he was a project manager with Merrimack Engineering Services in Andover. He is currently enrolled at Babson College, pursuing his MBA.

John Mathews has been promoted to senior engineer at Northeast Utilities in Connecticut. Since joining the company in 1980, he has held several posts, including that of project engineer for the Mt. Tom Station coal conversion, a 148,000-kilowatt NU generating station in Holyoke, MA.

Hugh McAdam was recently named vice president in charge of marketing and engineering for the International Paper Box Machine Co. of Nashua, NH. Previously, he was chief engineer, responsible for R&D as well as customer service engineering. Starting with the company in 1974 as a project engineer, he was later promoted to chief engineer. He has an MBA from Babson.

Richard McGuire is with Taylor, Wiseman & Taylor in Mt. Laurel, NJ.

Charles Nickerson is a staff engineer for Haley & Aldrich in Portland, ME.

Richard Piwko has been named Outstanding Young Engineer of the Power Engineering Society of the Institute of Electrical and Electronics Engineers (IEEE). As application engineer with GE's Electric Utility Systems Engineering Department in Schenectady, NY, Piwko was recognized for outstanding technical contributions in the research, development and practical application of new high-voltage direct-current (HVDC) transmission system controls. The successful application of HVDC will reportedly save millions of dollars for the electric utility industry. With GE since 1976, Piwko is responsible for studies of power system performance and the development of improved control systems for GE's generation and transmission products.

Lt. **Linda Woodward** serves as a project manager with the U.S. Air Force at Eglin AFB, FL.

1975

Reunion **September 28, 1985**

MARRIED: Robert Cummings to Martha Dungan on March 24, 1984, in Albuquerque, NM. Martha graduated from Albuquerque Career Institute and is employed as a paralegal. Robert serves as senior operations engineer at the Public Service Company of New Mexico. . . . **Ronald Simmons** and Jane Albright, recently. Jane is a nuclear engineer at Puget Sound Naval Shipyard in Bremerton, WA. Ronald was promoted to lead senior engineer with the Westinghouse-Bettis atomic power laboratory resident office in Bremerton in January.

BORN: to Anne and **Peter Hatgelakas** a son, Brian, recently. Peter is a senior exploration geologist for CNG Development Co., Pittsburgh.

Cliff Ashton has been promoted to senior engineer in the generation mechanical engineer department of Northeast Utilities. In 1979, he joined the firm as an associate engineer and was advanced to engineer the following year. He

has an MSME from RPI and is currently studying for his MBA at Rensselaer. Active in professional engineer associations, he belongs to Pi Tau Sigma and Tau Beta Pi engineering honor societies.

Michael Aspinwall has been named director of corporate planning at Pitney Bowes Inc., Stamford, CT. He joined the firm in 1981, serving most recently as manager of corporate strategic planning. Previously, he was associated with FMC Corporation, Philadelphia. He has an MBA from the University of Chicago.

Joseph DelPonte works for BDM Corp. in Huntsville, AL.

John FitzPatrick, who received his MBA from Rutgers last year, is currently a staff engineer for Exxon Research and Engineering Company in Colombia, South America.

David Giddings serves as a senior chemist at Nalco Chemical Co. in Sugar Land, TX. He has an MS and a PhD from Brandeis.

Robert Hart continues as a software engineer with the U.S. Army Electronics R&D Command's Tactical Software Support Center. His wife, Linda, is a graphic designer with Bell Labs.

Kenneth Howell is a collection coordinator at UConn Health Center, Farmington, CT.

Gary Kiontke has been promoted to associate actuary at Monarch Life Insurance Company, Springfield, MA. With Monarch since 1977, previously he was assistant actuary. He attended the University of Connecticut School of Insurance. His professional associations include the American Academy of Actuaries and fellowship in the Society of Actuaries.

James Qualey III has just received his PhD from Penn State.

Kazem Sohraby, who holds a PhD in electrical engineering from Brooklyn Polytechnic Institute, is a member of the technical staff at AT&T Information Systems in Somerset, NJ.

Wayne Stratton is an electrical engineer with the Federal Communications Commission in Washington, DC.

Earle Vickery III is a design engineer with Micron Technology in Boise, ID.

1976

MARRIED: Paul Jacques to Jane Sienkiewicz on June 23, 1984, in Rochester, NY. Jane has an associate's degree in health sciences from Monroe Community College, Rochester. Both she and Paul are employed at Kodak. . . . **Dick Lessard** and Jennifer McOmber on June 2, 1984. Jenny has a bachelor's degree in social work from Virginia Commonwealth University and works for the Pennsylvania Avenue Development Corporation. Dick is a senior associate with IMR Systems Corp., Falls Church, VA. . . .**Wayne Mandrus** and Debra Elmasian on May 26, 1984, in Springfield, MA. She graduated from Monson Academy and is regional manager of Helen Olevson Inc. in Providence, RI. He is a computer engineer for Bedford Control in Acton.

Lt. Col. **William Baker** writes that he is currently deputy district engineer of the Japan district of the U.S. Army Corps of Engineers. He is responsible for executing all design and construction contracts for military construction projects on mainland Japan and Okinawa. In Japan, the Corps services the Army, Navy, Air Force and Coast Guard. In December, he plans to attend the Defense Systems Management College at Ft. Belvoir, VA.

Doug Brown, who just received his MS in technology management from Polytechnic Institute of New York, is a consultant with C.H. Kline & Co. Inc. in Fairfield, NJ.

Jeremy Brown has been elected assistant vice president of group pension product development at State Mutual Life Assurance Company, Worcester. He joined the firm in 1976 and was named director of group pension product development in 1981.

Greg Dubin is product manager for Oxle Fuel Co., Windsor, CT.

Daniel Garfi is a partner in D.D.J. Associates Inc., Monmouth Junction, NJ. He has an MS in computer science from Fairleigh Dickinson University.

In February, **K. Alan Kelley** joined Federal Mogul Corporation's National Grinding Wheel Division, North Tonawanda, NY, where he serves as a product development engineer.

Nancy Sauberman, PhD, is a third-year medical student at St. George's University School of Medicine, Grenada, West Indies.

Dr. **David Sawyer** continues as a senior research engineer with Chevron Research Co., Richmond, CA. He has degrees from Clark and the University of Illinois.

Robert Schildt is now a liquor store assistant manager for the Commonwealth of Pennsylvania. He resides in Rock Ledge.

John Smith, who received his MD from SUNY-Stony Brook this year and his PhD from Roswell Park Memorial Institute in Buffalo, NY, last year, is currently a resident in internal medicine at Yale-New Haven Hospital, in New Haven, CT.

Paula Stratouly is studying for her MS in finance at Texas A&M University.

Steve Tuckerman has been accepted as a full member of the American Institute of Certified Planners.

Having spent the past two years as a postdoctoral fellow at the IBM Research Lab in San Jose, CA, **Edward Whittaker** is now assistant professor of physics at Stevens Institute of Technology in Hoboken, NJ. He and his wife, Suzanne, are the parents of a two-year-old daughter, Justine. Edward writes, "Justine is a native Californian."

1977

MARRIED: Michael Bloom and Linda Moskowitz in East Rockaway, NY, on July 31, 1983. Linda has a master's in social work and public administration from Syracuse. Michael has a new job as senior software engineer with Prime Computer in Framingham, MA. . . .**Paul Hajec** and Brenda Ayers in Georgetown, MA, on January 7, 1984. Brenda is completing her degree in English at Salem State College, where she is editor of *Soundings East*, and serves as a substitute teacher in Georgetown. Paul, a staff engineer with the consulting firm, HMM Associates, Concord, has a master's degree from Northeastern. . . . **Matthew Ward** and Meredyth Wessman on September 17, 1983. He is with the robotics systems research department at AT&T Bell Labs, Holmdel, NJ.

Gary Babin has been named assistant superintendent of the electric division for the Wellesley Department of Public Works. He has an MBA from the University of New Haven, and for six years he was employed with the United Illuminating Company of New Haven, CT. His most recent job was with the University of Connecticut's Office of Facilities in Storrs.

Stann Chonofsky was recently promoted to manager at Arthur Andersen & Co., Boston, an international public accounting and consulting firm. As a manager, he will continue in the consulting practice of the Boston office, specializing in service to distribution and public utility organizations. In 1977 he joined the company. In 1982 he received his M.Sc. from Sussex University, Brighton, England.

James Gado recently received his MS from MIT.

In July, **Keith Harrison** was promoted to area engineer with the Federal Highway Administration and transferred to Trenton, NJ.

Mark Knights is a senior physicist with Sanders Associates in Merrimack, NH.

Jerry Melcher has a new post as a senior applications engineer with Acurex, Autodata Division, Mountain View, CA. Acurex manufactures measurement acquisition and control systems and rotating machinery instrumentation equipment. He writes, "Just purchased a home in San Carlos Hills on the beautiful San Francisco peninsula."

Steven Terrell-Perica is a kavai epidemiological specialist with the Hawaii Department of Health in Lihue. He has an MA in physiology from San Francisco State University and a degree in epidemiology from the University of Hawaii.

Brad Prouty is a senior engineer for United Technologies Diesel Systems in Springfield, MA.

Jeffrey Wessels serves as engineering specialist with Northrop Corp., Pico Rivera, CA.

Gilbert Wilson holds the position of engineering section manager at Varco-Pruden Buildings in St. Joseph, MO.

1978

MARRIED: Daniel Durbak and Debra Stopera in Schenectady, NY, on June 2, 1984. Debra graduated from Cohoes High School and is a legal secretary. Durbak works for General Electric. . . . **Richard Ruscito** to Donna Yates on May 6, 1984, in Cranston, RI. Donna graduated from Rhode Island College. Richard is with Olin Corporation, Tallahassee, FL.

Richard Bielen works for FirePro Inc. in Wellesley Hills, MA. He holds his MS in fire protection engineering from WPI.

Robert Brosnahan serves as a senior product development engineer at Richards Medical Co., Memphis, TN.

Currently, **Paul Cody** holds the post of engineering supervisor at Westinghouse in Hillside, NJ.

Ron Fish is senior manager of technical services at Teledyne Systems Co., Northridge, CA.

Richard Gottlieb works as an engineer-estimator at Perini International Corp., Framingham, MA. He is studying for his MBA at Babson College.

Thomas Gudewicz is a candidate for an MD degree at the University of Texas in Galveston.

Man in Control At Livermore

"Basically, I run a control system which attempts to keep bottles from leaking," says Bob Pancotti, '78 CS.

Pancotti, who also holds an MSCS from WPI, is not talking everyday control systems and bottles. He's talking a $17 million control center and bottles containing pure energy.

"We try to keep the energy inside the bottles," he adds, "with twin 375-ton magnets."

Last fall, *Fortune* magazine ran a photo of Bob in the control room at Lawrence Livermore (CA) National Laboratory. He serves as team chief for the man-machine interface, Integrated Control and Diagnostic Systems Group, for the Mirror Fusion Test Facility (MFTF).

"The fusion community is trying to get fuel from sea water for energy products," he explains. "One gallon of sea water contains the energy equivalent of 300 gallons of gasoline. It could solve our future energy needs."

Livermore's MFTF is the largest and most expensive ($226 million) mirror fusion research project in the world. Bob is involved with the facility's computerized control and monitoring system (SCDS), which controls more than 10,000 devices and monitors more than 25,000 sensors.

Mitch Epstein

Bob Pancotti in control room

"SCDS will provide physicists with a method of studying machine and plasma behavior by acquiring up to 8 Mbytes [million] of diagnostic information every machine cycle, as often as every five minutes," Bob says.

The control room houses a state-of-the-art man-machine interface composed of 14 touch-sensitive color graphics screens and 27 additional color graphics screens for monitoring.

"With touch screens an operator can change current or voltage rates by touching the screens at certain points," Bob reports. "Changes to the control system, as required in an experimental environment, can be made quickly by writing a little software for new buttons." Computerized controls, he says, are the wave of the future. And the new wave may well help scientists draw limitless energy from the seas.

Capt. **Peter Hunt,** USAF, is chief of launch vehicle integration for the space division at Los Angeles AFS, CA. He has an MS in systems management from USC.

John Johnson has been awarded a Santa Barbara (CA) Research Center faculty development program fellowship. Johnson, who is working for his doctorate at the University of California at Santa Barbara, was selected because of his academic record and his commitment to becoming a university professor upon obtaining his degree. Previously, he was with Raytheon in Massachusetts.

Gregory Koss has joined Analog Devices Inc. in Norwood, MA, as marketing manager of the component test systems division. He is responsible for product planning, applications engineering, sales support, training and publications. Previously, he was product line manager at Computer Devices in Burlington.

Joseph Maslar is an account representative with Burroughs Corp. in East Hartford, CT.

Laura Mattick holds the post of production manager at Foote Mineral Co., Exton, PA. She is married to **Michael Poirier, '79.**

Thomas Medrek recently received his master's degree from Amos Tuck School of Business Administration at Dartmouth College.

Lucian Ograbisz works as principal electrical engineer at Sanders Associates, Nashua, NH.

Peter Rowden works for Mass Comp. in Westford, MA.

Last year, **Martin Schulze** received his PhD in nuclear physics from MIT. Currently, he is on the visiting staff at Syracuse University.

Bettina Tuttle was recently promoted to engineering manager at Polyclad Laminates Inc. in Franklin, NH. She is responsible for all process, product and facilities engineering and will also help oversee the computerization of engineering systems, as well as ensure conformance to OSHA and EPA standards and regulations. Formerly she was a process development engineer for GE and a research engineer at Exxon. She joined Polyclad's Millbury (MA) plant as a process engineer in 1983. In her spare time, Tina enjoys athletics, coaches sports and works with the handicapped and underprivileged.

Karlis Viceps is self-employed in Taos Ski Valley, NM, where he does solar-earth shelter consulting and residential design.

1979

MARRIED: Stephen Clarkin to Cynthia Welch in Mendon, NY, on May 26, 1984. Cynthia graduated from SUNY, Albany, and is employed at RIT's College of Business. Stephen, who received his MBA in marketing from Cornell in May, is with General Mills in Minneapolis. . . . **Cynthia Connor** and Keith Tomko in Holyoke, MA, on April 28, 1984. Cynthia is with Westinghouse in West Mifflin, PA. Keith graduated from Pennsylvania State University and is also an engineer with Westinghouse. . . . **Gail D'Amico** and Mark Mason on May 12, 1984, in Middletown, CT. Gail has an MA from Mount Sinai School of Medicine in New York City. Mark has a BA from Bowdoin and an MS from the University of Connecticut. Both are in their final year at Tufts University School of Veterinary Medicine in Boston. . . . **Judith Dorkin** and Craig Pendergraft on May 19, 1984, at Hammersmith Farm in Newport, RI. Judith is pursuing a master's degree at the University of New Haven and has worked for Southern New England Telephone Co. for the past five years. She will be working for Pacific Telephone as an assistant manager in San Jose, CA. Craig graduated from Humboldt State University, Arcata, CA. He is an accounts manager for Synercom Technology Inc. . . . . **Alan Masse** and Kathleen Murphy in Pawtucket, RI, on May 19, 1984. Kathleen graduated from Middleboro High School. Both she and Alan work for the Kemper Group.

BORN: to Cynthia and **Glenn Braunstein** a son, Glenn Jr., on September 25, 1983. Glenn, a development engineer for Goodyear Tire & Rubber Co., is on a temporary six-month assignment at the Goodyear plant in Luxembourg. He has an MBA from the University of Akron (OH).

Paul Blackmer is an industrial engineer with GE in Utica, NY.

Michael Blaney works for Thermo Electron Corp.

Paul Burgarella is now a project engineer at Teledyne Philbrick, Dedham, MA.

Stephen Caputo serves as sales manager for the eastern region at GE capacitor products department in Hudson Falls, NY.

Jane Estey of Old Saybrook CT, was recently named a structural engineer at Hoffmann Architects. A professional engineer, she is responsible for the structural design and engineering of rehabilitation projects. She is a master's candidate at UConn.

Tom Girotti is an associate engineer in the planning department at Virginia Electric &

Power Co., Norfolk. He and Deb are the parents of two children and reside in Newport News, VA.

Capt. **Robert Gregorio** serves as assistant division transportation officer with the U.S. Army, 3rd Armored Division, Frankfurt, Germany.

Brian Hallett works for Westinghouse-Bettis, West Mifflin, PA.

Thom Hammond is now a senior sales engineer for Masoneilan Marketing International Company. He is on a two-year contract in Saudi Arabia selling to refineries and Aramco.

Arthur Hughes has been transferred to Alice, TX, where he is currently open-hole operations manager for Dresser Industries. He resides in Corpus Christi.

David Johnson, who is vice president of RWP Johnson Associates Inc., Bridgewater, CT, is studying for his bachelor's degree in theology at The Way College of Emporia, KS.

Michael Josbaecher works for Digital Equipment and is currently traveling in Europe.

James Korte is an aero- and bias-tire compounder for Goodyear in Danville, VA.

Claire LaChance, who has her MS in systems engineering from the University of Pennsylvania, continues as a member of the technical staff at the Mitre Corp., Bedford, MA. She is married to Jeffrey Toth.

Mark Lovington works for Concord Data Systems in Waltham, MA, where he is a member of the technical staff.

Carl Nyerick received his MS in medical physics from the University of Pittsburgh in April. Currently, he is a medical physicist with Gastroenterology Medical Associates in Pittsburgh.

Peter Pappas serves as senior software engineer at Stratus Computer, Natick, MA.

Michael Poirier, formerly a consultant for Arthur Andersen in Philadelphia, was recently named a manager for Sigma Data Systems, a computer consulting firm in the Wilmington, DE, area.

Steve Rusckowski has received his MS in management from MIT's Sloan School of Management. His degree concentration was in corporate strategy and marketing, and his thesis was entitled "Financial Reporting: Liberal or Conservative." Prior to entering MIT, he was production manager for three years at Procter & Gamble Mfg. Co., Quincy, MA. Currently, he is a financial-planning manager with Hewlett-Packard's Medical Products Group. The Rusckowskis, who have a daughter, reside in Waltham.

Sanford Selman is manager of energy utilization technology at Edison Electric Institute, Washington, DC.

Susan Titherington continues as a software engineer at Compugraphic in Wilmington, MA.

John Tracy is involved with institutional equity sales at Morgan Stanley & Co., New York City.

1980

Reunion **September 28, 1985**

MARRIED: Michael Ramadei to Michele Celentano on June 1, 1984, in Hamden, CT. She holds a BA in history from Yale and a JD from St. John's University, Jamaica, NY. She was admitted to the Connecticut Bar last November. He has an MBA from Rivier College, Nashua, NH, and is pursuing an MSEE at the Hartford Graduate Center. He is with Phillips Medical Systems in Shelton. . . . **Pamela Thomas** to James Cadorette, last fall. She is a quality engineer at American Bentley Labs in Irvine, CA.

BORN: to Eileen and **Art O'Leary** a second son, Theodore Richard, on May 23, 1984. Art still works for Artisan Industries in Waltham, MA. The family resides in a new house in Leominster.

James Barker is a project engineer at Exxon Research & Development Labs in Baton Rouge, LA.

Robert Dreyfoos has been named plant manager of Photo Electronics Corp., West Palm Beach, FL. His father is president of the firm, which manufactures electronic equipment used by professional color photofinishing laboratories. Robert joined the firm as a design engineer in 1980. He headed the team that developed the company's newest product, PVAC, the professional video analyzing computer, which along with the firm's other products is marketed by Eastman Kodak. Photo Electronics is the parent company of the ABC-TV affiliate in West Palm Beach, Laser Color Laboratory and the Sailfish Marina.

Charles Dyke is employed as a senior chemical engineer at Texaco Inc. in Glenham, NY.

Margaret Fernald works for Mitre Corporation in Bedford, MA.

Arman Garakani works for IBM as an associate engineer in Poughkeepsie, NY.

John Hassey is a senior software engineer for Data General, Westboro, MA. He and his wife, Donna, have two children and reside in Worcester.

Arthur Huggard is a senior manufacturing technology engineer for Monsanto Chemical in Indian Orchard, MA.

Leo Kaabi is a manufacturing management trainee for R.R. Donnelley, Torrance, CA.

Don Maki holds the post of plant engineer at Borden Chemical, Diball, TX.

Ronald Marshall, who graduated with his master's degree from the University of Vermont in May, received the 1984 Graduate Award in Statistics on Honors Day at the university.

Jay Meisner is a graduate student at Einstein College of Medicine in Bronx, NY.

Robert Myers works as a contract administrator for Parsons Brinkerhoff Construction Services in New York City.

Mark O'Neil recently completed his first year at Harvard Business School.

Matthew Powell is a member of the technical staff at the Mitre Corporation in Bedford, MA.

Chartsiri Sophonpanich, who recently received graduate degrees in chemical engineering and management from MIT, is now a management associate at Citibank, New York City.

Mark Tino is now a manager at Arthur Andersen & Co., Boston. He has been with the international public accounting and consulting firm since 1980. As a manager, he will continue in the consulting practice of the Boston office, specializing in service to distribution and manufacturing organizations. He and his wife, Pamela, reside in South Easton, MA.

Geoffrey Ward works as a thin-film process engineer at Analog Devices Semiconductor, Wilmington, MA.

Lisa Wylie is an information systems staff member at AT&T Technologies in North Andover, MA.

Daryoosh Yaghmaei, who works in the gold mining industry, has been named a laboratory analytical chemist at Pilbara Laboratory, a division of Macdonald Hamilton & Co., Kalgoorlie, Australia.

1981

MARRIED: Antonio Cabral to Janet Gigli on April 28, 1984, in Manchester, CT. A manager for Rite-Aid Corporation, Janet graduated from Robert Morris College, Pittsburgh, PA. Cabral is a materials engineer for Pratt & Whitney Aircraft, East Hartford, CT. . . . **Robert Daley** and Susanne Hoffman on July 21, 1984, in Milford, CT. Susanne, an associate with Brian Alden Inc., graduated from Salve Regina College, Newport, RI. Robert is vice president of Savery Tool Sales Co., West Hartford. . . . **Paul Filosa** and Donna Rodeschin in Glen Burnie, MD, on May 5, 1984. Donna has a BS degree in mathematics from the College of Charleston, SC. She and Paul are both employed as mathematicians for the Department of Defense in Washington, DC.

MARRIED: James Martin and Holly Graham in Great Barrington, MA, on July 7, 1984. Holly, a special-education teacher in the Upland School District, graduated from Wheelock College. Martin is a field sales engineer with Automatic Switch Co. . . . **John Nykyforchyn** and **Janice Millard, '83,** on April 7, 1984, in Cohasset, MA. Janice is employed by General Dynamics-Electric Boat, Groton, CT, and John serves as a resident manufacturing engineer at United Nuclear. . . . **Michael Thompson** and Ann-Marie Murray in Worcester on April 28, 1984. Ann-Marie, a registered nurse, graduated from Worcester City Hospital School of Nursing and Worcester State College. Michael is a sales engineer for Westinghouse Electric Corporation in Fayetteville, NC.

Wayne Barry of Paxton, MA, who was a volunteer with Big Brothers/Big Sisters of Worcester County as a student at WPI, has been a Big Brother to Brian Maddox since 1977. Last year, Brian was joined by Tavie Johnson. Wayne was recently married, but says that his wife is very supportive of his Big Brother activities. Professionally, Wayne works in residential and commercial real estate management and is assistant varsity coach and coach of the junior varsity basketball team at Doherty High School in Worcester.

Joe Bellas works as a sales engineer for Gulf Oil, East Providence, RI.

Robert Breault has been promoted to senior industrial engineer at Chesebrough-Pond's Inc., Clinton, CT.

Jeanne Coughlin works as a systems engineer at IBM in Paramus, NJ.

Joseph Des Jardins works for Motorola in Ft. Lauderdale, FL.

Gary DiFederico serves as a project engineer at Hamilton Standard, Windsor Locks, CT.

Dan Doherty Jr. is currently a senior software engineer at DEC in Nashua, NH.

Susan Hoffma has joined the Peace Corps and is serving in Tanzania.

David LaPotin is currently a student at Carnegie-Mellon in Pittsburgh.

Michael Przybyla is employed as an assistant planner at Pioneer Valley Planning Commission, West Springfield, MA.

Art Shorrock is a quality assurance engineer with Hitchiner Mfg. in Milford, NH.

Gary Winer has received his JD degree, *cum laude,* from New England School of Law. As a law student, he used his technical background while working as a law clerk for the Boston firm of Weingarten, Schurgin, Gagnebin, and Hayes, which specializes in patent, copyright and trademark law. He also served as president of the New England School of Law International Law Society, and he was a member of the school's law team that competed in the Jessup International Moot Court Competition.

1982

MARRIED: Gary Baier and Jennifer Krusen in Harvard, MA, on June 16, 1984. Jennifer graduated from Simmons College and is now a graduate student at UMass. Gary, who works at GE in Pittsfield, is enrolled in a master's program at RPI, Troy, NY. . . . **David Batbouta** to **Ellen Dusseault, '83,** in Worcester on May 19, 1984. Ellen serves as a software engineer for Digital Equipment Corp., Nashua, NH. David is with Killsman Instrument Co., Merrimack. . . . **Frank Bilotta, Jr.** and Joan Spierdowis on May 5, 1984, in Norwood, MA. Joan graduated from UMass, Amherst, and is employed at Rentacolor Corp. Frank works at Data General. . . . **Martin Riccitelli** and Karen Tatro in Westfield, MA, on June 30, 1984. Karen received her BSME from Western New England College and is an applications engineer for Prime Computer, Windsor, CT. Martin is with United Technologies Diesel Systems.

MARRIED: Barry Rosen and Deirdre Sullivan in Westwood, MA, on June 2, 1984. She is a programmer for GE in Lynn. Barry serves as a quality control engineer for GCA in Andover. . . . **Elizabeth Sydney** and **James Krieger, '85,** at Higgins House, Worcester, on May 20, 1984. She is an industrial engineer with New England Electric in Westboro, MA, and is currently pursuing her MBA. He is majoring in computer science. . . . **James Tata** to Patricia Valone in Warren, PA. Patricia graduated from Allegheny College, Meadville, PA, and received her master's degree from the University of Rochester. She is employed by the University of Rochester Medical Center in the department of radiation biology and biophysics. Tata, who received his master's degree from the university this year, is currently a candidate for a PhD in chemistry.

Robert Arbogast, a senior majoring in Greek at Calvin College, Grand Rapids, MI, has been awarded the college's Board of Trustees Scholarship for 1984-85. He intends to enter Calvin Seminary and become a minister of the Christian Reformed Church. Currently, he tutors Greek in the Calvin classics department. He and his wife, Janet, have a daughter, Kathryn.

Frederick Berbig holds the position of project engineer for Los Angeles County Sanitation Districts, Whittier, CA.

Modeling in Milan

Setting the Pace In Fashion

Big-time male modeling. Glamorous. Right? Easy. Right? What a way to make a living!

Steve Pace, '78, laughs as he discusses people's reactions to his part-time profession. "It certainly sounds glamorous to be sent off to Paris and Milan for months at a time to model high fashion," he admits. "I always enjoy the experience, and occasionally I get to keep the clothes. But, easy? Sometimes, I work from 6 in the morning until 9 o'clock at night!"

Steve, who regularly is a commercial real estate broker for Ashwill Schneider in San Jose, CA, tries to play down the glamorous aspects of modeling. But when your clients are such world-famous names as Missoni, Fiorucci, Puma, Panchetti, *Men's Vogue Italian* and *Playboy Italian,* the glitter can't help but come through the seams.

"I like to model on location," Steve says. "It's more enjoyable than doing routine studio assignments. It gives me a chance to travel to new places and meet interesting people. For example, while in Europe recently, I worked for the major magazines, designers' fashion shows and for TV commercials."

Back in the U.S., his modeling clients, mostly in the San Francisco area, are Macy's, Hastings, Emporium Capwells, Neiman-Marcus and J.C. Penney. Recently, he modeled for a Paul Masson winery brochure.

As far as the future goes, Steve plans to continue dealing with commercial-industrial real estate (RE) in the Silicon Valley ("I fell into RE four years ago."), and to take acting lessons with an eye toward doing more TV commercials. Eventually, he might even go into acting.

"Meanwhile, I'll continue to model locally," he says. "But if I get another opportunity to model in Europe, you can be sure I'll take it!"

Peter Booth is an automation engineer at Northrop Corporation in Norwood, MA.

John Browning is manager of Anaconda-Kaye Sports in Kingston, NY.

Peter Fanning is a mechanical engineer for the Department of the Navy in Port Hueneme, CA.

Matthew Flynn is a medicinal chemist with Pfizer in Groton, CT.

Mohammad Golnaraghi, a PhD student at Cornell, is working as a research assistant in the theoretical and applied mechanics department.

Edmund Henry is employed as a project engineer at Stone & Webster, Boston.

Karlin Jessen serves as division chief for the U.S. Air Force at Hanscom AFB, MA.

Michael Lawrence is an engineer intern for the Connecticut Department of Transportation in New Milford.

Michael Maloney works as a systems engineer at Arinc Research Corp., North Billerica, MA.

Thomas Marnik has been appointed to the post of building commissioner in Fairhaven, MA. He holds a construction supervisor's license and is a town meeting member and a call fireman.

Mark Morawiec has completed his first year in the MBA program at Duke University, Durham, NC.

Martin Morra is a research assistant at MIT.

Thomas Neale now works as a senior assembly engineer with Zytrex Corporation in Sunnyvale, CA.

Lynne Ondek is in the advanced engineering program at Honeywell Information Systems, Billerica, MA.

Richard Petrucci works as a pipe support designer for Stone & Webster (Boston) in Waterford, CT.

Wilson Powell is an associate software engineer for Raytheon in Bedford, MA.

John Ravener is with Electric Boat, Groton, CT.

1983

MARRIED: Michael Brown and Elizabeth Calabro on June 9, 1984, in Waterbury, CT. Elizabeth graduated with a nursing degree from St. Joseph College in West Hartford and was formerly an RN at Waterbury Hospital Health Center. Michael, an electrical engineer with Hughes Aircraft, Canoga Park, CA, is studying for his master's degree at USC. . . . **Keith Comeford** and **Lorrie Hermanson, '84,**

recently in Clinton, CT. Lorrie is doing graduate work at Brandeis University. Keith is a software engineer at Digital Equipment Corp., Nashua, NH. . . . **David Dumas** to Penny Kramer on June 24, 1984, in North Kingstown, RI. Penny, a graduate of Becker, is an interior designer with Royal Business Group, Worcester, MA. David works for Data General in Southboro. . . . **Michael J. Gagnon** and Linda Corrado on May 12, 1984, in Cumberland, RI. Linda, a certified occupational therapist assistant, graduated from Becker. Michael is an assistant sales engineer with Westinghouse in Jericho, NY. . . . **Richard Scott** to Judith Stiles in Falmouth, ME, on June 30, 1984. She graduated from Becker. He works for UNC-Naval Products Division, Uncasville, CT.

Jane Norris Booth is a materials engineer at the Army Materiels and Mechanics Research Center in Watertown, MA.

Dennis Boyd serves as a technical service engineer at National Starch & Chemical, Bridgewater, NJ.

Guy Busa is now a graduate student at MIT.

Catherine Coyne works as a software engineer at Wang Laboratories in Lowell, MA.

David Crawford holds the post of manpower management officer for the U.S. Air Force at the Air Force Management Engineering Agency, Randolph AFB, TX.

Gerard Grippo works as a material supervisor at General Dynamics in Quincy, MA.

Joseph Iantosca Jr. is a project coordinator for Belair Construction in Weymouth, MA.

Brian Klaubert works for Kimberly-Clark Corp., New Milford, CT.

Kevin Manning is currently in Birmingham, England, serving as a consultant for the machinery division of E.M. Hart Corp.

David McFarlin serves as inventory coordinator at Nypro Inc., Clinton, MA.

Cheryl O'Neal is with DEC in Maynard, MA.

Joel Patenaude, who is with the Peace Corps in Kenya, is affiliated with the International Development Regional Office of Housing and Urban Development.

Mark Pease now works with a transmitter design group in the systems development division at the Westinghouse Defense and Electronic Center in Baltimore, MD.

John Pepper works as associate test engineer at Hamilton Standard, Windsor Locks, CT.

Eric Peterson is with Raytheon Co. in Portsmouth, RI.

James Petropulos is a civil engineer for Allan H. Swanson Inc., Nashua, NH.

Michael Russell works for Superior Electric in Bristol, CT.

Douglas Saunders is a marketing manager with Automated Assemblies Corp., Clinton, MA.

Peter Simeone is with the aircraft engine group at GE in Lynn, MA.

Charles Smith works for Production Services Corp., Cambridge, MA.

Stephen Smith is a components engineer for GE in Pittsfield, MA.

No longer with ITT, **Lynn St. Germain** is now a design engineer at Hamilton Standard, Windsor Locks, CT.

Ronald Thompson, Jr. was recently promoted from commercial loan analyst to cash management consultant at the United Bank of Denver, Denver, CO.

Cynthia Nault Torrey is now a software engineer for the Foxboro (MA) Company.

Bernadette Young is an associate engineer at New England Electric, Westboro, MA.

Ralph Rosen has received his MBA from Babson College.

Douglas Schelleng is a planner for Rockland County Planning Board in New York City.

Garrett Thompson is currently a senior engineer for Harris-Government Satellite Communications Division.

John Tirrell is employed as a design engineer by Stone & Webster in Shippingport, PA.

Scott Traynor works for the Naval Underwater Systems Center in New London, CT.

Robert Valentine continues as a component engineer at Data General in Westboro, MA.

Cynthia Widmer is an electronic engineer II at Sanders Associates in Nashua, NH.

Peter Young recently graduated from the Northern Essex Community College Evening Nursing Program in Haverhill, MA. One of his classmates was his mother, Ruth. They are thought to be the first mother and son team anywhere to complete a four-year nursing program together.

1984

MARRIED: Kimberly Cote and George Bursaw III on July 14, 1984, in Slatersville, RI. Kimberly is with the Raytheon Co., Wayland, MA. George, a graduate of Ponaganset High School and a staff sergeant in the Rhode Island Air National Guard, works for Alumiline Corp., Lincoln. . . . **Kenneth Messier** and Robin Tucker in Spencer, MA, on May 26, 1984. Robin graduated from Quabbin Regional High School. Kenneth works for Howmedica in Groton, CT.

William Abbott has joined General Electric.

Daniel Adner is now with General Spring & Wire Co.

Susan Ames works for Du Pont.

David Anderson is on the staff at Teradyne Inc.

William Andrews has been named a member of the staff at NBI.

Douglas Anneser works for Unitrode Integrated Circuit Corp.

Arpi Aprahamian has been employed by the Gillette Co.

Michael Atamian is a graduate student in chemistry at the University of California.

Dean Athans works for GE.

Desiree Awiszio works for Digital Equipment Corporation.

David Backer is on the staff at Sikorsky Aircraft.

Carol Bagdis has joined Polaroid Corporation.

Craig Baptiste is with Du Pont.

Terry Barber has joined Pfizer Inc.-Howmedica.

David Barlow is with the U.S. Army.

Kevin Barrett works for Data General.

James Barry has joined the Foxboro Company.

Steven Baturin is now with IBM.

David Beane has joined the Turner Corporation.

Thomas Beaulieu is with Data General.

Rudy Beaupre works for Combustion Engineering.

David Beck has accepted a post with Du Pont.

Maria Biascoechea Fernandez is currently with Nypro Co. in Puerto Rico.

John Bibinski works for the Gillette Co.

Sam Bigelow has accepted a post with IBM.

Earle Blatchford is with Alan H. Swanson Inc.

James Bock has joined Data General.

Michael Bonder is on the staff of Stratus Computer.

Denise Bolduc works for DEC.

David Boudreau is with the Raytheon Company.

Patrick Brady is employed by General Electric.

Robert Bragdon has joined the staff at Sanders Associates.

Jack Bravo is now with Data General.

Patricia Bray works for IBM.

John Breen works for General Electric.

School of Industrial Management

Guy Nichols, '56, retired as chairman of the board, president and chief executive of New England Electric Systems on July 1. He had been with the company 38 years, 14 as president. He will continue as director. Under Nichols's leadership (diversified holdings in coal, oil, hydropower and nuclear areas), the utility has lowered its prices to consumers and raised its return on equity. In 1983, he was named New Englander of the Year by the New England Council, a 1,200-member regional business association. In 1982, he received the Founders Award from the Energy Technology Conference, an annual forum for energy professionals. In 1980, he was elected to a three-year term on the Coal Industry Advisory Board, sponsored by the Paris-based International Energy Agency. He was one of eight U.S. representatives of major coal-related industries to serve on the board. Recently, he received an honorary doctoral degree during commencement exercises at Nichols College in Dudley, MA. He is a former Sloan Fellow from MIT, where he received his MBA.

Alden Jacobson, '66, coordinator of programs for the Vermont Agency of Development of Community Affairs since 1980, recently received awards from the state and from WPI for his contributions to machining and electronic training for Springfield area industries. Vermont Lt. Gov. Peter Smith and **Bill Julian, '49,** past president of the Alumni Association, participated in the presentation, which took place during ceremonies held for graduates of the Advanced Vermont Electronics Training Program. . . . **Lee Peterson, '75,** has been advanced to vice president of operations at the BTR Valve Group's member company, the Worcester Controls Corporation, West Boylston, MA. He is in charge of manufacturing, data processing and office services for company facilities in West Boylston, Olive Branch, MS, and Liberty, NC. Affiliated with the firm for 22 years, he has held a variety of posts, most recently that of vice president of finance and controller. . . . **William Poist, '77,** has been named president and chief operating officer of Commonwealth

Gas Co., Southboro, MA. He joined the company in 1971, and was promoted to executive vice president in 1978. He has a bachelor's degree in business and industrial management from Johns Hopkins University and an MBA in marketing from BU. Currently serving in various capacities with several national gas industry associations, he is vice chairman of the New England Gas Association. A director of the Shawmut Community Bank, he also is chairman of the local Boy Scout Council, as well as a trustee of both Central New England College and the Regional Family YMCA. In 1983, he received the Albert J. Schwieger Award from WPI's School of Industrial Management.

COMPLETED CAREERS

Eugene H. Powers, '12, died May 25, 1984, in Worcester Memorial Hospital. He was 93 and a native of Worcester.

Following his graduation as a civil engineer, he worked as a salesman for Adams & Powers Co., then was a science teacher in Worcester high schools from 1915 to 1922. From 1922 to 1931, he was vice president and assistant treasurer of Adams & Powers Co. He retired in 1960 after serving as a science and math teacher in Worcester high schools.

Active with the Masons, he was a former master of his local lodge, and he belonged to the Royal Arch chapter and the Worcester County Commandery, Knights Templar. He belonged to the Odd Fellows, was a founder of the Worcester North Chester Club and was a 70-year member and past president of the local chapter of the Sons of the American Revolution.

A member of the National Retired Teachers Association and the Retired State, County and Municipal Employees of Massachusetts, he also belonged to the Tech Old-Timers, the Worcester Historical Society and the Friends of Old Sturbridge Village. He was the father of **Foster C. Powers, '37.**

Clarence E. Fay, '17, of Lake Worth, FL, passed away of congenital heart failure on May 15, 1984. He was born April 7, 1894, in Framingham, MA, and graduated with a BSEE.

He retired in 1959, after being employed with Bell Telephone Co. of Pennsylvania since 1919. During his career with the firm, he was district engineer, district plant superintendent and division plant superintendent.

A life member of the Telephone Pioneers of America, he was also a member of the Presbyterian Church (elder) and the Masons. He was a former president of the Pittsburgh chapter of the Alumni Association.

Otho M. Fish, '17, died at his home in Chatham, NJ, on April 23, 1984, at the age of 92. He was born in Fitchburg, MA, and was an electrical engineering student at WPI.

Before retiring in 1958, Mr. Fish was an engineer for 20 years with Jackson & Moreland Engineers, an electrical transmission firm in Boston. He belonged to the Masons and to the High Nooners Club. He was a graduate of Pratt Institute, New York City.

Carl E. Skroder, '21, a professor emeritus at the University of Illinois, died at his home in Urbana, IL, on April 12, 1984, at the age of 85. He was born in Worcester on April 29, 1898, and graduated as an electrical engineer from WPI.

Prof. Skroder, who was a professor of electrical engineering at the University of Illinois for 41 years, retired in 1966 as professor emeritus. He had an MS from the university and had previously been employed by AT&T.

A member of the American Association of University Professors, he also belonged to the American Society for Engineering Education and Rotary International. He was a registered professional engineer in Illinois. His other memberships included SAE, Eta Kappa Nu and Tau Beta Pi. He attended the Methodist Church.

John D. Austin, '22, of Seneca, NY, passed away on May 24, 1984.

From 1919 until his retirement in 1966, the Kendall native owned and operated Austin Farms in Hall. In 1956, he and his son were the New York State corn production champions.

Mr. Austin belonged to the Ontario County Farm Extension Service and the Farm Bureau. He was a charter member of the Grange League Federation, which eventually became Agway. He belonged to the United Church of Christ, the American Legion, the Masons and the local fire company. He was an avid hunter and sportsman. During World War I, he served in the U.S. Army.

Robert M. Wilder, '22, a leading Southern California structural engineer, died April 2, 1984, in Eureka, CA. He was 83 and a native of Athol, MA.

After graduating from WPI with his BSCE, he was employed in Peru, Panama, the Bahamas, the West Indies, Cuba and Florida in construction and design. From 1934 to 1954, he was affiliated with Paul E. Jeffers, a structural engineer in Los Angeles. From 1954 to 1964, he was a structural engineer in private practice.

Mr. Wilder was a former executive of the structural engineers associations of California and Southern California. An early proponent of earthquake-proof building methods, he designed many California structures, including the racing plant for the Los Angeles Turf Club at Santa Anita Park in Arcadia, and the largest communications complex in the world, the Los Angeles Telephone Building and microwave tower.

Other earlier affiliations were with the Los Angeles Chamber of Commerce, American Arbitration Association and the Mineralogical Society of Southern California, which he had served as treasurer. He belonged to Lambda Chi Alpha.

Russell L. Norton, '23, of West Falmouth, MA, passed away on April 7, 1983. He was a native of Willimantic, CT, attended Brown University, and graduated from Boston University.

For 40 years, he worked for the New England Telephone & Telegraph Co. After retirement, he took enamel-on-copper art classes. He belonged to SAE and Skull.

William L. Reynolds, '24, died April 23, 1984, in Portland, ME, after a long illness. He was 81 years old.

He was born in Northampton, MA. For many years, he was a superintendent for Lovell Bus Lines, Maynard, MA. He retired in 1978 after 25 years with Hemingway Transportation Co. He belonged to the Odd Fellows.

Charles M. Moran, '26, a co-owner of the National Contracting Company, Fall River, MA, died May 9, 1984, at the Clifton Geriatric Center, Somerset, MA. He was born in Fall River on Sept. 13, 1905.

He graduated as a mechanical engineer from WPI. During his career, he was with Crompton & Knowles, Petroleum Reclamation Co. and Swiss Oil Co. Later, he became a partner in the National Roofing Co. and the National Contracting Co., as well as president of Webarm Diecasting. In 1959–60, the National Contracting Co. sandblasted and painted the dome of the U.S. Capitol building.

Mr. Moran spent more than 25 years upgrading the former Union-Truesdale Hospital (now known as Charlton Memorial Hospital) from a small, two-building facility to a viable health care complex, serving as hospital president, trustee and as chairman of the building committee. His fellow trustees paid tribute to him by naming the fourth new hospital building in his honor.

He had served 30 years as director of the former B.M.C. Durfee Trust Co. and as honorary director of its successor, the Durfee Attleboro Bank. Fifty years ago, he was commodore of the Fall River Yacht Club. He belonged to the ASME, SAE, Skull and the Poly Club, and he was a former vice president of the Rhode Island chapter of the Alumni Association.

Charles N. Ryan, '27, president and owner of the former Ryan Manufacturing Co., died in Ware, MA, on April 16, 1984, at the age of 80. He was a native of Ware. In 1969, he retired from Ryan Manufacturing.

Theodore J. Englund, '28, a longtime employee of Norton Co., died in Worcester on July 3, 1984, at the age of 78. He was born in Worcester and graduated with his BSME from WPI in 1928.

He was with Norton Co. for 45 years, serving as an industrial engineer, manager of industrial engineering and as a factory manager. He retired in 1969. For many years, he taught mathematics at Worcester Junior College. He attended Harvard Business School.

Ted was a 50-year member of the Mendelssohn Singers of the Trinity Lutheran Church. A past president of the Tech Old-Timers, he was

recently presented with its distinguished service award. He was secretary of the Class of 1928.

He served as a director of the Shrewsbury Historical Society and was a former director of the Worcester Crafts Center. He was a charter member and former council member of Trinity Lutheran Church. He belonged to Tau Beta Pi.

John E. Gill, '29, a retired executive with Buffalo Forge Company, died in Sharon, CT, on May 28, 1984, at the age of 77. He was born in Manchester, CT, and graduated as a mechanical engineer from WPI.

He joined Buffalo Forge, Buffalo, NY, in 1929, retiring in 1972 as manager of foreign licensees. During his career, he had also served as sales engineer and chief engineer of the firm. He was instrumental in designing fan equipment for the world's largest vehicular tunnel through Mt. Blanc, connecting Italy and France.

Mr. Gill belonged to ATO, the Poly Club and Skull. He was a former vice president of the Western New York chapter of the Alumni Association.

Richard W. Hanson, '30, passed away in Greenville, SC, on September 13, 1983. He was 74, a native of Biddeford, ME, and a member of the Class of 1930.

He was retired from the Platt Saco Lowell Corporation. In World War II, he served in the U.S. Army. He belonged to Sigma Phi Epsilon.

Arthur W. Backgren, '32, a retired opera singer, died in San Francisco on June 18, 1984, at the age of 73. He was born in Worcester and received his BSCE from WPI.

Following graduation, he entered the insurance field. He then joined the Massachusetts Water Supply Commission on construction of the Winsor Dam of Quabbin Reservoir. Other posts were with Quonset Point Naval Air Station in Rhode Island and the U.S. Engineers as office engineer on flood control and airport construction in Lowell and Bedford, MA.

For 20 years he sang in the chorus of the Metropolitan Opera in New York City, retiring in 1973. He had also sung with the New York City Opera Company, at St. Thomas Church on Fifth Avenue and in choral productions with Arturo Toscanini and the NBC Symphony Orchestra. Earlier, he had sung leading bass roles in the Gilbert and Sullivan operas produced by the Worcester County Light Opera Club.

Ernest M. Crowell, '34, a longtime research chemist in polymer chemistry, died at his home in Beverly, MA, on July 15, 1984, at the age of 71. Born in Marlboro, he received his degree in chemistry.

During his career, he was with the Douthart Co., E.F. Drew & Co. and MIT. For more than 35 years, he worked for USM Corporation (Emhart) in Beverly, MA, where he served as a research and development chemist in the machinery division. His primary concern was with organic adhesives for use in shoe assembly. He retired in 1973.

Mr. Crowell belonged to the American Chemical Society, the Society of Rheology, the American Association for the Advancement of Science, the Quarter Century Club and the Congregational Church. He was the father of **Douglas Crowell, '66.**

B. Gustaf Larson, '34, a retired superintendent of maintenance for New England Power Co., died in Fairlawn Hospital, Worcester, on June 18, 1984, at the age of 71. He was born in Worcester and graduated with a BSEE from WPI.

In 1973, he retired from New England Power after having served the company for 38 years. Among his posts with the firm were meter superintendent, technical assistant and superintendent of maintenance. He had also served as staff assistant.

Mr. Larson, a registered professional engineer, was also a 32nd-degree Mason and a past monarch and life member of Aletheia Grotto. He belonged to the Scottish Rite Bodies and the Shrine. Other memberships were with Lambda Chi Alpha, the Tech Old-Timers, the Poly Club and the Baptist Church.

Donald C. MacKenzie, '34, of Brewster, MA, died at Cape Cod Hospital on April 21, 1984. He was 72 and a native of Lowell.

After attending WPI, he owned and operated a wholesale grocery business. In 1950, he moved to Cape Cod, where he was a self-employed cabinetmaker, specializing in antique reproduction furniture. He operated a shop called The Pine Tree Shilling.

Clare W. Harris, '38, of Carpinteria, CA, retired project engineer from Rockwell International, passed away on May 14, 1984, following a long illness. A native of Bangor, ME, he was born on Oct. 28, 1915.

Following graduation as a mechanical engineer, he was employed by Wright Aero Corp., Republic Aviation Corp., Curtiss-Wright, M.W. Kellogg Co. and Rocketdyne. He belonged to Tau Beta Pi and the American Rocket Society. He was an associate fellow of the AIAA.

Robert J. Hamilton, '39, of Bridgton, ME, passed away in Florida on March 25, 1984, after a short illness. He was born in Madison, ME, on July 15, 1915. He received his BS from the University of Maine at Orono.

At one time, he was manager of fleet sales for Mobil Oil Corp., New York City. He belonged to Phi Gamma Delta.

Gerald Lainer, '40, was stricken and died at his home in Manhassett, NY, on April 1, 1984. A Worcester native, he was born on August 21, 1918. He was a graduate electrical engineer.

Mr. Lainer, a member of AEPi, was in the electronic-equipment exporting business in Manhassett.

Harold A. Gibbons, '49, died in Fort Pierce (FL) Medical Center on April 25, 1984. He was born in Southampton, MA, on Feb. 14, 1917. He received his BSEE from WPI.

For many years, he was with Westinghouse Electric Co. in Springfield, MA, and in Albany, NY. He retired and moved to Florida in 1977.

Edward W. Eidt, Sr., '53 SIM, of Bushnell, FL, passed away on April 3, 1984. He was born in Worcester on December 16, 1908.

During his career, he was a trooper with the Massachusetts State Police, personnel manager for Wyman Gordon, Worcester, foreman for Bay State Abrasives, industrial relations manager for Reed Prentice Corp. and commissioner for the Federal Mediation Service in Albany, NY. In 1955, he was elected chairman of the Worcester Rent Control Board.

He was the father of **Edward Eidt, Jr., '57,** and **William Eidt, '65.**

David F. Johnson, '58 SIM, a retired comptroller for Woodbury Co., passed away on May 30, 1984, in Worcester Memorial Hospital. He was born in Worcester on June 25, 1916.

A graduate of Northeastern University, for many years he was a comptroller at Woodbury Co., retiring in 1979. During World War II, he served as a chief warrant officer in the Army. He was a lector at Immaculate Conception Church, and he was a member of the Worcester Civitan Club, the National Cost Accountants Association and the Green Mountain Club.

Walter Zakrzewski, '60 MNS, died in Worcester on April 5, 1984, after a long illness. He was 52.

For 17 years, he was a science professor at Quinsigamond Community College. Formerly, he had taught chemistry, physics and general science at Plainfield (CT) High School. He then taught and was chairman of the science department at Leominster High School. Later, he taught chemistry at Auburn High School and chemistry and biology at Grafton High School.

He graduated from Worcester Junior College in 1952. In 1954, he received his BS in biology and chemistry from Clark. In 1958 he was the recipient of a National Science Foundation scholarship to pursue advanced training in science.

Mr. Zakrzewski belonged to the Massachusetts Teachers Association, the National Education Association, the American Association of Physics Teachers, the New England Mathematical Association of Two-Year Colleges, the American Mathematics Association of Two-Year Colleges and Our Lady of Czestochowa Church.

Laurence Michaels, '75, of Ringwood, NJ, died in January of 1983, following a long illness. He was born in Far Rockaway, NY, on Sept. 10, 1949. In 1975, he graduated with his BS in computer science from WPI.

During his career, he had served as a systems programmer with Whitlow Computer Systems in Englewood Cliffs, NJ, and as a self-employed computer consultant with Michaels Enterprise, Plainsboro.

Anthony Sinkewich, '79 SIM, became ill while on a business trip in Seoul, South Korea, and died May 25, 1984. He was 72 and a native of Barre, MA.

He was a graduate of WPI's School of Industrial Management and was also a member of the Class of 1967. In 1980, he retired after working as a heat treating specialist at Massachusetts Steel Treating Division of GKN Powdermet Inc. in Worcester. Since 1981, he had been a consultant with Small & Medium Industry Promotion Corp., also in Worcester.

Mr. Sinkewich had an associate's degree in engineering from Northeastern University. He was a founding member of St. Columba's Church, Paxton, and belonged to the former Sons of Paxton. He was a life member of the ASM and a member of the American Association of Retired Persons.

"of the waters of the Earth"
continued from page 33

mixed: "It really separated the social from the math types" he says. In most college programs, he adds, hydraulics professors teach hydrology as a subset of highway engineering courses. It was his efforts at Stanford that attempted to change that direction. Yet he admits that today his field may be drying up, because, in his mind, "Hydrology is a field that calls for experience, and finding Ph.D.s to head graduate hydrology programs is becoming next to impossible." Plus, he says, "The computer seems to be eliminating the need for so many warm bodies."

During his tenure at Stanford, Linsley also served in the federal Office of Science and Technology, was a member of the U.S. National Water Commission, and was president and chairman of Hydrocomp Inc., Palo Alto, CA. Earlier in his career, he was a Fulbright Professor at Imperial College, London. A member of the National Academy of Engineering, he has won several prestigious ASCE and other awards.

In 1973, he received an honorary doctoral degree from the University of the Pacific. And in 1979, WPI awarded him an honorary doctorate in engineering, to climax his exemplary career.

Linsley retired from academics in 1975, leaving Palo Alto ("Too much smog in the Valley," he says) to head Linsley, Kraeger Assoc. In the pristine air of Santa Cruz, on the northern rim of Monterey Bay ("But too much water traffic for my sailing style"), he and wife Ann are "comfortably inaccessible" to the hectic demands of academe.

He's been called the country's paramount hydrologist in the heyday of the profession. Yet Ray Linsley has always preferred the outdoors to things like the cocktail party circuit, the solitude of hiking to the buzz of the city, the satisfaction of guiding Boy Scouts to the frenzy of public life. You can almost hear the gurgling of the stream, the hush of the breeze and the song of unseen birds in the oversized mural that dominates his firm's offices.

"Executive" was the type of work indicated in his 1937 career placement records from WPI. By any measure, Ray Linsley's teaching, research and writing, his quiet style, leadership and intense commitment to the best management of our most precious resource, have melded to become a classic fulfillment of that prophetic observation of almost 50 years ago.

FEEDBACK

Michael Carroll

Editor:
A few comments on your article about Higgins House [August 1984]:

Much of the structural lumber for the house came from about 20 old New England barns purchased by Aldus Higgins, '93, and carefully disassembled.

The roof is unique. It is made of clay tiles which simulate cedar "shakes" in an amazingly realistic way. Milton Higgins has told me that the roof installed originally did not suit Aldus Higgins, who had it removed and replaced by the present roof. These special clay tiles, I understand, were developed solely for this application.

The article says little of the professional achievements of the Higgins family, such as the fact that both Milton and Aldus Higgins became president and CEO of the Norton Company and served as trustees of WPI (as did Milton's grandson, Milton P. Higgins).

Aldus Higgins gave the land for the First Baptist Church at the corner of Park Avenue and Salisbury Street from part of his estate. But in the deed he stipulated that no bells be rung at the church.

Dr. Ray E. Bolz, Vice President and
Dean of the Faculty Emeritus

Editor's note: For a complete history of the Higgins family and their relationship with WPI and the Worcester community, the reader may wish to refer to Two Towers: The Story of Worcester Tech, *by Mildred McClary Tyneson.*

Editor:
Your article "Unraveling Rainbows" [August 1984] was very interesting. It covered virtually every rainbow myth and theory throughout history, but failed to consider the most ancient of books.

The Bible account found in the ninth chapter of Genesis is quite interesting. It shows how the rainbow serves as a sign by God that he will never destroy the Earth by flood again. The rainbow thus serves a useful purpose. It creates an atmosphere of tranquility after a storm.

Richard Fisher

WASHBURN:
THE TRADITION RESTORED

Find out what's new—and what remains the same—in WPI's second-oldest and now most modern learning facility. Coverage of the renovation, expansion and rededication of Washburn Shops and Laboratories begins in this issue and continues in the February 1985 issue of the *Journal*.