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Volume 2 Number 1 October 1985

Labs Awarded $4.8 Million for SDI Research

Everyone has heard that Georgia Tech has received the largest research contract in its history—$21.3 million awarded to the School of Electrical Engineering to develop ultra-high-speed computers for controlling missile interceptors. What is not so widely known is that two GTRI laboratories have tasks under this contract totaling $4.8 million to perform research on related aspects of these interceptors.

Both the Radar and Instrumentation Laboratory (RAIL) and the Energy and Materials Sciences Laboratory (EMSL) are contributing to the overall effort. The research is in support of the Strategic Defense Initiative (SDI) and is sponsored by the U.S. Army Ballistic Missile Defense Advanced Technology Center at Huntsville, Alabama.

Guidance Techniques

RAIL has a $2.4-million, five-year contract to study guidance mechanization concepts for ground-based Army interceptor missiles seeking to destroy hostile nuclear-armed missiles either while they are still in space (the exoatmosphere) or just after they have penetrated the earth's atmosphere (the endoatmosphere).

RAIL has long had a working relationship with the Army's Strategic Defense Command, of which the Ballistic Missile Defense Advanced Technology Center is part, and has gained a great deal of experience in seeker and sensor technology in various tactical programs. For the last year and a half, RAIL researchers have been working on a terminal imaging radar that would pick out reentry vehicles from chaff, decoys and other "trash" sent up by the enemy to confuse our interceptors.

Energy-Absorbing Materials

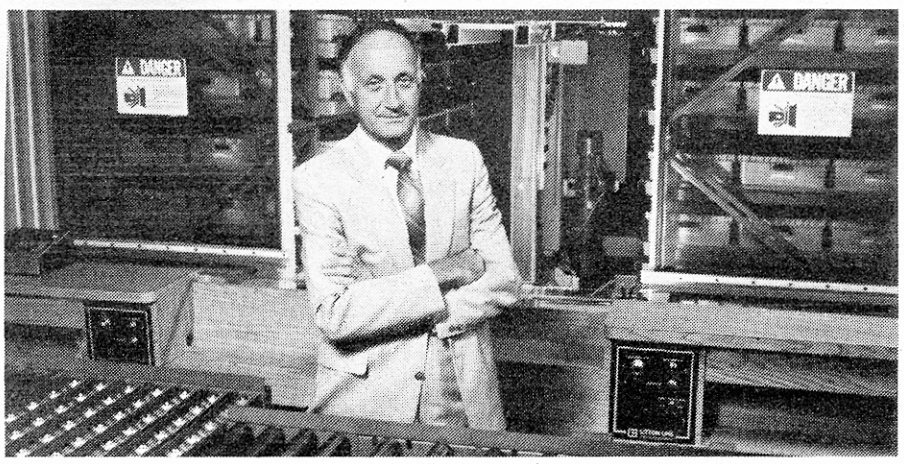
In EMSL, John Handley is directing a study of integral heat protection materials for use in interceptor missiles. The Thermophysics Branch will be testing and evaluating various heat shield concepts that will be used to protect the ground-launched interceptors from the severe aerothermal heating environment that they will encounter during their hypersonic flight through the atmosphere.

Heat sink, ablative and actively cooled designs will be considered. The materials used in these designs must be characterized from the structural, chemical, thermal and aerodynamic viewpoints.

"Essentially, we're evaluating the Army's materials in high-stress environments," Handley explained. "Since no test facility exists that will simulate the range of operating conditions for their next generation interceptors, we'll have to perform a series of separate simulations. Design procedures will be based on these simulations and their associated analyses.

"We've worked with the Advanced Technology Center since 1977 through the radar directorate," Handley added. "This program is an opportunity to utilize our testing capabilities. Our program will provide an engineering solution to a difficult problem. We're dealing with interceptors that must go faster than previous interceptors for shorter periods of time."

Conferences to Focus on Manufacturing Technology



Lanny Feorene in the Material Handling Research Center, an important component of Georgia Tech's manufacturing technology research. (Photo by Charles Haynes)

Georgia Tech is holding two special conferences on manufacturing technology this month. Although the programs are almost identical, the audiences will be different. Industrial executives and managers are invited to the sessions on October 22-23, while the October 29-30 conference is for Department of Defense administrators.

"The conferences are designed to facilitate joint research efforts between Georgia Tech, on the one hand, and industry and government, on the other," says Lanny Feorene, conference coordinator and director of GTRI's manufacturing technology program.

Both meetings will emphasize research in the areas of intelligent systems, sensor technology, and computer-integrated systems. "We polled executives of more than 80 leading U.S. firms during the past year, and a majority singled out these topics as important," Feorene said.

The presenters are almost equally divided between GTRI and the academic side of Georgia Tech. From GTRI, they include: EML—Ron Bohlander, John Gilmore, James Larsen; ESCL—Brit Williams, Hugh Denny, Linda Martinson, John Mills, Roy Scruggs; SEL—Fred Cox.

Academic participants are: EE—Ron Schafer, George Vachtsevanos; ChE—Joseph Schork; ICS—Richard DeMillo, Janet Kolodner; ME—Wayne Book; AE—James Craig, Daniel Schrage; ISyE—Christine Mitchell, Alan Porter; GTICES—Leroy Emkin.

Tom Stelson will provide an overview of Georgia Tech research, and Don Grace will summarize GTRI military and industrial research. Lt. General Melvin F. Chubb, Jr., Commander, Electronic Systems Divisions, AFSC, will deliver the keynote address for the military conference. Others on the programs include Jerry Carey, President Joseph Pettit, and Governor Joe Frank Harris.

Mary Ann Burke of the Research Communications Office handled the conference arrangements.

EMSL Revamps

The Energy and Materials Sciences Lab (EMSL) has upgraded its chemical research program into a division. Dan O'Neil is chief of the new Chemical Systems Division, which embraces the biotechnology and chemical engineering activities in EMSL.

Reporting to Dr. O'Neil, William A. (Bo) Hendrix heads the Thermal Processes Branch. He will assume responsibility for entrained pyrolysis process development from Jim Knight, who will be retiring late in 1985 after 40 years of meritorious technical leadership at Georgia Tech. Leadership of a new Biological Processes Branch remains open.

Bob Cassanova continues to devote 25% time to directing the Thermal Sciences Division. Under him, John Handley heads the Thermophysics Branch and Tom Brown heads the Solar Energy Branch. David Asbell has been named director of the Advanced Components Test Facility (solar site).

The Materials Science Division remains with Tom Starr as chief and Garth Freeman as head of the Materials Characterization Branch. Dr. Starr also heads the Materials R&D Branch.

Wally Shakun now reports to the laboratory director's office with responsibility for industry programs and management of Area II facilities. Tudor Thomas continues to direct the zeolite research program.

Symposium Speakers Warn of "Passive Smoking" Dangers

By Lincoln Bates, EDL

Increasingly, there are few buts about it—involuntary intake of cigarette smoke may be more than simply an annoyance. Remarks at Georgia Tech's Indoor Air Quality Symposium October 2-4 suggest that by risk assessment, if not hard evidence, "passive smoking" can be hazardous to your health.

Public health expert Dr. John Spengler of Harvard University noted that long-term studies have shown a higher concentration of benzene in smokers' homes than in those of nonsmokers. He also said that cigarette smoke and occupational exposure to indoor air pollutants can accelerate the natural decline of pulmonary performance.

Tobacco smoke, noted EDL's Dr. Charlene Bayer, is the primary source of particles in indoor air pollution. It contains nitrogen dioxide, chlorinated hydrocarbons, arsenic and other toxic elements.

A pediatrician and epidemiologist from the Centers for Disease Control pointed to acute and chronic adverse health effects in infants resulting from passive smoking. Citing a 1983 Seattle study, Dr. Ruth Etzel said that middle ear disease, which has an annual price tag of $1 billion to $2 billion, is four times more likely in houses where parents smoke. The precise agent and mechanism remain unknown, but Dr. Etzel suggested that whatever irritates the lower respiratory tract may do the same in the upper.

Dr. Etzel included lung cancer and pulmonary function problems as other hazards related to infants and passive smoking.

"Passive smoking is becoming a big issue," said Dr. Marilyn Black, director of EDL's analytical lab and coordinator of the symposium. "We have a proposal out with Dr. Etzel for further research on cigarette smoke and its effects."

Tobacco smoke is far from the only culprit in the relatively young field of indoor air quality. Speakers from the U.S. Environmental Protection Agency, Oak Ridge National Laboratory, National Institute of Occupational Safety and Health, and other agencies and institutions discussed radon, microbial sources, formaldehyde, faulty air conditioning, the "tight house syndrome," and other aspects of indoor air contamination.

The symposium, said Dr. Black, drew about 100 people, including the speakers, from at least a dozen states. "We had top-notch speakers, and many of them said they'd return if we held another symposium next year," Dr. Black added.

EDL Winds Up Assistance in Central America

By Lincoln Bates, EDL

Engineers in the Economic Development Laboratory are accustomed to transferring their knowledge to plant supervisors, technicians and company managers statewide. But doing that in Spanish **and** in Central America is a different story, although as one recently returned staff member notes, not entirely different.

Alan Pashkevich spent the past year in Central America helping industries learn how to conserve energy in the face of expensive petroleum imports. Industries assisted ranged from breweries to textile plants to sugar cane mills.

"The industries were similar to those Tech helps here at home—mostly small in size, with similar payback and similar tasks, and many using dated equipment and procedures," observes Pashkevich. "But capital is tighter down there, the recession is deeper, and materials are harder to get."

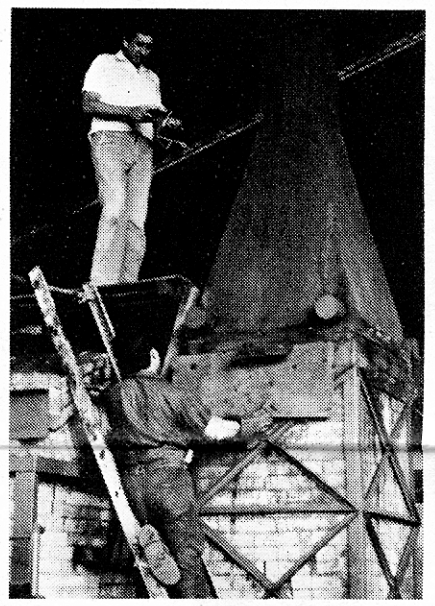
Pashkevich was a technical training advisor with the Regional Industrial Energy Efficiency Project. The project is based in Guatemala, but addresses industrial energy conservation throughout Central America.

Seminars and demonstrations were important means of technology transfer. Topics included energy management, steam systems, electrical systems, energy audits, and energy measurement and instrumentation techniques. Project staff also put together publications and distributed bulletins.

"The industrial boiler workshop was an attention-getter, as was electric energy management," Pashkevich says. "We had about 50 participants per workshop. They included boiler operators who knew only how to turn a boiler on and off and those with 30 years of experience, rural workers and urban workers, engineers who were very theoretical and engineers concerned only with practical application, and managers of all sorts and levels.

"The energy audits were most useful, I think. They provided concrete steps to follow. We pointed out that efficient lighting may save six to 15 percent of energy costs or that one inch of insulation would reduce about 90 percent of energy loss. The potential for savings was appreciated." The Tech team also trained Central American engineers to perform energy audits and review audit reports.

Georgia Tech, a subcontractor to the Central American Institute for Industrial Research and Technology, began its efforts in May 1983. According to Ken Maddox, director of Tech's International Programs Branch, funding from the U.S. Agency for International Development (AID) runs to the end of this year. "An independent AID evaluation called it a worthwhile project with the potential for being among the best energy conservation programs sponsored by AID," he said.



Plant energy audits were a part of the Central American Industrial Energy Efficiency Project. Here, Guillermo Bran takes a stack gas measurement from a forging oven while the plant maintenance supervisor looks on. (Photo by Alan Pashkevich)

NEWS BRIEFS

GTRI to Host Women's Lunch

The 1985 Georgia Tech Women's Christmas Luncheon will be hosted by GTRI and is scheduled for Friday, December 13. The theme is "A Centennial Christmas." Committees are making plans for the menu, entertainment, decorations, and door prizes. All women employees will receive an invitation in mid-November.

SEL Field Office Moves

SEL's Eglin AFB field office has moved into larger quarters off the base and should be addressed as follows:

Georgia Tech Field Office
2112 Lewis Turner Blvd.
Ft. Walton Beach, FL 32548
(904) 862-6229

STL Division Forms Branches

The Microwave Systems Division (MSD) of the Systems and Techniques Lab (STL) has formed three branches as follows: The Development Branch is headed by Dayton Adams, who will continue his assignments as associate chief of MSD. This branch primarily will provide antenna and microwave components to STL's traditional sponsors in the simulation business.

Larry Corey heads the Antenna Analysis Branch, which will provide theoretical analysis of reflector antennas, phased arrays, and radar systems. The Antenna Measurements Branch will offer hardware and software support for antenna measurement systems under the direction of Howard Atkinson.

STL Continues Long-Term Association with FTD

The Systems and Techniques Lab (STL) is proceeding with final negotiations for a new contract with the Air Force's Foreign Technology Division (FTD) at Wright-Patterson AFB. The new contract, which is for one year with two one-year options, will provide for continuation of a series of contracts under which STL has been rendering task-type analytical support to FTD continuously for 11 years. In recent years, STL also has had several other contracts with FTD for both hardware and analytical work. This fall STL is completing the first year of a three-year radar design study for STD.

Library Acquires Readers to Assist Visually Impaired

In cooperation with the Office of the Dean of Students, the Tech Library has installed two Visual-Tek readers for use by visually impaired students, faculty and staff. The readers enlarge with a zoom lens, providing a 6:1 ratio between minimum and maximum sizes. An electronic line marker controls the amount of information displayed on the screen by blanking out unneeded portions. The machines are equipped with plexiglass sheets for holding down book pages to minimize the curvature in the center.

The machines may be used for writing as well as reading. They are housed on the first floor of the West Building. Assistance will be provided by Circulation Desk personnel.

Integrated Circuit Technology Advances Spur Research

By John Daher, ECSL

Rapid improvements are being made in the functional performance of high-speed, high-density integrated circuits. But little attention is being directed to electromagnetic compatibility (that is, how well the device operates in its intended electromagnetic environment). So Rome Air Development Center (RADC) has asked the Electronics and Computer Systems Laboratory (ECSL) to develop the methodology for measuring the electromagnetic susceptibility characteristics of these devices. The information to be obtained from these measurements is vital for determining whether electromagnetic interference (EMI) conditions exist and, if so, what appropriate steps should be taken to eliminate these problems.

The Department of Defense has initiated the development of very high speed integrated circuits (VHSIC) for two major reasons. First is the need to achieve force multiplication through the use of more sophisticated weapons. The second major reason is to spur the microelectronics industry into pushing the state of the art in semiconductor technology and to apply the newly developed technologies in ways useful to the military.

The ultimate goal of the VHSIC program is pilot production in 1986 of processors containing 250 K gates, operating at clock speeds of at least 80 MHz, and performing several million to several billion operations per second. The processor chips are to achieve a functional throughput rate of 10^{13}gate-Hz/cm^2 with minimum dimensions of 0.5 micron. The technology is to be inserted into existing military hardware and is to be capable of operating in the military radiation environment.

The present-day military inventory contains large numbers of emitters of electromagnetic energy. These emitters range from low-power backpack radios used for short distance battlefield communication to gigawatt radars for detecting enemy aircraft hundreds, even thousands, of kilometers away. The frequency range covered by these sources extends from near 1 MHz to 100 GHz and beyond. Included within this inventory are large numbers of emitters whose primary purpose is to disrupt, or jam, communication and tracking systems.

The VHSIC devices must operate reliably within this increasingly congested and hostile environment. Therefore, the military has contracted with ECSL's Electromagnetic Compatibility Division (ECD) to develop the methodology for thorough, yet cost-effective testing of these devices in a controlled RF environment.

ECD engineers will develop the required modifications to an existing state-of-the-art VLSI tester to demonstrate that electromagnetic susceptibility measurements can be made in addition to normal functional testing. Additional hardware will be integrated into the automatic tester for combining RF and logic/power signals at specified pins during functional evaluation of the device. A combiner unit will be designed and interfaced for this purpose while introducing minimal degradation of the VLSI tester performance characteristics. The combiner also must provide the necessary isolation between the RF generator and the host test system. In addition, a high-frequency switching unit is needed to permit particular device pins to be selected for RF injection via software control. Under the influence of RF signals, deviations from normal functional responses will be detected and susceptibility thresholds determined.

Software Review

By Pat Mathiasmeier, RSTF

The Research Software Training Facility now offers three new courses: SuperProject, Presentation Graphics using PictureIt and Videoshow, and Survey of Communications Software—SmartCom, Crosstalk, and Kermit.

SuperProject

Provides instruction in a software package used for the planning and tracking of complex, multi-task projects. SuperProject combines techniques of project management with the latest software development for an effective tool to use in managing projects. The project director can use SuperProject to define activities, choosing the order, length of time, completion date, person responsible, etc. Gantt or PERT charts then can be generated for both planning and tracking a project. Data can be changed easily for testing alternative schedules. Prerequisite: None.

Survey of Communications Software—SmartCom, Crosstalk, and Kermit

Covers the basics of communicating with the IBM PC and looks at three popular communications packages—SmartCom, Crosstalk, and Kermit. Some of the functions covered for each of the three packages are establishing a connection, originating and answering calls, uploading and downloading files, and capturing data. Prerequisites: None.

Presentation Graphics Using PictureIt and Videoshow

The Presentation Graphics course demonstrates the creation of LINE, PIE, BAR and TEXT charts using the PictureIt software for the IBM PC. PictureIt is a menu-driven software program that creates chart layouts which are displayed using the Videoshow 150 and a color monitor. The Videoshow 150 provides high-resolution (2000 x 600) display of 1000 different colors and interfaces with a camera for creation of high-quality 35 mm slides. Prerequisites: None.

Other classes available at RSTF include:

Basics of Computer Literacy
Beginning and Advanced DOS
Beginning and Advanced Lotus 1-2-3
Symphony
Beginning and Advanced dBASEII
LISP
"C" Programming Language
Personal Editor
Volkswriter
Beginning and Advanced Wordstar
PROFS—Beginning, Advanced, Document Processing, and Scheduling

Call RSTF at ext. 6206 to sign up for classes.

Software Training Schedule

LISP (9-4:30): Nov. 4-6
Beginning Symphony (9-4:30): Nov. 7.
Symphony Communications (1:30-4:30): Nov. 8.
Integrating Symphony Environments (1:30-4:30): Nov. 15.
Symphony Word Processing (9-12): Nov. 19.
Computer Literacy (9-4:30): Nov. 1, 18, 20.
PROFS Scheduling (10-12): Nov. 8.
PROFS Document Mode (10-12): Nov. 15.
Advanced PROFS (10-12): Nov. 22.
Begining DOS (1-4:30): Nov. 12, 14.
Advanced DOS (9-12): Nov. 14.
Beginning dBASE II (9-4:30): Nov. 13.
Advanced dBASE II (9-4:30): Nov. 26.
Beginning Lotus 1-2-3 (9-4:30): Nov. 11, 21, 25.
Advanced 1-2-3 (9-4:30): Nov. 27.
Beginning Wordstar (9-12): Nov. 12.
Advanced Wordstar (1:30-4:30): Nov. 22.

PROFESSIONAL ACTIVITIES

COMPUTER RELATED SERVICES

Congratulations to the following, who received master's degrees from Georgia Tech on September 7: **Lee Gantt** (EE), **Art Vandenberg** (ICS), **John Dillard** (ICS), and **Bob Malcolm** (Mgt).

ECONOMIC DEVELOPMENT LAB

Claudia Huff and **Deborah Lockman** presented a paper entitled "What? Me? Coordinate a Conference?" at the 9th annual Practical Conference on Communication in Knoxville (TN) October 11-12. The conference was sponsored by the Society for Technical Communication.

Harris Johnson, George Rivers, Carol Aton, and **Keith Nelms** taught a course, "Managing the Small Technical Project," for Southwire in early September.

"Recycle Approaches for Paper and Pulp Mills," by **Craig Wyvill, John Adams,** and **Ed Valentine,** originally published in the *Proceedings of the Water Reuse Symposium, 1984,* was reprinted in the September/October 1985 issue of *Waterworld News.*

The Engineering Technology Branch, in cooperation with the Georgia Poultry Federation and the Georgia Poultry Processors Association, presented the second in a series of workshops on repetitive motion injury for first-line supervisors at poultry processing plants. The September 24 workshop, held at Gainesville Junior College, was coordinated by **Craig Wyvill** and **Nancy Davis.** Instructors were ergonomist **Dan Ortiz** and accident investigation specialist **Bobby Cline.**

EHSD Chief **John Nemeth** has been appointed to Governor Joe Frank Harris' Hazardous Materials and Emergency Spills Advisory Board. In early October, he spoke at the National Conference on Small Business and the Environment in Washington (D.C.).

Jim Muller will teach a "Lisp" course this fall on the AMCEE/NTU Satellite Network. Five two-hour sessions, beginning December 3, will cover widely used tools in the AI community that apply directly to business and industry problem solving.

ELECTRONICS & COMPUTER SYSTEMS LAB

Johnson Wang presented papers on diode-switched microstrip arrays and far-field to near-field computational methods at the International Symposium on Antennas and Propagation in Kyoto, Japan, and at the International Symposium on Antennas and EM Theory in Beijing, China, in late August.

At a meeting on the use of computers in nuclear power plants, held September 9-12 in Pasco (WA) by the American Nuclear Society, **Jim Mahaffey** presented a paper on the installation and startup of the emergency response data systems at Georgia Power's Plant Hatch, including a 15-minute film of an actual automatic shutdown incident at the plant.

Congratulations to **Michael Witten** for achieving his M.S.E.E. in September.

Roy Miller recently attended a one-week course, "Cost Schedule and Performance Measurement," at the Defense Systems Management College at Fort Belvoir (VA).

SYSTEMS ENGINEERING LAB

Lloyd Lilly has been approved for the grade of senior member in the Institute of Electrical and Electronics Engineers.

PERSONNEL NEWS

COMPUTER RELATED SERVICES

Ron Creswell has transferred from SEL and is acting manager of the Research Software Training Facility.

ECONOMIC DEVELOPMENT LAB

Deborah Lockman has been promoted to program coordinator in the Industrial Extension Division.

Carolyn Carter is the new administrative secretary in the Madison Regional Office.

Maureen O'Neill Fellows has joined the staff of the Savannah Regional Office as a research scientist I. She received her B.A. in psychology from Hamilton College (NY) and her M.S. in human factors engineering from Cornell University. She has two years experience with the American Society for Engineering Education and is particularly interested in the office environment and worker motivation.

ELECTRONICS & COMPUTER SYSTEMS LAB

Kimberly S. Moreland has joined the Computer Technology & Applications Division as a research scientist I. She has a B.S. in computer science from the University of Kentucky and worked 4 1/2 years in the Software Development Group at Westinghouse Electric Company. Her work encompassed development of the Alabama Power Company safety parameter system and the research, design and documentation for the advanced control room engineering working model. She moved here from Pittsburgh with her husband, Doug.

Gina Hillhouse has been made a research scientist I in the Command & Control Division after receiving her B.S. in information and computer science from Georgia Tech in September. As a student assistant, she was a valuable contributor to the Penetration Analysis Project for the U.S. Air Force.

Glen Champion has joined the Electromagnetic Compatibility Division (EMCD) as a research engineer I. As a student assistant in EMCD for two years, he helped develop a unique electromagnetic probe that can be used to distinguish coin denomination. He also worked on laboratory measurements to characterize a microwave feed horn, design and development of analog circuitry, and development of several automated test programs.

EMCD also welcomes **Betty Dulaney** as administrative secretary. She comes to Tech from Georgia Public Broadcasting.

The Command & Control Division welcomes student employee **Larry Adams,** who is pursuing a physics degree, and says farewell to **Larry Becker.**

RADAR & INSTRUMENTATION LAB

The Analysis Division welcomes GRA **Steve Sutton,** and the New Jersey office welcomes secretary **Maureen Hennessey.**

Lizbeth Applebaum has transferred to EML.

SYSTEMS & TECHNIQUES LAB

The Design Services Group welcomes **Alan Freeland,** electronics technician I.

SYSTEMS ENGINEERING LAB

David Flowers has been appointed acting chief of the Countermeasures Development Division, a position recently vacated by Tony Chimera. Dr. Flowers will continue as head of the Advanced Countermeasures Branch.

Judith Wiesman recently was promoted to artist II.

The Defense Systems Division has gained **Dorothy Baskin,** senior secretary; **Randy Hess,** co-op; and **Paul Hudson,** student assistant.

Resignations at SEL include **Marti Boyce, Chet Goins, Mark Linebarger,** and **Andy Spiessbach.**

Kurt Gingher (left), a GRA in EML who is working on his M.S.E.E., receives some counseling from Jim Wiltse, coordinator of GTRI's GRA employment program. Dr. Wiltse says GTRI currently is employing 84 GRA's (as of October 8), with more to come. Electrical Engineering supplies 43% of the GRA's; Information and Computer Science, 26%; Physics, 15.5%; and the remaining 15.5% come from several other academic units. The GRA's work in all seven laboratories, CRSD and OOD. (Photo by Patricia Stone)

Personal Notes

EDL: Our deepest sympathy goes to Elizabeth and **Hardy Taylor,** whose son, Hardy, Jr., died October 8 of injuries received when a horse threw him.

ECSL: Jackie Perkins and Donald L. Piper were married on September 21.

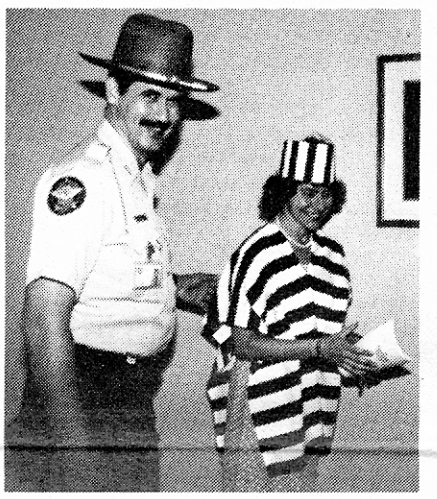
EML: A baby girl, Stefani Diane, was born September 26 to Alice and **Ron Forsythe.**

RAIL: Jill Kaplan recently got married and is now Jill Bach.

Marvin Cohen is moving to New Jersey to head the Fort Monmouth office for one year.

STL: Vince Camp was married on September 21 to the former Susan Phillips.

JoBeth and **Douglas Martin** have a daughter, Autumn Len, born September 17.



Maggie Harrison's birthday was anything but the usual working day. She hadn't been at work long before a Georgia State Trooper arrived, served her with a warrant for her arrest (charging that she had lied about her age when she arived in the "Colonies" 17 years ago), handcuffed her, and took her off to jail on the Marietta square. Luckily, it turned out to be a joke played by some of her "friends" at RAIL. It was all for a good cause: to raise money for the American Cancer Society.

Network Operations Center Assists GTNet Users

The Network Operations Center (NOC) is a centralized network support facility created as an extension of Tech's Office of Telecommunications and Networking and its Office of Computing Services. NOC operators are available 24 hours a day, seven days a week to assist users who may be experiencing network difficulties or who need network information.

Call NOC at 894-2777 for access to:

- Up-to-date network and computer status information, including notification of planned outages and known system constraints.
- Trained operators to provide instruction and guidance on using GTNet.
- Technicians and engineers to resolve trouble reports and provide support for network maintenance.

GTRI PROFS users need to call NOC if they cannot get a network prompt or if they get messages saying "PROFS not found" or "Cannot connect to PROFS." They should leave the following data with the operator: name, telephone number, building, the kind of machine or terminal they are using, and the machine to which they are trying to be connected.

If the screen says, "Success," then freezes, the network is all right, but the IBM computer used for PROFS is not. Then the user should call John Dillard of GTRI's Computer Related Services Department at 894-7172. Dillard also may be called when the user is in doubt as to the source of the problem.

Continuing Education Calendar

Asbestos: (For further information, call Ann Harbert, EDL, ext. 3806)

Nov. 12. **Asbestos Awareness Seminar.** Atlanta. Sponsored by Environmental Protection Agency and EDL Environmental, Health, and Safety Division. Coordinators: Bill Ewing and William Spain (EDL).

Nov. 13. **Asbestos Abatement Workshop.** Atlanta. Coordinators: Bill Ewing and William Spain (EDL).

Electronics:

Nov. 4-8. **Principles of Modern Radar.** Atlanta. Course Coordinator: Jerry Eaves (RAIL), 424-9609.

Nov. 18-21. **Phased-Array Antennas: Theory, Design, and Technology.** Atlanta. Course Administrator: Larry Corey (STL), 424-9663.

Hazardous Waste: (For information, call Ann Harbert, EDL, ext. 3806)

Oct. 29. **Hazardous Waste Generators: Requirements and Compliance.**

Oct. 30. **Transportation of Hazardous Materials and Waste.**

Oct. 31-Nov. 1. **Hazardous Waste Site Safety.**

Nov. 20-21. **Part B Hazardous Waste Permit Preparation.**

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