

Station News

Georgia Tech Engineering Experiment Station

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TAL Project Promotes Farm Energy Independence

Researchers from the Technology Applications Laboratory (TAL) are turning a family-owned dairy farm in north Georgia into a model of energy independence.

With a \$410,000 grant from the U. S. Department of Energy and \$309,800 in State funds, the Aubrey farm near Cartersville is being developed as one of eight "energy integrated" farming operations in the United States. The four-year research program aims to demonstrate to farmers how they can generate most of the fuels they need.

"We intend to supply most or all of the Aubrey farm's energy requirements with on-site systems fueled by renewable energy sources produced

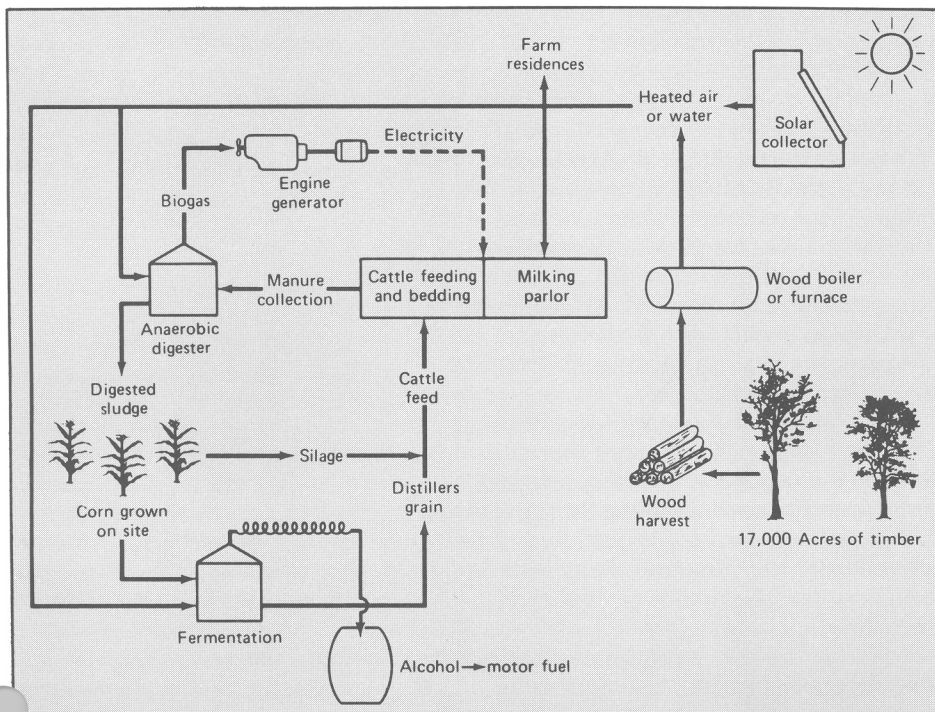
on the farm," says program director **Richard Combes**. "The key to this approach will be thorough integration of the various energy systems on the farm, so that one feeds into the other, utilizing the available energy to the fullest extent possible."

Meeting Aubrey farm's fuel needs will be an ambitious task. The farm totals 18,000 acres, of which 1,200 are devoted to crops and dairy operations. The remaining acreage is timberland, and a commercial contract sawmill is operated most of the year. The farm currently uses about as much electricity as 25 homes—25,000 kilowatt-hours per month—along with nearly 24,000 gallons of diesel fuel, gasoline and li-

quified petroleum gas per year.

To achieve energy self-sufficiency, TAL has the following plan:

- Electricity will be provided by an engine/generator which runs on methane gas produced by an anaerobic digester. The digester produces methane by breaking down cow manure by anaerobic fermentation. Waste heat recovery equipment installed on the engine/generator will heat water for other farm operations.
- Sludge from the anaerobic digester will be mixed with feed or used as a fertilizer.
- Wood cut on the farm will fuel a boiler or furnace, with the resulting energy used to produce alcohol for motor fuel or to heat farm buildings and residences.
- Solar collectors will heat water for the dairy operation.
- Corn grown on the farm will become feedstock for a fermentation process that produces alcohol. The by-product, distillers grain, will be fed to farm animals.
- Farm energy surveys and energy conservation practices will cut energy needs to a practical minimum.
- Additional electric power may be produced by a small hydroelectric plant at a dam on one of the two lakes located on the farm.



Energy integrated farm diagram for Aubrey farm shows all aspects of TAL's plan except the hydroelectric dam being considered for one of the lakes on the farm.

"We spent the first six months of the program monitoring farm energy consumption patterns," says Combes. "Now we're studying the design for alternative energy systems to meet these needs."

Others working on the program are **Mahendra Bery** from the Energy and Materials Sciences Lab and **Ralph Lamade** and **Chuck Ross** from TAL.

Station Helps Train Korean Technical Teachers

Sixty-one Korean technical teachers are receiving training on the Georgia Tech campus this summer in a 10-week program developed by the International Programs Division of the Technology Applications Laboratory (TAL) for the Ministry of Education, Republic of Korea.

These engineers/teachers are gaining hands-on experience with modern machinery now being used or soon to be installed in Korean industry. They also are learning about vocational/technical education as practiced in the United States and getting firsthand information through visits to schools, industries, equipment vendors and expositions. On their return to South Korea, they will be prepared to instruct students in Korea's schools of engineering technology and vocational education on the operation of this advanced industrial equipment.

Tech's Office of Interdisciplinary Programs is handling the primary contract, with subcontracts to TAL, Southern Technical Institute, the College of Architecture, and the Schools of Chemical Engineering, Civil Engineering and Mechanical Engineering. Project Director is **Ken Maddox**, TAL, and **Richard Johnston**, Economic Development Lab (EDL), is coordinating activities of the various instructional units.

Personnel from TAL and EDL provided training in audiovisual techniques, automation and robotics, and industrial safety. For the last four weeks of their training, the students are divided into groups according to their engineering discipline—mechanical, electronic and electrical, civil, chemical and architectural—for specialized training and experience. They will complete their training August 21.

This training program is a follow-on to the highly successful training course planned and coordinated by TAL for 37 Korean technical teachers during the November 1980-January 1981 period.



Mechanical engineering teachers from Korea get practical experience in Tech's Materials Processing Laboratory. They are part of the 61-person group in a 10-week training program provided by EES and other units of Georgia Tech. (Photo by Charles Haynes)

EES Contributes To Electronics Publications

Three EES engineers are coauthors of a new book just published by Academic Press, *Infrared and Millimeter Waves*, Vol. 4, *Millimeter Systems*. **Jim Wiltse**, EES associate director for the electronics labs, coedited the book and contributed the first chapter, "Introduction and Overview of Millimeter Waves." **Ed Reedy** and **George Ewell** of the Radar and Instrumentation Lab wrote the chapter on "Millimeter Radar."

Wiltse also was guest editor of the June 1981 issue of *Microwave Journal*. One of the articles, "The Coming of mm-Wave Forward Looking Imaging Radiometers," was coauthored by **Jim Schuchardt**, **Joe Newton**, **Tom Morton**, and **Joe Gagliano** of the Electromagnetics Lab (EML), and a radiometric image supplied by EML was the cover picture. Also appearing was a news story on the radar in coal mines project directed by **Dennis Kozakoff**.

Staff Members

ECONOMIC DEVELOPMENT LAB

William Spain of EDL's Occupational Safety and Health Group has been selected for membership on the editorial board of *Occupational Health and Safety Magazine*.

David H. Poss, II, director of IED's Augusta office, recently returned from Korea after providing five weeks of technical assistance on the Korea Credit Guarantee Fund project for TAL. Another overseas traveler was **Nick Gibson**, head of EDL's Economic Analysis Group, who spent three weeks in Egypt working on an Agency for International Development project to evaluate renewable energy applications. **Rich Combes** and **Jim Clark** of TAL also participated in the project.

ELECTROMAGNETICS LAB

Charles Rucker presented a paper entitled "Chip Level IMPATT Combining at 40 GHz" at the International Microwave Symposium in Los Angeles on June 16. Coauthors were **John Amoss** and **Carl Hill**. Rucker also chaired a session on Solid State Circuits and Devices.

Information Resources Available from Research PR

An extensive array of promotional publications and slide programs is available from Research Public Relations. Recently produced items include:

Georgia Tech's Engineering Experiment Station. Brief overview of EES listing 175 areas of research. Pamphlet.

Energy Research at Georgia Tech. Describes the range of current energy research. Pamphlet.

Annual Report, 1979-80. Highlights EES research thrusts and significant achievements. 25 pages.

Gasohol: One Key to Energy Independence. Everything you always wanted to know about it. 24 pages.

Research at Georgia Tech: Technology for Today and Tomorrow. Depicts 25 major research projects in the colleges and at EES. 32 pages.

Service to Georgia. Outlines the numerous ways Tech serves industries, governments and people over the state. 24 pages.

Current Research at Georgia Tech.

Lists most sponsored research projects at Tech by subject areas. 32 pages. (For Corporate Liaison Program.)

If you are still using outdated editions of these publications, why not replace them with the current versions? Order from Research PR.

You can borrow the following slide programs from Research PR:

Research at Georgia Tech. Highlights research by both EES and the academic side. For lay audiences. Available for showing with one or three projectors. 20 minutes.

Electronics Research at EES. Begins with EES overview, then highlights research in the electronics labs. For potential clients or knowledgeable laymen. 19 minutes.

Resources Laboratories at EES. Same for the resources labs.

Advanced Technology Development Center. Explains the rationale and advantages of an ATDC on campus. For technical or lay audiences. 18 minutes.

Research PR has the equipment necessary to show these programs, which have an audio track with narration and pulses that move the slides forward in synchronization with the narration. You should reserve programs well in advance of the date for showing.



EML surprises new director Bob Shackelford with "hail to the chief" party. (Photo by Charles Haynes)

Shackelford Named Director of EML

Robert G. Shackelford has been named director of the Electromagnetics Laboratory (EML), effective August 12. He was appointed after an extensive search that has been conducted since **J. W. Dees** resigned in January to become director of the Office of Contract Administration.

Bob demonstrated his management skills by organizing EML's Electro-Optics Group (now a division) in 1975. As its chief, he has been responsible for the division's growth in six years from six full-time staffers to 23 and from \$125,000 in sponsored personal services income to \$720,000. He has been associate director of EML since 1977 and a member of EES since 1959.

Among the honors Bob has received are NASA New Technology Awards for design and fabrication of an experimental image-forming light modulator and for a hybrid optical-digital processor. In 1980, he served as consultant to the Office of the Chief Scientist, Department of the Army, for evaluation of the Army's \$223-million Microwave/Millimeter Wave Technology Base Program. He is the author of 41 major reports and publications.

Present Papers, Attend Meetings

At the Tri-Services CROSSBOW meeting at Huntsville June 16-17, **Albert Mullikin** and **Gene Loefer** presented an invited paper entitled "GR/GU Digital Model."

ENERGY & MATERIALS SCIENCES LAB

John Handley and **Wallace Shakun** were invited guests at an Industrial Wastes Seminar presented by International Incinerators, Inc. in Houston, Texas, on May 19.

OFFICE OF THE DIRECTOR

Jim Wiltse presented a talk on millimeter-wave receivers at the International Microwave Symposium in Los Angeles in June. He also was a member of the 1981 and 1982 Technical Program Committees and the Standing Committee on Millimeter Wave Integrated Circuits. Locally, Wiltse was elected a director of the Atlanta Section of the IEEE Microwave Theory and Techniques Society.

Gordon Harrison was coadministrator of the "Millimeter and Microwave Ferrite Materials" Continuing Education course August July 20-22.

SYSTEMS ENGINEERING LAB

David Flowers presented papers entitled "Radar Vulnerability to Coherent Countermeasures" and "Polarization Vulnerability of Monopulse Radars" at the Tri-Service Radar Symposium in Monterey, California, June 20-25. **Robert Wohlers** attended the symposium.

A paper by **Harry Andrews** and **Donald Gordon** has been accepted for presentation at the Society of Flight Test Engineers annual symposium in Dayton, Ohio, September 16-18. The title is "Georgia Tech Coherent Jammer Flight Test."

SYSTEMS & TECHNIQUES LAB

Berry Pyron, assistant director of STL, attended the Tri-Service Radar Symposium at Monterey, California, June 23-25.

TECHNOLOGY APPLICATIONS LAB

Jim Clark presented two papers at the annual meeting of the American Section of the International Solar Energy Society in May at Philadelphia: "The Georgia Solar Industrial Process Heat Project" and "A Solar Water Heater Program for the City of Atlanta."

People, Places and Events

ECONOMIC DEVELOPMENT LAB

Richard Johnston has transferred from TAL's International Programs Division to EDL's Industrial Extension Division (IED). **Tracy Husband**, an IE junior, has joined the IED Atlanta office for the summer as a student assistant. **Lynn Tessner**, IED research engineer for 12 years, left in June to form his own company to saw Georgia granite in Elberton.

The father of **George Lee**, director of IED's Macon office, died unexpectedly on June 27.

Charles Estes, **Steve Kramer**, **Ken Smith** and **Steve Wilenchek** all ran in and completed the Peachtree Road Race July 4.

ELECTRONICS & COMPUTER SYSTEMS LAB

Paul Friederich was married July 4 to Barbara Whittier.

RESEARCH PUBLIC RELATIONS OFFICE

Mary Ann Burke has joined the Research PR staff as a research associate II, coming from the Atlanta Regional Commission.

Martha Ann Stegar has been appointed editor of *Station News*, effective this issue.

Jerry Webb will handle graphics.

SERVICE GROUPS

Martha Miller is the new manager of Supply Services. Taking Martha's place as assistant department manager is **Mary Bryant**, who comes from Mead Packaging. Mary is no stranger to EES, having worked as an electronics lab secretary a few years ago.

SYSTEMS ENGINEERING LAB

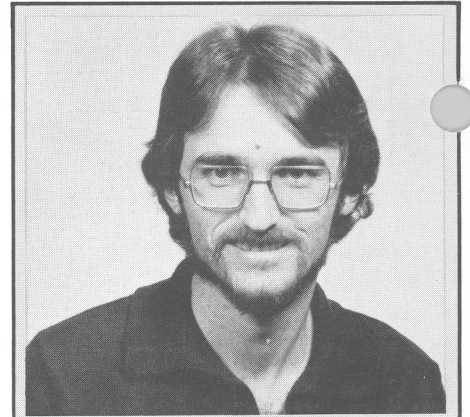
Welcome to **Linda Leiker**, research scientist II, who transferred to the Concepts Analysis Division from RAIL. **John Passafiume** will be transferring to the School of Information and Computer Science in September. Good-byes were said in June to **Fred Cox**, **Albert Harbuck** and **Judith Elliott**.

Debbie and **Jimmy Thomas** are the proud parents of a daughter, Mary Elizabeth, born on June 16.

W. A. "Gus" Baird returned to work June 30 following surgery.

SYSTEMS & TECHNIQUES LAB

June was a memorable month for **Doug Martin**, Defense Electronics Division: he was graduated from Tech, was promoted to research engineer I, and was married to Jo Beth.



Boyd Exhibits Art

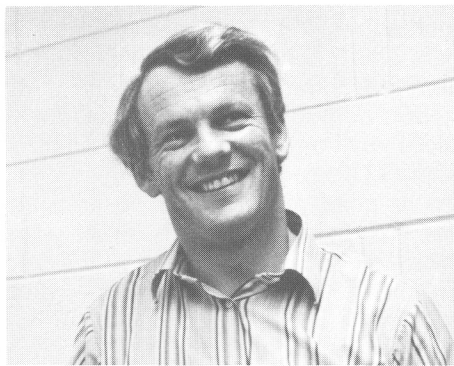
Four paintings by Mailroom Supervisor **Bill Boyd** were exhibited in a showing of 20 new Atlanta area artists at Avondale Art, Inc. July 12-August 8. A 1975 graduate of Georgia State University with a Bachelor of Visual Arts degree in painting, Bill has gone on 80% time at Tech so he can build up a part-time free-lance illustrating business.

TECHNOLOGY APPLICATIONS LAB

Ross Hammond has closed Georgia Tech's Asia Office in Manila and is back on campus in the International Programs Division.

Larry Moriarty was married on May 2 to Sheila Maher. Sean David is the name of **David Harris'** son, born April 26.

Irish Smiles Brighten Baker



Cyril J. Burkley, senior lecturer in electronic engineering at the National Institute for Higher Education (NIHE) in Limerick, Ireland, is on a six-month sabbatical assignment at the Electromagnetics Lab (EML) through December 1981.

He is conducting research in the general area of GaAs monolithic millimeter wave integrated circuits, with emphasis on the design, development and fabrication of receivers at 35 and 94 GHz.

Dr. Burkley, whose specialty is telecommunications, played a major part at NIHE in developing the electronics degree and diploma courses. He says NIHE is the only Irish institute that uses American concepts in engineering education. Cooperative education is built into the program, with nine months of work in industry sandwiched between the halves of the student's four-year academic program. NIHE is the location for the European Research Institute of Ireland, the European affiliate of Georgia Tech which opened for business in June with **Dan O'Neil** and **Charles Hilbers** of EES at the helm.

"The most striking thing about Atlanta is its sheer size—so spread out," Burkley says. He, his wife, and three children are living in a rented house in Marietta. He admitted they weren't prepared for the hot summer. They also were surprised to discover that the cost of living is higher in the U.S. than in Ireland, "but then, so is the standard of living," he said.

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