TECH WORKS FOR AN OLYMPICS

Also Inside

- Persistence Pays
- Leonardo: A Hell of an Engineer
- New Information Age
- Research into Airplane Safety

Atlanta 1996
Carolina Alumnus Enjoys Tech Traditions

Editor:

When a friend, John Hunsinger, sent me a copy of the Georgia Tech Alumni Magazine, I was surprised and honored to see myself in the centerfold photo of people visiting the Atlanta Botanical Garden ["Urban Isle," Summer 1989]. Also appearing in the photo are my wife, Beverly, my cousin Billy, and his wife, Jan.

Although I am a 1949 graduate of the University of North Carolina, Chapel Hill, my association with Georgia Tech goes back many years, and includes some great and happy memories. My first experience with Georgia Tech involved a "contribution" to Bobby Dodd and the Jackets tradition in Chapel Hill in September 1945 as I participated (on Carolina's side, unfortunately) in Bobby Dodd's first game as a football head coach. Dodd and the Jackets won by a 20-14 score.

After moving to Atlanta in 1954, I joined the Atlanta Touchdown Club, and a couple of years later was admitted to the Southeastern Conference Football Officials Association. I was immediately surrounded by more Tech grads and fans than you could shake a stick at.

Over the next 10 years, I officiated a number of Tech games and enjoyed the super individuals and great atmosphere of the Bobby Dodd era.

In my 35 years of business and personal life in Atlanta, I can truly say that both have been wonderfully and substantially enhanced because of Georgia Tech and all of the fine folks you have graduated, including my partner, Robert M. Shulman.

Now that my cousin and I and our wives have been afforded a centerfold position in your magazine, I'm even more of a Georgia Tech fan—except when they are playing Carolina!

W.G. Pritchard Jr.
Pritchard & Jerden Inc.
Atlanta

Give Credit Where Credit is Due

Editor:

Joe Massari and I were elated to see our LifeNet System software product featured in the Georgia Tech Alumni Magazine ["Taking it to the Streets," Summer 1989].

I wish we could take credit for developing the write-top computer and the handwritten symbol recognition algorithm, but that honor belongs to someone else. Ralph C. Sklarew, PhD, chairman of Linus Technologies Inc. of Reston, Va., is responsible for developing and bringing this innovative product to market.

Robert M. Mead
President
LifeCare Technologies
Atlanta

Wrong Class

Editor:

The profile of Dr. Leon Zalkow which appeared in the Georgia Tech Alumni Magazine ["Distinguished Professor," Summer 1989] contained an error. The $10,000 Distinguished Professor Award was endowed by the class of 1934, not the class of 1933.

I.L. Kunian, TE '34
Atlanta

Thank you to the official sponsors of the GEORGIA TECH ALUMNI MAGAZINE

- Acme Business Products
- Ball Stalker
- C&S Bank
- The Coca-Cola Company
- Delta Air Lines
- Dodson International Air
- First Atlanta
- Pickett Suite Hotel
- Ritz-Carlton, Atlanta
- Ritz-Carlton, Buckhead
- Technology Park/Atlanta
- Wyndham Hotel
43rd Roll Call Opens $4.15 Million Campaign

Kicking off the 43rd Roll Call Drive are (l-r) John Carter Jr., William Knight and President John P. Crecine.

Incorporating the Georgia Tech Alumni Association's Grand Gold Award into its theme, the 43rd Annual Alumni Roll Call kicked off its $4.15 million campaign challenging alumni to be active supporters of "a winning team."

G. William "Bill" Knight, IE '62, vice president for the 43rd Roll Call, told an audience of alumni volunteers, and Tech and Alumni Association administrators, "We're the No. 1 alumni association in the country and we want all of our alumni to be a part of the winning team."

The kickoff luncheon was held Sept. 11 in the Wardlaw Center.

The Alumni Association received the 1988-89 Grand Gold Award for its Total Alumni Relations Program from the Council for the Advancement and Support of Education (CASE).

The $4.15 million goal for 1989-90 is a 10 percent increase over last year's successful Roll Call drive, which raised $3.75 million.

Tech President John P. Crecine said, "The money raised in the Roll Call campaign is critical to the future of Georgia Tech."

The Roll Call "provides the margin of difference that makes it possible for us to aspire to be the premier technological university in this country," Crecine said.

"I want to thank you for your support and dedication," Crecine added. "You've got our support and dedication to make sure we wisely use the resources that you make..."
This is quickly becoming the most important tool we use to build our office equipment.

It may not be as sophisticated as a CCD image scanner. But it'll make quantum leaps possible in copier, facsimile and laser products. Because last fall, it broke ground a little north of Lawrenceville, in Gwinnett County, Georgia. Where Ricoh is building another U.S. manufacturing site for office equipment.

We've certainly had practice. In 1976, Ricoh was the first Japanese company to make copier products in America. Our three plants in Southern California make us the largest Japanese employer in Orange County. We hope to have the same positive effect on the economy of this county outside of Atlanta. By employing local people, buying supplies from nearby companies, and helping the community grow.

A commitment you'll be able to see for yourself on the labels of the office products that come out of our new factory. The ones that say Made in America.

Presented by

Acme Business Products
An ALCO Office Products Company
Ricoh's largest dealer in the U.S.

For a free demonstration contact the Acme office nearest you:
Albany, (912) 432-2344; Athens, (404) 353-0368; Atlanta, (404) 246-5500;
Augusta, (404) 863-2263; Brunswick, (912) 264-6675; Columbus, (404) 327-5114;
Gainesville, (404) 531-0593; Macon, (912) 788-7416; Rome, (404) 295-7247;
Savannah, (912) 232-6576; Dothan, AL (205) 793-0005;
Macon, GA (205) 271-1413; Hilton Head, SC (803) 686-2050.
And Now The Award For “Not Just Thinking About The Future, But Creating It...”

It all began with a vision. With an idea of what the future held. And a plan to turn that dream into reality... the reality of Technology Park/Atlanta. Of Johns Creek. Of Lenox Park. You’re looking at perhaps the only thing our Master Plan didn’t include: Winning the very first Governor’s Award for Excellence in Real Estate in 1989. Our family of high-tech corporate tenants have always shared our vision. We hope they share our pride in accepting this award.
43rd Roll Call Kicks Off Record Campaign

available to us for the maximum benefit of the institution.

Alumni Association President Oliver H. Sale Jr., ME '56, called the Roll Call drive a vital responsibility. "We've always preached quality education here, and to take a word from Ford, with Georgia Tech 'quality is job one,'" Sale said. "We can't keep up the quality education without the great work of our alumni."

John B. Carter Jr., IE '69, Alumni Association vice president and executive director, and James M. Langley, newly appointed vice president for communications and development, led the campaign kickoff by example, as both men turned in pledges for the 43rd Roll Call.

The Alumni Roll Call provides Georgia Tech with its largest source of unrestricted gifts, said Stacey Sapp, IMGT '80, Roll Call director. As of Oct. 1, the Roll Call drive raised $811,572 toward its goal, according to Sapp.

In addition to setting a new record in contributions, the Roll Call has also set its sights on increasing the number of alumni participating in the annual fund-raising drive, Sapp said.

By a unanimous vote, on Sept. 13 the Board of Regents of the University System of Georgia approved Georgia Tech's restructuring proposal. The vote came after discussion of the plan by the Regents the previous day, after it had passed the Regents' Education Committee in a 4-0 vote, with one abstention.

"This is a victory for Tech and the 131 faculty members who participated in the restructuring plan," said President John P. Crecine. "I look forward to continuing to work with the faculty to implement these proposals."

Earlier in the summer, the proposal received the endorsement of the Tech faculty in a tight vote. The plan, which was put together by several ad hoc committees on reorganization and had strong support from President Crecine, calls for the establishment of the following new academic units:

- College of Sciences, including schools of biological sciences, chemistry and biochemistry, Earth and atmospheric sciences, mathematics, physics, and psychology.
- College of Management, Policy and International Affairs, including schools of management, economics, and public policy. New divisions include international affairs; literature, communication and culture; and history, technology and society.
- College of Computing.
- Division of Fine Arts, including a department of music, to be part of the College of Architecture.

Regents OK Restructuring Plan
In Unanimous Decision
Delegation Tours Tech Olympic Site

When the delegation from the International Olympic Committee visited campus in early September, Tech was ready.

Despite the fact that school had not started, more than 275 Tech students, faculty and staff members gathered at the entrance to the Wardlaw Center to greet the committee in town to study Atlanta’s bid to host the 1996 Olympic Games.

The crowd cheered and waved flags emblazoned with Atlanta’s Olympic logo when the IOC delegates arrived to meet with President John P. Crecine.

The group heard a presentation about the proposed Olympic Village at Georgia Tech and later toured the campus.

Tech has been an active participant in Atlanta’s drive to bring the Olympics to its hometown. Tech’s unique, trend-setting interactive video proved to be a highlight of the IOC’s tour.

Leading the IOC group are Billy Payne, left, president of the Atlanta Olympic Committee, and Prince Albert of Monaco, right, with hand on jacket. Other IOC members attending the meeting were Phil Coles (Australia), Vladimir Cernusak (Czechoslovakia) and Gunther Heinze (East Germany).

Continued page 11

Georgia Tech Alumni Association

Officers
Olive H. Sale Jr. ’56
president
B. Joe Anderson ’50
past president
Shirley C. Mewborn ’56
president-elect/treasurer
John C. Staton Jr. ’60
vice president-activities
H. Hammond Stith Jr. ’58
vice president-communications
G. William Knight ’62 ’68
vice president-Roll Call
John B. Carter Jr. ’69
vice president/executive director
James Langley
vice president

Trustees
Thomas A. Barrow Jr. ’48
James D. Blich III ’53
Hugh A. Carter Jr. ’64
Stanley L. Daniels ’60
H. Guy Darnell Jr. ’65
Joseph T. Dyer ’69
H. Allen Ecker ’57 ’58
Edwin C. Eckles ’52
Jack J. Faussemagne ’65
Hal W. Field ’51
Frank B. Fortson ’71
Samuel O. Franklin III ’65
Thomas B. Gurley ’59
P. Owen Herrin Jr. ’70
Brian D. Hogg ’61
James R. Jolly ’64
G. Paul Jones Jr. ’52
James R. Lientz Jr. ’65
Frank H. Maier Jr. ’69
Ronald L. Martin ’68
Robert E. Mason ’60
Patrise M. Perkins-Hooker ’60
James Richard Roberts III ’69
L. Gordon Sawyer Sr. ’46
V. Hawley Smith Jr. ’68
W. Clayton Sparrow Jr. ’68
Francis M. Spears ’73 ’80
George A. Stewart ’69
H. Milton Stewart Jr. ’61
S. Joseph Ward ’51
43rd Annual Roll Call Drive

OUR GOAL: $4,150,000

EXIT 7 ENDOWMENT CLUB $5000-9,999

EXIT 4 GOLD CLUB $500-999

EXIT 3 FRIENDS OF GEORGE CLUB $250-499

EXIT 2 TIGER CLUB $100-499

EXIT 1 WHISTLE CLUB $48-99

EXIT 5 THOUSAND CLUB $1000-2499

BULL DOX X-ING MAINTAIN SPEED

END OF TAX YEAR ARE U

YELLOW JACKET X-ING CAUTION

EXIT 6 TOWER CLUB $2500-4999

EXIT 8 PHOENIX CLUB $10,000 UP

As of Oct 1: $811,572
DON'T LET OUR YELLOW JACKET WEEKEND FLY BY. $95 PER NIGHT.

Take off for a grand weekend at The Ritz-Carlton, Buckhead. Where you can shop next door at Phipps Plaza and Lenox Square. Give our pool and fitness center a workout. Then retreat to a gracious room with a lovely view of Atlanta. Just call 800-241-3333 or 404-237-2700 for reservations. At a price that doesn't sting.

THE RITZ-Carlton
BUCKHEAD
Minority Affairs Committee Sets '89 Homecoming Agenda

The Minority Affairs Committee of the Georgia Tech Alumni Association has scheduled a number of activities in conjunction with Homecoming on Oct. 20-22.

The committee begins its weekend activities with a pizza party at the Georgia Tech Afro-American Association house at 8 p.m. Oct. 20.

The group will meet at 9 a.m. Oct. 21 at the Delta house on campus. After the Tech-North Carolina football game, the committee will hold a reception at the Atlanta City Club in the Equitable Building.

A brunch will be held Sunday morning, Oct. 22, at the Marriott Marquis hotel downtown.

A commemorative print observing the 25th anniversary of black students attending Georgia Tech is also being offered for sale through the Minority Affairs Committee. The print sells for $150 and can be purchased by contacting Richard Branton, committee treasurer, Georgia Tech Alumni Association, Atlanta, GA 30332-0175.

The section of Third Street which crosses the Georgia Tech campus in front of the Old Gym has been re-named Bobby Dodd Way. Mrs. Alice Dodd was guest of honor at the ceremony, which took place before Tech’s football home opener against Virginia on Sept. 16.

Third St. Named for Coach

The Alexander-Tharpe Fund is pleased to present...

"THEY SAID IT COULDN’T BE DONE!"

by Wallene T. Dockery and Steve Williford

THEY SAID IT COULDN’T BE DONE! profiles the exciting life-changing principles of Homer Rice, Director of Athletics at Georgia Tech, which have transformed a sleeping giant into a landmark sports program.

In this entertaining and informative book, Dr. Rice explains how his "Attitude Technique" can work for you as it has for Georgia Tech coaches, athletes and many others.

You'll learn how to set goals and achieve them, develop self-confidence in yourself and your abilities, and how the "boomerang effect" can change your life to be happier and more fulfilling.

THEY SAID IT COULDN’T BE DONE is a book for anyone, regardless of age or interest in sports. It's a book you'll want to share with others... a book you'll enjoy today and benefit from tomorrow.

(The proceeds from this book will be donated to the Alexander-Tharpe Fund for the student-athlete Total Person Program.)

To order your copy
Send check or money order made to:

GTAA
150 Third St., N.W.
Atlanta, GA 30332

Name ____________________________
Address __________________________
Street City State Zip

Phone No. ( ) __________________________

Number of books ordered at $11.95 plus $2.00 Postage & handling __________________________

Total $ __________________________

GEORGIA TECH • Technotes 11
ATLANTA
Olympic City 1996?

Written by John Dunn
Photography by Margaret Barrett
SEEING IS BELIEVING

With plans, schematics and a spectacular Georgia Tech-generated multimedia ride through "Olympic sites," the Atlanta committee made its bid. The decision now rests with the International Committee.

The blue earth rotates in the black of space, a dramatic, computer-generated, 3-D image viewed on a 32-inch television screen. A companion Apple Macintosh screen reads "Atlanta 1996."

This is the interactive multimedia presentation featuring Atlanta as host city for the 1996 Olympics that became the blockbuster attraction of the August meeting of the International Olympic Committee in San Juan, Puerto Rico—and thrust Georgia Tech to the forefront of a new technology.

At the touch of a "track ball," the image zooms toward Earth, rushing through strata of clouds and swooping above the southeastern United States soaring over lush forests, rivers and lakes, sweeping over the north Georgia mountains until the city of Atlanta looms ahead. The IBM Tower becomes a focal point and you are swept into the building. Inside, people look up from a conference meeting, and you glide down a busy corridor, into an office, and suddenly exit through a window to continue an aerial approach to the city and Olympic sites of 1996.

Sound like fun? It's fantastic.

"It received overwhelmingly positive response from the membership of the IOC, the media, and the members of delegations from our competing cities," says Robert M. Brennan, a member of the Atlanta Organizing Committee. "It was the technological highlight of that meeting."

For Georgia Tech President John P. Crecine, who conceived the idea of the multimedia production as Tech's contribution to Atlanta's effort to attract the 1996 Summer Olympic Games, the presentation exceeded expectations.

"Technically, it is a very difficult thing to do because we are trying to integrate many different technologies and they are all state-of-the-art," Crecine explains. "This is a great technical achievement that has overcome some really difficult systems integration problems—hardware, software, and remote sensing data from different sources.

"People understand that they are seeing something really special, something different," Crecine adds. "That doesn't always happen."

Using the "track ball" device a viewer can experience what the multimedia presentation promises is a "magic carpet" tour of Atlanta and visit facilities where Olympic events would be held. Facilities that exist only as architectural computer models appear as real structures on site, true to scale, and available for inspection. Because it is interactive, you can enter a stadium; meander around; create your own route; venture left or right, forward, backward or in any direction you care to by moving the tracking ball.

While the television screen displays video images and 3-D graphics, the Macintosh screen displays a directional map that shows your location and locates the Olympic venues.

Travel to Stone Mountain Park to see the velodrome, the cycling arena; go inside the World Congress Center or drop in through the skylight of the Georgia Dome. Speed over to the open-air Olympic Stadium, just south of the existing Atlanta/Fulton County Stadium. And be sure to stop by Georgia Tech, site of Olympic Village, where the natatorium, the Olympic swimming complex, is located west of the Callaway Student Athletic Complex.

The out-of-pocket cost for the production was $350,000, Crecine says, but that figure is deceptive. Georgia Tech researchers developed ways to "bridge" technological gaps and "marry" different technologies.

Dr. Mike O'Bannon holds a glass video disc, scored with a laser, that allows random access to video sequences in the interactive media presentation.
Why
Yellow Jackets
Fly Delta.

Yellow Jacket Country goes from Grant Field to Hartsfield and beyond. Way beyond.
That's why Delta and The Delta Connection* give Yellow Jackets over 4,000 flights a day to over 250 cities around the world.
And Delta gives you over 400 nonstop flights a day from Atlanta.

What's more, Delta has been ranked number one in passenger satisfaction among major U.S. airlines for 15 straight years, according to the U.S. Department of Transportation.*
So next trip, whether you're flying to Yellow Jacket Country or some other country, fly Delta. We'll make you feel right at home.
Delta. We Love To Fly And It Shows.*
“We’ve been the beneficiary of a tremendous amount of donations,” Crecine adds, “everything from our faculty, staff and students donating time—and I can’t emphasize enough how important that was—to support from hardware and software manufacturers. If you brought a cost accountant in and tried to estimate the value of this presentation, you’d be lucky to get away with three times $350,000.”

Crecine had been contemplating the direction that computing systems would take in the future when William “Billy” Payne, president of the Atlanta Organizing Committee, invited Tech to participate in preparing the IOC presentation.

Crecine suggested the interactive, 3-D, multimedia video and Payne liked the idea. Inspired, Crecine dispatched a seven-page memo explaining his concept of the production, including various groups and their involvement, and a list of outside experts in the field.

“A month later about 40 faculty members and a bunch of students had voluntarily formed committees and were working on this thing,” Crecine says.

Frederick B. Dyer, director of special projects, says multimedia technology “will be all-pervasive in the future. We need to be moving rapidly in this arena because it affects everything from high definition TV to the next generation of medical computing imagery for things like CAT scan and magnetic resonance scanners.”

Dyer adds that home computer applications of the technology could include information systems, such as an on-line Yellow Pages.

The Japanese have invested millions of dollars in developing what they call the “new media,” Dyer says. Other institutions, including the Massachusetts Institute of Technology and Carnegie Mellon, have conducted research in advanced media technology, as have major firms such as Apple and IBM.

“Our belief is that all of these various activities have been precursors of what will become mainstream and a very important area not only for research, but for application as well,” Dyer says.

“We would like to get in at this point and move quickly to establish ourselves as the premier university in the development and application of this technology.”

Crecine is enthusiastic about the possibilities. “We have the potential at Georgia Tech to go into this research area in a very ambitious way,” he says. “This is a forerunner of what is going to be the dominant and exciting use of computer technology in the next five to 10 years. It is the merger of all these different digital-based technologies—video moving from an analog-based process to a digital process, sound moving toward a digitally-based bit stream of data.”

Even though the multimedia presentation represents an analog picture, it was processed in the digital domain, explains Mike Sinclair, a senior research scientist at Tech. The computer graphics are digital video images while “live-action film footage was converted directly to digital video tape, and all processing after that remained in the digital domain.”

“Mike Sinclair and Mike O’Bannon were the principal gurus working on this project,” says Dyer. Sinclair served as technical director and O’Bannon, an industrial psychologist, helped design the interface blending the technical aspects with the artistic requirements. Their primary support staff consisted of a dozen exceptional graduate and undergraduate students.

“A lot of people don’t think much about human factors—how people interact with machines and information,” O’Bannon says. “We wanted it to look as little... Continued page 20
Boast Collegiate's officially licensed sportswear combines classic good looks with the wearability and quality from today's leading clothing manufacturer.

**Boast for people who don't have to.**

(A) **Unisex Nylon Jacket**—This lightweight, durable nylon jacket is lined with terrycloth to keep you warm and looking good! The collar unzips to reveal the hood. Colors are white, red, navy and royal blue. Order No. 4002 Unisex sizes S, M, L, XL, XXL. $61.00

(B) **Pleated Tennis Skirt**—This pleated poly/cotton blend tennis skirt will help you keep your cool on the courts. Pretty pastels and traditional white wins every time! Colors are white, light blue and pink. Order No. 0112 Women's even sizes 4 thru 18. $57.00

(C) **Ladies Golf Shorts**—Whether you're an avid golfer or just a spectator, you'll be right in the "swing" of things with these poly/cotton side-pocket, adjustable waistband golf shorts. In white, light blue and pink. Order No. 0156 Women's even sizes 4 thru 18. $51.00

(D) **Ladies 100% Cotton Polo Shirt**—A classic, the cotton mesh-knit polo, is always in style! Choose solids in white, light blue and pink. Order No. 0011 Women's sizes XS, S, M, L, XL. $36.00

(E) **Ladies 100% Cotton Tennis Jersey**—The soft cotton tennis shirt comes in white with striped collar and cuffs in white/light blue and white/pink. Mix and match with skirts, slacks and shorts. Order No. 2012 Women's sizes XS, S, M, L, XL. $38.00

(F) **Ladies 100% Cotton Golf Jersey**—This soft jersey knit polo with open sleeves is a perennial favorite for everyone from sports enthusiasts to the leisure set. In 100 percent cotton, it is available in pastel stripes of white/light blue and white/pink. Order No. 0088 Women's sizes XS, S, M, L, XL. $42.00

(G) **100% Cotton Unisex V-Neck Sweater**—Our long-sleeved V-neck sweater is made of 100 percent flat-knit cotton. Soft and breathable, it comes in white or navy. Order No. 0480 Unisex sizes S, M, L, XL. $54.00

(H) **Tennis Shorts**—What every tennis enthusiast needs—traditional white shorts. These crisp poly/cotton shorts give you that polished, professional look—both on and off the courts. With side pockets and elasticized waist. In white only. Order No. 0003 Men's even sizes 32 thru 42. $35.00

(I) **Men's Pleated Golf Shorts**—Whether you're on the course or just relaxing, these ultra-comfortable pleated poly/cotton golf shorts are a must for every wardrobe! With side pockets and an adjustable waistband, in classic white, light blue or navy. Order No. 1004 Men's even sizes 30 thru 42. $66.00
(J) Men's 100% Cotton Golf Jersey—Our soft-collar jersey knit golf shirt offers traditional style with the benefits of 100 percent pure cotton comfort! In white, light blue, red, navy and royal blue. Order No. 1206 Men's sizes S, M, L, XL, XXL. $40.00

(K) 100% Cotton Mesh-Knit Shirt—This 100 percent cotton two-button collared tennis shirt is ideal for mixing and matching with just about everything! White with striped collar and cuffs in white/royal, white/navy and white/red. Order No. 0009 Men's sizes S, M, L, XL, XXL. $38.00

(L) 100% Cotton Mesh-Knit Shirt (Solid Color)—For wardrobe versatility, choose the classic short-sleeved mesh-knit polo shirt in every color. In 100 percent heavy cotton, it is available in white, red, navy, royal blue and burgundy. Order No. 0010 Men's sizes S, M, L, XL, XXL. $38.00

(M) 100% Cotton Unisex Crew Neck Sweatshirt—A year-round classic, this high-quality 100 percent cotton crew neck sweatshirt is the ultimate in comfort and fit. Choose white, navy or grey or all three! Order No. 6100 Unisex sizes XS, S, M, L, XL, XXL. $46.00

OUR GUARANTEE: If you are not completely satisfied, we will gladly replace the merchandise or, if you prefer, refund your purchase price.

EXCHANGES AND RETURNS: Merchandise returned for exchange or refund will receive our prompt attention. When returning merchandise please include all original packaging and paperwork you received with your order. Return merchandise to:

BOAST COLLEGIATE
5700 Columbia Circle
Mangonia Park, FL 33407

TO ORDER: Use the order form or you can order by telephone, simply call us at 1-800-446-7660, 9am to 5pm, EST Monday through Friday. Please have your Visa or MasterCard number handy.

MAIL ORDER FORM TO:
BOAST COLLEGIATE
5700 Columbia Circle
Mangonia Park, FL 33407

All garments have your university's insignia embroidered as shown below.

Also available with the standard maple leaf BOAST logo.
TEAMWORK

The Olympics project was a good example of Tech's ability to draw expertise from several disciplines to create one of the most technologically advanced videos ever produced.

Zooming in on track and field, computer simulations do in seconds what humans will take years to build: the Olympic Stadium

like a computer and as much like a television as possible. There is a sort of game-like characteristic, too, which we hoped would attract people." Another goal was to give the viewer a sense of control, O'Bannon says, and controlling movement of the tracking ball provides that illusion.

"We wanted to encourage people to explore," O'Bannon adds. "The idea was to show as much of Atlanta as we could in a very short period of time."

Aerial photography was originally shot from a helicopter using a special gyro-stabilized 35mm camera, the same type of technique used in the filming of movies such as "Top Gun." The filming, using a video disc and track ball, was done by Hill Branscomb, president of Advanced Interaction, a San Francisco production firm. Additionally, specialized camera techniques were used for filming inside the IBM Tower and inside the Georgia World Congress Center. The 35mm film was then transferred to a broadcast-quality video tape, edited and placed on a glass video disc, scored with a laser.

Two video discs, each holding about 30 minutes of video, are used. The discs allow random access to the various sequences of video.

"We use two different discs to create the experience of continuous travel," explains O'Bannon, who was responsible for much of the on-line graphics, map screens and for making certain the video segments were on the correct disc. "The computer has a basic understanding from a data file of where different material is and how it relates spatially."

While one disc is being viewed, the computer searches the next possible direction on the other disc; constantly switching back and forth between the two discs, making a smooth transition and permitting the viewer freedom to travel about at random.

Sinclair developed the technological "box" that enables the computer to switch from one laser disc to the other.

"We made a point absolutely not to sacrifice quality," recalls Sinclair, whose background includes creating flight visual systems for the Defense Department.

"The rules that we all had imprinted on the insides of our eyelids were that any transition would be smooth. We decided it would not be just a sophisticated, electronic tour; we had to make the transitions smooth and creative, like the path through the IBM Tower."

Another aspect involved the generation of 3-D computer graphics as well as pictograms, rotating three-dimensional images symbolizing the different Olympic venues.

Frank Vitz, a computer graphics consultant, along with Ray Halebian, a student volunteer, created 26 venue pictograms used as transitional elements in the presentation, and also assisted in the creation of animated 3-D computer graphics showing the Georgia Dome, the open-air Olympic stadium, the natatorium and the velodrome as completed structures.

Working from the architect's computer models, the Tech researchers developed a method of "filtering" data and converting the data base to a format that created computer graphics showing a finished structure instead of the wire-frame structural design.

"The graphics here are based on the engineering data for the design of the stadium, so even if the color isn't exactly right, at least the shape and perspective is exactly the way it would be," Vitz says.
Engineering is clearly a career with a future.
And there's no better place to develop the technical skills and leadership qualities you'll need to be a success in that career than in today's Navy.

If you qualify to serve as a Navy officer, you'll get all the technical training, challenge and responsibility you can handle.

You'll play a key role in an organization that is a recognized leader in today's technology—especially nuclear energy. And you'll be part of an elite Navy team.

See your Navy Officer Programs Officer today or call 1-800-327-NAVY.
Get a deeper understanding of tomorrow's technology. In today's Navy.

NAVY OFFICER
You are Tomorrow. You are the Navy.
POTENTIAL

Interactive multimedia presentations that merge many different digital-based technologies will become “all pervasive,” touching such areas as architecture, city planning, education, medicine and tourism.

To position computer graphics of a future stadium accurately on live-action film and make them appear realistic, Tech researchers developed a technique called “witness point tracking.”

Before making an aerial film of the site of a future stadium, the researchers made precise measurements and marked the relative positions of the future structures. When the film was made, it captured the “witness points.”

Once the film was converted to video disc, the disc was brought into the lab where, one frame at a time, the witness points were plotted into a computer “The computer crunches for a while and then spits out for that particular frame exactly where the camera was when it took that picture—how much altitude, roll, pitch and yaw,” says Sinclair.

“The camera angle is then fed back into the computer in an animation sequence and the computer is told to generate a perspective picture of the dome with that exact camera angle. That was done on a frame-by-frame basis.”

Tech worked closely with Crawford Post Production, an Atlanta-based graphic communications firm, in composing graphic images on-live-action film, having live-action film footage transferred onto digital video, editing and finally putting it on a glass disc.

As spectacular as the Olympic video presentation was, it is even more spectacular now—edited and improved for viewing at the Olympic Sports Federation meeting at Budapest, Hungary, Oct. 16-21.

The new version has more computer-generated footage and interactive graphics, and, more audio. Additionally, the presentation has narrations in both English and French, keyed by computer to wherever the viewer happens to be.

Sinclair says graphics will be added that show where public transportation is located. “If you’re over North Avenue and Peachtree and you want to know where the public transportation is, you can stop there and the graphics will superimpose over the aerial view showing the MARTA route and where the stations are.”

The future of interactive multimedia presentations may include incorporating the mathematical concept of fractals, a means of compressing data, especially as it relates to images. Dr. Alan Sloan and Dr. Michael Barnsley, professors in Tech’s School of Mathematics, have pioneered work in the field of fractals.

In addition to the research potential of the rapidly developing technology, it has broad commercial applications. A sampling of applications include architectural marketing; city planning; convention and tourist bureaus; real estate; the total concept of a geographical information system combining tax digests, land use, pollution, etc.; educational productions; and the entertainment industry.

“We’re very much on the cutting edge for interactive multimedia, which is kind of a buzzword,” believes Vitz. “This lab is sort of a microcosm of interactive media development, a kernel that could become a multimedia center.”

“We believe that this project is one of many that we will be doing in the context of multimedia,” Dyer adds. “Georgia Tech has a long-standing reputation in a number of computing areas, particularly computer graphics. We anticipate being a leading institution in the development of this technology.”

For a preview of the proposed Olympic Village that will be on Tech’s campus, see page 25.
Yellow Jackets get special savings at the Wyndham Midtown Atlanta. For just $55 on weekends and $72 weekdays* you can relive those college days. Only blocks from campus, we offer luxuriously appointed guest rooms and superb service. Popular dining and entertainment. And the state-of-the-art Midtown Athletic Club. Call now for reservations at (404) 873-4800 or 800 822-4200. As Ramblin' Wrecks from Georgia Tech you get a helluva Wyndham deal!

*Rates are per room, per night, based on availability.

**WYNDHAM MIDTOWN ATLANTA**
A TRAMMELL CROW HOTEL

Peachtree & 10th Streets, N.E., Atlanta, GA 30309  (404) 873-4800
U.S. 800 822-4200  CANADA 800 631-4200
Banking Excellence
From Any Angle

No matter how you look at it, you can't beat the services and convenience of C&S.

We offer a full range of banking services including secured and unsecured lines of credit, Individual Retirement Accounts and other time deposits. We also give you a choice of MasterCard or VISA bank cards. And with our statewide network of C&S Instant Bankers, you'll have instant access to your accounts anytime you want, day or night.

For your business needs, C&S has 11 Commercial Banking Centers located throughout the Metro Atlanta area. And for the entrepreneur, our Enterprise Banking department is available to help you set up and finance your new business.

Get a whole new perspective on banking... stop by C&S today.
Russ Chandler has a case of Olympic fever so serious that if enough people catch it, the 1996 Summer Olympic Games will be held in Atlanta. So far almost half the International Olympic Committee has been exposed to it, and another 30 IOC members are almost certain to come in contact with it.

A self-made multi-millionaire, Georgia Tech benefactor and 1967 industrial engineering graduate, A. Russell Chandler III is chairman of the Olympic Village Committee, a subcommittee of the Atlanta Organizing Committee's Bid Preparation Committee. Atlanta, he believes, is the city that easily has the most to offer the Olympics. "If we can get the IOC members to Atlanta and let everyone see what we have to offer, we will be a shoo-in," says Chandler. "Atlanta sells itself. The whole concept here works. There is so much support within the entire system that it just comes through. And everyone sees the excitement of the people."

Georgia Tech is a vital part of the concept. Tech's sprawling campus would be the site of the Olympic Village, which for a two-week period would be home to some 16,500 visiting Olympic athletes.

"The legacy of the games at Georgia Tech," Chandler says, will be twin 28-story Olympic Village apartment complexes and a natatorium—a 15,000 seat swimming and diving stadium.

The Olympic high-rise towers would be constructed to house the athletes. The apartment complexes would flank North Avenue at Techwood Drive, display the symbolic Olympic rings, and create a distinctive entrance to the village.

The towers would have an apartment-style configuration, Chandler says, with four-bedroom apartment units including a kitchen and living room.

Cost of the twin towers would be approximately $125 million and would be funded privately. "The plans for Atlanta's bid does not include any public funds," says Chandler. The Atlanta Games will be privately funded from television and corporate sponsors.

After the Olympics, Georgia Tech would receive the north tower, which would provide housing for several thousand students and help alleviate Tech's current housing shortage. Georgia State would be awarded the other tower.

In addition to the swimming and diving competition held at the natatorium, Olympic boxing competition would be held at Alexander Memorial Coliseum.

A factor favoring Atlanta's bid, Chandler adds, is the centralization the city offers the Games.

The Atlanta Organizing Committee identified the Olympic Village as one of the main centers of activity. Other centers are the Olympic Ring, an imaginary circle extending 1.5 miles from the Georgia World Congress Center downtown; Olympic Center, a complex of facilities centering around the Georgia World Congress Center; Olympic Park at Stone Mountain and the Savannah yachting complex, for the yachting competition.

Other cities in the competition include Athens, Greece; Belgrade, Yugoslavia; Manchester, England; Melbourne, Australia; and Toronto, Canada.

"We've made presentations to about 40 IOC members," Chandler says. There are 92 IOC members and Chandler expects to make his presentation to another 30 members. The members will vote on Sept. 17, 1990, in Tokyo. "The first city to receive 46 votes is the one that wins."

Chandler is so confident Atlanta has the best chance, "I'll be surprised if we're not successful."
Persistence Pays Off

By Dr. B. Eugene Griessman and Charles Hyatt
Photography by Paul Obregón

Persistence has paid off for entrepreneur Robert S. Prather, who graduated from Georgia Tech in 1968 after earning both bachelor's and master's degrees in industrial management. After graduating from Avondale (Ga.) High School in 1962, Prather put himself through four years of college by working full time at Columbia Heights Pharmacy and part time at Scott Hudgins Real Estate Co. He also managed the Tech football team one year.

"He was never a show-off in class," says William Schaffer, one of Prather's professors, "but when he went to work, that was a different story. Robert Prather has one of the most incredible minds for reading, understanding and remembering numbers that I've ever seen."

His abilities in financial analysis impressed J.B. Fuqua as well. After being interviewed by Prather for a class project and reading his final report on the company, Fuqua offered Prather a job. Six months after graduating, Prather was named assistant to the president of Fuqua Industries. In two years he was vice president of corporate development. He held that position for 10 years until he purchased Hall Steel in 1981 with a former football buddy, Stephen Almond, IM '68.

Now Prather is president and CEO of Phoenix Corp., the umbrella group over Hall Steel and Phoenix Metals. Recently, in partnership with Fuqua, he acquired Vista Resources Inc., a leather-processing company ripe for expansion and acquisitions.

Married and the father of two sons, Prather still reads extensively, still enjoys a challenge and still knows the value of persistence.

If you came back to Georgia Tech today, what would you do differently?

Well, I feel like I got a great education here, but I would concentrate more on taking courses that may not be related strictly to business. I would take more English, more history, more communication and public speaking, and more psychology. You get out in the business world and you find out that these things are just as important or more important than the accounting and the economics and the statistics. I wish I had taken more courses on the basics of communicating, on writing, and on learning how to communicate ideas and getting them across to other people.

Most of the high achievers can tell what they are good at. What

Continued next page

Robert Prather pauses during one of his regular tours of the steel works of his Phoenix Corp.
are you good at and what are you not good at?

I am good at conceptualizing ideas and communicating those ideas to other people. I'm good at making things happen. My weaknesses are that I am not good at details and following up on things. Ideally, the person I want working for me is someone who can do the things that I am not good at. My strength really is coming up with ideas and focusing on those ideas and then implementing them and getting them going.

You worked for J. B. Fuqua. Why is he good at what he does?

The key to Mr. Fuqua's success, and I have watched him closely and learned a lot from him, is that when he makes up his mind to do something, whether it be to acquire a company or do a bank financing or do a bond issue or do a divestiture of a company, he totally focuses on that particular goal and doesn't allow anything to interfere. I've told a lot of people over the years that one of the secrets to my success in getting along well with him was that I knew when to stay out of his way and when to be in front of him. When his mind was on something, he was completely focused on getting that particular thing done.

You told me that when you went to Fuqua, you did anything the boss wanted you to do.

I made up my mind that anything Mr. Fuqua wanted, I was willing to do. I didn't think there was any job too little for me, and I think that was a big factor in his taking me under his wing and becoming a mentor for me. He spent a lot of time over the years educating me in what goes on in the business world and explaining things to me a lot more than he ever needed to do or had to do. He would cover up mistakes for me, where I would go in with what I thought was a great idea and he would shoot it down. But he would explain to me why he shot it down. I have a plaque on my desk that says, "Experience is a good school but the fees are very high."

When you bought your own company, you had never supervised an employee?

At the time that I acquired Hall Steel Co., Mr. Fuqua, myself and his secretary had been the acquisition team for Fuqua Industries and I had never had anybody working directly under me. I was kind of out of the chain of command at Fuqua and spent all my time looking at companies and negotiating deals and analyzing balance sheets. It was a shock to me to get into the day-to-day operating of a company.

What is the hardest thing you have to do now?

The hardest thing that I've ever done is fire somebody. There is no good way to do it. You don't want to fire anybody right before Christmas, but does it make them feel any better if you fire them after Christmas? Someone asked me if I ever regretted firing anybody, and I told them that I couldn't think of anybody that I regretted hiring, but that I did regret waiting too long to do it.

Most people who get fired are not surprised. They know that it is coming and are just waiting for the axe to fall. Most people who get into a job over their heads or a job that they are not good at will just draw into a shell and wait for something to happen. It is a tough thing to do, but most businessmen make an error by not firing people sooner.

You're an avid reader, I'm told.

I read a lot of history, a lot of biography, a lot of books about what is going on in the world. I'm interested in everything. I read books about all kinds of things.

What does reading non-business books do for you?

You look at things a little bit differently. One of the things that I have noticed over the years is that a lot of times people in a particular business—especially people who started businesses—will get too narrow in their thinking. They don't know what is going on in the world outside. The world passes them by and their businesses gets in trouble.

You mentioned also that reading relaxes you.

It does. I enjoy reading and could read a book every night for a few minutes and don't have any trouble falling asleep. It is like a sleeping pill to me. I usually take a book with me everywhere I go. I have one in the car with me right now. If I get delayed somewhere or am in the doctor's office or whatever, I have a book with me to read.

Mark McCormack, in What They Don't Teach You In Harvard Business School, recommends writing down the next day's agenda before turning out the light. Do you do anything like that?

Yes. I keep blue index cards and write notes and things to myself all the time.

How time-conscious are you?

I'm not probably as time-conscious as I should be. I like to be early when I'm going to an event and I am conscious of being on time, but as far as the use of my time goes, I'm probably not as disciplined as I should be. People ask me what my philosophy of acquisitions is and I tell them that it is opportunistic. You have to be ready to strike when the iron is hot.

How good are you at concentrating on one thing?

I feel that is one of my strengths.
It was a shock to get into the day-to-day operating of a company.

I'm a big believer in persistence. I've got a trust for my kids with the name of Persistence Trust. I'm a big believer in making up your mind to do something and not stopping until you get it done.

What are you like when you're really concentrating?

Probably people think I am distracted.

Are you cranky?

No. I'd be willing to bet that very few people who work in my company ever know when I am upset. I try to maintain a pretty level approach to things. I don't ever raise my voice to anybody. I don't ever remember showing emotion one way or the other. I try to keep an even keel because I am a big believer that when you walk in the door in the morning and say "Hello" to somebody who works for you, how you say "Hello" determines how their day goes a lot of times.

By the same token, if you come in and act positive and glad to see them, they will think maybe they ought to ask for a raise. So, I try to be on an even keel, and I try to do that with everybody, not just the people that work for me. I'm a big believer in trying to treat people the way I want to be treated.

Some research indicates that it takes a minimum of ten years to become world-class at most difficult undertakings. Would you say that describes the business of acquiring companies?

My favorite quote comes from the fellow who is vice-chairman of Trust Company Bank, Jimmy Williams. He is one of the smartest businessmen I have ever known. When I was buying Hall Steel Co. in 1980, I had done all these deals for Fuqua and they all seemed easy to me. Then, all of a sudden, I was buying my own company and having to get my own bank financing and getting all the legal work done. Interest rates were going up every day, and the bank had told me that if I didn't get this thing closed, their commitment was going to lapse, because they had a fixed rate and didn't really like it.

On Sept. 30, I was sitting in Jimmy's office and I said: "This is absolutely the hardest thing I've ever done in my life." He looked at me and said, "Bob, if it was easy, everybody would be buying companies."

That kind of sums it up. If it was easy, everybody would do it. I think that is true of anything you set your mind to be good at. You have to be willing to put in a lot of hard work and a lot of preparation to get there. The things that come easy in life usually aren't worth much.

You learn what to look for?

You do. You look for key things in annual reports and balance sheets and read the footnotes. Most annual reports have 10 or 12 pages of footnotes, and those are often the real guts of a financial statement. They tell you whether the company is really making money, or just making it look like it is making money.

The other thing I found out in analyzing companies is that no matter how much you study one from the outside, you really don't know what makes one tick until you get in there and operate it yourself. In most of the deals that I have done, I always try to take time in doing them because if you take five or six months to get it done, if something is going wrong with the company, it is hard to cover it up for that long.

It amazes me to see some of these deals nowadays, where they go in and make an acquisition in two or three days, when they haven't even looked at the company before that. There may have been a lot of mistakes made in the past two or three years that have not surfaced yet.

When you go into a company and you have already looked at the footnotes, what do you look for as you are being shown around?

I guess that I visited about a thousand different companies in the 12 years I was with Fuqua, and I've looked at a good many deals myself because I've bought five or six businesses of my own. One of the things that I always look for is what kind of housekeeping they have. Very few unsuccessful companies keep a clean, neat, well-organized factory or distribution center or offices. By the same token, when you see companies with poorly laid-out plants and dirty housekeeping, a lot of times those companies are headed for trouble.

Continued next page
How important is the lucky break?

I was born on a Friday the 13th, at 10:13 p.m. I'm a believer in luck. I also believe that you make a lot of your own luck. Being at the right place at the right time is, no doubt, important. This company I just bought, Vista Resources, is a good example.

It turns out that the former chairman of the company just happened to be good friends with the old Fuqua lawyer in New York, Milton Gould, who is one of the most respected trial lawyers in New York. He basically was the guy who got me in the door. He had been approached for years about selling his company and never would talk to anybody. I think Gould's calling him up and asking him to see me had a lot to do with getting this done, so that was kind of a lucky break that he was friends with Milton Gould.

How teachable are you?

I am very teachable. That is one of my strengths. I told these guys at Vista Resources when I went up and visited them that I didn't know anything about the leather business but that I was a blank page and they could just fill in the blanks. That's the way I look at things when I go into a new venture. I always like to ask dumb questions like, "Why do you do this?" "Why do you do that?"

That is one of the strengths I gained from being at Fuqua and not being married to one particular discipline and one particular business. I got a much broader view of businesses than most people do.

How important is nerve, chutzpah?

I think that is important. An old sergeant in the Army told me one time when I went up and asked him something, "Sure you can do that." I said, "Sarge, I'm surprised you would let me do it." He said, "Hey, son, in the Army, he who asks, gets." That is kind of a simplified thing, but I learned a good lesson. Sometimes you just need to ask for things. A lot of people are willing to give you what you ask for or help you on the way to get it.

How much do you enjoy your work, on a scale of one to 10?

Ten.

I love going to work everyday. I don't consider what I'm doing now a job, really.

How important is discipline?

Discipline is hard. The real value of education at Tech is learning discipline. One of the keys to success in life is making yourself do the things you don't like to do. In my own way, I am a procrastinator about a lot of things, especially about things I don't like to do. I have to constantly discipline myself to do those things that I don't like now, instead of waiting.

Do you like to see aggressiveness?

Yes. Most of the time the people who don't like aggressiveness are the people you are showing up. Most of the time, bosses like aggressiveness. However, if your boss perceives you as a threat because you are too aggressive and too smart, it can cause problems for you. You have to learn to know when to say things and when not to say things.

There are a lot of politics in big companies. Small companies have politics, but it is more of a personalized thing in the small company. You have to make up your mind to play the game or do something else. It can determine your success in life, whether you want it to or not. If you try to buck the system, you are better off to get into another system.

Any thoughts on how to play the game?

I've always tried to treat people like I want to be treated. When you are working with people on your same level on a job, those people need to like you and you need to make an effort to learn something about them and know them and know what their desires and goals are. You don't want people to feel like you are running by them on your way to somewhere else.

I'm a big believer in being ambitious and getting ahead in the world, but you can't run over people getting there. You have to be careful of other people's feelings because they can stick a foot out and trip you up a lot of times without you even realizing it.

Do you feel it is important for businesses to take an active role in special problems?

It is very important. A business operates within a community and the people who work for you live in that community. We try to do things that help the people who work for us. I have people who work for me coming to me all the time the get us to contribute to a certain charity or something that they are working on. I enjoy doing that. I don't get a big kick out of United Way or things that are impersonal. I try to personalize the charitable things we do.

Sometime you can get carried away by thinking that you can solve all of the world's problems, so that's why I say that I enjoy trying to make it more on a personalized basis than a localized basis.

Dr. B. Eugene Griessman is director of communications and development for the College of Management and the author of The Achievement Factors. Charles Hyatt is a graduate student in psychology at Georgia Tech.

"I love going to work. I don't consider what I'm doing now a job. On a scale of one to 10, it's a 10."
Leonardo da Vinci (1452-1519) has been described as “an engineer who occasionally painted a picture when he was broke.” But that is not to denigrate Leonardo as an artist. He was a hell of an artist and a hell of an engineer.

But why separate Leonardo the engineer from Leonardo the artist? He made no such distinction himself. To him, studies in science and technology made his art more effective. At the same time, his art rested on studying the mechanisms of human beings and nature in order to discover the truth of nature.

Wherever he looked, he found something worth investigating.

He lived during the Renaissance, an age of individual genius, scientific progress, technological experimentation and artistic glory which spanned the 15th to the 17th centuries. Most of his life was spent in northern Italy, the center of a vibrant economy bursting with activity, and the hub of extraordinary artistic creativity which has never since been equaled.

The very embodiment of the Renaissance man, Leonardo left a great heritage of thoughts, writings and masterpieces. He filled some 20 notebooks with observations about anatomy, astronomy, botany, geology and geography. He anticipated many scientific discoveries made centuries later.

Although his genius elevated him above his contemporaries, Leonardo’s approach was not unique. The wedding of art and technology was characteristic of the times. Many of Leonardo’s peers, including Michelangelo, also applied their talent to several different fields.

Leonardo used art, scientific experiments and the mechanisms of technical objects to understand the underlying principles of nature and man. Art and technology were two roads to the same goal, namely, as he wrote, “knowledge, the aim of all good men.”

In terms of quantity of output, Leonardo concentrated more on his work as an engineer than as an artist. After all, no more than 10 paintings indisputably by him can be found on the walls of the world’s art galleries, and his
He studied birds and dreamed of human flight. But to earn a living he invented gadgets which had military applications.

purely artistic drawings number only a few hundred. But Leonardo produced thousands of studies, notes, drawings and sketches which show his intense and imaginative concern with technical devices and principles.

There seems to have been nothing which lay beyond the frontiers of his curiosity and interest. He especially enjoyed applying results from one field, such as mechanics, to another field such as physiology. In studying the mechanical aspects of the human body, he came to regard the heart as a pump and the lungs as bellows, thereby hitting upon the idea of the circulation of blood more than a century before William Harvey did so.

Leonardo's interest in painting and sculpture led him into science because his work presented technical problems which required solutions. For example, problems in smelting and casting metal for sculpture led him to metallurgy; the desire to create realistic effects in painting and sculpture led him to study optics, perspective, anatomy and physiology.

He procured cadavers for dissection in order to gain knowledge of the skeletal and muscular structure of the body. His interest in the human body also led him to attack problems in static and dynamic mechanics so that he could understand the motions of human and animal bodies. He became interested in flight and noted the movements of birds, which led him to dream of human flight and to design machines for this purpose.

He left over 400 sketches of flying machines, bird flight and aerodynamics. Of these, about 150 were devoted solely to flying machines, including several thousand words of descriptive matter. Most of the designs were ornithopters, machines with flapping wings, as he sought the key to human flight by examining the flight of birds. But Leonardo could not achieve flight, although a few scholars believe that he experimented with gliders.

Some of his notes indicate that he concluded that men did not possess sufficient physical strength in relation to their weight and height to make aerial flight possible by muscle power alone, as in the case of birds.

Partly to earn a living and partly out of personal curiosity, he invented numerous gadgets and machines which had military applications. The constant warfare carried on by the Italian city-states made military engineering the engineering of the time.

One could say that Leonardo foresaw modern devices such as the machine gun and tank, but it can scarcely be said that Leonardo was the inventor of such devices, for all those developments came about independently and much later.

Leonardo was interested in mechanical operations of every sort, and thought of mathematics as the key to understanding the operations of nature.

However, he was not a mathematician in the sense of using equations and formulas. Instead, his was a descriptive mathematics which portrayed in drawings the mathematical precision of natural forces.

He regarded painting as an instrument for inquiring...
He was preoccupied by the control of motion and he applied the principles of lever and pulley to human anatomy.

to the structure of nature. Similarly, he was interested in mechanical devices not as individual gadgets, but in terms of their operating principles. In other words, he was interested in the science of mathematics as the key to understanding the workings of mechanical devices.

As Leonardo put it, “Mechanics is the paradise of mathematics because it is through the former that the latter is fully realized.”

The mechanical designs in Leonardo’s notebooks indicate his recognition of the basic principles for the operation of machinery and show many improvements over similar devices in use at that time: a lathe worked by a treadle crank, an automatic file-cutting machine, a rolling mill, a spinning machine, a machine for minting coins, a windmill with revolving roof and better weight-driven clock mechanisms to make clocks more accurate.

Altho although few of his inventions ever saw the light of day or existed outside the sketches in his notebooks, Leonardo was important as an inventor. He was preoccupied with the transmission of power and the control of motion through the use of pulleys and gear trains, and he applied the principles of the lever and pulley, for example, to human anatomy.

But it was not simply the theory which attracted him. He felt that he could do something about it, utilizing the theory to make practical devices.

For example, Leonardo was among the first to recognize the connection between municipal hygiene and health. When a plague killed about 50,000 Milanese in 1484-85, Leonardo took note of the filthy street conditions and devised a new city plan. His proposal included sewage drain systems and double-decked roads with the lower thoroughfare earmarked for commercial traffic and the upper level intended for pedestrian traffic.

Although Leonardo’s scheme was never implemented, his vision is startlingly similar to modern urban architecture.

At least one of his major projects was built. In order to increase commerce, the government wanted a dependable canal waterway to bring barges and ships carrying merchandise to Milan. Leonardo devised a system which employed a new kind of mitered gate and wicket for allowing water into canal locks from the upper level. Previous gates had been unable to withstand the pressure of the water, but Leonardo’s wicket allowed a flow of water which equalized the pressure so that the larger gates of the locks could be opened.

This was one of the first and most successful European canals for inland transport, and its principles and techniques are still employed today. In fact, the San Marco lock at Milan, designed by Leonardo and whose installation he supervised, is still in place today, although the timber and some of the masonry has been replaced.

Another of his inventions that might have been built is a parachute, which Leonardo called a “tent of linen.” Some scholars believe that he actually tried it out successfully.

Continued next page
To measure humidity, Leonardo balanced weights on a scale, one holding cotton balls. Humidity is determined by measuring the imbalance caused when the cotton absorbs moisture and tips the balance.

Many designs in his notebooks were impractical, in part because they could not have been carried out with the technical means and materials then available.

His design for a helicopter did not get off the ground, although the physical and mechanical principles which he employed are the forerunners of today's propellers.

The quantity and quality of Leonardo's remarkable discoveries may be attributed to several factors, most notably his boundless curiosity, his desire to see beyond the appearance of things and look into the natural, mechanical forces governing actions and appearance.

A second factor was his ability to take the knowledge from one field and apply it to different problems. Experts on the innovation process claim that application of knowledge from one field to another is a major source of innovation.

Another reason was Leonardo's ability to move easily between technology and art, from the structure of bones and muscles to machines, or to view the rippling surface of water in terms of transmitting energy (what is now called wave theory). He took a new look at commonplace things and approached them in the context of mechanical and natural principles. Paul Valery, a French poet and thinker, described Leonardo: "A chasm makes him think of a bridge."

A fourth attribute was that Leonardo viewed every mechanical device in terms of operation, effectiveness and efficiency. Many of his drawings showed improvements of existing devices. Even though he produced few actual machines, he was constantly thinking of how to make things work better and how to make them useful to mankind.

Leonardo said "Learn how to see; dare to think." What others simply accepted or took for granted, he observed in a new light and thought about in a way to advance human knowledge.

Dr. Melvin Kranzberg is Georgia Tech's professor emeritus of the history of technology. He was recently named honorary president of the International Committee for the History of Technology. In addition, Lehigh University Press has published a book of essays in honor of Dr. Kranzberg titled, In Context: History and the History of Technology.

Photographs accompanying this article were taken at the "Models of the Inventions of Leonardo da Vinci" exhibit at SciTrek in Atlanta, now through Jan. 3, 1990. For information call 404-522-5500.
Charter Your Next Flight With Dodson.
It’ll Be Time Well Spent.

Business data is transmitted in nanoseconds. But multi-million dollar corporate producers are made to wait idle in an airport, waiting for a connection. You can’t afford to waste any of the valuable time of these valuable people.

Dodson International Air offers custom-tailored arrivals and departures and flies to any destination, large or small. We service those airports too small for major airlines, thus eliminating time wasted on ground transportation. Charter their flight direct on DIA.

Our interiors are designed to allow in-flight conference meetings (including phones and catering), further utilizing flight time.

Dodson International Air offers cargo transportation, private fleet management and staffing services as well as business charter.

Take a minute to call us. It’ll be time well spent.
Work in the New Information Age

Written by Alan Porter
Illustrated by Mac Evans

The "job" is the cornerstone of the American social structure, and fills many economic, social and psychological needs. Drastic unemployment could instigate riots, class war and ultimately lead to the collapse of society.

While we now live in the so-called Information Age, technological and social changes at work will create a new Information Age over the next 20 years. Among the effects of that new era may be a massive decrease in the number of jobs—as much as a 50-million-job shortfall by the year 2010.

Preparing for and adjusting to this possibility requires a radical change in our attitudes toward employment and unemployment. With the prospect of fewer people employed, working fewer hours, society must start rethinking its socio-economic system if we aspire to manage a graceful transition to this new age.

New Information Age Scenarios

Here is a brief look at some of the changes we may find in some of the major employment sectors as we enter the new Information Age. These speculations do not provide for future technological breakthroughs, and will likely prove to be too conservative.

The scenarios also assume:
- No major war.

Continued next page
Can trimming the labor force be done as easily, as painlessly, as trimming one's beard? Can employers—should employers—find a way to avoid the cuts?

Construction

In the new Information Age, as before, growth fuels growth. Office/apartment complexes use modular structures, prefabricated in a semi-automated factory, then trucked to site. Labor costs are a fraction of traditional construction, which has ground almost to a halt nationwide. Demands for architecture, engineering, and planning have all been restricted by the use of modular units.

Transportation

Telecommunications takes a big bite out of transportation. Individual calls and teleconferences, using phone, video and holographic images, now substitute for much business and personal travel. The high cost of vehicles and energy, along with the consequent high cost of services, results in even lower transportation demand.

The airlines are down to three major carriers. All-American Air flies half the flights once available on its component carriers prior to consolidation because of larger planes and reduced demand. Crews today consist of the auto-pilot and one human co-pilot, who actually intervenes on less than one-tenth of one percent of all flights. In air travel, people make their own arrangements at computer terminals. Airline and travel agents are almost extinct; they only work on intricate international packages. In terms of employment, the skies are not friendly but lonely.

Finance, Insurance and Real Estate

Integration of the airlines doesn't hold a candle to what has happened to what is now called Financial Services. Investment (stocks, real estate, venture partnerships and legalized betting), credit (everything from debit cards to mortgages), daily transfers (payments sent and received), and insurance of all sorts have fused. The top ten national banks devoured the local banks when deregulation hit, ate up other financial services, and now fight each other over shares of the pie.

Government

Federal, state, and local governments, squeezed by budget pressures, have failed to maintain the role of employer of last resort. Most government work is white collar, information work. Those inertial bureaucracies chock full of managers and clerks feel the computer shaving away at their job security like an electronic razor. Computerized records, expert system query handlers, electronic funds transfer (EFT) systems (e.g., Social Security automation), and automatic reporting and accounting procedures clip away the bureaucratic behemoths. That officious clerk doling out tidbits of information has been swept away by direct terminal access to an intelligent system.

The profit-conscious U.S. Postal Service is a showpiece of efficiency. Competition on both
the electronic and hard copy fronts keeps the Postal Service lean and mean. EFT has eliminated billing and check writing, corporate and personal. The physical mail mainly consists of unusual correspondence and packages.

**Manufacturing**

The image of an enormous, dark, unpopulated factory almost without human workers has become widespread reality. Indeed, all three major production systems—process industries, mass production and small batch production—utilize full-scale automation.

The chemical plant presents an eerie scene: acres of gleaming steel machinery, hissing sinisterly, with pungent odors wafting to and fro—but no people. A few humans await emergencies as intelligent computers monitor and control other computers that operate the plant.

One-person publishing operations exemplify modern mass production. A manuscript is sent electronically to an expert system which selects fonts and sizes and colors and so on. Then it publishes the volume, even doing most of the editing, formatting, and proof-reading. Materials handling, printing and assembly are fully automated. Of course, most publications are electronic, received via computer with automatic royalty fee transfers.

Gone are the days of the tool-and-die shop staffed by expert machinists. Today, one person oversees on-demand automated production. Orders are placed electronically. Flexible manufacturing cells are reprogrammed dozens of times daily. Inventories and distributors are creatures from the past. A truly integrated system features automated order-processing, design, materials handling, production, distribution and funds transfer.

**Trade**

Information technologies mean direct links which, when coupled with automated manufacturing, enable production on demand, minimal stockpiling, and direct sales. The traditional role of the wholesaler disappears. Retailing feels the change, too.

Consider auto sales: The consumer has home access to action videos and full data on cars' performance. Options can be selected at will with detailed video representations and price comparisons. When Renault decided to drop its dealer network in favor of lower prices and more convenient direct home sales, the competition quickly followed suit. Service largely relies on self-fault detection and diagnosis with many easy-to-replace modules.

Now over 50 percent of retail sales are conducted electronically via home computers. CompuSears, for example, provides an electronic catalog with easy search capabilities that save consumers time and hassle. The consumer calls up videos and documents as desired to compare products, delivery dates and price. Ordering and payment are handled electronically.

**Services**

You might imagine that all the jobs reside in the services. But the information technologies driving factory and office automation integration are doing the same in many key service areas.

The “one man and a computer” operation takes over many professional services. Furthermore, many of the ordinary providers are driven out of business by the truly expert system. Nowhere are gains in efficiency more pronounced than in programming. Software engineering, high-level languages and artificial intelligence means the really outstanding systems designer dominates, doing the work of a hundred programmers of 20 years ago.

Some of the most surprised victims of the Information Age have been the would-be salespersons. Take medical supplies, for example. When pharmaceutical firms set up computerized distribution systems and provided hospitals and doctors with free terminals with which to order drugs and supplies, the old sales system collapsed under the weight of better information.

**The Changing Nature of Work**

On the individual level, the form that jobs take in the future will be radically different. This means that we need to rethink education and job training systems. More importantly, we must recognize the potential of an aggregate effect. Increases in productivity could be so sharp that we could no longer pretend to have full-time work for everyone who wanted it.

The evidence mounts that the shortage of work will constitute the No. 1 political issue of the coming quarter-century. We have attempted to legislate work since 1946, when the
Can government programs, labor union demands or management incitements compensate for the lone worker staffing the new empty office? Can we set aside fruitless Industrial Era answers and pioneer new ways of working? Can we handle our own future?

U.S. Congress first committed the United States by law to the goal of full employment. We strain the economy to dream up unneeded and often unfulfilling work.

What can be done about the shortage of work that looms ahead? Typical responses find:

- Unions resisting introduction of microelectronics as "job killers."
- Training programs with endless wrinkles, perhaps viable at the micro level in getting one worker prepared for a job, but barely relevant in terms of the macro level of too many workers in the labor force for too few jobs.
- Government subsidizing industry to create work, whether through partial payment of wages to induce hiring of disadvantaged workers or through a $300-billion defense program propped up by the need for jobs.
- Cries of management and labor to raise trade barriers to keep out cheap steel and quality cars, futile in a world economy.
- Welfare itself, the cursed last resort, condemned as demotivating, wasteful and sinful.
- And, most intriguing, plans to reduce work hours—resulting in capable people moonlighting while the less able starve, a lessening of international competitiveness, growing poverty for everyone, or all of the above, depending on how wages are adjusted.

In a closed economic system, these actions might succeed to some extent. But in the face of hard-charging international competition, they fail. Automation means cheaper and better-quality products and services. Even the developing countries with dirt-cheap labor cannot compete with highly automated production processes. Labor-intensive today translates to loss of jobs tomorrow. Furthermore, the value of using people to perform work that a machine can do must be questioned.

Changing Attitudes Toward Unemployment

The potential to produce what we want without having to do very much work could bring about the biggest system change of all. The costs of many goods and services should drop. By computerizing routine and expert functions, government should cost less. Likewise for goods, housing, education, health care and so on. This means less income will be needed. All of this could help ease the transition toward a less-work society.

Our system of government is loathe to plan. It finds greater rewards in responding to crisis than in avoiding it. We cannot afford to wait on the issue of work. Industry and labor need to join with government to set a clear agenda to build effective policy.

We need to begin thinking about these issues now. Our track record is that technological changes move faster than social institutions adapt. The adaptation required to handle a surplus of would-be workers is staggering.

The first step is to recognize the probability—not the certainty—of drastic long-term employment shortfalls. We must set aside the fruitless Industrial Era remedies for unemployment and test uncharted waters prudently. We must run guaranteed income programs for restricted populations, try paid-volunteer programs, back pioneers in flexible work careers, and vary co-op arrangements.

How do we cope with the generation caught in transition to a new economic system? What work mechanisms will function well in a new system?

Working out the details will take decades, yet effective work strategies depend on having early answers to these questions. The future of society depends on these strategies working.

Dr. Alan Porter is professor of industrial engineering and director of the Technology Policy and Assessment Center at Georgia Tech. He is the co-author of The Impact of Office Automation on Clerical Employment, 1985-2000 [Quorum Books, Westport, CT, 1985].

This article originally appeared in The Futurist.
The Ritz-Carlton, Atlanta is offering a special rate for Yellow Jacket fans. Just $79 per room per night on weekends, subject to availability. Join us at Peachtree and Ellis Streets for the city's finest accommodations. Luxurious rooms. Gourmet dining. An elegant bar. Impeccable service. And an obsession for detail that shows in everything here. From fine art to fresh cut flowers throughout the hotel. For reservations, call 404-659-0400 or 800-241-3333. Our doors are wide open for you.
Q. When does a little really mean a lot?

A. When it's a contribution to Charitable Life!

Georgia Tech Charitable Life, Inc. ensures a lot of Tech's future for just a little money. Through the Charitable Life program, you can arrange for Tech to be the beneficiary of a $50,000 life insurance policy for premiums as low as $2.81 per day or less, depending on your age.

You can use this cost-effective method to support the Georgia Tech Foundation, Inc. and/or the Alexander-Tharpe Fund, Inc. Your gift helps guarantee a generous endowment for Georgia Tech.

Tuition at Georgia Tech turned out to be one of your best investments; now, make a good investment in the future of Georgia Tech through the Charitable Life program.

---

Yes! I would like to learn more about Georgia Tech Charitable Life.

- [ ] Alumnus or friend
- [ ] Insurance agent

Name ________________________________

Major __________________ Year __________

Address ________________________________

Phone (____) __________________________

Return this card to:
William T. Lee
Executive Director
Georgia Tech Charitable Life, Inc.
Georgia Institute of Technology
Atlanta, Georgia 30332-0220
or call (404) 894-4678
Uplift for the Nation’s Aging Airline Fleet

As airlines prepare to spend millions of dollars to remedy potential structural problems in their aging aircraft, materials engineers at Georgia Tech are using computer-aided tomography—developed to help doctors peer inside the human body—to look inside aircraft component materials.

Other Georgia Tech researchers are developing improved aluminum alloys and better fabrication procedures which may reduce the problems of fatigue and corrosion in future aircraft.

Most failures in aircraft structures result from fatigue caused by corrosion and cycles of use—repeated pressurization and de-pressurization of an airliner’s cabin or the constant flexing of its wings in flight.

Fatigue problems worsen with the number of use cycles, while corrosion is a factor of time and the environment. Both weaken an aircraft’s structure.

“There is a negative synergism,” says Dr. Stephen Antolovich, director of Georgia Tech’s School of Materials Engineering. “When you have interactions between fatigue and corrosion, cracks propagate faster.”

To help detect and understand those processes, Antolovich, Dr. Stuart Stock and other researchers at Tech’s Mechanical Properties Research Laboratory have been using computer-aided tomography to look at the internal structure of materials used in aircraft components. They believe the non-destructive technique will give them a better understanding of the complex processes which induce failure, and lead to strategies for preventing it.

“You can actually get a physical picture of what is happening internally,” Antolovich says.

The technique is applicable to all types of materials.

For years, aircraft designers have worked with the same basic set of aluminum alloys. Because of their long experience with them, designers know the materials’ strengths and resilience to damage.

Metallurgists are developing a new generation of alloys that will be stronger, lighter, and more damage-resistant than current materials. And through better understanding and control of the manufacturing processes, these new materials will better retain their attributes.

“It’s not that alloys used on commercial airplaines are inferior, it is simply that we can produce better materials,” says Dr. Thomas Sanders, professor in the School of Materials Engineering.

During the ’70s, sharply rising fuel costs prompted a search for lighter materials to reduce fuel consumption. Among the results were alloys of aluminum and lithium, which promised significant fuel savings.

New alloys will also help improve the performance and damage-tolerance that designers can build into aircraft. Those are particularly important to U.S. military agencies, whose pilots must push their aircraft to the limits.

“The military is really pushing for performance,” Sanders notes.

Aircraft may eventually be constructed of a large variety of aluminum alloys, as well as new composite materials. But moving a new alloy from the laboratory to manufacturing facilities can be difficult.

“You can’t control things in production nearly as well as you can in a lab,” Sanders notes. “In a lab, you test perhaps 200 pounds of material,
Tech Scientists Help Uplift America's Aging Airline Fleet

but in production you manufacture several thousand pounds every day. Because everything is much larger, things like heat transfer become a problem."

Sanders is attempting to optimize manufacturing through precise control of temperature, solidification rate and processing speed.

Solid Lubricants for "Hot Wheels" of Tomorrow

Ceramic engines for automobiles of the future will operate at temperatures so hot that conventional liquid lubricants would turn to sludge. Researchers at Georgia Tech are developing new solid lubricants capable of withstanding temperatures of up to 500 degrees Centigrade.

“One of the exciting things we found is that you can lubricate ceramics to an acceptable degree with metal oxides, at fairly high temperatures," says Dr. Ward O. Winer, director and Regents professor of mechanical engineering.

Solid lubricants could be applied to moving ceramic engine parts in a number of ways. A film might be applied to the parts during assembly, or a "sacrificial" part made of a lubricant material could be installed in such a way that it wears into the parts, says Winer.

Another possibility would be to build parts from materials that would generate lubricating oxides during operation, creating a "self-lubricating" engine.

Tech, UGA Researchers Find "Missing Link"

Researchers at Georgia Tech and the University of Georgia have invented a way to integrate two complementary but previously incompatible methods of chemical analysis.

The new technology links an infrared spectrometer with a liquid chromatograph.

In the past, scientists had no easy method for integrating these two instruments. The most commonly used alternate method, gas chromatography coupled with mass spectrometry, can't be used to analyze many organic compounds.

"There are nine million chemicals in the Chemical Abstracts Registry," says Georgia Tech chemistry Professor Dr. Richard F. Browner. "Less than five percent of those can be analyzed with gas chromatography-mass spectrometry. By contrast, more than 95 percent can potentially be analyzed using this new device."

Invented by Browner and Dr. James A. de Haseth of UGA, the interfacing device should prove useful for analyzing pharmaceuticals, food products and environmental pollutants.

Browner said the device will also help scientists conduct basic research to learn more about the nature of particular substances.

When the Going Gets Tough, Try Mediators

Atlanta's new historic preservation ordinance marks a victory for planners who slogged through months of controversy to find answers. It also demonstrates the success of mediation techniques that have become increasingly attractive to city planners, legislators and citizens groups facing tough public policy decisions.

The ordinance was drafted after Atlanta called on mediation experts from Georgia Tech and the University of Virginia.

Mediators practice a relatively new communication science that calls for collaborative decision-making. In recent years, the demand for mediation skills has grown as community organizations and other groups seek a stronger voice in public policy decisions.

Mediators tackle issues ranging from airport noise to solid waste management, affordable housing and economic development.

"In the '50s and early '60s, local residents didn't get directly involved in issues such as economic development and historic preservation," says mediator Michael Elliott, a professor of architecture and a founder of the Southeast Negotiation Network, part of Tech's Center for Planning and Development.

But that trend has changed, Elliott says, and public officials are beginning to recognize the value of collaborative decision-making.

48 GEORGIA TECH • Fall 89
Putting People First Makes First Atlanta Second To None.

FIRSTATLANTA
Second to None

©1986 The First National Bank of Atlanta Member FDIC
Dr. Philip Enslow says the past 35 years have brought "dazzling" changes in telecommunications, but he freely confesses that he's not certain where that change is leading society.

Enslow, a professor in Georgia Tech's School of Information and Computer Science, made the remark last year in Amsterdam, on the occasion of his acceptance of the prestigious Blaeu Prize.

The annual award honors individuals "who have contributed in a globally significant way to the development of international telecommunications."

"Technology is not all that has been changing," Enslow said in accepting the award. "As we watch in amazement as the magician deftly moves his hands, we ought to remember that there is more to the show than just the magician. There is also the rabbit; one who has the disconcerting habit of changing position while we are not even seeing him move.

"So let us forget, for a brief moment, the virtuoso magic of telecommunications technology, and try to concentrate... on the elusive rabbit of the economic, regulatory and social changes associated with telecommunications."

Enslow's remarks reveal the depth of his involvement with telecommunications. Under the broad heading of "technology of computer science," the internationally respected lecturer is an expert in networks, distributed data processing systems, systems organization and operating systems.

His education philosophy mirrors his wide-ranging interests, and his concern for the future of telecommunications.

"It's easy to build systems with current technology," he says. "In a university, we should be talking about developing the next generation of technology and new systems ideas."

Technology is the manifestation of knowledge, Enslow says. And while certain technologies have a relatively brief shelf life, the knowledge they embody lasts forever.

"It's easy to get swamped by technology," says Enslow. "What we should be doing in higher education is teaching people general principles, fundamentals. "The fundamentals of addition haven't changed in a long time," Enslow adds by way of example. "Yet the pocket calculators that do it have changed dramatically."

Enslow draws a distinction between education and training, and is critical of industry's preference for the latter. Ideally, education establishes a framework for thinking and understanding, he explains, and should be the primary focus of a university. Such an intellectual base helps people avoid making "piecemeal solutions" to problems that require "system-level thinking."

On the other hand, "the effects of training quickly die off after school," Enslow notes. Training is usually limited to solving current problems with available knowledge—a short-term approach when a long-term perspective is needed.

Technological changes may not
be as important as the new operating environment they have produced, Enslow says.

"The worldwide telecommunications scene has become almost impossible to survey and comprehend, much less direct and control," he says. "This proposes a threat and a new type of vulnerability in society and its industries and organizations."

Enslow notes that many companies have become "addicted to the short response times provided by modern, state-of-the-art telecommunications." But access to a greater volume of timely information may be a mixed blessing. "We are in danger of creating a situation in which we have only a few real decision makers," he says, which would, among other things, "make it increasingly difficult to shape and develop mature and responsible decision makers for the future."

A military officer from 1955 to 1975, Enslow has held various assignments in the telecommunications area for the U.S. Army, including helping set up the long-lines communications network in South Vietnam.

After a brief stint at the Pentagon, Enslow joined the Executive Office of the President in the Office of Telecommunications Policy.

In the early '60s, Enslow had taught in the Department of Electricity at West Point. There, "I discovered that I enjoy teaching," he says, and decided to pursue that career after his military service.

After retiring from the Army in 1975, he joined the Tech faculty as an assistant professor of ICS. He was promoted to full professor three years later.

He has been actively involved in the ICS school and has served as director of the ICS Computer Laboratory, chairman of the Faculty Representative Committee and coordinator for a major research program in distributed processing.

He has played a significant role in shaping Tech's computer science curriculum.

Many schools have programs in telecommunications, most of which are "focused more on the management side," he says. "They don't get as deep as we do into the technology and into the fundamentals."

In his remarks at the Blaeu Prize ceremony, Enslow concluded, "We have created the world's largest and most complex integrated and interconnected system. It works well, and it fails rarely, but we should remember this: As a system, the whole is much more valuable than its component pieces. We must guard against damaging the system by trying to 'optimize' a handful of its parts; planning must address, by necessity, complete systems' solutions."
Dressed For Success.

With a selection of more than 300 lines of office furnishings, we can help you fashion an office image that's tailored to suit your company personality. Conservative or innovative, daring or discreet, outfit your office to express your success.

Call on Ball Stalker for space planning, design services, consultation, and the widest selection of office furnishings in the Southeast.

Ball Stalker Co.
for all the right reasons.

151 Fourteenth Street, N.W.
Atlanta, Georgia 30318 • (404) 876-8999
TECH TO SELL TOWER?

The original? No.
A highly detailed work of art, cast in pewter? Yes.

To commemorate the 100th birthday of the Georgia Tech Administration Building, we have commissioned Michael Ricker, noted American sculptor, to create the official Alumni Association Tech Tower. Our work is approximately four inches tall, and is cast in heavy, glistening pewter...an attractive piece in any setting.

Michael Ricker is recognized around the world as the leading artist in his field. Collectors of his works include Presidents and monarchs, and he has been approached by the Smithsonian to exhibit. Pewter casts of pieces of art from his studio in Colorado have been known to double in value only one year after purchase.

Mr. Ricker studied the Administration Building's tower from every perspective to render this highly detailed work. He has produced a terrific, classy way for all Tech fans to display their allegiance. The Alumni Association Tech Tower has been designed to look great either in your office or home, and is a great gift idea for Christmas or birthdays. And it can be purchased only through the Georgia Tech Alumni Association.

Order immediately...delivery will begin on a first come, first serve basis.

Please accept my order for Georgia Tech Alumni Association Tech Towers @ $36.50 each =
Shipping & Insurance @ $3.50 each =
Total enclosed $ 

Please make check payable to: Alumni Association Tech Tower
Georgia Tech Alumni Association
Alumni/Faculty House
Atlanta, Georgia 30332

You may charge your purchase to □ Master Charge or □ Visa
Card No. ________________________________ Expiration Date ____________________
Signature ____________________________________________________________________
Ship my Alumni Association Tech Tower to:
Name ________________________________
Street ________________________________
City __________________________ State _______ Zip ________

If you want Tech Towers shipped to other addresses, please enclose a card with name, address, and quantity to be shipped to each address.
The 1990 Alumni Tour Schedule

WINGS OVER KENYA
Safari by Air
Jan. 20-Feb. 3

LEEWARD ISLAND
Aboard the Yorktown Clipper
Feb. 11-18

TIGER TOPS
Thailand, Nepal and India
March 3-20

SCANDINAVIAN CAPITALS
Aboard the Crown Odyssey
May 21-June 4

JOURNEY OF THE CZARS
Moscow, Leningrad, Volga River Cruise
July 24-Aug. 6

ALASKA
Midnight Sun Express
and cruise aboard the Sea Princess
Aug. 9-21

DANUBE RIVER CRUISE
Munich, Vienna, Danube River
Sept. 18-Oct. 1

For information contact:
Janice G. Sangster
Georgia Tech Alumni Assn.
Alumni/Faculty House
Atlanta, GA 30332-0175
(404) 894-2391

The Georgia Tech Alumni Magazine
Georgia Tech Alumni Association
Atlanta, Georgia 30332