

## Research Contracts Since January 1 Now Total \$196,200

The College of Engineering through its Engineering Experiment Station has been awarded a total of \$196,200 in research contracts since Jan. 1, Prof. Dwight A. Nesmith, EES director, has announced.

The total includes a \$100,000, five-year contract from the Department of Health, Education, and Welfare to Dr. Larry E. Erickson, associate professor of chemical engineering.

Under the contract, Dr. Erickson will teach only one class per semester for the next five years. The remainder of his time will be devoted to research into modeling, analysis and optimization of biosystems.

Prof. Nesmith also reported that the K-State experiment station has been granted a total of \$563,639 in contracts since the start of the new fiscal year which began last July 1.

Other new contracts received since Jan. 1 include:

—Dr. John E. Kipp, associate professor of applied mechanics, "Heat Transfer and Pressure Drop for Liquid Hydrocarbons Flowing in an Annulus," National Science Foundation, \$25,000.

—Dr. J. Kenneth Shultis, assistant professor of nuclear engineering, "Neutron Transport Theory Without Azimuthal Symmetry," National Science Foundation, \$14,500.

—Dr. Frank A. Tillman, professor and head of industrial engineering, "Designing a Bulk Mail Processing System," U.S. Post Office, \$7,204.

—Dr. Dale E. Kaufman, assistant professor of electrical engineering, "A Study and Evaluation of Stripline Circulator Matching Techniques," Bendix Corporation, \$4,496.

—Dr. Curtis E. Chezem, professor and head of nuclear engineering, "Reactor Sharing Program," Atomic Energy Commission, \$4,000.

Four contracts totaling \$117,650 have been renewed.

—Dr. E. Stanley Lee, associate professor of industrial engineering, "Modeling and Optimization of Water Resources Systems," Office of Water Resources and Research, \$36,650.

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1970 ENGINEERS' OPEN HOUSE ROYALTY—Wayne A. Ross, senior in nuclear engineering, was crowned St. Patrick, the engineers' patron saint, and Rita Rieschick, senior in elementary education, was named St. Patricia, St. Pat's lady. They reigned over the 1970 Engineers' Open House in late March. Dr. Ralph G. Nevins (left), engineering dean, crowned St. Patricia, and Patty Phalp (right), president of the Engin-dears coed auxiliary, did the honors for St. Patrick.

## W. L. (LeRoy) Culbertson, Class of 1939, Honored for Professional Achievements

An executive officer of a major U. S. oil company who has achieved eminence in his profession has been granted the 1970 Distinguished Service Award in Engineering by Kansas State University.

W. L. (LeRoy) Culbertson, a vice president of Phillips Petroleum Company, Bartlesville, Okla., was presented the award March 21 by KSU President James A. McCain during the 46th annual Engineers' Open House.



L. Culbertson

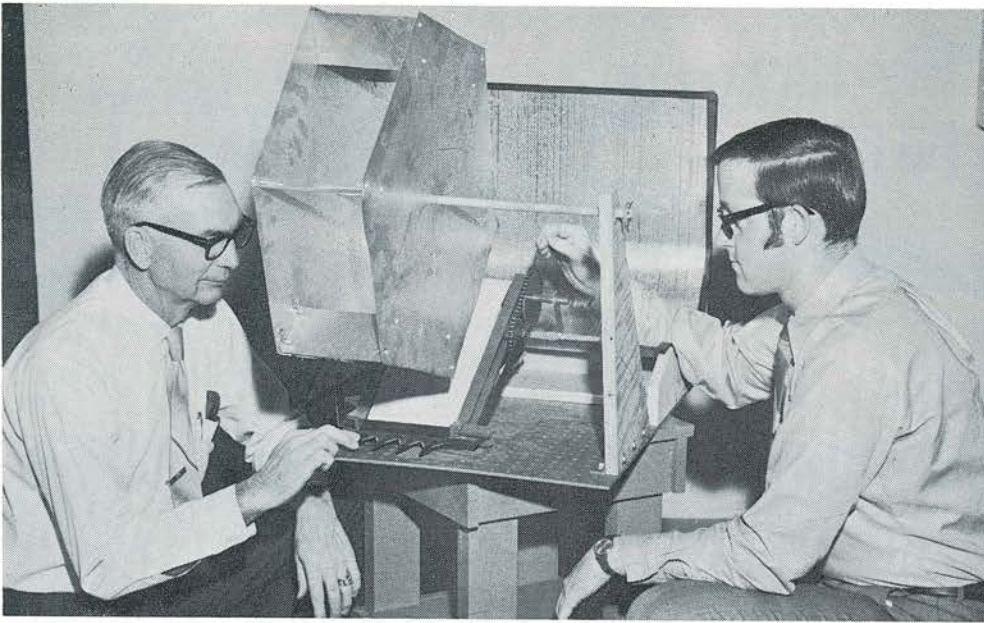
Presentation of the DSA was part of several activities of the Open House which

attracted more than 7,500 persons to the K-State campus March 20-21.

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An estimated 100 K-State engineering alumni and friends took part in the second annual Alumni Symposium on Saturday morning, March 21. Dr. William L. (Bill) Everitt, engineering dean emeritus at the University of Illinois, Champaign, was the featured speaker. An open forum, examining engineering—past, present and future—was well received.

(Continued on page 2)



**DESIGN BY AG ENGINEERS**—An innovative cutting attachment for a soybean harvester has been designed by a K-State agricultural engineering class. Prof. Gustave E. Fairbanks and senior Edward L. Swenson exhibit a model of the attachment (See related story below.).

## Agricultural Engineering Seniors Design Innovative Attachment

An agricultural engineering design class for seniors at Kansas State University has developed a model harvester attachment which, if perfected, could add \$180 million a year to the income of the nation's soybean producers.

The class is taught by Prof. Gustave E. Fairbanks who says the attachment is designed to cut soybean plants within one or two inches of the ground. Harvesters presently in use in the U.S. leave millions of beans unharvested on the uncut parts of the plants.

"It's estimated that \$360 million is lost annually because it has been difficult to design a cutting attachment which can snip the plants off at ground level. If the design works as well as we hope, we ought to be able to save about half the amount currently being left uncut," Fairbanks said.

The K-State class had its recommended design for the cutting attachment evaluated in January by the engineering staff at Hess-ton (Kan.) Manufacturing Company. Hess-ton's engineers "saw a few bugs in the students' design," Fairbanks said.

Hesston also has been trying to design a better cutting attachment. The firm has field-tested three or four designs which

need a little further development, Fairbanks added.

Last September the K-State class was organized into a typical industrial research team. Prof. Fairbanks was installed as vice president of production for the mythical company.

Heading the team were Jerry F. Carlin, Scottsville, chief engineer, and Edward L. Swenson, Concordia, assistant chief engineer.

Serving as project engineers were Glenn Caldwell Jr., Garnett; David F. Fairbanks, Manhattan; Jimmie L. Gartung, Liberal; Robert E. Henning, Athol; Gerald J. Lang, Ellis; Bill McMillan, Garden City; David L. Peterson, Lenexa; Glen E. Richardson, Lawrence; Jerry L. Schmidt, Newton; Donald D. Snethen, Goodland; and Gary D. Stromberg, McPherson.

The model was developed by the class by incorporating the best features of four preliminary designs.

"What the boys came up with still needs work. We know there are refinements to be made in the model after our trip to Hess-ton," Fairbanks said.

A typical student reaction was voiced by Swenson: "I enjoyed the course because I got to make some engineering applications. It's good to see practical applications of theory."

The model was displayed during the 46th annual Engineers' Open House at K-State, March 20-21. It also was entered in

## Preventive Ergonomics Can Check 'Disease' Says Paul van Wely

If your wife irons clothes in a standing position, chances are she may be subjecting herself to the possibility of considerable musculo-skeletal pain within a few years.

So says Dr. Paul A. van Wely, visiting professor of industrial engineering at Kansas State University, Manhattan, who conducts research on the relationship between posture and pain.

He contends that it's much better to iron in a sitting position where muscle and the skeletal system are not as likely to encounter excessive strain.

Many women iron while standing "only because of tradition," says Dr. van Wely, who is a visiting professor on the University of Oklahoma faculty spring semester. "Girls have seen their mothers iron that way. So they think that standing is the only way to iron."

Dr. van Wely, as a member of the ergonomics group at the Philips Factory, a 290,000-employee electronics firm based in Eindhoven, Holland, has been studying and compiling relevant statistics on musculo-skeletal diseases (He defines disease as "a pain which doesn't go away.") for several years.

The Philips' ergonomists study their employees' work situations in terms of three factors: efficiency, health, and comfort.

They have found that poor design of industrial furniture, tools, and equipment is most often the cause of musculo-skeletal disease.

"Many poorly designed work situations cause workers to assume twisted and contorted postures: for example, stooping all day long year after year, or reaching up and out for extended periods. These are hard on the body," Dr. van Wely said.

**When a worker uses a bad posture in the same job over a period of several years, he may experience severe pain later in life. The Dutch scientist points out that "we try to help our workers to avoid such diseases through preventive ergonomics."**

Dr. van Wely stresses that preventive ergonomics is more feasible than corrective ergonomics. He distinguishes between the two types:

Corrective—changing existing work situations by redesigning furniture, tools, and equipment. "This is more expensive. Many companies cannot afford this."

Preventive—foreseeing what the work situation will be like and then designing equipment "to prevent disease. The preventive approach is more effective than the corrective approach and costs less money. In some cases, you gain money."

the design competition at the Mid-Central meeting of the American Society of Agricultural Engineers in late March at St. Joseph, Mo.

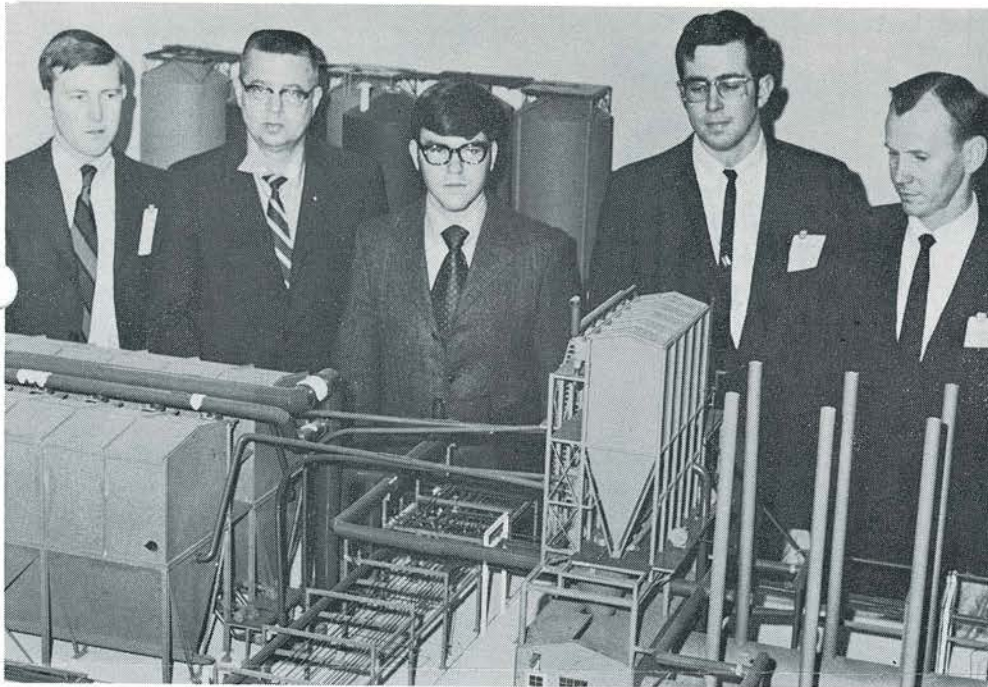
Starting next fall Fairbanks' farm machinery design class will work on a problem furnished by a Kansas industrial firm.

### W. LeRoy Culbertson Lauded

(Continued from page 1)

About 300 persons attended the third annual Engineers' Open House banquet Saturday evening where Culbertson was honored. Entertainment was provided by the New Angle Singers.

Culbertson was elected vice president in charge of Phillips' natural gas and gasoline department in April, 1964, after four months as department manager.



**SENIORS VISIT PHILLIPS**—Three seniors in a mechanical engineering design class taught by Dr. Ralph O. Turnquist (right) presented a design of a carbon black bag filter to the engineering staff of Phillips Petroleum Company, Bartlesville, Okla., in January. Howard R. Sharp (second from left) of the firm's engineering department evaluated the students' design. Jerry Carlin (left), John Ratcliffe (center), and Ron Norton (second from right) were given data and premises required to design a process filter to accommodate three reactors of a carbon black plant.

## Computer-Controlled Fuel System Enriches ME Laboratory Studies

Four KSU seniors in mechanical engineering have had their laboratory studies enriched through the generosity of Volkswagen Inc.

During the first semester the seniors studied the computerized fuel injection system of an \$850 engine donated to K-State's department of mechanical engineering by Volkswagen through its Manhattan, Kan., dealer, Larry K. Allingham.

Dr. Ralph O. Turnquist, associate professor of mechanical engineering, guided the students—Gary C. Axton, Wichita; Myron E. Kroeger, Ellis; Dennis R. Phalen, Riverton; and Michael E. Schwinn, Coffeyville—in a study of the engineering aspects of the injection system, controlled by integrated computer circuits.

Turnquist described the approach the students followed in the course:

1. Studied the literature on how the computerized injection system works.
2. Operated the engine, studying various inputs to the fuel injection computer. They saw, for example, how the engine load is measured and "converted into an electrical signal which tells the computer to vary the fuel injection rate."
3. Observed the output signal from the computer which opens and closes the fuel injection control valves.
4. Studied the details of the system.
5. Prepared written assignments and oral reports on their activities.

"The donated engine has been helpful to us," Dr. Turnquist said, "in that it has given the students further opportunity to

apply various theoretical and experimental techniques learned in their previous course work in engineering."

### Tractor Axle Design Model Developed by Grad Student

Tractor axle design remains more of an art than a science. But some hard work by a graduate student in engineering at Kansas State University may help reverse the situation.

N. P. Mathur, agricultural engineering graduate student from India, has just completed his master's thesis. In it he developed a general mathematical model to take much of the guesswork out of tractor axle design.

His model, solved with a digital computer using the Runge-Kutta method of numerical integration, predicts the resulting transient stress due to bending at the point where the rear axle enters its housing.

"This is an important contribution," says Mathur's major professor, Dr. Stanley J. Clark, "because of the increased utilization of dual wheeled tractors which has caused a significant rise in rear axle failure in the past four or five years."

Mathur's general mathematical model has 17 differential equations.

## Engineering-Science Summer Institute Has Two Sessions

About 100 top mathematics and science students in Kansas high schools will be selected to participate in the sixth annual Engineering and Science Summer Institute (ESSI) in June at K-State.

Two one-week sessions are scheduled, June 14-20 and June 21-27, announced Dr. Kenneth K. Gowdy, K-State's assistant engineering dean. One two-week session was held previously.

Students now classified as sophomores and juniors will be provided with an opportunity to explore career and educational opportunities in 12 technological fields.

Participants have been selected on the basis of academic standing, proficiency in science and mathematics, extra-curricular activities and interests.

ESSI is sponsored by the K-State College of Engineering and the Kansas Engineering Society (KES). Cost for each participant is \$40. Many students will receive KES scholarships to pay part or all the cost.

A broad range of subject material will be covered in lectures, laboratory experiments and special projects in each one-week session.

Courses have been organized to stimulate learning experiences leading to greater understanding of modern engineering and science. Common interests, problems and techniques among various branches of engineering and science will be emphasized.

### Design for Cutting Attachment Tops in Sectional Competition

A design of a cutting attachment for a soybean harvester drawn by an agricultural engineering class at Kansas State University, Manhattan, has won first place in a sectional competition.

The innovative attachment design made during a fall semester class taught by Gustave E. Fairbanks, professor of agricultural engineering, won the Mid-Central Section design competition at St. Joseph, Mo., in early April sponsored by the American Society of Agricultural Engineers.

Edward L. Swenson, senior in agricultural engineering from Concordia, presented the design by the class of 13 K-Staters at the ASAE meeting.

### Award Research Contracts

(Continued from page 1)

—Chezem, traineeships, Atomic Energy Commission, \$36,000.

—Dr. Preston E. McNall Jr., professor and head of mechanical engineering, "Water Requirements for Prolonged Shelter Occupancy," Office of Civil Defense, \$35,000.

—Dr. Fredric C. Appl, professor of mechanical engineering, "Cutting Action and Wear of Diamond Cutting Tools When Cutting Non-Metallic Materials," Christensen Diamond Products Company, \$10,000.

## Newsworthy Notes

KSU engineering professors—O. D. Hunt of electrical engineering, and Delos C. Taylor of applied mechanics—will retire May 31. Hunt joined the K-State faculty in 1923 and Taylor in 1931. They have combined total of 86 years of teaching service.

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Some 500 state, county and city engineers were at K-State March 25-26 to participate in the annual Kansas Highway Engineering Conference. Sponsors were K-State, State Highway Commission, Kansas County Highway Engineers Association, and Kansas Association of City Engineers. In charge was Dr. Bob L. Smith, K-State professor of civil engineering.

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An unrestricted grant for \$1,000 was presented on March 10 to the College of Engineering by J. G. Barnhart for the Natural Gas Pipeline Company of America. The check was accepted by Prof. M. A. Durland, KSU engineering dean emeritus.

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Prof. Nigel Corlett of the University of Birmingham, England, presented a colloquium entitled, "Mathematical of Human Motor Movements," on March 19 to the K-State department of industrial engineering.

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Clare M. Hakeman, senior in electrical engineering, earned second place and an \$80 prize on March 12 in the Kansas City section, Institute of Electrical and Electronics Engineers. His topic: "Ion Implantation in Semiconductors."

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Dr. Floyd W. Harris, associate professor of electrical engineering, is working at American Electric Power Service Corporation, New York City, for 18 months. His employment was arranged by the American Society for Engineering Education and the Ford Foundation Program of Residencies in Engineering Practice.

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The K-State Office of Extension Radio and TV has won a top audio-visual achievement award from the American Society of Association Executives for its production of "Engineering Makes a World of Difference," a 20-minute color careers film.

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Special Report No. 85, "Experience with Wet Scrubber for SO<sub>2</sub> Removal at the Lawrence Station of the Kansas Power and Light Company," by Daric M. Miller, manager of electric power production at KP&L, has been published by KSU's Engineering Experiment Station. Copies are available on request.

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Cadet Col. Philip M. Smith, senior in electrical engineering from Liberal, Kan., has been selected commander of the K-State Air Force ROTC Cadet Wing. It is the highest position held by a student in the Air Force ROTC Program.

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John S. Schwartz, junior in electrical engineering from Pittsburg, Kan., is the new editor of "Kansas State Engineer" magazine. Schwartz, formerly the news editor, succeeds Leland J. Polly as head of the student publication.

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Dr. Philip G. Kirmser, professor and head of applied mechanics, is on a February 1 to July 1 sabbatical at the Batelle Institute for Advanced Study in Geneva, Switzerland. Prof. Frank J. McCormick is acting head of the department during his absence.

## Larson Steps Down After 14 Years As Department Head

Dr. George H. Larson, head of agricultural engineering at Kansas State University, has asked to be relieved of his administrative duties, effective July 1, to devote full time to teaching and research interests.

Head of the K-State department for 14 years, Dr. Larson will continue as a professor of agricultural engineering, Dr. Ralph G. Nevins, dean of the College of Engineering, announced.



G. H. Larson

During his administration the agricultural engineering faculty has doubled in size from eight to 16, including six Ph.D.'s; agricultural engineering-agronomy irrigation experiment fields have been developed at Belleville and St. John; and the department's research and course offerings have been expanded.

Larson, a native of Lindsborg, Kan., earned his B.S. and M.S. degrees at K-State in 1939 and 1940. Then he taught at the University of Wisconsin and Panhandle A & M College before joining the Navy in 1942 and serving until 1946.

He was named an associate professor at K-State that year and was promoted to professor in 1950. He received his Ph.D. in agricultural engineering at Michigan State University in 1955 and was appointed head of the K-State department the following year.

In 1969 he was granted a life membership in the Kansas Liquefied Petroleum-Gas Association. Larson has coordinated the KLPGA annual short course for the past 20 years.

A licensed professional engineer, Larson is active in the American Society of Agricultural Engineers, American Society for Engineering Education, Kansas Engineering Society, National Society of Professional Engineers and the American Association for the Advancement of Science.

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Dean of the College  
Dr. Ralph G. Nevins

Director  
Engineering Experiment Station  
Dwight A. Nesmith

IMPACT Editor  
Thomas A. Gerdis