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# Station News

Georgia Tech Engineering Experiment Station

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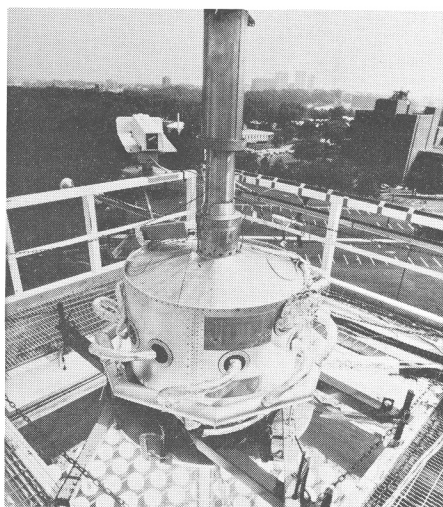
## Solar Power Tower Makes History Again

The Energy and Materials Sciences Lab has participated in another world "first." Last year, its solar tower staff worked with Swedish scientists to use a Stirling engine generator unit to convert solar energy to electric power and feed it to a commercial utility grid. In August and September of this year, they worked with scientists from the Lawrence Berkeley Laboratory (LBL) of the University of California to successfully test LBL's solar-unique design for heating air through direct absorption of sunlight.

"This is the first time anything like this has ever been tested," said LBL's Dr. Arlon Hunt. "Other solar heating experiments adapt techniques that were developed for fossil fuels. For instance, a steam boiler can be powered by burning oil, coal, gas, etc., as well as by sunlight."

But how does one directly heat air? "We inject small carbon particles into an air stream and then pass the absorptive mixture through a concentrated solar beam," Hunt said. "First, we decompose acetylene in a particle generator to produce very fine carbon particles. Then we swirl the very thin smoke and air mixture into a cavity-type solar receiver, where it absorbs the sunlight. At design temperatures, the carbon particles are decomposed and form carbon dioxide. The sunlight, concentrated by the field of mirrors below, enters the bottom of the chamber, and the heated air rises through a central stack."

The innovative part of this process, according to Hunt and Tom Brown, manager of Tech's Advanced Com-



Tech and California scientists recently tested this unique design for heating air through direct absorption of sunlight. This view from the top of Tech's solar tower shows the mirrors on the ground focusing the light into an opening in the bottom of the hot air receiver.

ponents Test Facility (ACTF) or solar tower, is that the radiant energy from the sun is absorbed directly into the gas rather than heating tubes that contain gas. Thus, the gas is much hotter than the walls of the receiver. This means that inexpensive materials can be used in the walls, and the better the materials used, the higher the temperature can go.

They were able to achieve temperatures exceeding 750°C in the initial series of tests, and potentially much higher temperatures (2500°C) can be reached with different combinations of particles and gases. The amount of acetylene required is very small compared with the amount of power generated.

The high-temperature gas can be used to run a turbine to produce electricity or it can supply industrial process heat. In their tests, the researchers got as much as 30 kilowatts of output at 750°C. Based on 40% turbine efficiency, this is enough energy

to power 12 homes. Although the tests were run on Tech's large-scale solar thermal facility, smaller applications are possible using a parabolic dish reflector.

Hunt stressed that their experiments are on a very basic level now, but test results should stimulate further research funding. The process won't be ready for commercialization for at least five years.

## Millimeter Wave Of The Future

EES has formed a Millimeter Wave Working Group, chaired by Jim Wiltse and with representation from six of the laboratories. It is the first of several Technical Thrust Working Groups to be set up in areas where research activity cuts across laboratory lines.

The group will help the labs coordinate and focus their millimeter wave efforts for maximum efficiency and effectiveness. It will coordinate contract development activities and sponsor interactions, coordinate promotion and advertising, promote sharing of lab space and capital equipment, foster joint research efforts, and provide an information exchange.

Membership is as follows:

- OOD: Jim Wiltse, chairman (alternate, Jerry Carey)
- ECSL: Jim Fuller (alternate, Ricky Moore)
- EML: Ronald Bohlander (alternate, Robert McMillan)
- EMSL: John Handley
- RAIL: Charlie Brown (alternate, Lucien Bomar)
- SEL: Charles Krebs (alternate, Bill Youngblood; coordinator, Fred Dyer)
- STL: Don Bodnar (alternate, George Ewell)



Influential Georgia Tech alumni who are living or working in Cobb County were invited to a luncheon meeting on September 14 at the Georgia Tech Research Facility in Cobb County. The purpose of the meeting was to discuss how a greater Tech presence can be established in the Cobb County community. The agenda included remarks by Dr. Thomas E. Stelson, the High Technology slide show, and an important dialogue session on the growth and development of high technology. In addition to seeking support from its alumni, Tech will work with the Cobb County Chamber of Commerce to develop a plan of action. (Photo by Charles Haynes)

## Professional Activities

### ECONOMIC DEVELOPMENT LAB

**Phil Williams** gave a presentation on "Hazards in Restoring the Atlanta Cyclorama" to the Georgia Section of the American Industrial Hygiene Association in Atlanta on September 27.

**Anthony DeCurtis** is the author of a recent article in *Atlanta Weekly*. Entitled "Red Desert," it chronicled the ecological problems that have plagued the Copper Basin in Tennessee.

**Jim Mercer** recently conducted a two-day workshop on resource management for the City of Atlanta's top 25 managers, including staff from Mayor Young's office, department commissioners, and selected bureau directors.

### ENERGY & MATERIALS SCIENCES LAB

**Wally Shakun** made a presentation to the Georgia Industrial Engineering Society on "Computer-Aided Technology" on September 14 and another to the National Park Service on "Computer Techniques for Evaluation and Maintenance Procedures" on October 5-6.

At the Annual Meeting of the Society for Industrial Microbiology, held in St. Paul, Minnesota, August 15-20, **Abol Azhar** presented a paper entitled "Alcoholic Fermentation of Wood Acid Hydrolysate in an Upflow Immobilized Cell Bioreactor."

### TECHNOLOGY APPLICATIONS LAB

**Carol Aton, Ben James, Terry Moy,**

**Alan Pashkevich, Phil Potts and Henry Van** recently participated in a "training of trainers" workshop in Harper's Ferry, West Virginia, sponsored by the U.S. Agency for International Development (AID). The participants learned skills for training host (developing) country nationals to be trainers in association with the AID water and sanitation programs, which include TAL's hand pump program.

**Larry Banta** was technical coordinator and **Hank Jackson** was a speaker at an Electrical Energy Management Workshop in Savannah on October 20.

**Mike Brown** is technical coordinator of a Waste Heat Recovery Workshop to be held in Macon on November 10.

**Bill Bulpitt** made a presentation on biomass to an American Chemical Society regional meeting in Savannah on September 16. He was coordinator of a Robotics Workshop, staged jointly by TAL and EDL in Atlanta on October 12 with **Sid Firstman** and **Jim Mercer** also participating; some 30 plant managers and engineers from Georgia companies attended.

On September 16, **Tom McGowan** presented a Workshop on Energy Efficient Housing Rehabilitation at Lake Hartwell, Georgia.

**Rick Steenblik** has been awarded a U.S. patent for his Fresnel spiral reflector (solar cooker) design.

## Banta Caught In K

When Larry Banta of the Technology Applications Lab went to Nairobi, Kenya, in late July to train African engineers in industrial energy conservation, all went as planned for the first ten days. He met with government officials, set up plant visits, and conducted the first of two anticipated training programs. The second was never held.

Before dawn on Sunday, August 1, Larry and his wife, Connie, awoke to the sound of gunfire and loud voices. "When we looked out our hotel window and saw soldiers massed outside, we knew something serious was going on," Larry said. "We stayed in our room until things were calmer, then ventured downstairs about 6 a.m. We found out that the Air Force was trying to overthrow the Kenyan government!

"The Army remained loyal to the President, and since our hotel was across the street from a large Army compound and two major hospitals, we were in a dangerous location. For two days, we stayed inside for the most part, with heavy automatic gunfire and fighting all around us, and planes flying overhead.

"The Air Force took the radio station a quarter-mile away, announced (falsely) that they had taken the government, and invited the students to demonstrate in favor of the new government. Later, we saw several truckloads of bodies passing by, where the Army had mowed them down.

"The Kenyan government is nominally democratic, but there is only one political party, and the President is elected for life. The seeds of the rebellion started when the universities advocated establishing an opposition party and many of their leaders were summarily imprisoned.

"About 4 p.m. Sunday, a tremendous procession wound its way past our hotel. We saw 20 trucks carrying soldiers with machine guns, two armored vehicles with cannons, limousines, etc. This was President Daniel Arap Moi reclaiming the government. He announced a 6 p.m. curfew and ordered people to return to their jobs.

"The only time my wife and I felt deeply concerned for our personal safety came on Monday. A column of soldiers marched up, stopped and

## Kenya Coup Attempt

pointed guns at the hotel. They set up a machine gun at either side of the entrance, then came into the lobby. Everyone was made to put their hands over their heads and kneel in the lobby while they searched the rooms for rebels. The soldiers were very professional, but quite nervous — and so were we!

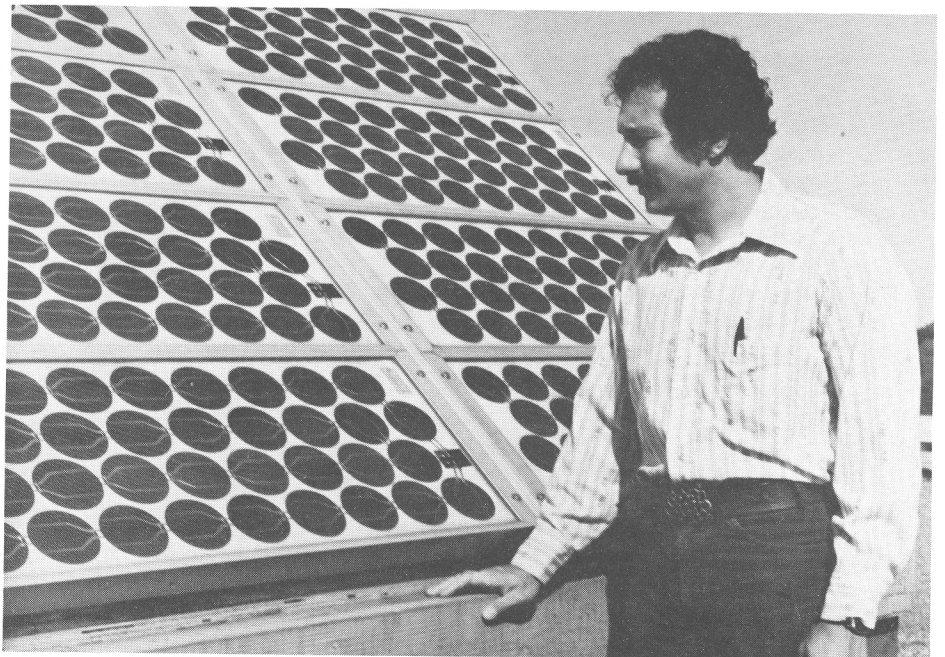
"It seems the Vice President of the country owned the hotel, and he was suspected of collusion with the rebels. Since the hotel was brand new and had only about two dozen guests, it was quite possible that snipers could have been hidden upstairs to cover the Army base across the street without our knowing about it, but none were found.

"After that, life returned to a semblance of normality. We could move around during the daylight hours, and eventually the curfew was extended to 9 p.m. Although the second training program was cancelled, I was able to do my follow-up work. I interviewed people in the vocational and technical schools, and found that the schools are excellent. I wrote a report recommending curriculum changes and making suggestions for setting up an industrial energy training program. I also wrote a report on cogeneration for industry."

Larry's work was done under sub-contract as part of a broad energy program which a Washington, D.C., consulting firm, Energy/Development International, is performing for the Ministry of Energy in Kenya. Now they are looking for a long-term on-site engineer to implement an industrial energy program. Do we have any takers?

## Christmas Holiday Change Announced

Georgia Tech's official Christmas holidays this year have been changed to Friday, December 24, through Thursday, December 30. The New Year's holiday will be observed on Friday, December 31. This means that the Institute will close campus-wide at the end of the work day on Thursday, December 23, and will not reopen for business until Monday morning, January 3, 1983. Happy holidays!



Larry Banta inspects an array of photovoltaic cells on the roof of Tech's Electrical Engineering Building. The array is part of a facility constructed by TAL to test and configure photovoltaic power systems for residential applications. (Photo by Pat Stone)

## Residential Photovoltaics Study Begins

The Technology Applications Lab (TAL) is embarking this month on an extensive investigation of the use of photovoltaic or solar cells to generate supplemental electricity for the home. Photovoltaic cells, a fallout of space technology, convert sunlight directly to electricity. Made from silicon, they are easy to use and very reliable in operation.

Georgia Tech and the Florida Solar Energy Center have been awarded a \$2-million, two-year contract by the U.S. Department of Energy (DOE) to form the Southeastern Residential Experiment Station (SERES). They will investigate practical aspects of feeding electricity from solar cells into electric power grids and the effect of their use on utility companies.

The main SERES center will be at Cape Canaveral, where Florida Solar will test the reliability of new types of solar cells and other components. Tech will gather data from field sites over the Southeast. Among these sites will be four photovoltaic houses being built by the Tennessee Valley Authority, Georgia Power Company's photovoltaic house in Roswell, the Alabama Solar Energy Center, and an array now under construction on the roof of Georgia Tech's Electrical Engineering Building.

Larry Banta of TAL is the principal in-

vestigator for Tech, with Dr. George J. Vachtsevanos, a visiting professor in the School of Electrical Engineering, also working on the project. Dr. Vachtsevanos has had extensive experience in applying photovoltaic technology and integrating photovoltaic power with an electric utility grid both in the United States and abroad.

After the initial two years of DOE-sponsored work, private funding for the final three years of the study will be sought from utilities, photovoltaic and electronics manufacturers, and research contractors such as the Electric Power Research Institute. Over the long haul, the research aims to solve the problems that arise when solar cells are connected to the utility grid — such concerns as lineman safety, power quality, reliability, and power management.

"One of the biggest concerns of the electric utilities is how to deal with fluctuations in the electricity generated by solar cells due to shadows, clouds, etc.," Banta said. "We'll be gathering computerized satellite weather information and other data so that we can predict how many cells will generate how much power at any given time. The goal is to develop systems for utility power dispatching and control."

## Strictly Personal

### ELECTROMAGNETICS LAB

The Millimeter Wave Technology Division welcomed new Division Chief **John Cotton** and Senior Secretary **Agnes Farley**. **Joseph L. Simms** is a new senior research engineer at the Huntsville Operations. **Daniel P. Campbell** has joined EML as a post-doctoral fellow. **Diane Smith** is the new administrative secretary in the Electro-Optics Division.

Congratulations to **Mike Sinclair**, who married **Ann Scott** on August 7.

### ENERGY & MATERIALS SCIENCES LAB

Administrative Coordinator **Jean Fuller** is transferring to EES Accounting. **Mahendra Bery** has resigned to work for Gallo Winery in California.

### RADAR & INSTRUMENTATION LAB

RAIL recently hosted an open-air party for its employees by the lake at the Cobb County Facility. **Sam Thomas** roasted a whole pig for the approximately 160 people present. Some of the children tried to beat the radar gun with their running and throwing speeds, but — as many motorists have found out — the radar won! A slide show, volleyball and softball games were some of the other activities.

Welcome to new employees: **Powers Garmon**, senior research scientist; **Mary Ann Adams**, research scientist II; and to **Peggy Cloninger**, **Wayne Cassaday**, **James Gaby**, and **Walt Thain**, all research engineers I. **Nick Weyland**, research scientist II, has transferred to RAIL from the School of Mathematics; **Britton Stillwell**, electronics technician I, has transferred from the Machine Shop.

### SERVICE GROUPS

Accounting: **Voranda Prather** is a new clerk typist II.

Mechanical Services: **Clay Donelson**, mechanical technician I, and **Jimmy Ross**, electronics technician I, are new employees at the Cobb County branch operation.

Personnel Services: **Brenda Wilkerson** gave birth to an 8 lb., 11 oz. boy, Christopher Ray, on September 11. Thanks to **Beadie Lloyd**, who has graciously agreed to be an associate editor for *Station News*.

Research Security: **Jerry Bryson** has been hired as assistant manager.

Supply Services: **Charles Shapiro** is a new clerk III. Best wishes to **Mary Bryant** and **John Cribbs**, STL, who were wed on August 27.

### SYSTEMS & TECHNIQUES LAB

**Rob Gault** has joined the Microwave Systems Division as a research scientist I. Co-op **Joe Hendrix** is the proud father of a new daughter.

### SYSTEMS ENGINEERING LAB

SEL welcomes **Paul H. Cleveland**, research engineer I, Defense Systems Division; **William E. Kenyon**, research scientist I, Eglin Field Office; and **Sharon L. Reeves**, senior secretary, Concepts Analysis Division. **Clara Galleshaw** has transferred to TAL.

Congratulations to **Thomas Murray**, who has received his M.S. in Electrical Engineering, and to **Beth Cockerham**, who has received her M.S. in Information and Computer Science.

### TECHNOLOGY APPLICATIONS LAB

**LuAnn Rockett** has resigned to take a job with Kimberly-Clark in Atlanta.

## Faculty Reps Named

Last month, Bob Cassanova, EMSL, and Larry Holland, SEL, began serving three-year terms on the Georgia Tech Executive Board. They were elected by a ballot mailed last spring to EES employees with research titles. They join Ed Reedy, RAIL, who is the new chairman of the board.

The Executive Board guides the activities of the General Faculty and Academic Senate and their committees. Under the Georgia Tech statutes, EES is entitled to three members. Among the colleges, Engineering has two; Sciences and Liberal Studies, two; Architecture, one; Management, one. All other units together have one member.

As General Faculty members, EES research staffers also are eligible to serve on its standing committees. Those elected for three-year terms at the spring quarter faculty meeting are: Public Relations, Ray Moore, RCO; Copyright, Archie Corriher, RAIL. Continuing on committees are: Faculty Honors, Gordon Harrison, OOD; Statutes, Neil Hilsen, SEL; Academic Services, Dean Spencer, SEL; Welfare and Security, Carl Baxter, FMD, and Jerry Eaves, RAIL.

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## Clifton Is UNIDO Consultant

EDL Director David S. Clifton, Jr., recently spent a week in Vienna, Austria, presenting industrial training modules at the request of the United Nations Industrial Development Organization (UNIDO). Clifton was invited to make the presentation to UNIDO on the strength of his 1977 book, *Project Feasibility Analysis: A Guide to Profitable New Ventures*, and EDL's pioneering industrial development work. UNIDO will use the training materials Clifton designed to assist developing nations throughout the world.

In addition to feasibility studies for thermomechanical pulp mills and

peanut processing in Georgia, both completed by Dr. Tze I. Chiang and other EDL staff, Clifton cites EDL programs in Mexico, the Philippines, Ghana and Indonesia as impressing UNIDO and drawing the organization's attention to EDL's work.

EDL staff will be involved in revising the UNIDO manual and will participate in future UNIDO seminars.

"My being invited to Austria represents recognition of EDL's work in industrial development," Clifton points out, "and it looks as if Georgia Tech and UNIDO could have a strong working relationship in the future."