

# EES Report

ENGINEERING EXPERIMENT STATION • GEORGIA TECH

*Serving Georgia and  
the Nation*

## Georgia Industry Should Feel Only "Soft" Effect Of Iranian Oil Cutoff

The impact of the elimination of Iranian oil from the U.S. import picture should be a soft one on Georgia industry over the next year or so, says a researcher with the EES Industrial Energy Extension Service.

Based on the following facts relating to No. 2 fuel oil, Dennis Coughlin says Georgia industry should have no problems weathering the cutoff from Iran. No. 2 fuel oil is the crude oil base product which has the greatest effect on industry.

Coughlin says that most small- and medium-sized industries use No. 2 fuel oil only as a second choice. Natural gas is their first choice and its supply picture looks pretty good.

For those industries that are curtailed from natural gas use during the winter, however, Coughlin believes there will be enough No. 2 fuel oil for their use. If not, he says propane is an alternative which has been used in the past and which remains available, although frequently at a higher cost.

For most large industries which use No. 2 oil, Coughlin says No. 6 oil offers an alternative which should be in good supply during the short term.

These speculations are strictly for the state of Georgia. Coughlin points out that some areas of the Northeast that have a heavy reliance on No. 2 and No. 6 fuel oils may have difficulties on a spot basis if there is a severe winter. Some of these areas are not supported by natural gas as either an alternate or primary fuel.

Coughlin adds that while supply is not a short-term problem with No. 2 fuel oil, the price will be. This, coupled with a new incremental pricing policy on natural gas which becomes effective Jan. 1, will mean higher fuel bills for everyone.

Prior to the Iranian oil cutoff, the U.S. was importing about 700,000 barrels of Iranian oil a day which was approximately 4 percent of its total imports.



*This picture from a millimeter wave radiometer is an image of rain activity. The lighter areas represent warmer temperatures and the darker areas represent colder temperatures. The darker the area, the heavier the rainfall.*

## Georgia Tech Storm Study May Improve Predictions

Hurricane David caught Easterners and weather forecasters by surprise with its unexpected fury after it was supposed to be just about rained out.

Researchers at Georgia Tech believe they may be able to improve the predictability of those kinds of summer storms by using a new monitoring device to study a number of thunderstorms and hurricanes.

The device, developed by the Engineering Experiment Station, is called a millimeter wave radiometer. It is an ultrasensitive receiver that records a storm's emitted and reflected energy. Tech has programmed the radiometer to record

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even the almost infinitesimal amounts of such energy emitted by moisture inside a storm.

The radiometer is currently being flown in a NASA research aircraft at altitudes of 60,000 feet. From this altitude the radiometer can monitor stretches of atmosphere eight to ten miles wide. Over the course of an hour the plane's movement could allow the radiometer to scan as many as 5,000 square miles of atmosphere.

The intent, however, is eventually to place the radiometer in a satellite. Then even the largest storms could easily be monitored.

The radiometer records data electronically onto a magnetic tape. This tape is later played back on a small screen, much the same as videotape is played on a television screen. The images shown resemble a satellite weather map as seen on television. By studying the information that appears on the screen, researchers can determine a storm's temperature and its moisture content.

"In time, we believe that the radiometer will be developed to the point that it will help to predict more accurately than ever a storm's potential size and strength," says Jim Schuchardt, manager of the Georgia Tech group that is developing the radiometer.

Schuchardt says that the radiometer can be used in many other weather applications, "Right now the concentration is on studying severe storms," he said, "But down the line we see the radiometer investigating weather fronts and frost development, as well as thunderstorms."

## **Johnson Elected IEEE International Society President**

Dr. Richard C. Johnson, a principal research engineer with EES, has been elected president of the Antennas and Propagation Society of the Institute of Electrical and Electronics Engineers (IEEE).

An active member of the organization since 1957, Dr. Johnson will direct the society's activities throughout 1980. The IEEE Antennas and Propagation Society is an international scientific interest group with more than 4,000 members. Its purpose is to advance theoretical and experimental research in antennas and electromagnetic wave propagation.

In 1956, after serving two years as an electronics officer in the U.S. Navy, Johnson joined Georgia Tech as a research assistant. He received a Ph.D. in physics from Tech in 1961. He is now an EES senior staff member. Dr. Johnson has written more than 50 scientific reports and publications while conducting research at Georgia Tech. He is also a member of the American Physical Society and the Sigma Xi scientific research society.

Dr. Johnson's current fields of interest at Tech include: antenna research and development; radar and radiometry systems; microwave theory and techniques; electromagnetic compatibility and applied physics.

## **Applied Research In Command And Control Support Systems**

Generally recognized as a military term, command and control (C<sup>2</sup>) covers the broad range of activities that relate to making decisions about an organization's operations. Command and control support systems bring together the information required by an executive to make decisions affecting activities that are dispersed geographically or organizationally. This includes such areas as personnel, facilities, procurement, and information and processing exchange; in short, anything involving the planning, organizing and controlling of operations.

Systems such as air-traffic control, emergency vehicle dispatching, and electricity distribution management are typical of the civil and industrial applications of command and control support systems. For a commercial firm, the benefits of C<sup>2</sup> support systems could include better allocation of resources, expanded service with existing assets, and higher profits.

For the military, the benefits are more cost-effective decision making and more comprehensive situation assessment. So important is C<sup>2</sup> support to the Department of Defense that approximately \$9 billion in research, development and acquisition monies have been allocated to C<sup>2</sup> this year, up by \$1 billion from last year.

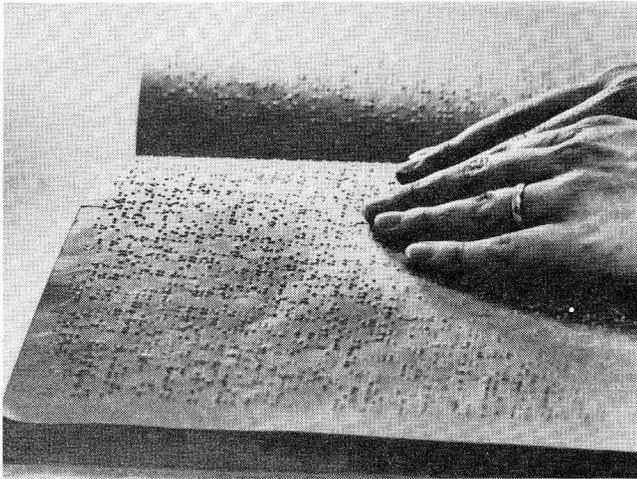
All organizations currently perform some degree of command and control—information is collected, communicated, processed and decisions are made. The introduction of new technology makes this process quicker and more efficient. However, if the potential value of new technology is to be fully realized, the design of a C<sup>2</sup> support system requires not only a systems engineering perspective but a management perspective as well.

For this reason, projects in command and control support systems require the combined application of traditional engineering skills, such as communications, information and computer science, and electromagnetics with decision theory, human behavior and operations research.

EES has organized the Command and Control Support Branch to integrate and apply these capabilities to commercial, state and national C<sup>2</sup> problems. The Branch is a part of the Computer Science and Technology Laboratory and anticipates approximately \$1 million of work this year.



— H. Bennett Teates, Head  
Command & Control  
Support Branch



*A computer braille display being developed at Tech could be read much the same way this person is reading a book in braille.*

## **Computer Braille Display Opens Jobs For Visually Handicapped**

Job opportunities for the visually handicapped could double as a result of a low-cost computer braille display now being developed at the Engineering Experiment Station.

EES researchers say that the 400 or so occupations now listed within the capabilities of the visually handicapped could easily go to 800 or higher if their computer braille display is successful. And they claim that the braille display could be almost 20 times cheaper than anything similar currently on the market.

Gary Kelly, project engineer who is himself visually handicapped, says that the braille display could be used the same way sighted persons use visual displays from computers. It would consist of a 40-character one-line printout that could be read as fast as the person could read braille.

Jobs that would become immediately accessible with this innovation, says Kelly, are in bookkeeping, airline reservations, banking, credit card verification or any others that require the use of visual displays from computers.

"We are now designing a software system to translate computer language into braille," says Kelly, "and we've come up with a conceptual design of the hardware. The next step will be getting additional funding to go ahead and build the unit."

Kelly says that if the funding becomes available a prototype could be ready as early as the summer of 1981. The project is currently funded by a private memorial fund.

### **EES REPORT**

**Peggy Simcic Brönn — Editor**

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## **Georgia Poultry Processor Boosts Energy Efficiency**

Poultry processing plants may be able to increase their energy efficiency by 20 percent as a result of a Georgia Tech/Gold Kist project in Ellijay, Ga.

One of the largest agricultural cooperatives in the United States, Gold Kist has interests in every area of farming and its poultry operations rank number one or two in the country. Its headquarters are in Atlanta.

The cooperative's Ellijay poultry processing plant reduced its actual energy use by the equivalent of almost 5,400 gallons of fuel oil during the first seven months of this year even though production increased 27 percent. Improvements in energy efficiency also saved the plant nearly \$29,000 in fuel costs projected for January to July 1979.

Bill Boykin of the EES Technology Applications Laboratory said that the plant's energy efficiency was increased by installing energy-conserving equipment and systems to reclaim heat wasted during the production process.

This month other poultry processors saw how heat that was being wasted in the plant's scalding, refrigeration and clean-up operations was reclaimed. To add the wasted heat back into the plant's total energy supply, Tech and Gold Kist installed:

- a new poultry scalding tank that holds less water and loses less heat from its sides and surface than the old scalding tank,
- a heat exchanger which uses heat rejected from the refrigeration system to heat water for other uses, and
- a more efficient rinse system which requires less fuel to heat the water used in cleaning up the plant.

Boykin said that the energy and cost savings at the Ellijay plant are due largely to the new scalding tank which uses 65 percent less steam than the previous model. Further savings are expected with continued use of the new heat exchangers and clean-up system.

Gold Kist and the U.S. Department of Energy spent \$92,000 to install this equipment. "A sound investment," says Boykin, "because we figure the energy-efficient equipment installed in this plant will pay for itself in less than three years."

Poultry processors from the Southeast were able to view the improvements at the Gold Kist plant in December thanks to a tour sponsored by the Georgia Poultry Federation and the Georgia Processors Association. The tour also included an educational seminar conducted by EES engineers.



*Tech Vice President for Research Dr. Thomas Stelson.*

## **Tech Vice President For Research Waiting For Senate Approval**

Dr. Thomas Stelson, Tech vice president for research, is waiting for Senate approval to accept a DOE position as assistant secretary for conservation and solar energy.

The position, created by newly-appointed Energy Secretary Dr. Charles Duncan, would cover almost all of the federal government programs involving conservation, new types of automobiles and solar energy. The government defines solar energy as covering wind, wood and hydroelectric power, as well as gasohol and alcohol made from agricultural products.

The 51-year-old Stelson, a civil engineer, is a member of the Energy Research Advisory Board of DOE, the Board of the Southern Solar Energy Center, and is Science and Technology Advisor to Gov. George Busbee of Georgia.

If approved for this position with DOE, Stelson would take a year's leave of absence from his duties at Tech. He is now head of all Tech's research programs, which include those of the Engineering Experiment Station.

Stelson is currently spending two days a week in Washington, D.C., on a consulting basis to DOE.

## **In Georgia**

### **Small Appalachian Industries Get Free Energy Assistance**

Industries in the Appalachian counties of Georgia with work forces of less than 200 persons can participate in a new energy conservation program in 1980.

The Appalachian Regional Commission (ARC), in cooperation with the Georgia Office of Energy Resources, has hired the Engineering Experiment Station to provide cost-free technical assistance and in-plant energy surveys to any of the approximately 1,000 small- to medium-sized industries in the 35 Appalachian area counties.

Staff engineers from EES will perform the energy surveys. They also will conduct two industrial energy conservation workshops on as-of-yet undesignated topics near the end of 1980. Participation is voluntary.

The ARC program will be modeled after the EES Industrial Energy Extension Service (IEES), a larger project whose purpose it is to help industries throughout Georgia to improve energy efficiency in their plants.

The ARC program has been funded because many small- to medium-sized industrial plants lack the technical expertise to identify areas with energy conservation potential and to design comprehensive conservation programs.

Conservation areas to be stressed by ARC engineers will be electrical demand control systems, lighting, heating and air conditioning, boiler operations, air compressors and operating and maintenance procedures.

Industry in Georgia is responsible for 27 percent of the state's energy use. By trying such simple measures as turning out unnecessary lights and adjusting boilers, some Georgia industries have realized energy savings of 10 to 20 percent. With comprehensive energy management programs, the energy efficiency of some industrial operations has improved by as much as 40 percent.

#### **EES Report ENGINEERING EXPERIMENT STATION**

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