The Wisconsin engineer. Volume 59, Number 3 December 1954

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

The Wisconsin

engineer

DECEMBER 1954

25¢

Robert L. Schneider, class of '49, speaks from experience when he says...

"United States Steel offers unlimited opportunities covering practically all engineering fields"

IN 1949 Robert L. Schneider graduated from college with degrees in engineering and physics. After being interviewed by United States Steel, he was accepted as a trainee. Then after a year, he was advanced to a test engineer in the Maintenance Department; then to a power foreman in the Power & Fuel Division. By 1953, he had been made Power Superintendent in the Power & Fuel Division at the Carrie Furnaces.

As superintendent, he is responsible for the operation and maintenance of power producing and distributing facilities for the plant which supplies electrical power to several of our largest steel mills around Pittsburgh. Such advancement is not unusual at U.S. Steel.

As for the future, Schneider says, "Opportunities are unlimited. U.S. Steel is such a large and diversified organization that the future is not restricted to your current department or division. Transfer to equal or better positions in numerous other divisions is always possible."

To all future graduate engineers Mr. Schneider says, "U.S. Steel offers the best opportunity to get an overall picture of and experience in industry today. U.S. Steel is big enough to cover practically all engineering fields and permits a man to find the fields he wants to pursue."

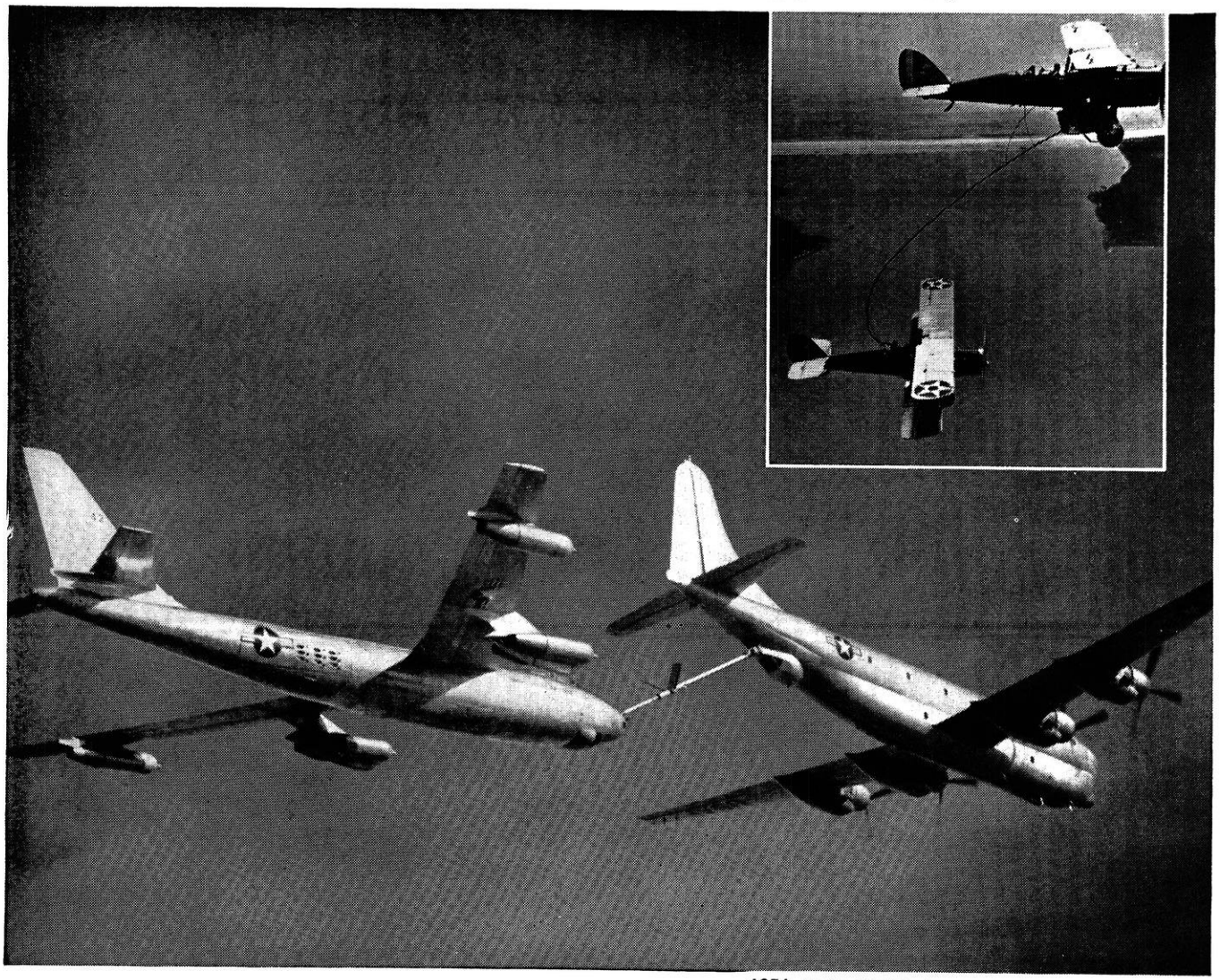
If you are interested in a challenging and rewarding career with United States Steel and feel that you can qualify, you can obtain further details from your college placement director. Or we will gladly send you our informative booklet, "Paths of Opportunity," upon request. Just write to United States Steel Corporation, Personnel Division, Room 1628, 525 William Penn Place, Pittsburgh 30, Pa.

SEE THE UNITED STATES STEEL HOUR It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL

AMERICAN BRIDGE . . AMERICAN STEEL & WIRE and CYCLONE FENCE . . COLUMBIA-GENEVA STEEL . . CONSOLIDATED WESTERN STEEL . . GERRARD STEEL STRAPPING . . NATIONAL TUBE
OIL WELL SUPPLY . . TENNESSEE COAL & IRON . . UNITED STATES STEEL PRODUCTS . . UNITED STATES STEEL SUPPLY . . *Divisions of* UNITED STATES STEEL CORPORATION, PITTSBURGH
UNITED STATES STEEL HOMES, INC. • UNION SUPPLY COMPANY • UNITED STATES STEEL EXPORT COMPANY • UNIVERSAL ATLAS CEMENT COMPANY 4-1892

1923—first aerial refueling

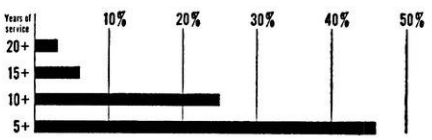


1954—Boeing KC-97 tankers completed 16,000 refuelings last year

30 years of progress in aerial refueling

The small picture shows the first aerial refueling by the Air Force. The large picture shows a Boeing KC-97, today's standard Air Force tanker, transferring 600 gallons of fuel a minute to a Boeing B-47 Stratojet bomber.

Boeing pioneered aerial refueling tankers and equipment. Further, during its 38 years, it has constantly pioneered trend-setting designs in commercial and military aircraft. This has meant such continuous growth that Boeing now employs more engineers than ever before, including the World War II peak. Boeing offers *stable* careers to engineers of virtually EVERY type: civil, mechanical, electrical and aeronautical. The company employs draftsmen and engineering aides for routine work, thus freeing engineers for more creative assignments.



Boeing engineers enjoy long-range careers—46% of them have been at Boeing 5 or more years, 25% have been here 10 years, and 6% for 15 years.

In addition to stability, Boeing offers an unusual variety of research, design and production opportunities, including work with new materials, guided missiles, jet bombers and transports, and research in nuclear-powered aircraft and supersonic flight.

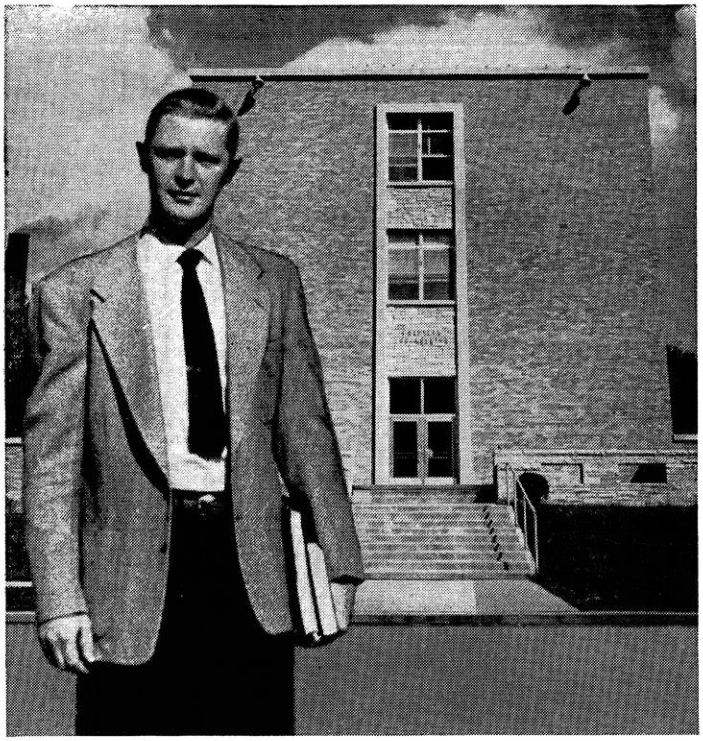
Boeing makes it possible for engineers to take graduate studies while working, and reimburses them for all tuition expenses.

For further Boeing career information, consult your Placement Office, or write:

JOHN C. SANDERS, Staff Engineer—Personnel
Boeing Airplane Company, Seattle 14, Wash.

BOEING

SEATTLE, WASHINGTON WICHITA, KANSAS



Delbert N. De Young received a B.S. in Chem. Eng. from the University of Wisconsin last June. Now he is working for an M.S. degree. By asking questions, he's learned that many excellent industrial opportunities are passed over because they're not understood by the average undergraduate.

Del De Young wants to know:

What sort of work is involved in technical sales at Du Pont?

Clarence D. Bell, B.S., Chem. Eng., Univ. of Pitts. (1937), joined Du Pont as a chemical engineer immediately after graduation. He began in the research group of the Ammonia Department, progressed steadily through assignments on nylon and a number of other products. Today he is an Assistant Director of Sales in the Polychemicals Department.

Clarence "Ding" Bell answers:

Well, if I said "All sorts," it might sound a bit vague to you, Del, but it would be very close to the truth. That's because technical sales work at Du Pont—bearing in mind the great diversity of products we have—is broader in scope than a lot of other technical assignments, and requires additional talents.

Let's suppose that one of Du Pont's customers is having technical difficulties—needs help in adapting "Teflon" to a specific gasketing application, for example. When our sales representative calls, he naturally must carry with him the engineering knowledge that's the basis for sound technical advice—data on flexural fatigue, chemical passivity, and deformation under load. The customer is receptive. He wants to make a better product, increase his sales, reduce costs—or do all three. Naturally, he's looking for reliable technical advice and intelligent actions that apply to his specific conditions. With the cooperation of the customer and help from our own research people, when necessary, the problem will sooner or later be "licked."

We have found, though, that if a technical service man is going to be *truly* effective in such a situation, he must possess certain *human* qualities in addition to his technical ability. That is, he must really *like* people and be sincerely interested in helping them solve their problems. He must—in every sense of the word—be an "ambassador" who can handle human relationships smoothly and effectively.

Take the depth suggested by this simple example, Del, and multiply it by a breadth representing all the challenging problems you'll run into with Du Pont's diversity of products. If your slide rule isn't too far out of alignment, the resulting area should give you some idea of what I meant by "all sorts" of work.

Let me emphasize one more point. The importance of effective sales work is fully understood and appreciated at Du Pont! In the past, sales work has been one of the active roads to top management jobs. There is every reason to believe that this will continue in the future.

Are you inclined toward sales work? There are four main types of sales activity in the Du Pont Company—technical sales service, sales development, market research and direct selling. Information on sales, and many other facts about working with Du Pont, are given in "The Du Pont Company and the College Graduate." Write for your copy of this free 36-page booklet to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware.

ANNOUNCING U. S. CIVIL SERVICE EXAMINATIONS

STUDENT TRAINEE

Positions, covering various fields of science and engineering, pay $2,750 to $3,175 a year and are located in various activities of the Potomac River Naval Command in Washington, D. C., and surrounding area, and the Engineer Center, U. S. Army, Fort Belvoir, Virginia.

Applicants must be high school graduates who have completed courses which would admit them to an engineering curriculum at college, or they must be college students who are majoring in one of the fields covered by this examination. Those selected will participate in special training programs requiring alternate periods of attendance at college and work.

Further information and application forms may be obtained from the U. S. Civil Service Commission, Washington 25, D. C.

ENGINEERING DRAFTSMAN
$2,750 to $5,940 a Year

STATISTICAL DRAFTSMAN
$2,750 to $4,205 a Year

Positions are located in Washington, D. C., Alexandria, Va., and Montgomery and Prince Georges Counties, Md. The work includes the performance, review, or supervision of drafting work or mechanical drawing, which is directly related to engineering or architectural activities of a professional and scientific nature.

Each applicant must submit with his application an original sample, in ink, on drawing paper, to show proficiency in the branch of drafting for which he is applying.

Applicants must have minimum total experience of one year which may be satisfied by professional experience or completion of a 4 year high school curriculum which has included four ½ year courses, two of them in drafting, and the others in math or art.

For further information write to: U. S. Civil Service Commission, Washington 25, D. C. and ask for announcement No. 356.

The Student Engineer's Magazine

WISCONSIN ENGINEER

Founded 1896

Volume 59 **DECEMBER, 1954** **Number 3**

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WISCONSIN ENGINEER

FOUNDED 1896

In This Issue . . .

ARTICLES

DEPARTMENTS

FRONTISPIECE

Alpha Poppy is not the name of a flower or a new fraternity, but the name chosen by General Electric engineers for a new radiation detector.

It looks like the common conception of a futuristic ray gun, but it doesn't send rays; it "catches" them.

The device is designed to check work areas and clothing for sources of alpha radiation, which can be dangerous if absorbed internally. It will often be used with equipment that sends out warning "pops" when alpha contamination is detected.

A tiny bit of radioactive material no larger than a pinhead will emit alpha particles for thousands of years. Since alpha radiation quickly dissipates its energy in air, it is normally harmless except when a source of such radiation becomes lodged inside the body.

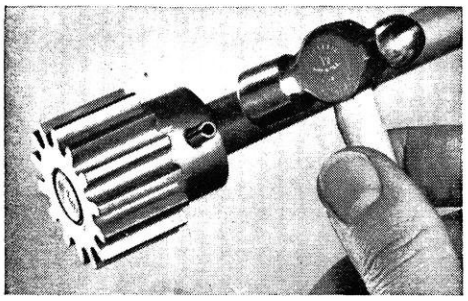
The "muzzle" of the pistol-like Alpha Poppy is passed close over the areas of suspected contamination. Tissue-thin aluminum foil lets in alpha rays, but keeps out ordinary light.

The alpha rays are "caught" by a zinc sulphide screen, which causes them to expend their energy, creating light. The light is converted to electrical impulses, which are amplified thousands of times and can be used to obtain an audible or visible signal.

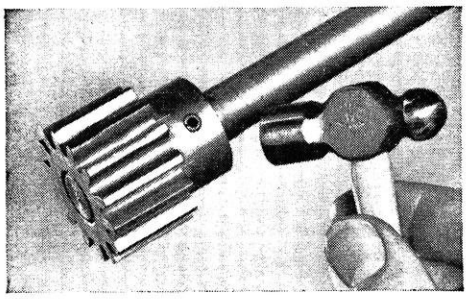
Where will you use this simple fastener?

No threading, peening or precision drilling with ROLLPIN

Rollpin is driven into holes drilled to normal production-line tolerances.



It compresses as driven.



Rollpin fits flush . . . is vibration-proof.

Rollpin is the slotted tubular steel pin with chamfered ends that is cutting production and maintenance costs in every class of industry.

This modern fastener drives easily into standard holes, compressing as driven. Its spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. Rollpin is readily removable and can be re-used in the same hole.

* * *

If you use locating dowels, hinge pins, rivets, set screws—or straight, knurled, tapered or cotter type pins—Rollpin can cut your costs. Mail our coupon for design information.

Elastic Stop Nut Corporation of America
Dept. R16-CM, 2330 Vauxhall Road, Unon, N. J.

Please send me the following free fastening information:

☐ Rollpin bulletin

☐ Elastic Stop Nut bulletin

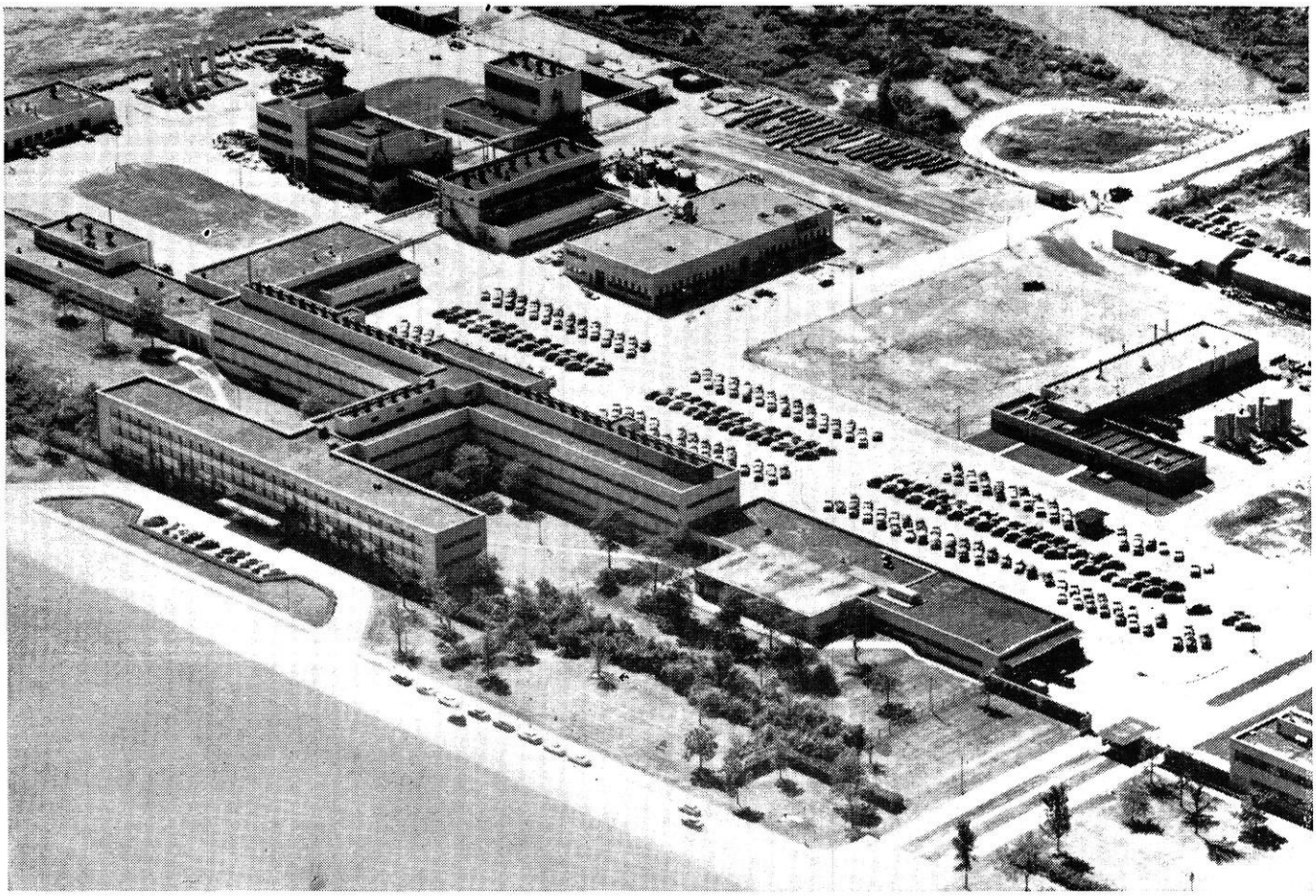
☐ Here is a drawing of our product. What fastener would you suggest?

*Name*_____ *Title*_____

*Firm*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____



MOST OF THE RESEARCH WORK that led to the development of Ultraforming—a more efficient and economical refining process—took place in the Whiting research laboratories of Standard Oil, above. Extensive studies in seventeen research-scale units demonstrated the merits of cyclic regeneration.

Standard Oil scientists develop **Ultraforming--** the latest in catalytic reforming

After several years of research, Standard Oil scientists have developed a new and important refining process—Ultraforming.

The process is a better way of improving the low-octane straight-run gasoline found in crude oil. To make such gasoline suitable for present day cars, refiners must change it into an entirely different material, which gives good anti-knock performance. The change is known as reforming.

Ultraforming is the last word in catalytic reforming. It gives greater yields of higher octane gasoline than were previously possible and gets good results even with poor feed stocks. In addition, it raises the yield of hydrogen, an increasingly valuable by-product of catalytic reforming.

Ultraforming units do not have to be shut down when the catalyst begins to lose activity through use. By a new technique, an improved platinum catalyst is regenerated to maintain peak performance.

The advantages of Ultraforming over previous methods are so great that Standard Oil and its subsidiary companies are building units at four refineries. They will start operating this year. The new process, of course, is available to the petroleum industry through licensing arrangements.

At Standard Oil, young engineers and chemists work with the stimulating knowledge that they are participating in important and lasting contributions to the oil industry and to their country.

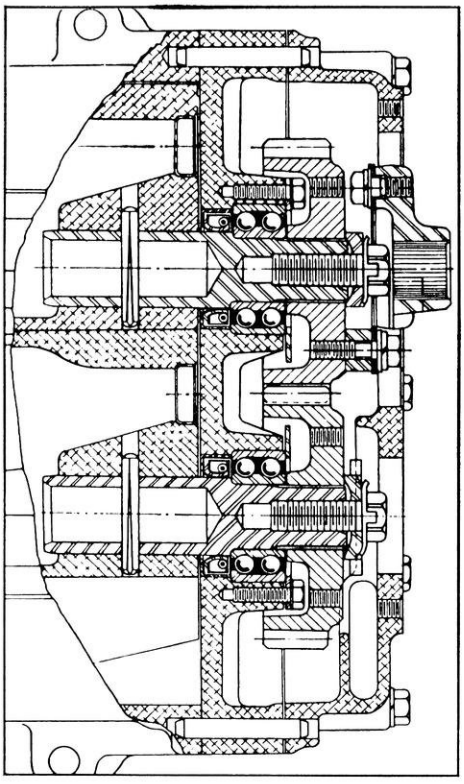
Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

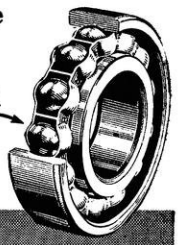
STANDARD

Naturally Dr. Diesel was proud of his engine. He was delighted! He'd spent the best years of his life on this "new departure." So many experiments. So many failures. He finally succeeded in 1897, and engineers everywhere acclaimed the Diesel engine.

Ever since, better and better Diesels have been built. Smoother-running, more compact, more powerful, more dependable. And New Departure has helped. For example, the double-row angular-contact **ball** bearing which supports the rotors in the GM Diesel Supercharger. This bearing was designed and developed by New Departure. It is just one of many reasons for New Departure's wide reputation for **ball** bearing leadership.



Two double-row angular-contact ball bearings provide close axial and radial location of rotors and timing gears in the GM Diesel Supercharger. This bearing type is one of many originated at New Departure.



NEW DEPARTURE
BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

The Lockheed Missile Systems Division

announces an advanced study program for

MASTER OF SCIENCE DEGREES

University of Southern California • University of California at Los Angeles

The Lockheed Graduate Study Council offers an Advanced Study Program to enable exceptionally qualified individuals to obtain Master of Science degrees in prescribed fields. Under this plan the participants are employed in their chosen fields in industry and concurrently pursue graduate study.

Students who are United States citizens or members of the Armed Services being honorably separated and holding B.S. Degrees in Physics, Electrical Engineering, Mechanical Engineering, and Aeronautical Engineering are eligible. Candidates must qualify for graduate standing.

The industrial assignment will be on the Research and Engineering Staff of Lockheed Missile Systems Division. The Advanced Study Program will be at one of the Universities named above. If sufficient number of qualified students apply, as many as 100 awards will be granted.

During the regular school year the industrial assignment will be coordinated with the Study Program to permit a half-time University schedule of advanced study. During the school vacation periods participants will be employed full-time at the Lockheed Missile Systems Division.

Salaries will be determined by the individual's qualifications and experience in accordance with accepted current standards. Participants are eligible for health, accident and life insurance as well as other benefits accorded full-time staff members.

Tuition, admission fees and costs of textbooks covering the number of units required by the University for a Master of Science Degree, will be borne by Lockheed. A travel and moving allowance will be provided for those residing outside the Southern California area.

How to apply:

Contact your placement bureau or write
The Graduate Study Council for an application form
and brochure giving full details of the program.

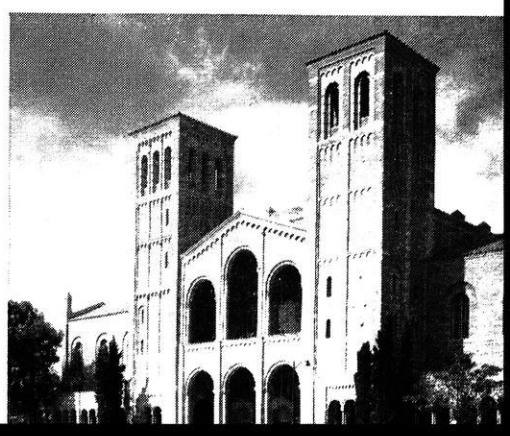
GRADUATE STUDY COUNCIL

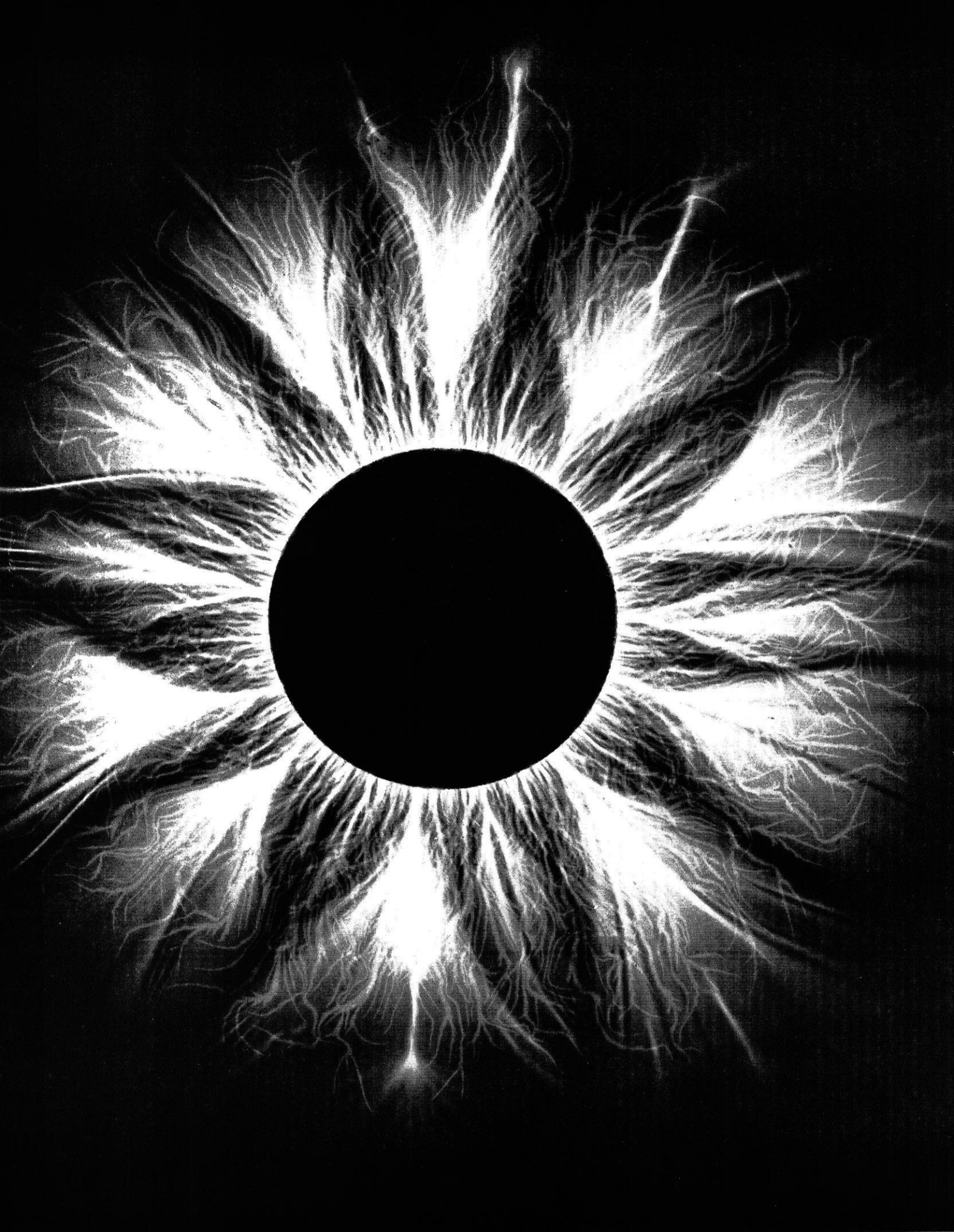
Lockheed

MISSILE SYSTEMS DIVISION

LOCKHEED AIRCRAFT CORPORATION

VAN NUYS • CALIFORNIA





GENERAL ELECTRIC ALPHA RADIATION DETECTOR

See page 5

editorial

A New Course—General Engineering?

Why not have a General Engineering course at the University of Wisconsin—one which offers some courses in each branch of engineering? Many, if not most, high school seniors who wish to enter Engineering School don't really know which of the branches they want, because they haven't had enough contact with actual engineering work.

Some field may at first seem more glamorous than the others, but will not turn out to be the one for which the engineer is best suited.

The course should emphasize the basics—mathematics, physics, chemistry, mechanical drawing, mechanics. English in all forms—grammar, writing, and speaking, need to be taught. The engineer must know how to express himself well. Some Commerce courses would fit into this curriculum, for the future engineer will need to be acquainted with the principles by which the business world is governed. Many men who start in engineering end up on the business end of manufacturing.

Six credits of History courses are now required of each engineering student. Perhaps a few elective credits should be laid aside for recommended Letters and Science courses, too.

Each of the engineering departments should have courses offered in the General Course: thermodynamics, surveying, electrical engineering, metallurgy, and others. Then, after the second or third year, the student would decide on his major in one of the engineering fields.

The suggested General Engineering course offers the student an opportunity to get the feel of what engineering is like, before he must decide definitely on which field he will make his life's work. He then need have no doubts or misgivings that the field he chose was right for him.

K. A. G.

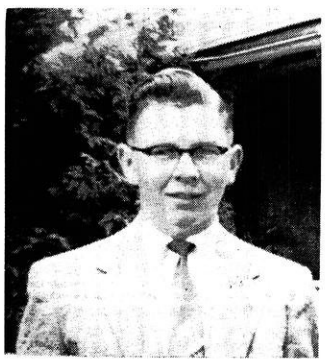
Meet the Authors

by Fritz Callies, m'55

PROF. HENRY G. GOEHRING
"Taking a Job Interview", page 18

Professor Goehring, Placement Director for the College of Engineering, and Coordinator of the University Placement Services, has been at Wisconsin since 1948. He has an extensive background in industry, having spent 17 years with United States Steel Corporation in production and industrial relations. Prior to this he taught mathematics at the University of West Virginia, and also taught high school and coached athletics in Pennsylvania for four years.

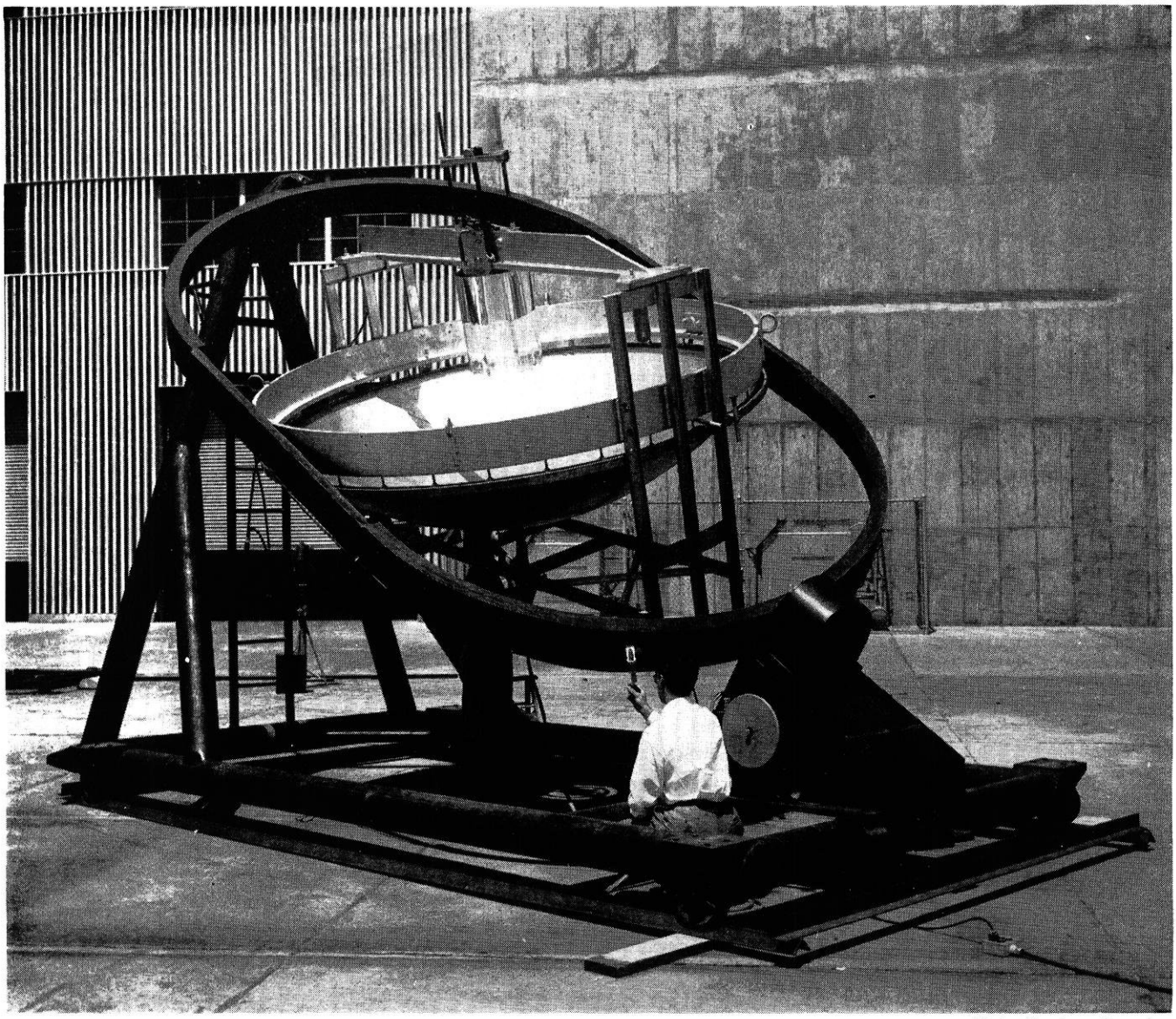
He is a graduate of Penn State University, the University of Chicago, and Harvard Business School, and also attended Bethany College.



DICK WHITE
"Solar Energy," page 14

One of the University of Wisconsin's outstanding Civil Engineering students, Dick White, is playing hookey for this semester while recuperating from a siege of pericarditis. White, co-founder of "Callies and White — Consulting Engineers", not only has compiled an enviable grade point in his first three years here at Wisconsin, but also has been an active member of numerous campus organizations. Last year, for instance, besides being Alumni Notes Editor of the Wisconsin Engineer, he was treasurer of Chi Epsilon, secretary-treasurer of the Society of American Military Engineers, trustee of the University Presbyterian Church, secretary of the Men's Halls Association Workshop Club, vice-president of Ochsner House, member of Tau Beta Pi and Phi Eta Sigma, secretary of the 1954 Midwestern A.S.C.E. Conference, and recipient of Sophomore High Honors, of the Milwaukee Society of Iron and Steel Fabricators' Scholarship, and of the Gold Medal Award for Outstanding M. S. III cadet in Corps of Engineers R.O.T.C.

Dick, a native of Chetek, Wisconsin, will begin his senior year in February. He plans to work for his Uncle Samuel for a couple years after graduation, and then go into the field of structural engineering.



—Photo Courtesy Convair

Fig. 1.—Convair's 120-inch solar furnace is shown here. Rays from the sun are collected by the large aluminum mirror and reflected to a dime-size focal point. When sky conditions are ideal, the furnace can develop a temperature of 8500° F., approximately 85 per cent of the temperature of the sun's surface.

PUTTING OLD SOL TO WORK

RESEARCHERS ARE NOW INVESTIGATING SEVERAL PROPOSED APPLICATIONS OF SOLAR ENERGY

by Richard White, c'56

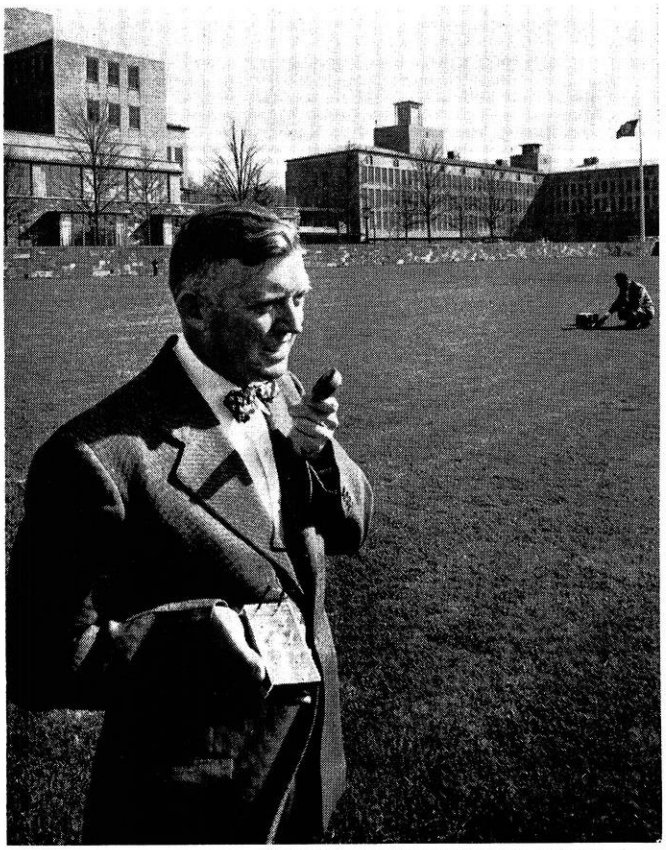
During the last half century the industry and utilities of the world, especially in the United States, have been using power in ever-increasing amounts. These huge increases have been largely responsible for our present high standard of living and industrial might, but they have also put heavy demands on available sources of energy, so future exhaustion of several of these sources now seems certain unless we can derive power from other methods. America, with only 7% of the world's population, is particularly hard on energy consumption, using 45% of the world's 1953 production. We used more energy last year than did our ancestors in the first 75 years of America's existence; thus it is easy to realize why officials connected with the conservation of resources are becoming quite alarmed. However, there are two new practically limitless power sources—the oft-mentioned atomic energy utilizing uranium and thorium, and the seldom-discussed solar energy that has even greater peace-time power possibilities.

Each year the world receives over 400 quadrillion (4×10^{17}) kilowatt hours of energy from the rays of the sun, and over 99% of this energy is lost to man. An ex-

ample of the true magnitude of this amount is: the energy striking the roof of an average house in one-half hour on a sunny summer day is sufficient to supply that house with heat, light, and utilities for an entire year. Nature's transformation of solar energy to useful energy is extremely inefficient, and since most conventional energy originally came from the sun, direct conversion of solar energy by man-made machinery would certainly be feasible even if the machine's efficiency were no more than 5 or 10%. Several such machines have been developed, and much more research is being conducted on similar devices. Present inventions include home-heating systems, a solar battery, a solar generator, and a solar furnace used in heat-testing experimental work.

Solar Home-Heating Systems

Studies of data on solar energy received on a horizontal surface in 49 U. S. cities have revealed that it would be relatively easy, although quite costly at the present, to heat a home anywhere in America utilizing solar heat collectors with heat pumps. In amount of radiation received from the sun, El Paso, Texas, had the highest yearly average of 2037 BTU per square foot per day, and East Lansing, Michigan, had the lowest with 998 BTU per square foot per day. Figures on monthly variation showed that Medford, Oregon, received 2804 BTU sq. ft./day in July, high in the nation, and Seattle, Washington, had the lowest reading—229 BTU/sq. ft./day in December and January.



—Photo Courtesy Bell Telephone Laboratories

Fig. 2.—The sun's rays falling on the new Bell solar battery are the only source of power needed to operate a small mobile radio transmitter, demonstrated here by D. E. Thomas and M. B. Prince of Bell Telephone Laboratories. Mr. Thomas is using a pocket-size radio transmitter containing transistors. Under ideal conditions, the transmitter will operate over a distance of several miles.

Perhaps the best design for a solar heating system would have a large, south-facing, vertical glass plate collector, which necessitates a large lot free from any shadows of adjacent buildings. The heat pump system is used rather than the direct utilization method because it allows for lower collector plate temperatures and thus higher collector efficiency (60% on a clear January day) and smaller collector surface.

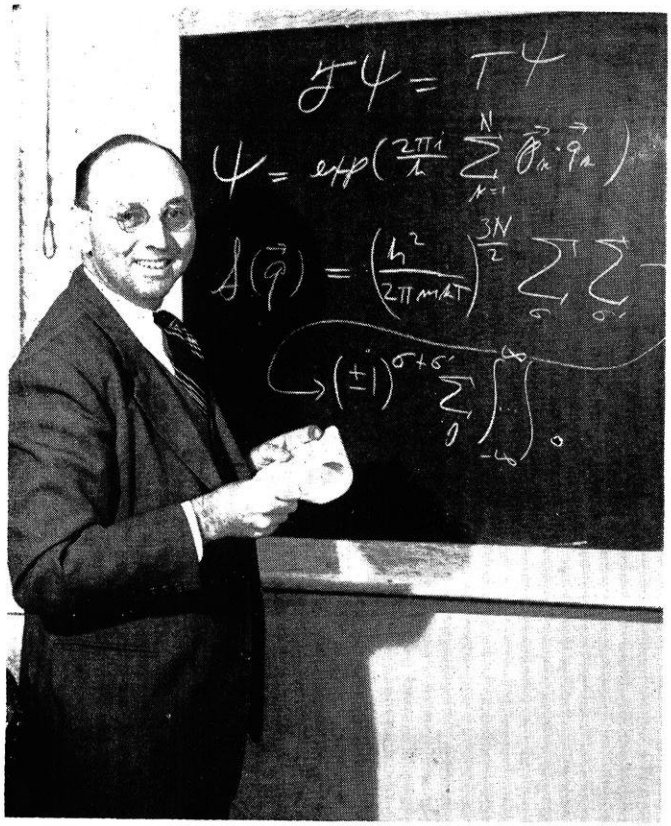
A year-round air conditioning system using either condenser side heat storage and single stage heat pump, or evaporator side heat storage and two-step condensation heat pump can be used in this set-up. In addition to having a heat collector and heat pump, some type of heat storage facility is necessary in this system to allow for the absence of the sun on cloudy days and night darkness. Heat of fusion type storage materials appear to be the best, and a volume equivalent to a small basement room has been shown adequate for a Lincoln, Nebraska, house with a 62,000 BTU per hour design heating load (a small auxiliary heating system was necessary for several unusually cloudy periods).

With the proper size system, houses anywhere in the U. S. could be fully heated by solar energy, but it would probably be more economical to use a conventional heat source in conjunction with the solar heat collectors in the colder northern states and extremely cloudy localities. Solar house heating has considerable promise and will undoubtedly be the first wide-scale user of solar energy. Standardization and mass production of collectors and heat storage units would reduce initial costs to the point that the system could successfully compete with conventional heating equipment, eventually reducing home heating costs substantially, and at the same time saving much oil and coal.

Solar Energy Battery

Bell Telephone Laboratories is the "birthplace" of this amazing invention that may soon be commercially feasible for producing electricity. The battery is simple in construction, being made up of wafer thin strips of silicon, each ½ by 2 inches in size *(Fig. 2)*. It generates about ½ volt per strip, and delivers about 38 milliamperes of current per square centimeter of strip area. Invented by three men, C. S. Fuller, G. L. Pearson, and D. M. Chapin, the solar device makes use of p-n (positive-negative) junctions, which are also the bases of the junction transistor. A microscopic layer of foreign material (usually boron) is introduced into the silicon strips by heating the semi-conductor wafer with a boron-containing gas, which creates the p-n junction. When light hits the battery, electrons are displaced in the silicon and an electrical current is produced.

(Continued on page 42)



JOSEPH O. HIRSCHFELDER

Professor of Chemistry and Director of the Naval Research Laboratory at the University of Wisconsin, Dr. Hirschfelder has been judged by fellow scientists to be "one of the ten ablest physical chemists in the United States". An authority on nuclear energy, he participated at Los Alamos in the development of the atomic bomb, was chief phenomenologist at the first Bikini underwater tests, and was chairman of the board of editors for that popular civilian-defense handbook, "The Effects of Atomic Weapons".

He attended the University of Minnesota for two years, received his B.S. from Yale in 1931, and did postgraduate work at Princeton, where he received his Ph.D. in physics and chemistry in 1936. The following year he came to the University of Wisconsin as a research associate. In March of 1953 he was married to Elizabeth Sokolnikoff of the University math department.

In the reference work "Who Knows—and What", Hirschfelder is credited with having developed at Princeton, "the theory of absolute reaction rates, liquid structure, chemical reactions produced by ionizing radiation", and, at Wisconsin, research concerning "determination of intermolecular forces, gas imperfections, molecular quantum mechanics, semiempirical theory of activation energies".

He has contributed to numerous scientific publications in addition to the "Wisconsin Engineer", including the "Journal of Chemical Education", "Journal of Chemical Physics", and "Physical Review", and is co-author of a book published this year called "Molecular Theory of Gases and Liquids".

How We Ca
SCIENTIFIC

by Joseph

University of Wiscon

We will probably live for the rest of our lives in a state of cold war. We shall always have reason to fear a sudden attack on ourselves or our families. Most experts feel that a future war would be sudden and swift and provide us with little time for preparation. How then can America meet such an emergency?

If we maintain a large standing army, together with a large number of professional military scientists and technologists, we will unbalance our economy and lose the international battle for industrial supremacy. The loss of this battle would lose for us the support of foreign nations and leave us in a hopeless military situation. On these accounts it is clear that we must maintain our traditional "minute-men" philosophy and each one must do his part to defend the nation. Each one of us must carry on his normal civilian functions but at the same time he must be trained to take his part within a matter of hours in some function in support of the national defense.

Although the Defense Department has set up elaborate plans for the stand-by use of manufacturing facilities, to the best of my knowledge there is no stand-by plan for the use of individual scientists and technologists. Military men are all too prone to think of individuals at the same level of training as being interchangeable. Each scientist and technologist has a very specific area of proficiency which he has developed through years of specialized training. If scientists and technologists are to be used to best advantage in the national defense, each one must be assigned to a special emergency function, and steps must be taken to train him for the job which he would assume in time of danger. Scientists and technologists represent only one-tenth of one per cent of our population, but their relative importance to the military is tremendous because of the existence of hydrogen bombs, guided missiles, germ warfare, and other super weapons which only scientists can develop and control.

I would like to propose the following plan: First of all, the Weapons Systems Evaluation Group should be called upon to map out in a broad sense how many scientists would be required in time of emergency to work on each type of military problem. To assist in lay-

Best Utilize Our MANPOWER

Hirschfelder
Naval Research Laboratory

ing this out they could call upon operations research organizations, such as RAND Corporation and the ORO at Johns Hopkins University. Then they could call upon the National Academy of Sciences to reconstruct, once more, the National Defense Research Committee which operated very effectively during the last war. The National Academy of Sciences, the senior scientific organization in the United States, was set up by President Lincoln to advise him along military scientific lines during the Civil War, and has served all subsequent Presidents in preparing for the national defense. The National Research Council of the National Academy of Sciences has a scientific manpower section, which already has a listing of all of the scientists in the country and their capabilities. During the last war, the National Defense Research Committee had a large number of divisions, each under a top flight scientist, whose function it was to work with the military in solving some specific type of problem. Each scientist should become affiliated with one or more divisions of such an organization. Then he should have the opportunity for specialized training along the lines of his emergency utilization. It would be hoped that the stand-by organization would be set up to the point where a specific scientist would know to which laboratory he would report in time of emergency. Suppose this was the Aberdeen Ballistic Research Laboratory. Scientist X would spend one or two weeks per year working at Aberdeen, familiarizing himself with their problems, and during the rest of the year he would be on the lookout for new discoveries which could be applied to the solution of Aberdeen's problems. In effect then, the Ballistic Research Laboratory might maintain only a small number of permanent employees during peace time, but the laboratory's effective staff trained and ready for emergency service would be as large as the Weapons Systems Evaluation Group deemed optimum.

Such a utilization of skilled and established scientists would make the question of proper utilization of graduate students in science and engineering easy to solve. Each graduate student would also be assigned to a specific military emergency function. Preferably this would be in the field of special interest of his major professor. The major professor then could take an active role in the military training of his students. In some cases it would seem altogether desirable for the universities to set up academic courses on specific military scientific and technological subjects and these could be sponsored by the departments of military science. These students, like their professors, would be exempted from the usual military draft but, in view of their deferment, they would promise to train themselves for their specially assigned functions.

The scientific laboratories of the country should also be placed on a stand-by basis. If this has already been done, it is on such a super-secret basis that laboratory directors cannot assist in the development of their facilities along desirable lines. For example, I am the director of the University of Wisconsin Naval Research Laboratory, which has a staff of twenty-five chemists, physicists, and mathematicians. In a matter of hours we could switch our research from our unclassified basic scientific research to the solution of ordnance or atomic energy problems. But, not knowing how our group will be used, we cannot provide the specialized laboratory equipment which would be required, nor can we train our personnel in the type of problems with which they would be dealing, nor can we set up a repository for the classified documents giving background material which these people would need to use. Also, in time of emergency it would seem desirable for the University of Wisconsin to make use of the firing ranges and at least one of the laboratory buildings at the Badger Ordnance Works near Baraboo, yet no steps have been taken to provide such stand-by facilities.

Most of the scientists who worked with the military during the last war have completely lost contact with military problems, and no effort has been made to maintain their level of proficiency along these lines. On each university campus and in each major city there is at least one military reserve officers' technical unit which meets every other Tuesday night to be indoctrinated on military subjects. The very least which we could do would be to open these meetings up to highly trained and security cleared civilians. At the same time a small amount of funds could be provided to improve the quality of the programs for these meetings.

The whole subject of military utilization of civilians is difficult, because both military and scientific experts agree that scientists can perform best if they are not assigned military rank and if their orders are kept on a flexible basis so that they are free to follow their interesting leads and can maintain freedom of thought in connection with their research problems. This does not mean that scientists are less patriotic than soldiers. As a matter of fact, the percentage of casualties of scientists working in the National Defense Research Commission was higher than the overall percentage of casualties in the military during the last world war. Most scientists are anxious to do their part in helping in the

(Continued on page 40)

Taking a Job Interview

by Henry G. Goehring

Placement Director, College of Engineering

Each year questions are asked by many of our senior engineering students as to what they should do with respect to arranging interviews with company representatives visiting the campus and what suggestions could be offered concerning the manner in which they should conduct themselves. To each of these students it is pointed out that there can be no hard and fast formula or set of rules. Interviews are exchanges of information between interested parties, and personalities frequently direct the course the interview follows.

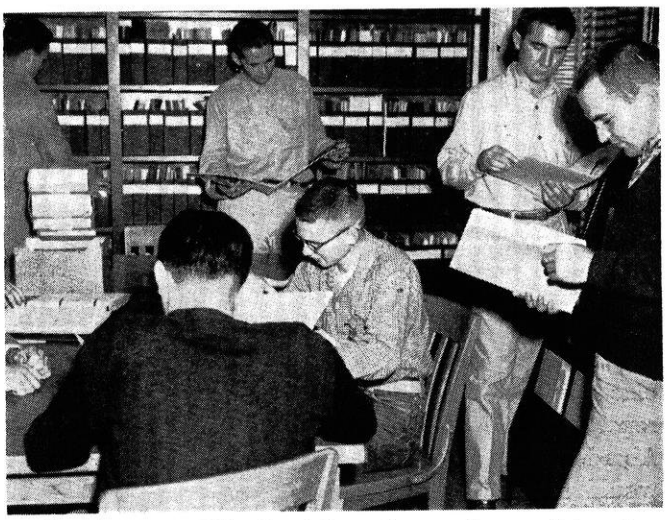
Engineering students are particuarly fortunate at the present time in having the opportunity to obtain information about employment opportunities in practically

Robert Gehrig, ChE 4, is shown taking an interview with A. D. Preston of the Chemstrand Corporation. Interviews are usually held on the second and third floors of the ME Building.

all areas of work in business and industry without leaving the campus. Frequently questions such as these are asked, "What opportunity does the petroleum or Chemical industry offer the Mechanical Engineer?" "What chance does an Electrical Engineer have with a manufacturer of mechanical products?" What place do high grades have in receiving consideration for employment?" "I have had to work a number of hours each week and did not have sufficient time to put on my studies, let alone participate in extra-curricular activities; how will that affect my chances for employment?" "Will employment be offered if I am required to enter the armed forces shortly after graduation?" and many similar queries.

All of these questions can be answered by experienced employer representatives during their visits to the campus. You can get the answers with respect to any one company by taking an interview. Frequently one company will be typical of the industry of which it is a part. You will find these representatives not only willing but eager to give you all the information possible about their individual companies. So it seems the procedure for the student is rather clear-cut—be sure to interview a representative group of employers, determine the opportunities available for one with your interests, and when you find an opportunity that appeals to you, try to "sell yourself."

There are a number of things an applicant can and should do if he is to shoulder his part of the responsibility of an interview. First of all, he should recognize that he is on the threshold of becoming a professional man. Personal integrity must be in evidence at all times. The practice of professional ethics helps to distinguish your appreciation of your chosen profession.



The Placement Office has information on dozens of American firms which are interested in hiring engineering graduates. Shown looking at some literature are (clockwise from top center): Jerry Slipper, Ronald DeBruin, Bob Reese, and sitting—Harvey Ulrich and Ed Riewe.

In addition, there are other personal characteristics that can help the student. He should be businesslike at all times. This includes personal appearance and manner of approach. When an interview has been arranged on a certain day, the applicant should start out in the morning with a clean shave, clean shirt, clothes in good condition and shoes shined. The normal wear and tear of the day will not detract from his appear-

(Continued on page 40)

The *Unwritten* Laws of Engineering*

Edited by Bob Hentges, ch'56

PART II: PURELY PERSONAL CONSIDERATIONS FOR ENGINEERS

The importance of the personal and sociological aspects of our behavior as engineers is brought out in the following quotation (1):

"In an analysis of over 4000 cases, it was found that 62 per cent of the employees discharged were unsatisfactory because of social unadaptability, only 38 per cent for technical incompetence."*

And yet about 99 per cent of the emphasis in the training of engineers is placed upon purely technical or formal education. In recent years, however, there has been a rapidly growing appreciation of the importance of "human engineering," not only in respect to relations between management and employees but also as regards the personal effectiveness of the individual worker, technical or otherwise. It should be obvious enough that a highly trained technological expert with a good character and personality is necessarily a better engineer and a great deal more valuable to his company than a sociological freak or misfit with the same technical training. This is largely a consequence of the elementary fact that in a normal organization no individual can get very far in accomplishing any worthwhile objectives without the voluntary co-operation of his associates; and the quantity and quality of such co-operation is determined by the "personality factor" more than anything else.

This subject of personality and character is, of course, very broad and much has been written and preached about it from the social, ethical, and religious points of view. The following "laws" are drawn up from the purely practical point of view based upon well-established principles of "good engineering practice," or upon consistently repeated experience. As in the preceding sections, the selections are limited to rules which are frequently violated, with unfortunate results, however obvious or bromidic they may appear.

"Laws" of Character and Personality

One of the most important personal traits is the ability to get along with all kinds of people. This is rather a comprehensive quality but it defines the prime requisite of personality in any type of industrial organization. No doubt this ability can be achieved by various formulas, although it is probably based mostly upon general, good-natured friendliness, together with fairly consistent observance of the "Golden Rule." The following "do's and don'ts" are more specific elements of such a formula:

1. Cultivate the tendency to appreciate the good qualities, rather than the shortcoming of each individual.

2. Do not give vent to impatience and annoyance on slight provocation. Some offensive individuals seem to develop a striking capacity for becoming annoyed, which they indulge with little or no restraint.

3. Do not harbor grudges after disagreements involving honest differences of opinion. Keep your arguments on an objective basis and leave personalities out as much as possible.

4. Form the habit of considering the feelings and interests of others.

5. Make it a rule to help the other fellow whenever an opportunity arises. Even if you're mean-spirited enough to derive no personal satisfaction from accommodating others it's a good investment. The business world demands and expects co-operation and teamwork among the members of an organization. It's smarter and pleasanter to give it freely and ungrudgingly, up to the point of unduly neglecting your own responsibilities.

6. Be particularly careful to be fair on all occasions. This means a good deal more than just being fair, upon demand. All of us are frequently unfair, unintentionally, simply because we do not habitually view the matter from the other fellow's point of view, to be sure that his interests are fairly protected.

7. Do not take yourself or your work too seriously. A normal healthy sense of humor, under reasonable control, is much more becoming, even to an executive, than a chronically soured dead-pan, a perpetually unrelieved air of deadly seriousness, or the pompous solemn dignity of a stuffed owl.

8. Put yourself out just a little to be genuinely cordial in greeting people. True cordiality is, of course, spontaneous and should never be affected, but neither should it be inhibited. We all know people who invariably pass us in the hall or encounter us elsewhere without a shadow of recognition. Whether this be due to inhibition or preoccupation we cannot help feeling

(Continued on page 34)

* "Industrial Management," by R. H. Lansburgh & W. R. Spriegel, third edition, John Wiley & Sons, Inc., New York, N. Y., 1940.

William R. Parlett, Cornell '48, Sets Sights on Executive Sales Job

"Within the next ten years", says William R. Parlett, young Worthington Sales Engineer, "many of the officers of the corporation, district office sales managers and top salesmen will be retired.

"Appreciating the fact that someone must fill these jobs, our management is striving to develop capable leadership among the younger men of the corporation.

"As a prospective Worthington Sales Engineer, I received several months of classroom instruction by works managers, top sales personnel and application engineers at all of the Worthington plants. The background I obtained was a sound basis for further development and learning gained in one of the product sales divisions and then in a district sales office. After obtaining sufficient product knowledge and sales training, I was ready to sell directly to industry. As more important sales assignments are available, I feel I will progress in proportion to my own development and sales performance.

"As a Worthington salesman I contact a class of trade with which it is a pleasure to do business. The company's reputation is a key to a welcome reception by my customers.

"I have found that with Worthington you have job satisfaction, adequate compensation, and unlimited opportunity."

When you're thinking of a good job, think *high*—think *Worthington.* 3.6

FOR ADDITIONAL INFORMATION, see your College Placement Bureau or write to the Personnel and Training Department, Worthington Corporation, Harrison, N. J.

WORTHINGTON

The Sign of Value Around the World

tonight

This man could almost reach the moon tonight... for he stands at the brink of a new age in the conquest of space, and he knows this:

If we had to, we could get him there. Given time and urgent need, we could design, build and deliver the total solution to that problem.

An entirely new development in the aircraft industry now makes this possible. It is a science and a method of developing aircraft, guided missiles and electronic systems not as traditional flying vehicles but as fully coordinated solutions to operations problems.

Today, The Glenn L. Martin Company's creative engineering resources and production facilities are among the finest in the new world of weapons systems development.

And one of the reasons for Martin's dynamic future in this new world is basic to leadership in any organization:

There is always an opening for outstanding ability.

MARTIN

BALTIMORE · MARYLAND

W. S. P. E.

WISCONSIN SOCIETY OF PROFESSIONAL ENGINEERS

Minnesota High Court Upholds Registration Ordinance

A decision of the Supreme Court of Minnesota holds that a city may require that certain plans bear the endorsement of a registered professional engineer. The test case involved heating and ventilating specifications for new construction of a major commercial nature. A summary of the court's decision is found in the October 1954 issue of the *American Engineer.*

Annual Meeting

The 12th annual meeting of W.S.P.E. will be held January 27th through the 29th in Milwaukee. The Schroeder Hotel will be headquarters for members attending. Information concerning the speakers and agenda will appear in this column in the January issue.

Appointments

President Steinmetz reported that Mr. Carl Holdampf had been recommended for appointment to the Building Code Board of the Industrial Commission.

President Steinmetz announced the following appointments to the Awards Committee:

Fred T. Agthe, *Chairman*
Ben G. Elliott
O. J. Muegge

President Steinmetz announced the appointment of Robert H. Hopwood as Chairman of the Consulting Functional Group of WSPE.

Progress Report #3

October 25, 1954

The membership campaign is moving forward. Last Saturday at Milwaukee the WSPE Board of Directors approved 14 applications, 12 Members and 2 Affiliates. The results are tabulated as follows, with FRV in first place again.

Chapter	P.E.'s & E-T-T's not Members of Affiliates 7/1/54–7/1/55 P.E.'s	E-I-T's	Membership 7/1/54	Quota	Sponsors for New Members 7/1–10/23	% of Quota
Fox River Valley ..	275		150	50	11	22.0%
Northwest	60		53	15	3	20.0%
Western	20		63	20	3	15.0%
Southwest	325		229	65	9	13.8%
Milwaukee	1,600	Est. 900	411	165	11	6.7%
Southeast	260		72	30	1	3.3%
Wisconsin Valley ..	60		52	15	0	0
Out of State	800	100	52	0		
Total	3,400	1,000	1,082	360	38	10.5%

Michigan Challenge

Following is a copy of the letter received from Wesley Bintz, president of M.S.P.E., in response to our challenge on membership drive extended to the Michigan Society by the writer with the approval of our president and chairman of the membership committee. A similar challenge was extended to the Minnesota Chapter as a renewal of last year's contest, but acceptance of this challenge has not been received by the writer to date.

These challenges have been extended in order to cooperate with the N.S.P.E. membership program and the competitive spirit instituted by N.S.P.E. on a national basis. It is suggested that future bulletins from the office of the chairman of the Membership Committee publicize these contests and request the continued cooperation of the chapter chairmen.

"Your Challenge regarding membership drive accepted with alacrity, on basis of increase in new members since July 1, 1954. However, five pounds of cheese won't take care of 25 Board Members at a pound each. Make it twenty-five pounds. Against your stinking cheese, we'll put up a pancake supper to your W.S.P.E. Board, to be given in Milwaukee, and this sup-

(Continued on page 24)

Meet the President

HARVEY E. WIRTH
Southwest Chapter

Mr. Harvey E. Wirth, newly elected president of the southwest chapter, has worked with the Wisconsin State Board of Health since his graduation from the University of Wisconsin in 1938. The only exception during this period occurred from 1942 to 1945 when Mr. Wirth served with the Corps of Engineers and the Army Air Force as a sanitary engineer. He was awarded the Bronze Star Medal for meritorious service as sanitary engineer of the Nineteenth Tactical Air Command. His final assignment was in capacity of Chief Sanitary Engineer of the Ninth Air Force. Mr. Wirth's present position is assistant state sanitary engineer in Wisconsin.

Born in Milwaukee on April 14, 1913, Mr. Wirth studied civil engineering at the University of Wisconsin, receiving a B.S. degree, and specialized in public health engineering at the University of Minnesota. He is affiliated with the American Waterworks Association and several public health societies. Mr. Wirth also serves as chairman of the board of trustees for the First Baptist Church of Madison. Prior to his election to the presidency of the southwest chapter, he was active in connection with registration promotion.

Mr. Wirth and Flora Jane Roberts were wed in 1942. They have three children.

W.S.P.E.

(Continued from page 22)

per will be put on (of course, it will never be necessary) by the President and Secretary and Chairman of the Membership Committee of M.S.P.E. personally. Please acknowledge acceptance pronto.

I might say that these pancakes which you can think about until next June, and which you aren't going to get, are not the tough tasteless kind that you get in the ordinary restaurant. They're the kind that melt in your mouth, believe it or not. I raised the Grand Valley Chapter here locally when I was president from 65 to 173 members. To all those who sold a membership, I gave a free pancake supper. Those who didn't sell anything paid for their supper, Worked out very nicely. I am sure that this will be a lot of fun, and if we should be so unfortunate as to have to put on that pancake supper for your Board—incidentally, how many are there of you—I think that we probably can get some good publicity out of it and a picture in the American Engineer.

I should like to present at the next Board meeting on November the 17th an acceptance of this proposal, and I am sure that I will have an answer by that time."

Very sincerely yours,
(signed) WESLEY BINTZ, P.E.
President, M.S.P.E.

New Members

Most engineers are budget-minded. Therefore make certain your workers point out that this is the season of lowest price. Between August 16 and November 16 the rate is only $4.50 plus $3.00 admission fee. All applications dated after November 15 must be accompanied by full 1955 dues, $18.00, plus $3.00 admission fee.

Following is the list of members admitted October 23, 1954 and their sponsors.

Fox River Valley	*Sponsored by*
Max J. Bauer	L. H. Kingston
Richard C. Straub ..	L. H. Kingston
William H. Scheer	D. T. Kottke
Fox River Valley	*Sponsored by*
John C. Kurtyka ..	W. E. Schubert
William W. Rumsey ..	W. G. Bryan
Milwaukee	
Francis C. Wilson	O. N. Nelson
Northwest	
Edward Hoeppner...	M. R. Charleson
Robert P. Pecore (Aff.)	W. F. Baumgartner
Southwest	
Donald E. Fugere	Clarence E. Maso
John D. Howard	C. F. Dobson
William J. Kerttula ..	C. M. Perlman
Ralph D. Culbertson	Leo Kosak
Richard H. Jann (Aff.)	W. S. Cottingham
Out of State	
Gerald A. Loew	Frank L. Carlson (W)

Report of Young Engineers Committee

Young Engineers Committee Urges that NSPE Board of Direction endorse the following program.

(A) *At National Level:*

1. Change name of E.I.T. to Junior Member.

2. The Committee recommends that the President of NSPE, in his committee appointments, make provision for a Junior Member on such National Committees that directly affect the development of the young engineer.

3. Preparation of a brochure listing professional objectives, professional obligations, service opportunities and benefits offered to new Junior Members.

4. The Committee recommends that subsequent Young Engineers Committees be charged with the development of a series of programs of national scope, for and by Junior Members.

5. The Committee recommends active assistance to Junior Members, including:

a. A Young Engineers page in the American Engineer devoted to items of interest to these young members.

b. The Committee recommends that subsequent Young Engineers Committees act as an executive committee for an enlarged advisory and guidance committee, consisting of the Young Engineers Committee and one member from each member State Society, whose duty would be a periodic check and guidance service for Junior Members to speed, increase and encourage their professional development.

(B) *At State Level:*

1. The program at the State level should be compatible and in full cooperation with the National Society's program.

2. Prepare and distribute a letter of congratulation and a recommendation to become registered to all graduate engineering seniors within the state.

3. A "Courtesy Card" to be issued all graduating engineers in the state's engineering schools. This card will entitle the graduate to privileges in the local chapter nearest their residence until he can join the Society as a Junior Member.

4. Furnish speakers for Student Meetings on professional subjects.

5. Provide counselor service to undergraduate engineering college students by practicing professional engineers in cooperation with the regular engineering faculty of the school.

6. Chapters of State Societies to assist student engineers in finding part-time employment where necessary.

7. Furnish speakers to high schools, outlining the possibilities of an engineering career.

8. State Member Societies to sponsor Student Chapters or Councils in the various engineering institutions of the State.

9. Member State Societies to give full consideration to the problem of voting privileges for Junior Members.

10. Member State Societies to give full consideration to the problems of State Office holding privileges for the Junior Member at the State and Chapter level.

11. It is the recommendation of the Committee that the member State Societies and local chapters permit a Junior Member representative on all State and Chapter level committees.

12. It is the recommendation by the Committee that member State Societies and Local Chapters sponsor special programs of statewide or local scope for and by Junior Members.

(C) *At the University Level:*

1. Encourage and assist in the organization and operation of Student Chapters or Councils under State Member Society sponsorship.

2. Encourage cooperative and joint meetings with State Member Societies.

3. Encourage interchange of ideas through organization of State Conferences of Student Chapters.

4. Encourage active participation in Engineers Week Programs.

5. Encourage the engineering faculties to emphasize and assist the students in their development of an active professional interest.

Respectfully submitted,

YOUNG ENGINEERS COMMITTEE
MILTON LITE, P. E.
RICHARD E. POTTER, P. E.
FRANK W. EDWARDS, P. E.
EARL V. MILLER, P. E.
L. R. MAST, E.I.T., P. E.
N. A. BLESHMAN, E.I.T., P. E.
E. W. CARLTON, *Chairman*

WSPE PROPOSED BUDGET 1954–55

September 18, 1954

Receipts

Estimated State share	
Adm. Fees	$ 300.00
Dues	6,410.00
	$6,710.00

Expenditures

Board of Directors' Expense	400.00
President's Expense	50.00
National Representatives Expense	300.00
Committees	
Fees and Classification	10.00
Membership	300.00
Nominating	50.00
Public Relations	50.00
Publications	1,300.00
Awards	10.00
Program	100.00
Directory	1,000.00
Legislative	50.00
Secretary's Office	
Honorarium	1,200.00
Secretarial Help	800.00
Social Security	30.00
Postage	200.00
Stationery and Printing	250.00
Addressograph and Mimeograph	$ 400.00
Telephone and Telegraph	10.00
Supplies	200.00
	$6,710.00

TREASURER'S REPORT

October 23, 1954

Cash Balance September 18, 1954	$3,621.85
Income Sept. 18—Oct. 23, 1954 (Dues)	390.00
	$4,011.85
Expenditures Sept. 18—Oct. 23, 1954	987.39
Cash Balance Oct. 23, 1954	$3,024.46
Cash Balance Oct. 23, 1953	$3,436.38

NSPE Completes Plans for New Headquarters Building in Washington

Architectural and engineering plans are nearing completion for the new headquarters building in Washington, D. C., of the National Society of Professional Engineers.

Located in the Northwest section of the Capital, the approximately $300,000, four-story, granite frame building will house the executive and administrative offices of the 33,000 member Society.

Financing of the new headquarters will be handled through the sale of building fund participation certificates to the membership.

The architectural work is being done by Lawrie and Green of Harrisburg, Pennsylvania, and Justement, Elam, & Darby of Washington, D. C., associated architects. The structural engineers are Beall and LeMay, and the mechanical and electrical engineers are C. Warren Bogan and Associates, both firms of Washington, D. C.

Contracts for the building will be awarded around the first of the year and construction will begin in January. The Society plans to occupy the new headquarters by the early fall of 1955.

The building, with a strikingly modern 40-foot frontage on K Street, N. W., will have window spandrels of polished serpentine stone. The windows and mullions separating the spandrels will be aluminum.

The concrete columns and footings have been designed to permit the addition of two more stories to the building. The basement and first two floors will be occupied by the Society, and the top two floors will be rented as office and meeting room space for local engineering groups.

The building will also house the offices of the *American Engineer*, monthly magazine published by the National Society.

Fully air conditioned, the building will have elevators, fluorescent and incandescent lighting, and will contain approximately 17,500 square feet of floor space. Parking facilities for a limited number of automobiles will be available at the rear of the building under an overhang of the first floor.

The National Society now rents office space in two downtown Washington buildings.

Clarence T. Shoch, NSPE president, called the decision to build a headquarters building "an inevitable one in view of the growth of the National Society in the postwar years."

Headquarters Building Program

Chairman S. Stolte of the *Headquarters Housing Committee* presented a resolution to the Board in connection with financing the N.S.P.E. Headquarters Building. The resolution provides for the following:

1. Authorize borrowing $400,000.00 from N.S.P.E. members.
2. Permit sale of National Headquarters Building Fund 4% Participation Certificates due December 1, 1974, in denominations of $100.00 each.
3. Authorize expenditure of $400,000.00 by the officers of N.S.P.E.

The Headquarters Building will consist of four floors and basement

providing 12,500 square feet total usable floor space. Both the Engineers Club of Washington, D. C. and The Society of American Military Engineers have expressed a desire to rent floors in this building.

About $1,100,000 was pledged by N.S.P.E. members.

Chapter News

MILWAUKEE CHAPTER
ROBERT J. MENDENHALL
Reporter

Hans P. Dahlstrand, surrounded by friends and former associates, was honored on the eve of his eightieth birthday at the September 23 Noon Luncheon of the Milwaukee chapter.

Dahlstrand, recognized as the dean of American steam turbine engineers, was very active in WSPE and other technical societies before his retirement in 1951 from the Allis-Chalmers Manufacturing Company of Milwaukee. His engineering success was surpassed only by his years spent in training young engineers.

At the age of 23, Hans, as he is known to his many friends, began his engineering career at Arboga, Sweden, after receiving his mechanical engineering degree from Boros College of Technology. At the Arboga Mechanical Works, he helped "draw up" the early versions of water turbines, which even today supply about 90% of Sweden's electric power.

Opportunities in the United States beckoned Hans, so in 1903 he joined the Hartford Rubber Works Company, now known as the U. S. Rubber Company, and in 1904 he began his work on steam turbines with Allis-Chalmers. One of his first responsibilities after becoming chief engineer of the steam turbine department in 1915, was the development of the Du Pont Line of 300 to 125 Kw steam turbines for powder plants, which mushroomed prior to and during the First World War years.

In 1930 Dahlstrand's greatest accomplishments had their beginning. A 60,000 Kw single-cylinder double-exhaust steam turbine was designed for the Lakeside Power Plant of the Milwaukee Electric Railway and Light Company. Success of this unit created the demand for an 80,000 kw tandem-compound reheat steam turbine-generator unit for the Port Washington Plant in 1930. In 1942 Dahlstrand was named consulting engineer, and in 1948 he was appointed to the emeritus position of director of steam turbine engineering at Allis-Chalmers.

Dahlstrand was a member of the internationally recognized test code committee of the ASME from 1918 to 1946 and was named a Fellow of the society in 1947. He is also an honorary member of Pi Tau Sigma, national fraternal engineering honor society, and is a past president of the Engineers' Society of Milwaukee.

Many significant technical papers and lectures by Dahlstrand on the subject of steam turbines are on record, particularly his 1925 ASME paper proposing the advantages of Topping turbines. About 20 patents have been granted him and he has contributed many outstanding improvements in steam turbine engineering.

Dahlstrand is a member of the American Scandinavian Foundation, the American Swedish Historical Museum of Philadelphia, and the Scandinavian Society of Milwaukee. He is also a member of the American Museum of Natural History in Manhattan.

In June, 1950, he was cited by the University of Wisconsin in recognition of his "eminent professional services." He is listed in both "Who's Who in America" and "Who's Who in Engineering."

* * *

Charles W. Yoder, P.E., consulting engineer and a member of the Milwaukee chapter WSPE, in addressing the September meeting of the New York metropolitan section of the American Society of Civil Engineers, cited four reasons favorable to the growth of collective bargaining among engineers.

These are, union pressure, economic pressure, large organizations employing sizeable numbers of engineers, and slow advancement and specialization.

Mr. Yoder, vice-chairman of the ASCE employment conditions committee, indicated that ASCE's policy is designed to "protect engineers against the inroads of labor unions."

FOX RIVER VALLEY CHAPTER
JOHN K. PRIMM
Reporter

Professional engineers of the Fox River Valley Chapter, Wisconsin Society of Professional Engineers, last night heard Willis D. Kimmel, district engineer for the Portland Cement Association give a slide talk on "New Developments in Concrete". Kimmel was introduced by Berry Brevik, PCA field engineer and a member of the Chapter.

Kimmel outlined recent important trends in concrete structures and shapes, how these are now brought ready-made to a building site and quickly erected into sturdy functional buildings, bridges, and other structures. "Pre-stressed concrete, a tremendous and popular development of recent times, allows very close control of product quality," Kimmel stated, "and this engineering control is an important factor in producing better buildings at lower costs." Of the 225 factories in the U. S. now making structural units, about 45 already are producing prestressed concrete products.

Chapter President Wayne Bryan, Neenah, announced that examinations for registration as Professional Engineer will be held in Madison, Jan. 31–Feb. 1, 1955 by the Wis. Board of Architects and Professional Engineers, with further information available from W. A. Piper, Board secretary, 1140 State Office Bldg., Madison.

(Continued on page 38)

QUARTZ CRYSTALS

How a 1¼ hour "gem-cutting" operation became an 8-minute mechanized job

PROBLEM: Preparing quartz crystals for use as electronic frequency controls calls for the highest degree of precision. So much so, in fact, that prior to World War II skilled gem-cutters were employed to do the job.

But during the war, there were not enough gem-cutters to keep up with the demand for crystals in radar, military communications and other applications.

Western Electric tackled the job of building into machines the skill and precision that had previously called for the most highly skilled operators.

SOLUTION: Here is how quartz crystals are made now—by semi-skilled labor in a fraction of the time formerly required:

A quartz stone is sliced into wafers on a reciprocating diamond-edged saw, after determination of optical and electrical axes by means of an oil bath and an X-ray machine. Hairline accuracy is assured by an orienting fixture.

The wafers are cut into rectangles on machines equipped with diamond saws. The human element is practically eliminated by means of adjustable stops and other semi-automatic features.

The quartz rectangles are lapped automatically to a thickness tolerance of plus or minus .0001". A timer prevents overlapping. Finally, edges are ground to specific length and width dimensions on machines with fully automatic microfeed systems.

Most of these machines were either completely or largely designed and developed by Western Electric engineers.

RESULTS: With skill built into the machines —with costly hand operations eliminated— this Western Electric mechanization program raised production of quartz crystals from a few thousand a year to nearly a million a month during the war years. This is just one of the many unusual jobs undertaken and solved by Western Electric engineers.

Quartz stones are cut into wafers on this diamond-edged saw, with orientation to optical axis controlled by fixture. This is just one of several types of machines designed and developed by Western Electric engineers to mechanize quartz cutting.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Manufacturing plants in Chicago, Ill.; Kearny, N. J.; Baltimore, Md.; Indianapolis, Ind.; Allentown and Laureldale, Pa.; Burlington, Greensboro and Winston-Salem, N. C.; Buffalo, N. Y.; Haverhill and Lawrence, Mass.; Lincoln, Neb.; St. Paul and Duluth, Minn. Distributing Centers in 29 cities and Installation headquarters in 15 cities. Company headquarters, 195 Broadway, New York City.

Schroeder's

ENGINE-EARS

by Ron Schroeder m'57

A.I.Ch.E.

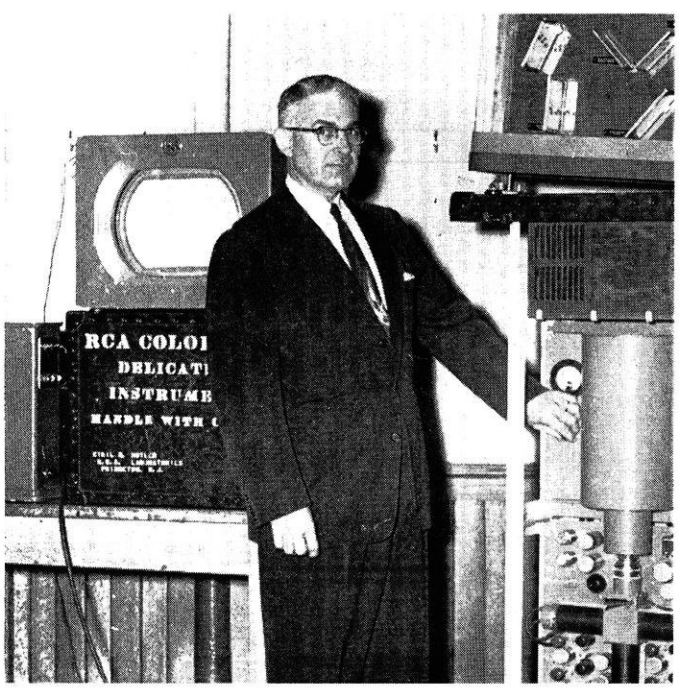
A.I.Ch.E. opened its 1954–55 year with an open house in the Chemical Engineering Building on Oct. 13th. All freshmen, sophomore and junior Ch.E.'s were invited to this gay affair. They were welcomed by Prof. Haugen, who gave an interesting welcoming address. A tour of the different laboratories in the building followed the opening address. A Guessometric Contest was conducted along with the tour, and small but practical prizes were awarded to the best guessers.

The serving of cider and doughnuts (about a half dozen per person) brought the open house to a successful end.

At the first meeting of the organization on Oct. 27th, in the Top Flight Room in the Union, Mr. Louis P. Shannon from the Du Pont Company spoke on "Let's Look at Tomorrow." He told of the research department at Du Pont, their work, and some of the products they have developed and discovered. His talk was very well received by the 50 or more members at the meeting. Five or six seniors stayed well after the meeting was over to try and finish the quarter barrel of beer, but they were unsuccessful.

KAPPA ETA KAPPA

The Delta Chapter of Kappa Eta Kappa pledged 13 Electrical Engineering students Monday evening, October 18th. The new pledges are David Bratz, Ronald Gollhardt, Richard Kraemer, John Liefer, Charles Luebke, Herbert Peter, Deronda Randall, Robert Richardson, William R. Stringer, Max J. Tolzman, Warren Watson, Clarence Yahn, Jr., and Bernard Rae. These men will help push forward the ideals and aims of this National Professional and Social Electrical Engineering Fraternity. These aims and ideals are to foster and promote fraternal relationships among the faculty and Electrical Engineering students.



Mr. Hoyler, RCA Color TV Demonstrator

COLOR TELEVISION

The accompanying photo was taken at a lecture on "Principles of Color Television," given by Mr. Cyril N. Hoyler, manager of technical relations of the Radio Corporation of America's laboratories. The lecture covered color television materials and systems including Phosphors, Colorimetry, Color Kinescope, and Flying Spot Scanners. Mr. Hoyler lectured on Monday, November 8 in the Education Building.

ASAE

"What is an Ag. Engineer?" is the most common question asked of any of the Agricultural Engineering students on campus. A graduate Ag. Engineer from the University of Wisconsin is an engineer plus a graduate from the College of Agriculture, or possibly he is a graduate in Agriculture and has taken courses that prepare him for mechanical, electrical, or structural problems of a career in handling farm equipment. Actually most students start in Agriculture and then finish their Mechanical Engineering requirements. They are of farm background and like problems in the field of engineering they have chosen.

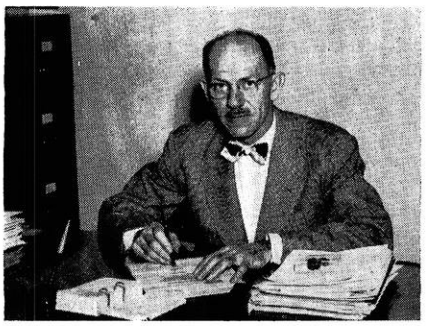
These students on this campus have their own organization which is a Student Branch of the national organization, the American Society of Agricultural Engineers. The functions of the Student Branch

(Continued on page 37)

DEANS' COLUMN

KURT F. WENDT
Dean College of Engineering
•
W. R. MARSHALL, JR.
Associate Dean
•
K. G. SHIELS
Assistant Dean

At the invitation of Kneeland Godfrey, editor of your Wisconsin Engineer, we are embarking on an experiment with this issue of the magazine. For the balance of the year Dean Marshall, Dean Shiels and I will take turns in preparing a column of notes and observations on matters that, we hope, will prove to be of interest.



KURT F. WENDT

Most of you realize that we still face a critical shortage of engineers, and that industry is still seeking many more trained men than are presently available. This situation will gradually improve as our enrollments in engineering colleges across the country increase. Nevertheless, it will probably be sometime between 1958 and 1960 before our annual crop of engineering graduates becomes large enough barely to meet current annual replacement demands. In the meantime the backlog demand continues to increase. Barring a sharp depression, the total number of engineers required by industry will also continue to grow rapidly in step with the increasing complexity of technology. But sheer numbers of engineers is not enough. Above all we need top quality.

In school, grades still constitute the best measure of quality that we have available. True, there are many outside activities that greatly enrich a student's life and contribute importantly to a well rounded education. These should not be neglected. Reasonably good scholarship must be maintained, however, if good quality is to be assured. Last week I had the pleasure of announcing Sophomore Honor and High Honor awards. These will be found elsewhere in this magazine. Each man on the list has earned the sincere congratulations of the faculty for an excellent job. We hope that the list will grow ever longer during the years ahead.

By the time this issue is off the press the national honor societies in the several departments and the national all-engineering honor fraternity, Tau Beta Pi, will be announcing elections for this semester. All involve high scholarship, good character, and personality. It is a matter of real distinction as well as personal satisfaction to achieve such recognition. Every one of you should strive to reach such a goal.

If you are having scholastic difficulties, see the instructor in the course or consult your adviser early. Don't delay. You will find them anxious and willing to help, but you must take the initiative in seeking their assistance. Many aids are available through the University counselling services to help you overcome troubles of many kinds, and your adviser is in a position to assist you to obtain the specific kind of help that you require. To be successful you must develop good study habits, prepare an adequate time budget, and stick to it! Meet your troubles and face up to them. If you wait until they catch up with you and get you down, it will probably be too late.

You owe it to yourself and to the profession for which you are preparing to do the best job of which you are capable. Over the years Wisconsin engineers have earned an excellent reputation. Let's keep it that way.

—KURT F. WENDT

CAMPUS NEWS SECTION

THE AMERICAN WELDING SOCIETY UNDERGRADUATE WELDING AWARDS

The American Welding Society will award $700.00 in prizes for the two best articles on welding to appear in undergraduate publications during the current school year. Author of the best article and the student magazine or paper in which it appears will each receive $200.00. Author of the second best article and the publication in which it appears will each receive $150.00.

These awards are made annually by the American Welding Society under the A. F. Davis Undergraduate Welding Award program. Sponsored by A. F. Davis, Vice President and Secretary of the Lincoln Electric Company, Cleveland, Ohio, the program's purpose is to stimulate interest of college students in the art and use of welding.

Articles on any type of welding or its application to design and construction will qualify. To be eligible, the article must be published between April 1, 1954 and June 1, 1955.

Posters giving more detailed information are on display in prominent places in the engineering buildings. Further information can also be obtained from the Dean's office.

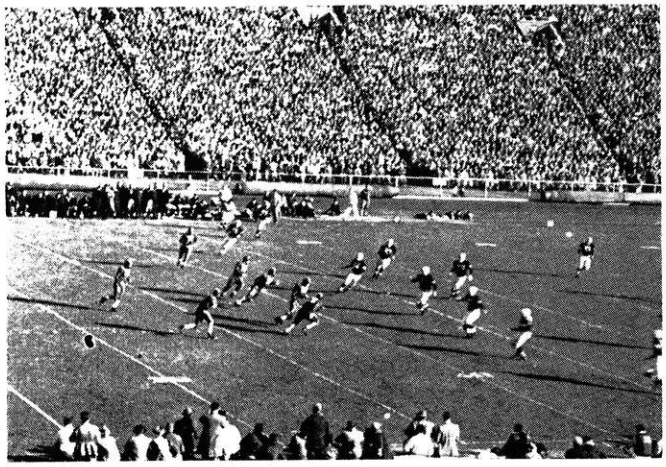
★

SILENT HOIST AND CRANE COMPANY MATERIAL HANDLING PRIZE AWARD

The income accruing from a permanent trust fund established by the Wunsch Foundation, Inc. is

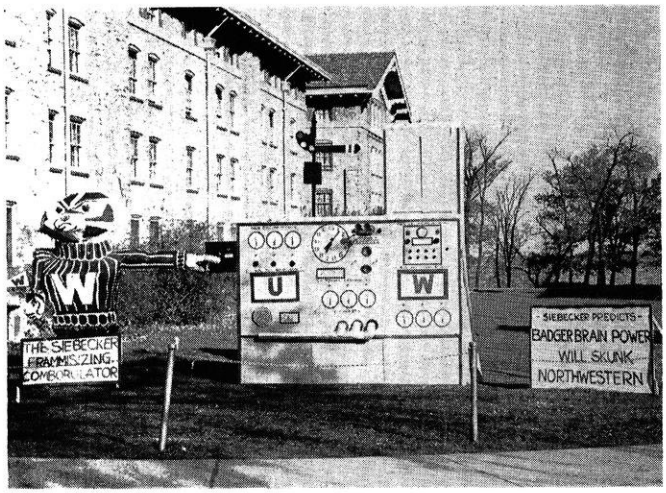
(Continued on page 31)

HOMECOMING—1954

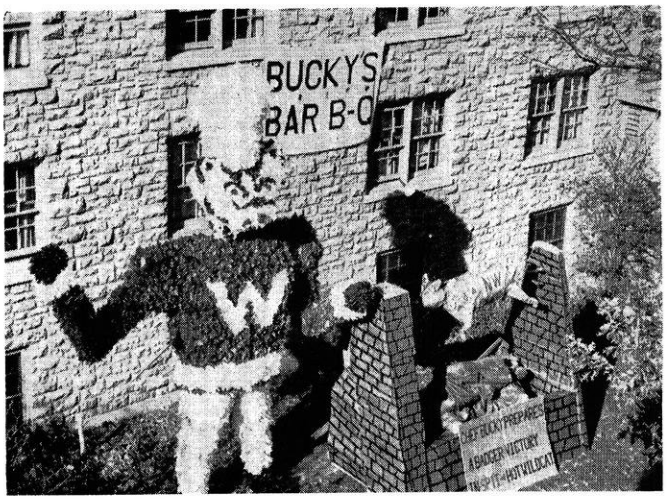


The homecoming victory provided a fitting climax to the festivities.

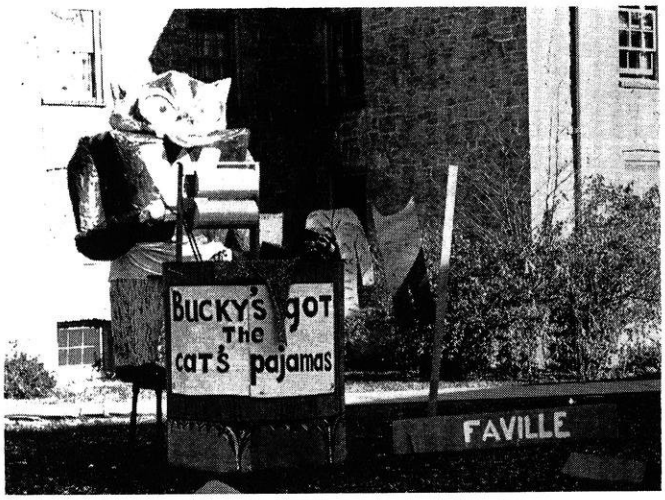
Tau Kappa Epsilon's all campus trophy winner.



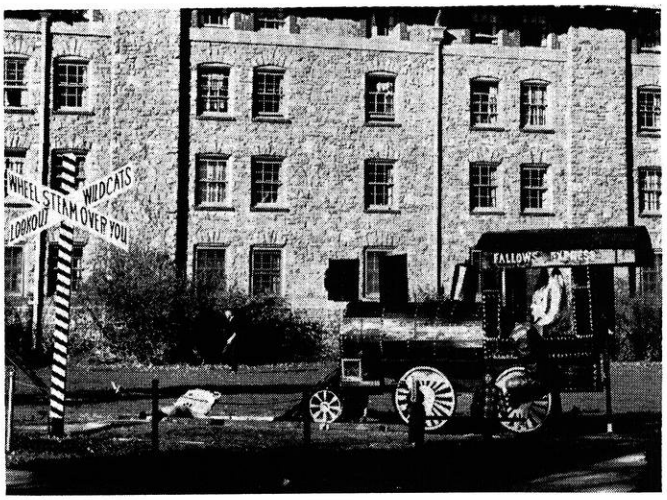
Siebecker's engineering mastery won first place in the dorms.



Jones proposed to give the Wildcat a hot time.



Faville's display boldly announces its theme.



Fallows' display, when visible through the steam, rolled over Northwestern.

Campus News Section

SILENT HOIST AND CRANE

(Continued from page 29)

awarded annually to University students submitting the best papers on the subject of Materials Handling. The Wunsch Foundation established this fund to promote the application of sound economic and scientific principles to materials handling and to stimulate the interest of University students in this subject.

The prize awards for 1955 will be $100, $75, $25, and 8 awards of $10 each; they will be granted on June 1, 1955 by a board of review which will judge the papers.

The rules for the contest: (1) The competition is open to all members of the student body, graduate and undergraduate, of the University of Wisconsin; (2) Papers must be submitted in duplicate on or before April 1, 1955; (3) Papers on any phase of materials handling in any field are eligible; (4) Papers will be judged on originality, organization, style, clarity of exposition, and significance of the information presented.

The Board of Review Professors: H. D. Bruhn (Agr. Engineering), H. E. Kubly (Commerce), J. W. McNaul (Mech. Engineering). Further information should be obtained from one of these men.

END

We wish to apologize for omitting the announcement of this contest in the November issue. The 1953–54 Prize Winning Article entitled "The Smith-way," by James R. Bley bore a reference to page 31 of that issue, which was to have included this announcement.

ASCE held a dance, "Transiteer's Twirl," at Tripp Commons in the Union on Friday, November 19. Shown (left to right) are: Don Landberg, Dance Chairman; Joan Seabath; Margo Herman; and Dick Gilbertson, President of the ASCE student chapter.

COLLEGE OF ENGINEERING

1953–54

SOPHOMORE HIGH HONORS

CHEMICAL ENGINEERING

Douglas, Ronald L. 2.94
Baumgartner, Jon H. 2.89

MECHANICAL ENGINEERING

Morsell, A. Lee, III 2.88
Luhman, Frederick A. 2.63
Overbye, Vern D. 2.63

METALLURGICAL ENGINEERING

Schendel, Danny E. 2.68

CIVIL ENGINEERING

Pike, Rodney G. 2.64

ELECTRICAL ENGINEERING

Harrison, Raymond E. 2.87
Costen, Robert C. 2.85
Kingsley, Jack D. 2.75
Reinhardt, James J. 2.69
Clement, Oliver R. 2.68
Engel, Robert F. 2.67
Niebuhr, Kenneth E. 2.65

SOPHOMORE HONORS

BIO-CHEMICAL ENGINEERING

Hurley, Thomas W. 2.60
Weinauer, Dietrich E. 2.43

CHEMICAL ENGINEERING

Nordby, Robert A. 2.60
Lehto, Delbert L. 2.48
Thygeson, Robert A. 2.41
Marshall, Wm. G. 2.38
Williams, Duane A. 2.35
Heller, James T. 2.28

CIVIL ENGINEERING

Albrecht, John M. 2.57
O'Sheridan, Thomas C. 2.32

METALLURGICAL ENGINEERING

Goehring, Henry G., Jr. 2.52
Baumann, Hilbert W. 2.26

ELECTRICAL ENGINEERING

Hannon, David L. 2.67
Kilger, Charles F., Jr. 2.55
McKeough, Patrick J. 2.48
Schauer, Robert J. 2.40
Wagner, Marlin H. 2.38
Buss, Jerrold L. 2.37
Fitzgerald, Gregory E. 2.32
Baker, John S. 2.31
Evans, Orville R. 2.28
Hartmann, David P. 2.25

MECHANICAL ENGINEERING

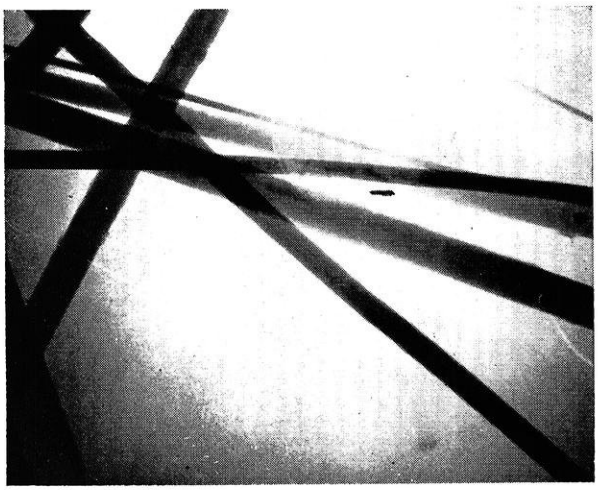
Lewis, Carl M. 2.47
Krist, Fred C. 2.42
Stieg, Richard F. 2.35
Schubring, Allin W. 2.32

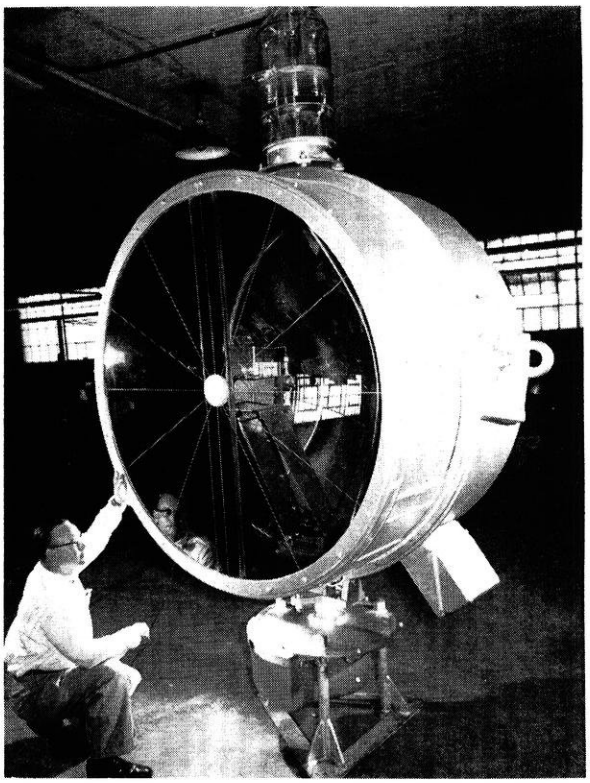
MINING ENGINEERING

Martens, Don W. 2.42

SCIENCE HIGHLIGHTS

Edited by Carl Burnard, CiE'57





HOLLOW HAIR

You probably didn't realize your hair is hollow, but this photograph, taken with General Electric's new X-ray Microscope, proves that it is. That light gray line in the center of each of these criss-crossed strands denotes the hollow center. A prototype model of the X-ray Microscope has been built by the Company's General Engineering Laboratory and after further refinements in design, it will be manufactured by G.E.'s X-Ray Department in Milwaukee, Wisconsin. The first of its kind in the United States, it is expected to find wide use in such fields as medicine, biology, chemistry and metallurgy.

GIANT SEARCHLIGHT

One of the world's largest and brightest searchlights, capable of throwing its beam approximately 120 miles, has been shipped to Dallas, Texas, by the Westinghouse Electric Corporation's lighting division plant at Cleveland, Ohio.

The huge light, containing a 2500-watt short-arc mercury-vapor discharge lamp, will develop 275,000,000 candlepower. It has a reflector five feet in diameter, stands more than 11 feet high, and weighs 1200 pounds.

The unit will be installed as an attention-drawing beacon atop the new 150-foot-high ornamental tower of the Republic National Bank Building in Dallas. When in place, the searchlight will be 598 feet above the street level.

Originally a carbon arc light used as an antiaircraft searchlight during World War II, the light was modified by the addition of a mercury lamp and a rotating base constructed of aircraft steel and aluminum capable of withstanding 100-mile-an-hour gales. A small, one-sixth horsepower motor will drive the light as it revolves at a rate of 12 revolutions per minute from dusk to dawn.

MORE POWERFUL RADAR

A powerful new radar height-finder being made by the General Electric Company here for the U. S. Air Force is helping to strengthen defense networks of the United States and its allies.

G. E. engineers say the radar's energy, concentrated in a narrow beam like that of a searchlight, detects planes three times as far as previous units of this type. Exact range is classified. (Interesting sidelight. The radio energy transmitted by the radar is so powerful that it can light fluorescent lamps over a hundred feet away.)

The radar height-finder is being used together with search radar to

(Continued on next page)

ALUMNI NOTES

by Dick Paske, ee'56

Behrens, Ray E., c'19, regional planner for Milwaukee County, is secretary of a committee that is preparing a report for the Legislative Council as a guide in the task of rewriting state laws governing the subdividing and platting of land. The 1953 Legislature made an attempt to rewrite the platting laws but found that the matter would need careful consideration. There may be action by the 1955 Legislature.

Science Highlights

(Continued from page 32)

detect high-flying aircraft and to provide information on distance, altitude and flight direction.

General Electric is making the new radar in mobile and fixed versions and has already supplied a large quantity for use in strengthening the radar fences guarding the North American continent, and for defense posts in countries receiving aid from the United States under the Mutual Defense Assistance Pact. Additional units are being produced for similar use.

In Arctic climates the radar is housed in a dome-shaped circular structure with a balloon-like radome made of woven glass fabric impregnated with a rubber compound. The radome is supported by air pressure, about a half pound per square inch, and can withstand winds up to 125 miles per hour. The radome protects the radar antenna from Arctic gales, snow and ice.

END

"Do you have any physical defects?" the army doctor asked.

"Yes, sir!" the draftee answered promptly. "No guts."

•

He: "Whisper those three little words that will make me walk on air."

She: "Go hang yourself."

Tacke, Walter H., c'30, former expressway engineer for Milwaukee, has been appointed deputy commissioner of Public Works for the city. Walter was on the teaching staff of the College of Engineering for several years after graduation and taught in the summer camp at Devil's Lake, where his proficiency at baseball was outstanding.

•

Rosecky, John E., c'38, is on the engineering staff of Carl C. Crane, Inc., consulting engineers of Madison, Wisconsin.

•

Gorder, Z. A., c'35, city engineer of La Crosse, Wisconsin, has been named chairman of the Wisconsin section of the American Water Works Association.

Gunderson, Roy R., c'46, is Bridge Engineer, System for the Western Maryland Railway Company. He is living in Baltimore.

•

Grimshaw, Walter E., c'49 is with North American Precision Casting Co. at McCook, Illinois.

•

Haas, Wilbur M., c'49, is assistant professor of civil engineering at Michigan College of Mining and Technology in Houghton, Michigan.

•

Dunwiddie, Jim F., M'40, is in Manila, Philippines, working for Standard Vacuum Oil. He has spent most of his time since graduation in the Far East, principally in Singapore and the Philippine Islands.

Laws of Engineering

(Continued from page 19)

that such unsociable chumps would not be missed much if we never saw them again. On the other hand, it is difficult to think of anyone who is too cordial, although it can doubtless be overdone like anything else. It appears that most people tend naturally to be sufficiently reserved or else overreserved in this respect.

Do not be too affable. It's a mistake, of course, to try too hard to get along with everybody merely by being agreeable and friendly on all occasions. Somebody will take advantage of you sooner or later, and you cannot avoid trouble simply by running away from it ("appeasement"). You must earn the respect of your associates by demonstrating your readiness to give any man a hell of a good fight if he asks for it. Shakespeare put it succinctly in Polonius' advice to his son (in "Hamlet"): "Beware of entrance to a quarrel; but being in, bear it that the opposed may beware of thee."

Regard your personal integrity as one of your most important assets. In the long pull there is hardly anything more important to you than your own self-respect, and this alone should provide ample incentive to maintain the highest standard of ethics of which you are capable. But, apart from all considerations of ethics and morals, there are perfectly sound hardheaded business reasons for conscientiously guarding the integrity of your character.

One of the most striking phenomena of an engineering office is the transparency of character among the members of any group who have been associated for any length of time. In a surprisingly short period each individual is recognized, appraised, and catalogued for exactly what he is, with far greater accuracy than that individual usually realizes. This is true to such a degree that it makes a man appear downright ludicrous when he assumes a pose or otherwise tries to convince us that he is something better than he is. As Emerson puts it: "What you are speaks so loud I cannot hear what you say." In fact it frequently happens that a man is much better known and understood by his associates, collectively, than he knows and understands himself.

Therefore, it behooves you as an engineer to let your personal conduct, overtly and covertly, represent your conception of the very best practical standard of professional ethics, by which you are willing to let the world judge and rate you.

Integrity of character is closely associated with sincerity, which is another extremely important quality. Obvious and marked sincerity is frequently a source of exceptional strength and influence in certain individuals, particularly in the case of speakers. Abraham Lincoln is a classic example. In any individual, sincerity is always appreciated, and insincerity is quickly detected and discounted.

A little profanity goes a long way. Engineering is essentially a gentleman's profession, and it ill becomes a man to carry profanity to the point of becoming obnoxiously profane. Unfortunately, profanity is sometimes taken as a mark of rugged he-man virility, but any engineer with such an idea should realize that many a pimply, half-witted, adolescent street urchin will hopelessly outclass him in this respect.

On the other hand, there is no reason why a man should be afraid to say "damn." On appropriate occasions a good hearty burst of colorful profanity may be just a healthy expression of strong feelings. But there is never any occasion for the filthy variety of obscenity, and a really foul mouth will generally inspire nothing but contempt.

Be careful of your personal appearance. Roughly eight out of every ten engineers pay adequate attention to their personal appearance and neatness. The other two offend in respect to one or more of the following items:

1. Suit rumpled or soiled, or else trousers, coat, and vest have nothing in common but their means of support.
2. Shoes, unpolished or dilapidated.
3. Tie, at half-mast or looking like it was tied with one hand. Some individuals seem to own but one tie, which takes an awful beating. Others wear colors contrasting violently with suit or shirt, but this is sometimes a matter of artistic license (if it isn't color blindness).
4. Shirt, frayed at collar or cuffs, or just plain dirty.
5. Hands, dirty.
6. Nails, in deep mourning, chewed off, or else absurdly long. A man doesn't need to be fastidious, but dirty neglected nails immediately and conspicuously identify a careless sloppy individual. (This is especially true in the case of an interview, where first impressions are so important.)

Of course we all know some very good men who are oblivious to such details, so that it cannot be said that all who ignore them are necessarily crude, third-rate, slovenly low-brows, but it is probably a safe bet that all crude, third-rate, slovenly low-brows are offensive in most of these respects.

Do not argue that you cannot afford to look your best; you cannot afford not to. Your associates and superiors notice these details, perhaps more than you realize, and they rate you accordingly.

In this connection, note the following quotation from a recent pamphlet on "employee rating" (2):

"The 'halo effect' simply means that rating of one trait is often influenced by that given to some other trait. Thus an employee who makes a nice appearance and has a pleasant manner is apt to obtain a higher rating on all other traits than he deserves."

Analyze yourself and your men. In the foregoing, it has been assumed that any normal individual will be interested in either:

(a) Advancement to a position of greater responsibility, or *(b)* improvement in personal effectiveness as regards quantity and/or quality of accomplishment.

(Continued on page 36)

"Allis-Chalmers Graduate Training Course Gave me a head start"

says GERALD SMART

Marquette University, BS—1948
and now Supervisor of Plant Engineering,
Allis-Chalmers, Norwood, Ohio, Works

"MOST MEN graduating from college don't have a clear idea of what they want to do. These individuals are helped by Allis-Chalmers Graduate Training Course to find the right job whether it be in design, sales, engineering, research or manufacturing.

"My case is a little different, however. I started the course with all my interest centered on tool design and 'in-plant' service. The reason is that I started getting vocational guidance from some very helpful Allis-Chalmers men back in 1940."

Served Apprenticeship

"At their suggestion I had gone to school part time while working full time. This not only gave me the chance to serve an apprenticeship as a tool and die maker, and earn money, but I learned what I wanted to do after graduation.

"Then came the war and service in the Navy. After the war I finished school. By the time I started on the course in 1948, I knew what I liked and seemed best fitted to do. As a result, my entire time as a GTC student was spent in the shops.

"The 18 months spent in the foundry, erection floor and machine shop have all proved valuable background for my present job.

"As supervisor of plant engineering at the Norwood Works, I am concerned with such problems as: Plant layout, material handling equipment and methods, new construction, new production methods to be used in building motors, centrifugal pumps, and *Texrope* drives. It's an extremely interesting job.

"From my experience, I'd say, whether you're a freshman or a senior it will pay you to talk to an Allis-Chalmers representative now. You can't start planning your future too soon. And you can't plan starting at a better place, because Allis-Chalmers builds so many different products that you'll find any type of engineering activity you could possibly want right here."

Facts You Should Know About the ALLIS-CHALMERS Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training. Length and type of training is individually planned.

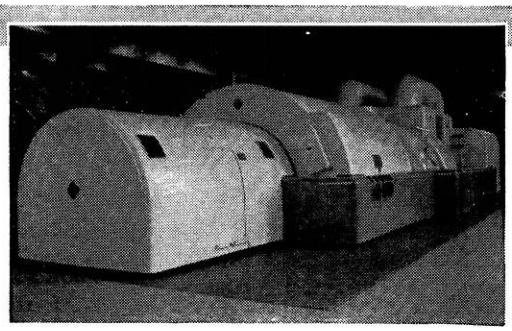
3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, specialized equipment or industrial apparatus with which he will work, such as: steam or hydraulic, turbogenerators, circuit breakers, unit substations, transformers, motors, control pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

5. He will have individual attention and guidance of experienced, helpful superiors in working out his training program.

6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisc.



Steam turbines, condensers, transformers, switchgear, regulators are built for electric power industry.

Motors, control, *Texrope* V-belt drives—all by Allis-Chalmers are used throughout industry.

ALLIS-CHALMERS

Texrope is an Allis-Chalmers trademark.

C-5678

Laws of Engineering

(Continued from page 34)

Either of these should result in increased financial compensation and satisfaction derived from the job.

With reference to item *(a)*, it is all too often taken for granted that increased executive and administrative responsibility is a desirable and appropriate form of reward for outstanding proficiency in any type of work. This may be a mistake from either of two points of view:

1. The individual may be very much surprised to find that he is much less happy in his new job than he thought he was going to be. In many instances young engineers are prone to assume that increased responsibility means mostly increased authority and compensation. Actually, the term "compensation" is well applied, for the extra salary is paid primarily to compensate for the extra burden of responsibility. Of course most people relish the added load, because of the larger opportunities that go with it, but many perfectly normal individuals find it more of a load than anything else. It is not uncommon for an engineer or a scientist to discover, to his dismay, that as soon as he becomes an executive he no longer has time to be an engineer or a scientist. In fact, some executives have time for absolutely nothing else.

2. From the business standpoint, it by no means follows that because a man is a good scientist, he will make a good executive. Many a top-notch technician has been promoted to an administrative position very much to his own and the job's detriment.

These facts should therefore be considered carefully by the man threatened with promotion and by the man about to do the promoting. There are other ways of rewarding a man for outstanding accomplishment.

It is very much like the design of a piece of apparatus. Any experienced engineer knows that it is always possible to secure substantial improvements by a redesign. When you get into it you will find that there are few subjects more absorbing or more profitable than the design and development of a good engineer! As Alexander Pope wrote many years ago:

"The proper study of mankind is man."

It is a significant fact that, in the overwhelming majority of cases, the decisive differences in the abilities of engineers are relatively small. In spite of the occasional incidence of a genius or a nit-wit, the great majority of personnel in any industry and the backbone of the large organizations are individuals who vary only slightly from the norm. In general, when executives look over an organization to select a man for a better job, those who are passed up have very few actual shortcomings, but the man who is chosen has the least. Likewise, many top executives are distinguished not so much by marked genius as by relative freedom from defects of character. There is nowhere near enough genius to go around.

This should be particularly heartening to the younger men who view the leaders of industry with awe and wonder upon what meat they feed. Nine out of ten of you have "what it takes" as regards native endowments. The problem is to make the most of what you have.

END

Campus News

(Continued from page 31)

LINCOLN ARC WELDING FOUNDATION AWARD AND SCHOLARSHIP PROGRAM

The James F. Lincoln Arc Welding Foundation has announced the eighth annual competition of its engineering undergraduate design program for the 1954–55 school year. The program offers 46 awards for papers of no more than 20 pages in length presenting the welded design of a machine, machine part, structure or structural part. The top award is $1,250.

All engineering undergraduates are eligible to compete for the cash awards and the national recognition which accompanies the awards. Competition is for undergraduates only and has been arranged so that frequently entries can be prepared from work that has been done for normal undergraduate study. It is a competition for mechanical or structural designs, separate awards being offered in each division. Because it is a design program, familiarity with the actual mechanics of the arc welding process are not a prerequisite for participating.

No special conditions, forms or fees are needed to enter. A Rules and Conditions booklet illustrated with previous award designs is available from The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

Wisconsin students who were awarded prizes in last year's competition were listed in the November issue, page 52.

CO-OPERATIVE ENGINEERING PLAN

An article which might interest prospective engineering students is concerned with the co-operative engineering curriculum of the Illinois Institute of Technology, Chicago.

The opportunity to combine college study with practical experience is being offered by Armour Research Foundation of that institution.

The program is available in the mechanical and metallurgical engineering fields through the Foundation's cooperative scholarship program, administered jointly by Illinois Tech and the Foundation.

Here's how the program, which lasts approximately five and one-half years for each student, operates: The student first attends Illinois Tech for two consecutive semesters, taking a regular schedule of courses leading to a degree in mechanical or metallurgical engineering. The student does not take classes during the third semester, but is employed on a full-time basis by the

(Continued on page 43)

Engine-Ears

(Continued from page 28)

are to keep students in touch with each other socially and scholastically, to meet and get acquainted with the members of the faculty, and to keep up with what's going on in the agricultural world. Regular monthly meetings are held to discuss the business of the club and to learn through a movie or speaker. Sometimes the problems of Ag. Engineering are forgotten, and a person on the campus is asked to talk on another field. Beside these meetings, extra events, generally of a social nature, fill out the program of the club. This year a new event was added to obtain the interest of the freshmen early in their school career. This event, a picnic at a faculty member's home, was a huge success. A short get-together after school on a regular meeting night with volleyball, plenty of eats, and a general introduction session proved very effective in getting the club started on the right foot.

Planned for the future is a field trip, more than likely to one of the implement manufacturing plants not too far from Madison. This spring a smorgasbord will be held where we will sum up the things that have been done up to that time. The final social affair of the year will be a picnic held in the Madison area. This is designed to exercise the students and unlimber the faculty.

One activity of the society is the publishing of a student and alumni newsletter. It is titled *Leakage*, and is quite effective in keeping our former students informed of what their old friends are doing on the university campus. To help out with the administrative functions, several standing committees are kept functioning. Everyone gets experience on the temporary committees formed for timely functions. Officers of ASME this year are John Balis, president; Don Polzin, vice president; Don Staab, secretary; and De Wayne Hillman, treasurer. **END**

W.S.P.E.

(Continued from page 26)

Mr. John Frederick, chairman of the publications committee, spoke to the chapter urging participation of all members in the news gathering program.

Robert W. Stieg, Clintonville, was appointed Vice President of the Chapter, to fill the unexpired term of Milo Griggs, Green Bay, who has moved to Michigan, and J. Robert Egan, Oshkosh, was appointed a Director and program chairman.

WESTERN CHAPTER

D. W. GRUNDITZ
Reporter

The Western Chapter met November 16th at the Cerise Club in La Crosse. The scheduled program included a trip through the local television studio. Mr. John Frederick, publication committee chairman, explained the purposes of the society publications, emphasized the importance of participation of all members, and stated the qualifications of news-worthy material.

NORTHWEST CHAPTER

WM. ROSENKRANZ
Reporter

The October meeting was held at the Hotel Eau Claire on October 6.

Mr. Baumgartner reported for the Membership Committee and made an appeal for some help from the members in securing new members for the chapter. He reported that WSPE membership has risen from 985 to 1011 in the period from July 30 to September 17.

Mr. Rosenkranz reporting for the Public Relations Committee, stated that our chapter was the only one which had both a Public Relations and a Publicity Committee and suggested their being combined into one group. Mr. Rosenkranz also asked that a Chapter Speakers Bureau be set up by the President and Directors to be available to schools, civic groups, paternal organization, etc. Mr. Thoreson asked that a definite fee or expenses be paid to members of the speakers bureau for the costs of their trips to speak. Members present thought this policy was justified.

There was considerable discussion on the problems experienced by Engineers in obtaining approval on plans presented to the Wisconsin Industrial Commission. The history of one specific case, that of John Hoeppner, has been put in letter form and placed in the hands of WSPE committee for study. Comments by several members indicated that the Industrial Commission is standing by their ruling that Engineers are permitted to design industrial buildings only.

Mr. Baumgartner made a motion that the chapter present lapel pins to new EIT and PE members. The motion was seconded by Mr. Thoreson and carried on a voice vote.

Mr. Herman Hagestad suggested a membership contest between two teams made up of members of the chapter, with the prize for the team securing the largest number of new members being a dinner for the winners paid for by the losers at a future meeting.

The Northwest Chapter held its monthly meeting Wednesday evening, November 3 at the Hotel Eau Claire. Following a dinner Mr. John R. Frederick, WSPE Publications Committee Chairman gave a talk concerning the publications of WSPE. The objectives of publications were explained, as were the type of news desired and the information which is essential for publication.

Wives of chapter members joined the membership to hear a talk on weather forecasting by Mr. Gil Tanner, Instructor in Physical Sciences at Eau Claire State College and weather forecaster for WEAU–TV, the Eau Claire television station. A very interesting talk concerning the principal air masses influencing the weather in the United States, most particularly Wisconsin, was presented. An explanation of the causes of our many rains and snows was extremely interesting.

The chapter Engineer's Week and Nominating committees were appointed by Pres. Charlson, membership as follows:

Engineer's Week Committee:

F. D. Kuckuck, *Chairman*
Al Lokken
R. F. Bott
Robert Cooper
R. G. Clark
Ken Hogenson
Jim Donaldson

Nominating Committee:

Wm. Rosenkranz, *Chairman*
Neal Bartholomew
C. A. Grubb

SOUTHWEST CHAPTER

L. W. STOCKNER
Reporter

The board of directors accepted President Wesley Burmeister's resignation, occasioned by his transfer to Milwaukee. The new chapter president, Mr. Harvey E. Wirth, is featured in the Meet the President series of this issue.

SOUTHEAST CHAPTER

JOSEPH H. KURANZ
Reporter

Mr. W. E. Dick, secretary of the Southeast chapter, announced that the group met December 1st in Waukesha. No other information was divulged to your beleaguered correspondent.

WISCONSIN VALLEY CHAPTER

JESS HOLDERBY
Reporter

No chapter news submitted. Such excessive modesty is not commendable, gentlemen.

END

Taking an Interview

(Continued from page 18)

ance. He should be punctual and not attempt to prolong the interview. If additional information or discussion is desired by the student, he should attempt to arrange a mutually convenient time. He should make it a point to talk freely but not to monopolize the conversation.

A student who enters an interview should have sufficient interest to secure all the information that is readily available about the company. In almost all cases this can be obtained in the Engineering Placement Office.

Olive Ebert and Mrs. Mildred Boycks are employed at the engineering Placement Office, 261 Mechanical Engineering Building, to arrange interview dates with the companies which send representatives to the campus. They also compile folders of material to show interested students what type of engineers any particular concern desires.

In addition, it is wise to have two or three intelligent questions to ask the interviewer about his company. Also, each sincere applicant should be able to present two or three reasons why he would be a desirable employee.

One of the most important aspects is to be natural. Remember, you are talking to another individual, one who is extremely human, and who has the interest of both you and his company at heart. It is the responsibility of a company representative to recommend for employment young men who will fit into the particular requirements of his company and strengthen the organization in future years. Such selections can be made only by getting a realistic "picture" of each applicant.

Security is something that is rather nebulous at the time of an interview. No employer can guarantee security—it can be obtained only by doing a good job day by day, week by week, and month by month over a period of time and in such a manner as to portray integrity, ability and vision.

Present day conditions make it possible for all of the senior engineering students to secure vital employment information and help, simply by taking advantage of the interviewing opportunities right on the campus. Do not pass up such a wealth of information. **END**

Manpower

(Continued from page 17)

national defense, and they hope that a proper organization will be set up to give them this opportunity. There is no insuperable barrier to the assignment of a scientist to a specific military task. First of all he would be invited by the National Defense Research Committee or its equivalent to serve in a specific capacity. If he does not approve of this assignment, or if he has been invited to work with another group which he deems more to his liking, he can so state. In other words, I would suppose that this organization could be set up on a strictly voluntary basis. Among scientists, as among non-scientists, there are conscientious objectors of all degrees of conscience and objection. However, the number of conscientious objectors among the scientists is so few that they could be treated on an individual basis and given noncombatant assignments to their liking. For example, very few of the conscientious objectors object to academic teaching. These objectors then could be used to fill in the gaps in our academic ranks when others take leave on their emergency assignments.

At the present time the scientific manpower committee has estimated that we have need to train more than twice the present number of graduate students in science and engineering in our universities. A large number of these scientists and technicians are required for use in industrial research laboratories. The industrial companies have found that their trained scientists are very valuable. These scientists can apply their knowledge of the physical, chemical, and electrical properties of materials in the development and improvement of commercial products. Also, because the knowledge of the scientist extends to an understanding of the underlying reasons for these properties, they are very effective in trouble-shooting and in eliminating wasteful steps in the development and production of industrial products. Since the winning of the International race for industrial and economical supremacy is most important in the present cold war, it is essential that we maintain a large supply of well trained scientists to the industrial companies. With the present selective service procedures, a scientist is very likely to be inducted into routine military service at the time he changes his status from a student to an employee of a commercial or government laboratory.

Because the need for well trained scientists far exceeds the supply, it is essential that each scientist be used to best advantage. The organization which I have suggested here would have the effect of increasing our supply of scientists by keeping the trainees in graduate school, and at the same time it would somewhat reduce the need for the present very large number of scientists permanently employed in government military installations. I hope that effective steps will be taken to remedy our present lack of preparation for a national emergency. **END**

THE ALUMINUM INDUSTRY WAS BORN ON SMALLMAN STREET

▼ In 1888, the aluminum industry consisted of one company—located in an unimpressive little building on the east side of Pittsburgh. It was called The Pittsburgh Reduction Company. The men of this company had real engineering abilities and viewed the work to be done with an imagineering eye. But they were much more than that. They were pioneers . . . leaders . . . men of vision.

A lot has happened since 1888. The country . . . the company . . . and the industry have grown up. Ten new territories have become states, for one thing. The total industry now employs more than 1,000,000 people—and the little outfit on Smallman Street? Well, it's a lot bigger, too—and the name has been changed to Alcoa. ALUMINUM COMPANY OF AMERICA . . . but it's still the leader—still the place for engineering "firsts".

As you prepare to trade textbooks for a position in industry, consider the advantages of joining a dynamic company like Alcoa—for real job stability and pleasant working conditions—where good men move up fast through their association with the recognized leaders in the aluminum industry.

Alcoa's new aluminum office building

We have fine positions for college graduate engineers—in our plants, sales offices and research laboratories from coast to coast. These are positions of responsibility in production supervision, plant and design engineering, industrial research or sales engineering. Right now it may be quicker than you think from a seat in the classroom to your career with Alcoa. Why not find out?

Your Placement Director will be glad to make an appointment for you with our personnel representative. Or just send us an application yourself. ALUMINUM COMPANY OF AMERICA, 1825 Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Solar Energy

(Continued from page 15)

Since nothing is consumed and there are no moving parts, the battery should last forever and have no operational or maintenance costs. The first battery had an efficiency of about 6%, and the new model has been boosted to 8% efficient, which is 10 to 15 times better than the best photovoltaic devices available. The maximum theoretical efficiency is about 22%, as the battery can produce electricity only from visible light waves—infrared and ultraviolet rays have no effect on it.

Although the battery is still in the experimental stage, it has already been used to power a miniature radio transmitter, in sending voices for short distances over telephone wires, and to run a transistor radio receiver. At Americus, Georgia, these sunshine batteries are under trial usage as battery chargers for rural telephone systems; and, with further development, they promise to supply all necessary power for long rural telephone lines. Linked together, the strips deliver power at about 80 watts of electricity per square yard of surface when the sky is clear from clouds or haze. However, as excess power must be generated during the sunny hours to allow for night and cloudy day usage, the area needed to generate a given amount of electricity on a sunny, clear day would have to be increased from 3 to 5 times; or about 60 square feet of silicon wafer would be necessary to keep a 100-watt bulb burning constantly.

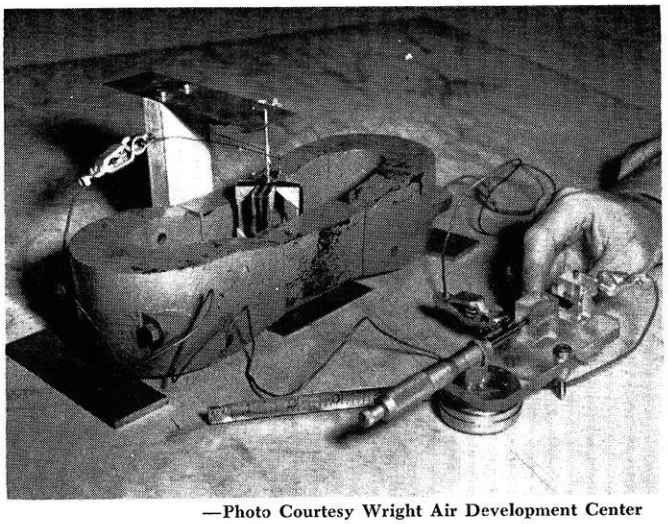
As the battery is improved, much better results are expected and undoubtedly will be achieved. It is already ahead of the new atomic battery, which has produced only one millionth of a watt by converting radioactive rays into current.

Solar Furnace

Consolidated Vultee Aircraft Corporation (Convair) of San Diego is presently using the country's largest solar furnace to study various metals and ceramic materials and their properties at extremely high temperatures. The furnace, which produces the highest temperature of any known method, was designed by Dr. Willi M. Conn and originally used at Rockhurst College.

The temperature at the $\frac{5}{16}$ inch focal point, which is 34 inches from the center of the 120 inch polished aluminum mirror *(See Fig. 1)*, is around 8500° F., well above the carbon arc's 6300° F. and the oxyacetelyne torch's 5800° F. This temperature can be reached only with perfect sky conditions, and since frequent trouble with clouds and haze has been encountered, the furnace is soon to be moved to a nearby mountain top where the atmosphere is much clearer.

The mirror is mounted to move with the sun and is equipped with a shade to control solar radiation intensity. It has a 20 power microscope located so that the observer can watch the effects on the material being tested. In addition to its extremely high temperature, the furnace produces "really clean" heat, which is important in materials testing. The heat has no combustion products, there is no electric or magnetic field interference, and there is no problem concerning the melting of the furnace structure. Information gained by Convair technicians on the materials is expected to help greatly in the solution of complex engine and friction problems.



—Photo Courtesy Wright Air Development Center

Fig. 3.—This is the solar generator developed in the Wright Air Development Center's Aeronautical Research Laboratory. The small crystal between the two pieces of plexiglass at the right catches the sun's rays, inducing an electric charge measured at one-third volt, which is sufficient to turn the d.c. motor at the left at 70 to 80 rpm.

Solar Generator

The recent development of a miniature solar generator by Wright Air Development Center has great promise in eventually converting sunlight into electrical energy in large enough quantities to run household appliances and possibly factories. The generator is quite simple, consisting of a positive electrode of silver on one side of a cadmium sulfide crystal with a negative electrode of indium on the other. When light strikes the solar generator, a direct current electrical potential is induced which is carried out by the electrodes to a wire running from the positive electrode through the desired electrical machinery and back to the negative electrode, completing the circuit. (Fig. 3)

Donald C. Reynolds and Lt. Col. Gerard M. Leies discovered the secret behind the success of the generator-crystal cadmium sulfide. The first model had a crystal about ½ inch on a side and supplied enough current to run an electric clock. It appears possible that a 4 x 15 foot slab would supply enough current to operate all lights and appliances in a house, using batteries to store the power for night time use and cloudy days. This new generator certainly looks promising and may be one of the main power sources of the future.

Other Solar Energy Utilization Projects

(1) Scientists are working on many different methods to increase the efficiency of natural photosynthesis, which is around one per cent or lower. One possibility along this line is the mass production of algae in man-made growing beds. By fertilizing the producing medium with carbon dioxide, much higher light intensities could be utilized; and the algae thus grown could be dried and used as a fuel, an animal feed, or even in the human diet. Another slightly different region of research is the storing of solar energy in controllable, reversible chemical reactions. As in most solar energy projects, the field is quite promising despite the many problems connected.

(2) Solar power plants, using concentrated solar heat directed on steam boilers. The steam produced could be used to generate electricity, run machinery, etc. This has been a favorite inventor's project for many years, but initial costs are extremely high in installing such a system.

(3) Production of fresh water from sea water by evaporation, using the sun's rays as a heat source. Recent shortages of natural ground water in many sections of the country will undoubtedly cause good promotion of this particular idea; and it may be pressed to use in some coastal cities even though not economically feasible in most localities.

(4) Utilization of the temperature gradient between surface ocean water and deep ocean water. Although the only attempt to prove the value of this idea resulted in the loss of a huge pipe which was to be used in the system, it is still a possibility as a future power source.

Much More Research Needed

Most of the above developments, and other recent inventions such as solar cookers now in use in India and solar hot water heaters, must have many improvements before mass production is begun and prices thus reduced to compete with ordinary devices on the open market. As conventional fuel supplies run shorter and shorter, however, the world will necessarily demand wide-spread usage of solar and atomic energy. Through the great atomic energy research projects conducted by the government, progress in this field has been rapid, but such energy sources will, by their nature, have to be in expensive, huge, central power stations. This is where solar energy has one big advantage over the power in the atom—it can be successfully used in small, inexpensive, isolated units, such as those needed to heat houses. (A recent report predicts 13 million solar-heated houses in the U. S. by 1975).

There is one very important fact to remember about this subject—it is quite improbable that a practical atom or sun-powered vehicle or train can ever be perfected; and therefore the world should try to keep the fuel and coal reserves for this use and harness the sun and the atom for producing electricity and heat.

END

Acknowledgements

1. "Chemical and Engineering News," May 3, 1954.
2. "Chemical and Engineering News," June 21, 1954.
3. "Journal of Metals," June, 1954.
4. "Heating and Ventilating," April, 1954.
5. "Chemical Engineering," July, 1954.
6. "Life," January 4, 1954.
7. Bell Telephone Laboratories News Releases.
8. J. Farrington Daniels, U. W. Chemistry Department.
9. William M. MacNevin, Ohio State University.
10. I. F. Hand, U. S. Weather Bureau, Blue Hill Observatory, Milton, Mass.

Campus News

(Continued from page 36)

Foundation in work closely related to his field of study. The student in successive semesters alternates between classes and work at the Foundation until he earns his B.S. degree. During the semesters he works, the student receives stipends based on current competitive rates.

Northwestern University also offers this co-operative plan as an option in all of their engineering curricula.

The plan has many advantages, but also some disadvantages which bear close consideration by high school students now thinking of college engineering educations. Further information can be obtained from the offices of Admissions of the respective institutions.

END

Overheard in Dean's office—

Dean to engineering student: "Aren't you ashamed to be seen here so often?"

Student: "Why, I've always thought of this as a respectable place."

So You Think You're SMART!

by Sneedly, bs'59

Well, if you were able to solve all of last month's problems, you did a better job than I did, lazy as I may be. Although I had the benefit of knowing about a typographical error on the math problem, I did not come up with the right answer. (I only took Math 7.) Let's all give the puzzle another try, however; here is the problem as it should have appeared:

While correcting some test-papers, a math instructor encountered one that was extremely illegible. He passed the following problem along to me, and am passing the buck to you:

```
      xxx
  ---------
√ xxxxxx
    x
    --
    xx3
    xxx
    ---
    xxxx
    xx3x
    ----
```

The x's represent numbers too illegible to be read. Fortunately this person, who, incidently, could hardly have been an engineer, was able to write 3's which *could* be read. The x's can represent any numbers—it is up to you to determine them. Answer next month, I hope.

* * *

For those of you who solved the infantry problem of last month (the answer was 8 M.P.H. to you engineer). I have another which is somewhat similar. A friend of mine got off work early one day and so took an earlier commuting train home, arriving at the home station just one hour early. His chauffer, who always started from the house so as to meet the train precisely, met my capitalist friend walking home, picked him up and returned home, arriving ten minutes earlier than usual. The chauffer drove at 30 mph. If you can, tell me how fast my friend walked. (Again, this problem is best worked without the aid of slide rule, and paper.) Having rendered the engineers helpless once again, I shall promise to give the answer next month; the rest of you readers, I trust, will have found the answer before then.

* * *

Eight men went to a motel for rooms. They each wanted a separate room, but the motel consisted of only seven units. The proprietor placed two men in the first room, then he placed the third man in the second room, and fourth man in the third room, the fifth man in the fourth room, the sixth man in the fifth room, the seventh man in the sixth room. He now had one room, the seventh, left, and therefore went back to the first room where he had placed the two men, took one out and put him in room seven; thus, as the example states, putting eight men in seven rooms and giving them all separate rooms. Explain how this was accomplished.

* * *

Here is a problem, the solution to which I may not be able to find, not being an engineer. It is a problem that some of you may have seen before, but I shall try to give you a hard time with it again now.

A truck is to cross a desert 400 miles wide. It can carry a load of 200 gallons of gas, 20 gallons of which must be in its fuel tank initially, and may not be removed. The truck gets 1 mpg, and there is a dump of cans and gas at the edge of the desert. It is apparent that the truck must establish dumps in the desert. How can this be done to minimize fuel consumption? How much fuel will it take? It is said that Rommel's lieutenant did it with fewer than 1600 gallons; can you?

* * *

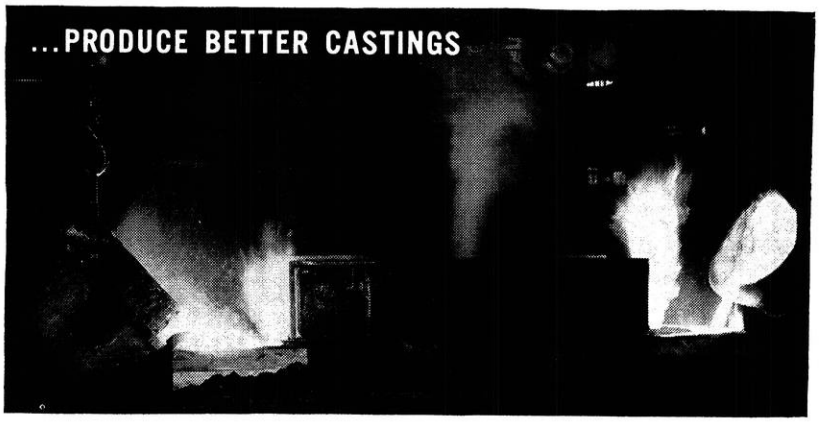
Finally, here's the answer to that key chain problem of last month. The catch to the solution, which you may or may not have recognized, is that when one link is cut, it unfastens completely from the rest of the chain. Therefore, for every cut, there will be a single link free. The chain needed to be cut in only two places to satisfy the conditions of the problem. The two links cut were the fourth and the eleventh. If you don't believe it—try it yourself.

HOW HERCULES HELPS...

Most businesses are helped today by Hercules' business . . . the production of synthetic resins, cellulose products, chemical cotton, terpene chemicals, rosin and rosin derivatives, chlorinated products, and many other chemical processing materials—as well as explosives. Through close cooperative research with its customers, Hercules has helped improve the processing or performance of many industrial and consumer products.

BEAUTIFUL BUT TOUGH—"Saucy Walker" greets "Mary Hartline", famed star of TV. Both dolls are members of the ever-popular Ideal Toy family. Molded with Hercules Hercocel® Cellulose acetate, the dolls have that combination of beauty and durability that spells increased sales . . . happy children . . . satisfied parents.

ONE PAINT IN A HUNDRED—Toronto's new $50,000,000 subway is modern in every way, including its glistening tile walls and brightly painted ceilings. For the ceiling, a paint was needed that could resist high humidity. More than 100 were tested and a paint based on Hercules Parlon® (chlorinated rubber) selected. On all types of surfaces, interior and exterior, Parlon paints are providing outstanding service at lower long-term cost.



FOR A WHITE HOT RECIPE—Pouring molten metal to produce castings weighing 30 tons or more places a heavy demand on the sand. Molds and cores for steel and cores for iron "stay put" when bonded with Truline® binder. Yet cores are easily removed when metal has set. And Truline means cores can be baked in half the normal time, preventing foundry oven bottlenecks; reducing man hours per ton.

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STATIC

by I. R. Drops

M. E. Prof. (to student who is half an hour late) "You should have been here at nine o'clock."

Student: "Why, what happened?"

* * *

Textbook style: "The puissance of hydrochloric acid is incontestable; however, the corrosive residue is inharmonious with metallic persistence."

Lab report style: "Don't use hydrochloric acid to clean your pipes, it eats the hell out of them."

* * *

"What's the hurry."

"Just bought a textbook and I'm trying to get to class before the next edition comes out."

* * *

"Did you hear about the wreck?"

"No."

"Yeah, four professors and one student were killed."

"Poor fellow."

* * *

Officer: "Cadet why didn't you salute me yesterday?"

Cadet: "I didn't see you, sir."

Officer: "Thank heavens, I thought you were mad at me."

* * *

Teacher (warning her pupils against catching cold): "I had a little brother seven years old, and one day he took his new sled out into the snow. He caught pneumonia, and died three days later."

Silence for ten seconds. A voice from the rear: "Where's his sled?"

* * *

It's tough to find
For love or money,
A joke that's clean
And also funny.

* * *

"To err is only human, but when you wear out your eraser before you've used up the pencil, you are overdoing it."

Golf is a game in which a ball 1½ inches in diameter is placed on another ball 8,000 miles in diameter. The object is to hit the small ball, but not the large one.

* * *

College Lad (arrested for speeding): "But your honor, I am a college boy."

Judge: "Ignorance is no excuse."

* * *

A fire engine was racing down the street, its siren shrieking, when a drunk came staggering out of a doorway. Spying the fire engine he gave mad chase for three blocks screaming "STOP! STOP!"

Finally, out of breath, he dropped panting to the pavement and shook his fist. "All right—you can keep your no good peanuts."

* * *

Kissing is just so much chemistry, according to Douglas Walkington, chemist for Canadian Industries. It has to do with a craving for salt.

The cave man found that salt helped cool him off in the summer heat. He found, too, that he could get salt by licking his neighbor's cheek. Also that it was more interesting if the neighbor was of the opposite sex.

Then everybody forgot about salt.

* * *

A pessimist is a fellow who always looks in both directions before crossing a one way street.

* * *

Freshman: "I don't know."
Sophomore: "I'm not prepared."
Junior: "I don't remember."
Senior: "I don't believe that I can add anything to what has been said."

One prospective engineer to another: "Buck up old man! Why don't you drown your sorrow?"

"I can't, my E. E. teacher is stronger than I am," replied the forlorn one.

* * *

Prof. Buck looked toward the next green, waggled his driver confidently and declared, "That's good for one long drive and a putt." He gave his club a mightly swing, blasted up about two inches of sod, and managed to get the ball about three feet from the tee.

The caddy stepped forward, handed him the putter, and suggested, "Now for one helluva putt."

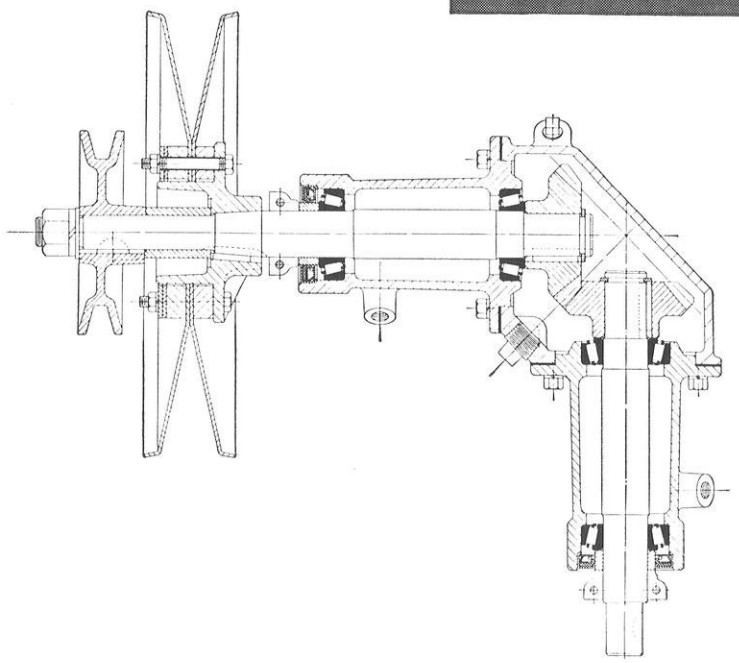
* * *

Out of the wild and wooly West comes this hazardous adventure. It seems that a grizzled old prospector was reminiscing for a bunch of New England tenderfoots. "There I was," he drawled, "trapped in a narrow draw with a hungry ole grizzly not twenty yards away behind a tree. Th' only way I could figger to bag the crittur was to ricochet a ball off th' canyon wall to th' right. Now bein' a champeen shot like I am I just gauged th' wind, judged the lead of the barrel and th' rate of twist, th' hardness of th' rifle ball and th' angle of yaw it'd have bein' smacked out of shape agin th' wall, and I figgered my chances of nailin' thet bar were about 70–30. A one rail bank shot. A controlled ricochet. So I let fly."

The old man paused. Softly one of the tenderfeet gasped, "Did you get him?"

"Nope," replied the prospector. "Missed th' wall."

Another page for **YOUR BEARING NOTEBOOK**

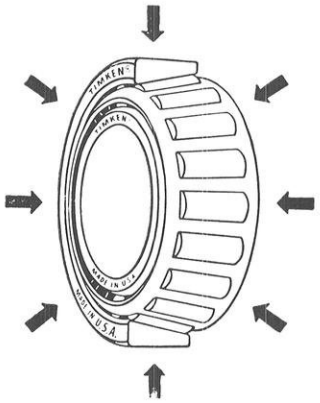


How to increase bevel gear life

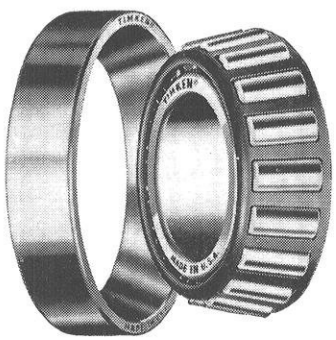
The shafts that hold the bevel gears in this farm machine gear box carry two kinds of loads. Loads from the bevel gears run 1) along the shaft and 2) at right angles to it. Timken® bearings, being *tapered*, carry both loads at once, hold gears rigidly in place. Perfect tooth-mesh is maintained; gears last longer.

How TIMKEN® bearings hold shafts rigid

The line contact between rollers and races of Timken bearings gives shafts rigid support over a wide area. Shaft deflection is minimized. And end-play is eliminated because the tapered design of Timken bearings lets them take radial and thrust loads in any combination.

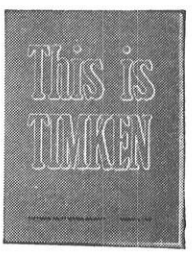


TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

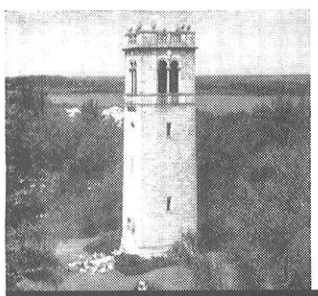


Want to learn more about bearings or job opportunities?

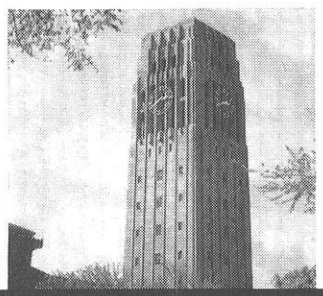
Many of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.



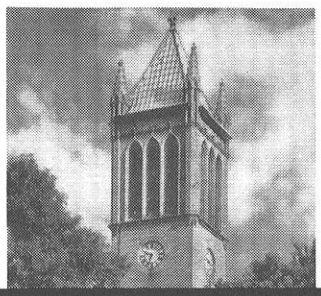
NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST —◎— LOADS OR ANY COMBINATION ✳



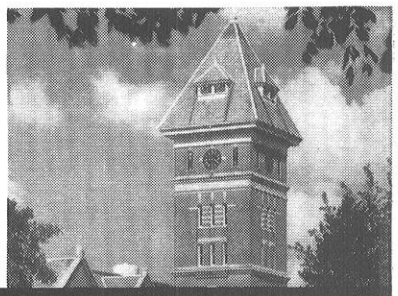
WISCONSIN



MICHIGAN

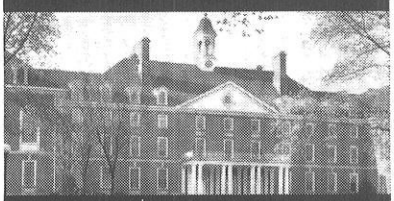


IOWA STATE

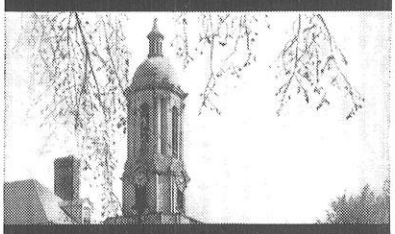


PURDUE

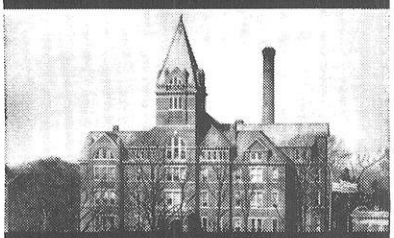
TEXAS A&M



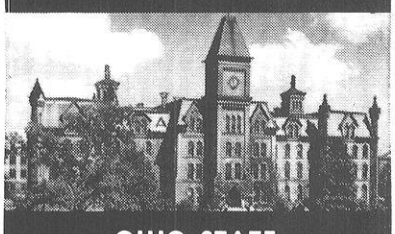
ILLINOIS



PENN STATE



GEORGIA TECH



OHIO STATE

Where do you go from here?

Year after year, we draw on these nine schools for electrical, mechanical, industrial and general engineers.

If you are looking for a future with real opportunities for growth and advancement, Square D has a lot to offer. The potential growth and development of the electrical industry is tremendous—doubling every ten years, in fact. And Square D is a long established, top ranking name in that expanding industry. Equally important, Square D offers the kind of personalized training that equips you to go far . . . *fast!*

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We'd like to send you a brochure, "Your Engineering Career." It gives the simple rules to follow in selecting an engineering career.

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Radiograph showing how anode grows in use. From such facts, National Carbon developed a battery with the largest possible anode in a small case.

When photography peered inside... the battery shrank in size...lasted longer

In air-depolarized hearing-aid batteries, anode size determines battery life. But anodes swell in use. How big could one be for a tiny new case? National Carbon Company used x-rays and photography and found out.

NEW electronic developments were making hearing aids more effective, smaller, more convenient. What was needed was a power supply equally advantageous. Could this be had without sacrifice in battery life?

National Carbon Company thought so—put x-ray photography to work—and came up with a mighty midget "Eveready" with unusually long life.

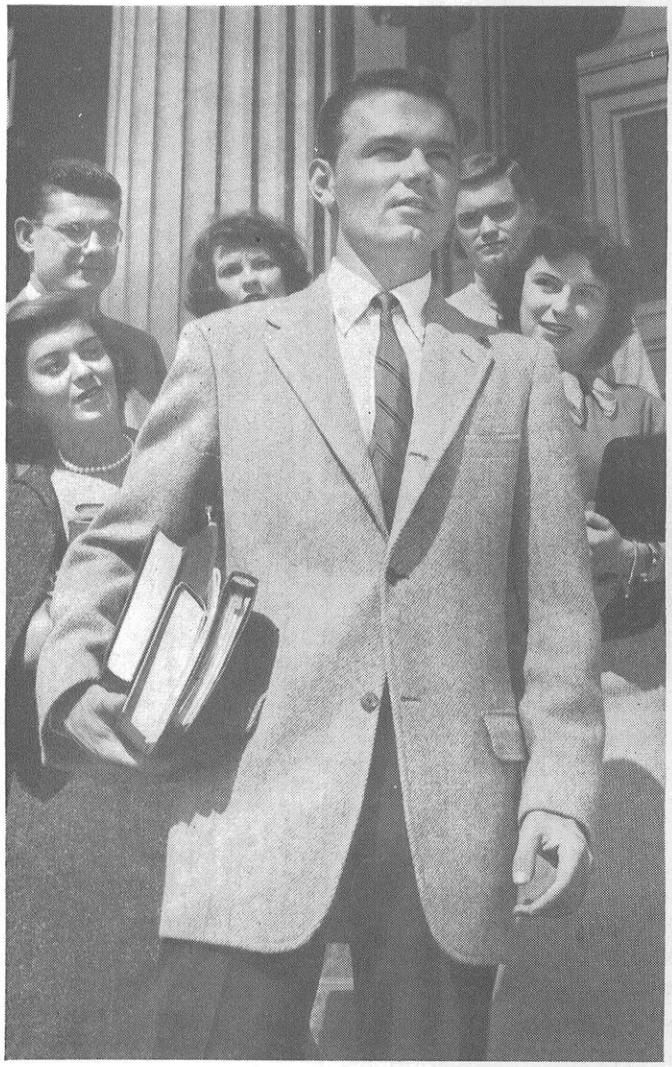
Checking internal conditions like this—proving the soundness of castings and welds—inspecting the inside of "sealed-in" assemblies—are all in the day's work for photography.

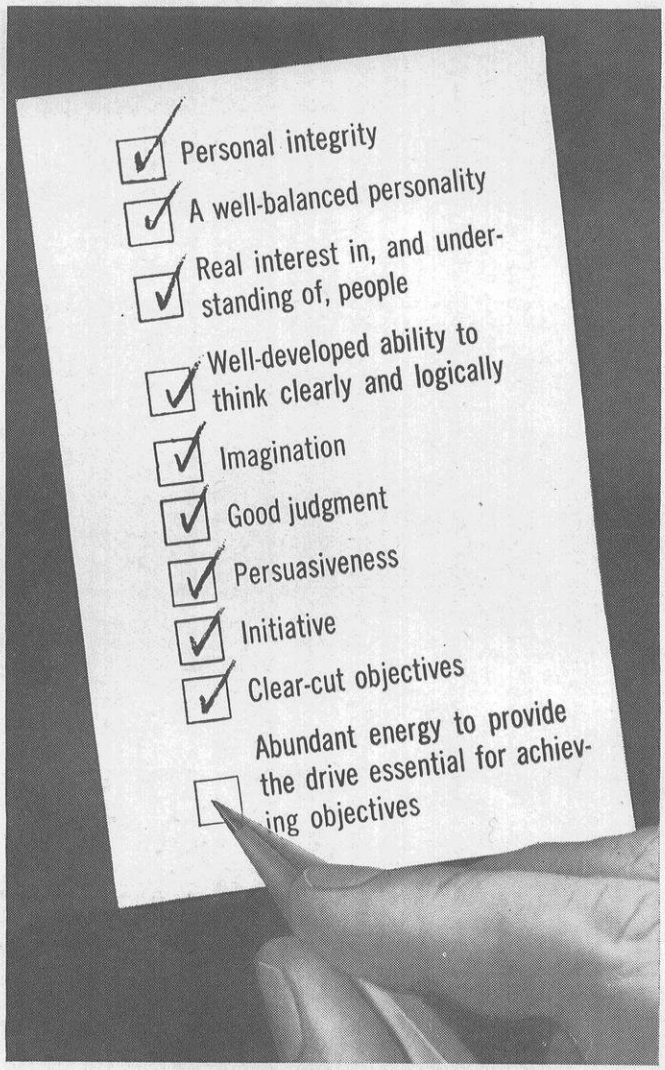
In fact, graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. Whether you are a recent graduate or a qualified returning serviceman, if you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.

Eastman Kodak Company, Rochester 4, N. Y.

Looking ahead with General Electric

How do you measure up in leadership qualities?





A young man who can lead has always had a good chance of success, but his prospects were never better than now. There's a steadily growing demand in industry for men to fill top professional and management jobs . . . fellows with a special ability to work well with other people and inspire their best work. At General Electric, we're constantly on the lookout for them.

Ten traits we look for, above, add up to a pretty good indication of potential success in business. Not everyone has them all to a top degree, but the basic characteristics are always present and can be developed in the men we pick to help lead General Electric. We hope you can rate yourself very high on the list and find it helpful.

EDUCATIONAL RELATIONS, GENERAL ELECTRIC CO., SCHENECTADY, N. Y.

DID YOU KNOW? Opportunities for G-E leadership jobs are expected to double in the next 10 years. The need: technical and non-technical professionals and managers.

Progress Is Our Most Important Product

GENERAL ELECTRIC