

the GTRI connector

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EML Research May Turn Laser "Sword" into Plowshare

by Mark Hodges, RCO

A laser originally developed for a tank missile guidance system has the potential to make coronary bypass surgery safer and more efficient, according to the GTRI engineers who designed the system and the Emory University cardiothoracic surgeon who has been testing it.

This medical system, based on carbon dioxide TEA laser technology, was designed in GTRI's Electromagnetics Laboratory (EML) at the request of Emory's Department of Surgery. Its experimental use in the laboratory on human coronary arteries, taken from bodies donated for medical research, shows that the laser can effectively vaporize plaque on the inner walls of narrowed arteries.

The TEA laser has two advantages over other lasers being investigated for use in removing plaque, according to Dr. Ellis Jones of Emory and EML project director Bob Platt:

- (1) Its high energy, short duration or pulsed waves blast the plaque out of the way with what the researchers describe as "a nice clean cut," leaving the inner walls of the artery "porcelain-ized" so that blood flows through the artery smoothly.

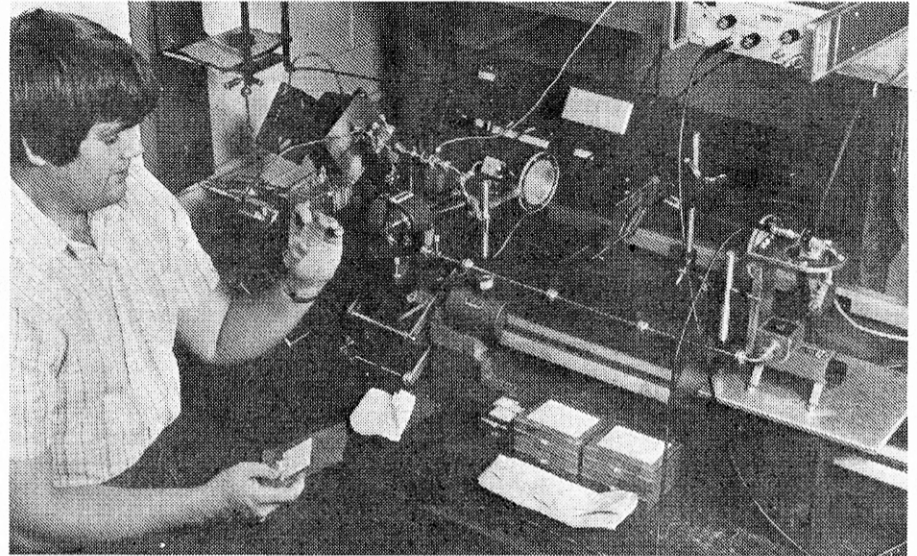
- (2) There is no evidence of damage to the surrounding nor-

mal tissue in the artery. This prevents subsequent clotting of blood on the injured surface of the lining of the vessel.

This may make the new laser system useful as an adjunct to the surgery for coronary artery disease — and, after much longer development, possibly to the treatment of coronary artery disease without surgery. "That's a long way down the pike," says Dr. Jones, "but this is a good step in the right direction."

Plaque is a fatty, often calcific deposit caused by high cholesterol levels in the body. It gradually accumulates inside arteries, narrowing them and reducing blood flow to the heart. In coronary bypass operations, surgeons route blood around the obstructed arteries by using segments of veins from the legs or arteries beneath the breast bone. Unfortunately, in some patients the arteries of the heart to which the bypasses are connected are themselves so diseased that initial or long-lasting good results are not possible.

Thinking of ways these vessels might be made more usable, Dr. Jones asked EML researcher Bob Platt to design a medical system based on carbon dioxide TEA laser technology for this purpose. TEA is an acronym for "transverse excitation at at-



Bob Platt led an EML team that designed a laser system to vaporize plaque on the walls of human arteries. (Photo by Charles Haynes)

mospheric pressure." The laser generates short, powerful pulses rather than one unbroken beam. Platt says that it is easier to control than continuous wave lasers now used most often in medical treatment. Platt also says that the TEA laser is very compact and its cost comparable to that of other lasers.

In laboratory experiments, Dr. Jones and Platt first proved the effectiveness of the TEA laser, then developed operational specifications for bypass surgery applications. This design is now complete, and Emory is looking for a manufacturer to custom-build the instrument.

The Georgia Tech and Emory researchers believe the TEA laser system could be useful for a variety of medical treatments. One future application might be to more thoroughly clean arteries of plaque, greatly modifying traditional bypass operations. But for such a technique to be possible, the laser beam would have to be transmitted into the clogged artery via a thin fiber. "No fibers are presently available for the TEA laser which don't distort the beam," says Platt. "Presently available fiber materials known to transmit the beam efficiently are either poisonous to the body or aren't flexible."

GTRI to Hold Employee Meetings

All GTRI employees are invited to attend one of four "GTRI—Present and Future" meetings the second week in October.

Two meetings will be held on campus in the Paul Weber Building (formerly the Space Science and Technology Building) on Tuesday and Wednesday, October 14 and 15. Meetings at the Cobb County Research Facility will be in the Building #1 Auditorium on Thursday and Friday, October 16 and 17. All meetings will be 3:00 -5:00 p.m.

Each meeting will begin with specific presentations on topics of general interest, such as GTRI status and future outlook, space, and new



Buzz says: "See you at the GTRI meeting!"

research thrusts. After a 30-minute period for questions and comments, the program will close with refreshments and informal socializing.

"We urge all GTRI staff members to come to one of these meetings," said GTRI Director Don Grace. "This is their chance to find out what's going on, get answers to their questions, and share their thoughts with us."

Remembering . . .

With the untimely passing of Joe Pettit, GTRI has lost its most articulate champion, consistent supporter, and effective critic. From the day he became President, Dr. Pettit espoused the concept of continuing GTRI as an integral part of Georgia Tech.

No matter what we achieved, he continually pressed us to do more and to become more. He wanted higher quality research, the cream of the crop in professional and support staff, greater interaction with our academic colleagues, more external publications, national and international visibility.

But he was quick to acknowledge the achievements of individuals and groups, and he was always available for

consultation, advice and leadership. GTRI was always an integral part of Joe Pettit's plans for the Institute as a whole.

All of us had many occasions to be very proud of him, both as our chief executive and as a person. I know for sure that he was also very proud of GTRI and its staff. We have, indeed, lost a giant, and I have lost a personal friend as well.

But the future lies ahead, and the finest tribute we can offer to the memory of Joseph Mayo Pettit is to remember his aspirations for us, maintain his high standards of excellence, adhere to his values, and move forward confidently into Georgia Tech's second century.

Donald J. Grace

Robotic Automation and the Space Station

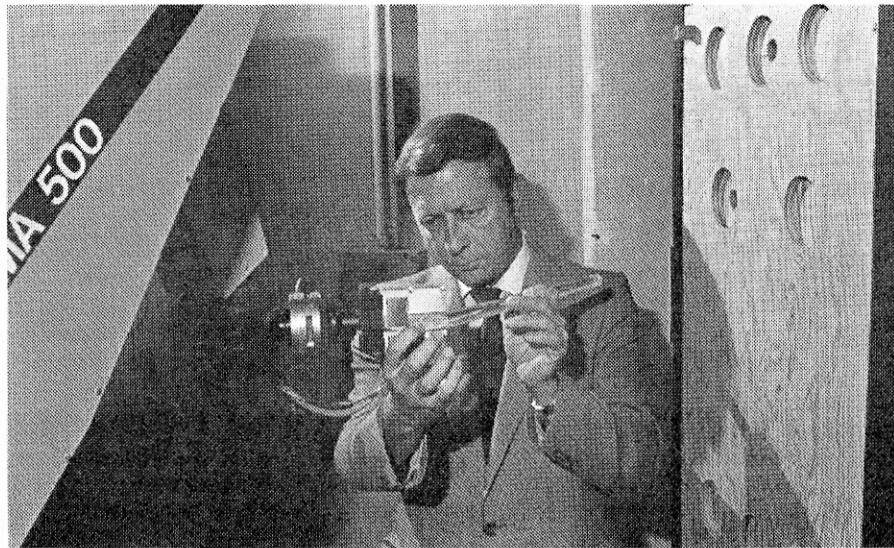
When the NASA Space Station becomes operational some seven to eight years from now, at least \$8 billion will have been spent to put it in space and six to eight astronauts will be needed to staff it. At this cost for a permanent human presence in space, it should not be surprising that a very high premium will exist for astronaut time and attention.

In fact, it is estimated that soon after the Space Station becomes operational, demands for attention will exceed available astronaut time by at least a factor of three. A myriad of activities will require support, including housekeeping, maintenance and troubleshooting, observation, communication, satellite servicing, extra-vehicular activity, and experiment servicing—and the load will grow as Station capability increases over time. Obviously, ways must be found to automate as many of these activities as possible.

One area that seems to have high potential for reducing demands on astronaut time through automation is the conduct and servicing of experiments. These experiments, particularly material science experiments, not only are time consuming, but also require special expertise that astronauts normally don't have.

ECSL Project

The Electronics and Computer Systems Laboratory (ECSL) has a project under way, supported by Boeing Aerospace Company, to demonstrate that a complex space experiment can be performed remotely by a scientist



Roy Scruggs explains a project ESCL researchers are working on to demonstrate that complex experiments can be performed in space by robots with minimal supervision by scientists on the ground. The demonstration experiment involves growing crystals in a microgravity environment. Here he shows how a one-arm robot will remove rods containing the crystals from a furnace and place them in holes in a storage panel, using tactile sensors to grip the tube and guide it safely into the slot. (Photo by Charles Haynes)

located at a terminal in a laboratory on Earth. The experiment chosen for demonstration involves growing crystals by vapor deposition in a microgravity (space) environment. This experiment, utilizing a high-temperature thermal gradient furnace, requires hours to perform, much experience, and much trial and error. Thus it cannot be totally automated and requires human intervention.

Project Director Dr. Roy M. Scruggs says a one-arm robot will be used to remotely perform the various manipulations that normally would be performed by the experimenter. The robot will automatically execute most of the support activities as well.

"One might reasonably ask," Scruggs says, "Why is automa-

tion needed? Can't the experimenter just use a joy stick, along with remote video, to guide the robot through the required motions?"

Time Lag Problem

The problem, Scruggs explains, is that there is a communication lag time of four to eight seconds, and it is variable. "This lag is due primarily to telephone and satellite relay switching time, and the fact that the Space Station's orbit causes variations in relative location," Scruggs explains. "As a result, the experimenter always would be leading the actual state of action on inputs and lagging in perception of that state on feedback.

"The robot must be able to sense its current condition and that of its workspace, and act

upon those conditions in something close to real time. In plain terms, its sensors must be smart enough to avoid collisions, loss of grip, and other catastrophic events.

"If a robot on Earth is moving an object and loses grip, it only has to locate the dropped object and pick it up again. But in space, such an event is catastrophic because the object cannot, based on current technology, be recovered. So rule number one for automated object handling in space is that all objects must be restrained at all times. This calls for unusual strategies when using a one-arm robot. Clearly, direct manipulation of the robot by the experimenter would create high potential for irrecoverable error."

These considerations have led the research team in ECSL's Computer Technology and Applications Division to some novel approaches to the space application of telerobotics. "We plan to report on them later in the year, but presently they are proprietary to Boeing Aerospace, due to the Phase B Space Station competition," Scruggs says.

The research is being conducted in ECSL's recently established Advanced Manufacturing Laboratory in the Electronics Research Building. The new lab will primarily support research in sensor-driven intelligent automation. The Boeing program is the first activity in what is expected to be a large base of research support from industry and government in coming years.



Software Review

by Pat Mathiasmeier, CRSD

The Computer Related Services Department has instituted a new service to insure a fast response to GTRI computer-related problems and questions. The CRSD Help Desk is now functioning daily from 8:00 a.m. to 5:00 p.m.

GTRI personnel with questions or problems can call ext. 7173 to log them into the CRSD Help Desk. Each problem is assigned a priority and a system area based on the nature of the problem. A CRSD staff member assigned to that system area will then contact the caller. Listed below are ex-

amples of the types of system areas that will be covered.

- Apollo Workstation
- Masscomp Workstation
- MicroVAX Workstation
- IBM Mainframe Hardware
- IBM Mainframe Software
- M204 Database
- Network Communications
- PC Hardware
- PC Software
- PROFS
- Software Training
- VAX Hardware
- VAX Software

Until the problem is resolved, each call is tracked and statistics are maintained on the length of time to resolve the problem. The Help Desk program is running under the Model 204 Database Management System on the IBM 4361.

You are encouraged to call the CRSD Help Desk at 7173 with your problems and questions.

Research Awards Nominations Due

It's time once again to select nominees for GTRI's annual research awards. Directors of GTRI laboratories and support departments must submit their units' entries to the awards review committee by October 15.

As in the past, outstanding performance in each category of GTRI employment will be recognized: research, program development, management, research support, and student employment.

A new category has been created this year for outstanding performance as a project director.

Each of the 15 honorees will receive a personalized engraved wall plaque, a \$75 dinner for two at any restaurant, and a letter of recognition from the

Office of the Director. In addition, a large "traveling" plaque will be placed on display in the building where the recipient works.

The awards will be presented on December 4 at a reception in the Student Center ballroom. All employees are invited to attend.

More details about eligibility and nomination procedures are available from your unit director.

Chris Summers (EML) is chairman of the 1986 Annual Research Awards Review Committee. Other members are Larry Corey (STL), Mark Hodges (RCO), Joe Seals (ECSL), Lois Speaker (EMSL), and Bill Howard (OOD, ex-officio and nonvoting).

PROFESSIONAL ACTIVITIES

ECONOMIC DEVELOPMENT LAB

Alan Pashkevich and Wayne Daley have become registered Professional Engineers in Georgia.

Marilyn Black recently presented a discussion on "Present Concerns of Indoor Air Quality" to the Georgia Solar Energy Coalition, and Charlene Bayer made a presentation on "The Role of the MS in Indoor Air Quality Analysis" at the annual conference of the American Society of Mass Spectrometry.

John Nemeth spoke September 15 on "The Impact of Health and Safety Issues on Work Performance" at the Focus invitational conference arranged by the Center for Work Performance Problems in Tech's College of Management. He has been invited by Kentucky Governor Martha Layne Collins to describe Georgia Tech's hazardous waste, health, and safety technical assistance programs at the 11th Annual Conference on the Environment.

In mid-August, Craig Wyvill chaired a roundtable session on "Live Production Automation" at the Data Processing Seminar put on in Atlanta by the Southeastern Poultry and Egg Association.

The Environmental, Health and Safety Division has taken its popular short course, "Supervision of Asbestos Abatement Projects," on the road. The training team went to Miami (FL) and Oklahoma City (OK) in August, to Charleston (SC) in September, and will venture onto the international scene in October, traveling to Toronto, Canada, and London, England.

The Industrial Education Group held its 19th Annual Training Conference August 10-13 at Jekyll Island. Ned Ellington led a session on the use of microcomputers to support training activities.

ELECTROMAGNETICS LAB

"Calibrating RF Test Fixtures," by David Hughes, Charles Rucker, Robert Feeney (EE), and David Hertling (EE), appeared in the September issue of *RF Design*.

An article by David Hughes,

Mike Harris and Charles Rucker, "An Equivalent Circuit for a 70 Mil Microstrip Package," was published in the August issue of *Microwave Journal*.

Chris Summers presented a paper entitled "The Variably Spaced Superlattice Energy Filter" at the Superlattice and Microstructures Conference held in Goteborg, Sweden, August 18-21.

The Artificial Intelligence Branch ran a demonstration booth at the annual AI conference in Philadelphia August 11-15. They demonstrated EML's Generic Expert System Tool (GEST), as well as several other projects.

ENERGY & MATERIALS SCIENCES LAB

Wallace Shakun was the luncheon speaker for the Georgia Power Engineering Association August 21, speaking on "Thermoelectric Generation Utilizing Waste Heat."

At the Electron Microscopy Society of America meeting in Albuquerque in August, Jim Hubbard gave a paper entitled "The Evaluation of Six Sealants Used to Encapsulate Insulation Material Which Contains Asbestos."

Michael Joseph has obtained an MS in electrical engineering and Don Simmons an MS in chemical engineering.

OFFICE OF THE DIRECTOR

Michael O'Bannon spoke on "Impacts of Automation on Managers, Professionals, and Clericals" at the Focus conference sponsored by the College of Management's Center for Work Performance Problems in September.

On September 19, Pat O'Hare spoke to personnel of Tech's Office of Communication and Development, the Alumni Association, and the Athletic Association on "How to Supervise and Be Supervised."

RADAR & INSTRUMENTATION LAB

John Trostel and Nick Currie attended the SNOW VI Symposium in New Hampshire and each presented a paper. Trostel's paper, coauthored with Jill Beaver, Gene



In a ceremony conducted earlier this summer, Rick Duke (left), director of Georgia Tech's Dublin Regional Office, receives a very special gift from Marshall McDuffie, manager of the Dublin textile plant of Forstmann & Company—and thereby hangs a tale. In 1983, as part of the preparation for Tech's Centennial celebration, Forstmann (then J. P. Stevens) began a joint project with the Textile Engineering School to create and produce an official, registered Georgia Tech tartan plaid fabric, using the school colors. After approval of the colors and weave pattern, the yarns were dyed by the Dublin-based company and the loom prepared for weaving. Students in the Textile School wove the fabric, and it was returned to the plant for finishing. Then the student-operated textile products company, Tex Tech, made the 100% woolen fabric into scarves and stadium blankets. These products have since been merchandised by Tex Tech at ball games and through the school bookstore, becoming popular items among Tech fans. The photo shows Plant Manager McDuffie, a Tech alumnus and member of the President's Scholarship Committee, presenting a framed scarf to hang in Tech's Dublin office. The calligraphy was done by Cheryl Cleveland of Tech's Douglas office. A stadium blanket also is on display in the Dublin office. (Special Photo)

Grener, and Joe Bradley, was entitled "Tower-Based Snow MMW Measurements—General Results and Comparison with Airborne Measurements." Currie's paper, "Pulse Airborne Measurements of Snow-Covered Ground," was coauthored with Bradley, Grener, and Trostel. Trostel and Currie also attended a U.S. Army Cold Regions R&D Laboratory workshop on snow reflectivity in Hanover (NH). Attendees included scattering experts from government and universities all over the U.S. and Europe.

SYSTEMS ENGINEERING LAB

Fred Cox presented a paper entitled "A Visual Programming Environment for Analog/Hybrid ATE" at the International Test Conference in Washington (DC) September 9. Coauthors were Lloyd Konneker and Doug Moreland.

John Bordelon recently presented a paper, "Advanced

Radar Signal Simulators," at the SEI Symposium of the National Security Agency in Ft. Meade (MD).

Congratulation to Paul Cleveland and Joe Brooks, who have earned their MSEE's from Tech, and to Greg Wright, who has won a BS in architectural engineering technology from Southern Tech.

SYSTEMS & TECHNIQUES LAB

Don Bodnar, Larry Corey, and Arch Nelson presented a phased-array antenna short course in Anaheim (CA) August 5-8.

Pat Burns presented an invited paper entitled "Preliminary Design of an Outdoor Compact Range with a 50-Foot Quiet Zone" at the 1986 International IEEE/AP-S Symposium on Antennas and Propagation.

Virginia Jory, John Cribbs, George Ewell, and Larry Corey participated in the ITEAMS meeting held at the Missile and Space Intelligence Center in Huntsville (AL) September 8-10.

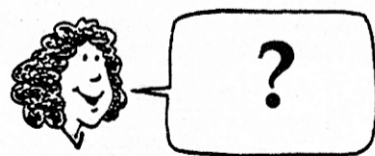
QUESTIONS, ANYONE?

by Charles McCullough, HRD

"Occasionally, I hear reference made to 'home department' and 'work department.' Is there a difference between the two?"

Yes! And there's such a big difference that unless you understand it you could easily—and unintentionally—sabotage your own paycheck.

Technically defined, your home department is "your primary campus department . . . responsible for the coordination of paperwork pertaining to payroll/personnel processing." In other words, regardless of how many departments you work for, only one of those departments is authorized to



initiate changes to your salary, to effect transfers, increases or decreases in the percent of time you work, etc.

If you are shared by two departments (for example, half of your salary comes from SEL and the other half comes from ME), the department other than your home department is called the "work department." Some employees, particularly temporary and student employees, have more than one work department. For instance, some GTRI employees (read: employees for whom a GTRI department is their home department) are paid a portion of their salary from GTRI, a portion from the Office of the Vice

President for Research, a portion from ATDC, and a portion from EE.

Before you decide that all this must be utterly fascinating to your lab's personnel coordinator but you don't have the least bit of need to concern yourself with anything so mundane as personnel policy and definitions, think again. Unless you know which is your home department, unless you understand the importance of keeping your home department informed of personnel changes, and unless you know who is supposed to initiate all your personnel paperwork, you can easily be spit out by The Computer or spend the greater part of the remainder of your adult life trying to track down where your paycheck has gone.

The reason for establishing the existence of a home department for each employee is sim-

ple: to hold chaos down to a bearable minimum. But imagine the mess if an employee worked for three different departments and all three were preparing personnel and payroll changes without the knowledge of the others.

The next time you need to have a personnel action effected on your record—you're going to be employed by another department in addition to the one for which you're now working, you're going to transfer, you're going to terminate, you're eligible for a salary increase, or anything else that affects your payroll and/or your personnel status—make sure that all your Georgia Tech employers are aware of the changes, but, more important, make sure that your home department initiates the action.

PERSONNEL NEWS

ECONOMIC DEVELOPMENT LAB

Richard Carey, RE I, has joined the Engineering Technology Branch.

The Environmental, Health, and Safety Division welcomes two new professional staff members. **David Mayer**, formerly with the U.S. Environmental Protection Agency, is a senior research scientist assigned to the Continuing Education and Publications Office. During the past 12 months, he was EPA's consultant on the asbestos abatement project at the White House. **Susan Bevington**, previously a lab specialist at Georgia Power Company, is working as an RS I in the Hazardous and Industrial Waste Management Program.

Bob Springfield has accepted a new assignment as director of the Madison Regional Office. Joining the Macon Regional Office is **David Chatham**, RA II, who will primarily assist with the satellite-based education program. He joins GTRI from IBM in Boulder (CO).

Deborah Lockman has transferred from EDL to OCA.

Technical Assistant **Melinda Denny** has left the Analytical and Instrumentation Branch to return to school. She will come back in the winter to complete an independent school research project on passive smoking.

ELECTROMAGNETICS LAB

Former student assistant **Alex Fox** has joined EML as a systems analyst I after receiving a BS in computer science from Tech. He will work in the Image Analysis Branch developing software for geographic database projects.

Former GRA **Steve Tynor** is a new RS I in the Artificial Intelligence Branch. He will be working on expert systems and computer vision projects.

Nile Hartman is a new SRE who will work jointly with EML's Physical Sciences Division and the Microelectronics Research Center. Formerly with Battelle Columbus Laboratories, he has conducted research in fiber optics, thin films, integrated optics, and optical sensor systems.

Dr. Gary Gimmestad has joined the Electro-Optics Division as a principal research scientist, coming from the Keweenaw Research Center of Michigan Technological University. He brings considerable experience in the areas of infrared and visible extinction in the atmosphere, infrared reflectance of surfaces, and environmental effects on electro-optical sensors in the thermal infrared.

ELECTRONICS & COMPUTER SYSTEMS LAB

The Electromagnetic Effectiveness Division says good-bye to **J. Pat Montgomery**.

RADAR & INSTRUMENTATION LAB

RAIL has realigned and refocused its Modeling and Simulation Division and Analysis Division. New designations and major research thrusts are: **Modeling and Analysis Division (MAD): Trent G. Farill**, chief. Electromagnetic modeling; signal processing. **Radar Applications Division (RAD): Robert N. Trebits**, chief. Systems analysis and design; applications.

Marvin Cohen completed his assignment as manager of RAIL'S NCTR (Non-Cooperative Target Recognition) Facility in Fort Monmouth (NJ) on September 12. **Herman Pardes** has replaced him as on-site manager.

Also in the New Jersey office, **Barbara Schroder** has resigned, and **Mike Brinkman** has transferred to the Technology Development Division at Cobb County.

New RAIL employees are **John Gibbons**, co-op; **Sandra Fluta**, secretary, New Jersey office; **Keith Vaughan**, programmer I; **Sam Piper**, SRE; **Stuart Davis**, co-op. **Dave Flowers**, PRE, transferred from SEL.

RESEARCH COMMUNICATIONS

Herschel Brown has joined RCO as an RA I. He formerly was editor of the faculty/staff newspaper at Georgia State University.

SYSTEMS ENGINEERING LAB

Receiving Employee of the Month citations this summer were **Dennis Folds** and **Janie Kite**. Dennis was cited for his attention to excellence, and Janie for her dedication even during the stress of overtime demands.

New employees in the Defense Systems Division include SRS **John Doss** (who is rejoining the Division), RE I **Phillip Warren** (former co-op who recently received his BSEE from Tech), and Staff Assistant **Vernessia Massey**. Vernessia has an MS in labor industrial relations and a BA in communications from Michigan State.

Ron Strickland has been named head of the Test and Evaluation Branch, following the promotion of **Harry Andrews** to chief of the Countermeasures Development Division (CDD).

Mary Ann Ingram has resigned from CDD to devote full time to completion of her PhD.

The Concepts Analysis Division welcomes **Deborah Borges**, senior secretary, and **Mary Cooper** and **Charlene Reid**, word processor operators. **Don Howard** has resigned to work on his PhD in physics.

Aldren Williams has joined the Flight Operations Group as a mechanic.

The Advanced Programs Office has gained **Bobby Hurley**, systems analyst, and **Melinda Harp**, graduate co-op.

Kenny Trussell has resigned to become an assistant professor at Georgia College in Milledgeville.

Greg Wright has been promoted to engineering drafter II and appointed head of the Electronic Support Measures Division drafting room. He succeeds **Tom Cotter**, who transferred to STL.

SYSTEMS & TECHNIQUES LAB

Welcome to new employees **Dr. Don Stephens**, SRE in OOD; **Charles T. Christensen**, administrative specialist in OOD; **Dorothy A. Gladney**, RT I (hourly) in the Technology and Analysis Division; **Jeffrey Tony Masters**, RE I in the Microwave Systems Division (MSD). **David Asbell** has transferred from EMSL to MSD, and **Tom Cotter** has transferred from SEL to the Design Services Group.

Vickie Fennell and **Pam Watt** have returned to work from maternity leave.

Business Assistance Funded Again

SETAAC Revived

A new agreement reached between Georgia Tech and the U.S. Department of Commerce has reinstated the Southeastern Trade Adjustment Assistance Center (SETAAC), which was discontinued last March. The new pact, involving some \$1.2 million in total funding, will enable the center to assist regional firms hurt by imports competition.

According to SETAAC Director Dr. Johanna Thomas, the center can serve former and new clients through December 31, 1986. "The U.S. House of Representatives has appropriated funds for 1987, but final funding awaits Senate action," says Thomas, who notes that many of the same consultants will staff the revived center. "We plan to resume service to pending clients first, then take newcomers," she says.

Assistance remains the same for SETAAC, according to Thomas, except that financial

aid in the form of government loans is no longer available. Consulting areas range from marketing and engineering to management and accounting, with the federal government paying up to 75% of the consulting fees. "The idea is to save jobs throughout the Southeast," Thomas says.

SEPCC Renewed

The one-year-old Southeastern Procurement Counseling Center (SEPCC) had its funding renewed in September for this fiscal year. Georgia Tech will contribute some \$137,500 and the federal government nearly \$98,500.

The center, which originally covered eight states, will now exclusively assist small and medium-sized Georgia companies in securing business with the federal government. Service, says EDL's Wendi Dodd, will be provided by counselors in Atlanta and Tech's 12 regional offices.

PERSONAL NOTES

ECSL: Condolences to **Hank Jenkins** on the loss of his mother, and to **Dr. Vojin Popovic**, adjunct senior research scientist with the Biomedical Research Division, on the sudden loss of his wife.

Congratulations to **Francis (Skip) Gross** and his wife, Jane, on the birth of Jill Elizabeth, their third child, and to **Barbara Call** on the birth of a granddaughter, Tamara Lynna.

Best wishes to **Brian Farris**, who recently was married to Roseann Hutton.

Everyone in ECSL wishes **George Whitley** a speedy recovery from his broken collarbone.

EMSL: **Charlotte Irvine** has a new granddaughter, Nicole Elizabeth, born July 20.

RCO: **Ray Moore** joined the ranks of grandparents September 2 with the birth of Joseph Robert, son of **Russ Moore** of the Georgia Tech News Bureau.

SEL: **Sandy Dixon** welcomed Rebecca Christina on July 17.

Co-ops **Alan Goddard** and **Jimmy Owens** have returned from an extensive stay in China, where they were attending a Chinese university under an overseas student program.

STL: **Robert Howard** was married on September 6 to Brenda Miller.

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... is published for Forest Williams, FMD building attendant, who greets all who pass through the Centennial Research Building lobby with a smile ...



and all the employees of GTRI.

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