Spring 4-1958

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Rose Technic Staff
Rose-Hulman Institute of Technology

Rose Technic

April 1958

In This Issue

3-D SOUND

INERTIAL GUIDANCE

NUCLEAR POWER

Picture of a man trying to wreck a train

Railroad trains have been clocked at speeds as high as 111 miles an hour. Most trains on open stretches run on a schedule that exceeds 60 miles per hour. Isn't it remarkable, when you think of it, that nobody ever wonders whether the *wheels* will hold up? For many years we have made this our concern so that it would never have to be yours.

To make sure that fast trains will also be safe trains, U. S. Steel research teams carry on a continuing study of railroad wheels at the U. S. Steel Research Center at Monroeville, Pa. Wheels of the type used in high-speed service are subjected to the toughest trials which can be administered on the world's largest inertia dynamometer. Here wheels are driven at speeds equivalent to 160 mph, with the dynamometer generating 68½ million foot-pounds of energy—enough to lift a 34,000-ton ocean liner one foot in the air. These tests show us the minor revisions in design which enable us to maintain the wide safety margin for the ever-increasing speed of operation. Today's wheels would provide complete safety at train speeds which are, as of now, impossible to attain.

This is only one of hundreds of research projects at U. S. Steel directed toward tomorrow's super products. And research is only *part* of the job of making, shaping, treating steel. It's a big job and we need good people to help us—people with your kind of training.

More of our story is told in the booklet, "Paths of Opportunity," which you can obtain by writing to United States Steel, Personnel Division, Room 1662, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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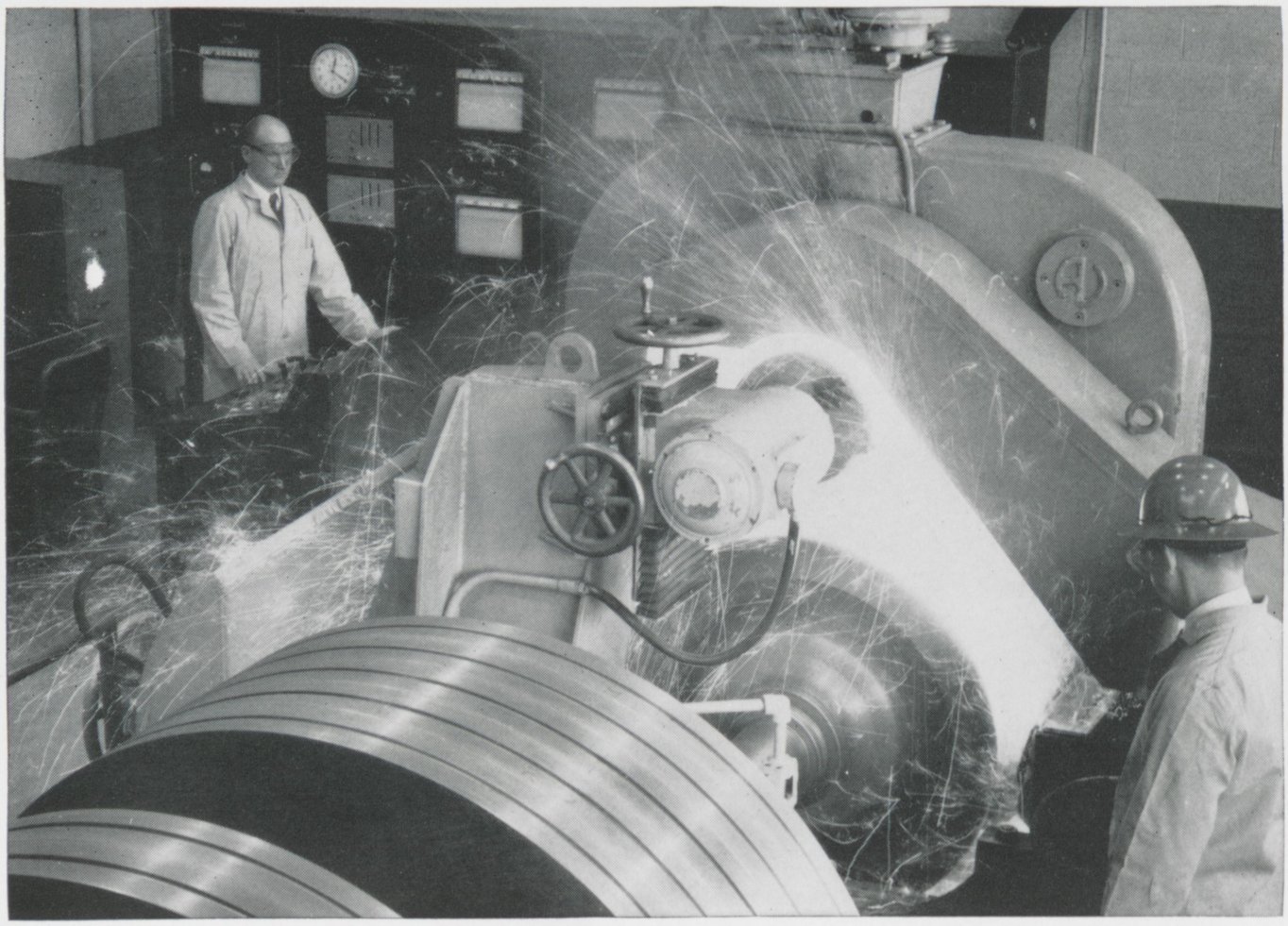


USS United States Steel

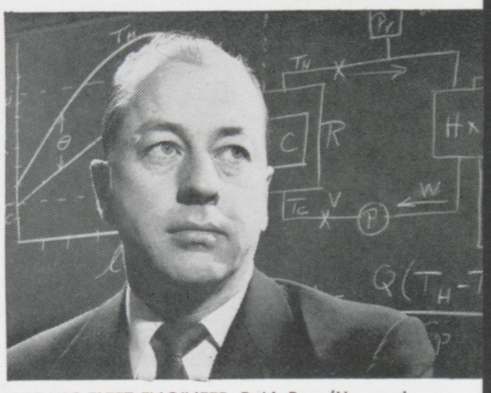
Put your creative ability to work at

WESTINGHOUSE

Where engineering talent is recognized

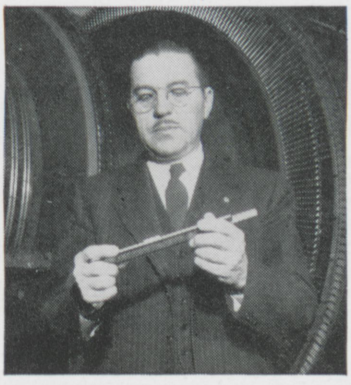
AIMS TORPEDOES. C. H. Jones (Northwestern—EE) is Assistant Department Manager of electronics and nuclear physics department. He recently invented a new device for underwater acoustics applications. While at Westinghouse he has supervised varied research projects on color TV, antennas, micro waves, radar and sonar.

BATTLEFIELD RADAR. J. W. Currie (U. S. Naval Academy—EE) and C. J. Miller (Virginia Polytech—EE) check fabric of the huge Westinghouse paraballoon, which they developed with the help of Cornell Aeronautical Laboratories. This lollypop-shaped device, more than 30 feet high when inflated, makes possible for the first time a lightweight, mobile radar antenna which can be set up near the front lines to support ground troops in battle.



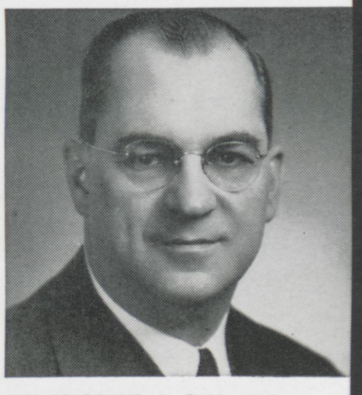
ATOMIC FLEET ENGINEER. P. N. Ross (Harvard —EE) is assistant manager of Large Ship Reactor Project for Westinghouse. He joined the company as a graduate student, rose rapidly in nuclear work. Mr. Ross played a key role in development of USS Nautilus, the first atomic submarine.

HEADED NEMA. J. H. Jewell (Pratt Institute—ME) headed National Electrical Manufacturers Association in 1954-55. He is Westinghouse vice president in charge of marketing.



TURBINE EXPERT. C. C. Franck Sr. (Johns Hopkins—MME) is consulting engineer in Westinghouse Steam Division. His research helped develop the Normandy invasion fleet. He is an internationally-known authority on steam turbines.

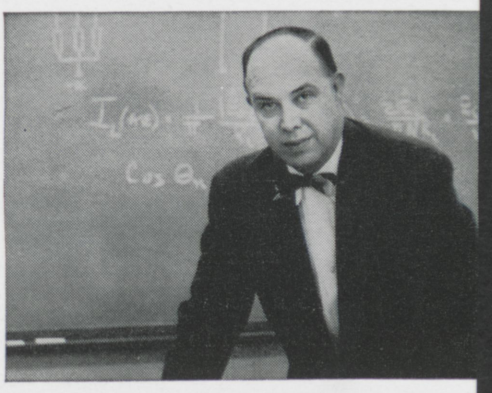
UTILITY "DOCTOR." As head of the Westinghouse Electric Utility Engineering Section, J. K. Dillard (Georgia Tech.—EE) helps diagnose ills and treat problems of 220 electric utilities across the nation. AC calculating board in background is largest computer of its kind in industry.



AIEE PRESIDENT. A. C. Montieth (Queen's University, Kingston, Ontario) was 1954-55 president of AIEE. He is vice president in charge of all Westinghouse apparatus products divisions.

WINS LAMME MEDAL OF AIEE. The Lamme Medal, one of the nation's top honors in electrical engineering. was won in 1955 by Dr. Clinton R. Hanna, (Purdue—EE) associate director of Westinghouse Research Laboratories. Left to right: Dr. John A. Hutcheson, (North Dakota—EE), Westinghouse vice president in charge of engineering; Dr. Hanna; and M. D. Hooven, AIEE head. Seven other Westinghouse engineers have won the Lamme Medal and 11 others the AIEE's Edison Medal.

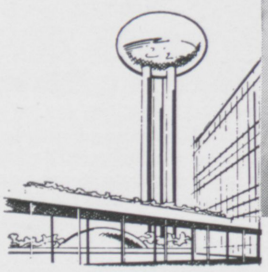
MOST EFFICIENT POWER STATION. J. W. Batchelor (Purdue—EE), head of Westinghouse Turbine Generator Engineering Dept., looks over the equipment which he helped to develop at Kyger Creek (Ohio) power station. The Federal Power Commission labelled this the most efficient station in the nation for 1955. Four Westinghouse turbine generators, each rated at 217,260 kilowatts, are there.

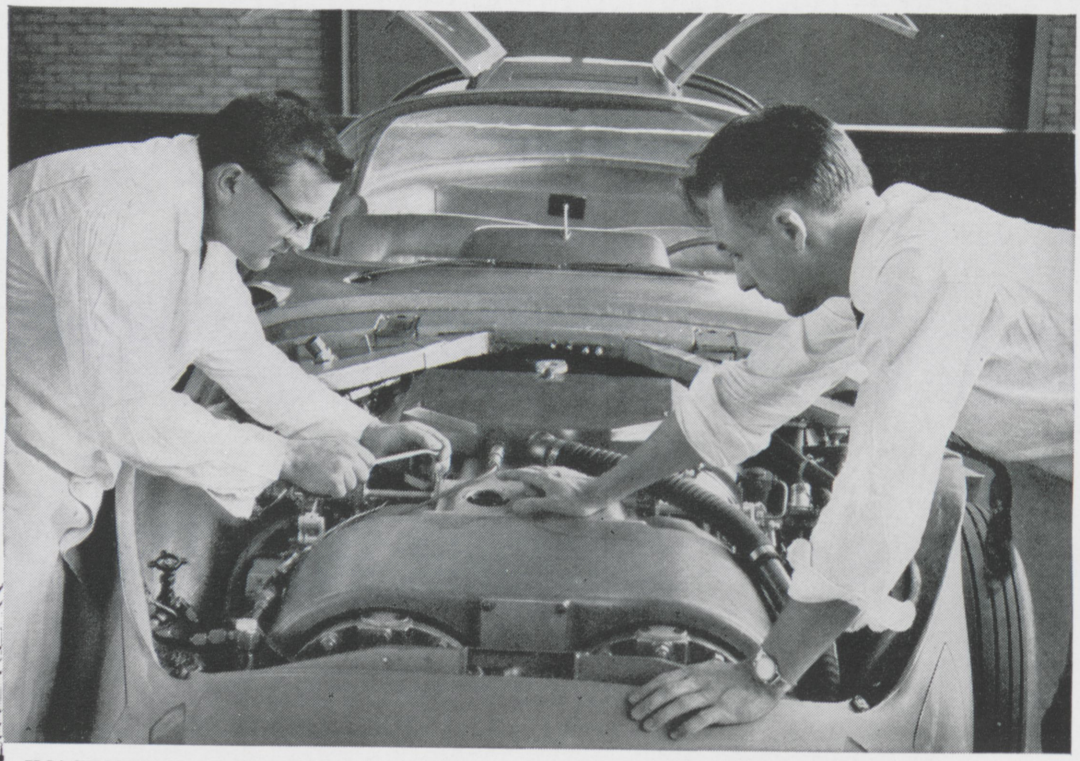


MODERN-DAY PIONEER. Dr. R. A. Ramey, Jr. (U. of Cincinnati—EE), is a pioneer in magnetic amplifiers. Joining Westinghouse in 1952 as a section engineering manager, he is now manager, new products department. He also had an important part in guiding the development of Cypak, the Westinghouse industrial control unit that thinks, decides and remembers.

Westinghouse

FIRST WITH THE FUTURE





IMAGINATION AT WORK—Young GM Research Engineer Bill Ahrens, B.S. '52, M.S. '56, and Worth Percival (r.), Assistant Head of Mechanical Development at GM Research, working on the free-piston-powered XP-500 automobile. Bill is on the team studying the future applications of the free-piston engine.

Because *engineering* is a *profession* at GM—we give your imagination free rein

COMMENCEMENT is just around the corner—you've probably decided what specialty you wish to follow in your chosen branch of engineering—possibly picked the company you'll join.

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To a young engineer just joining us, this means the freedom to pursue paths of professional inquiry—following the lead of his imagination.

It means an opportunity to associate with some of the most respected and distinguished engineers in the country.

And it means playing a part in developing the products which will keep GM on its progressive path—products produced by 35 Divisions and 126 plants in 71 cities and 19 states.

GM has 33 Vice-Presidents—14 are engineers. We have 42 Division General Managers—23 are engineers.

Professional recognition, opportunity without limit, salaries and working conditions to please young engineers—these are what GM offers you.

Better think seriously of this when laying the foundation for your future.

• • •

GM positions now available in these fields:

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MATHEMATICS • INDUSTRIAL DESIGN • PHYSICS • CHEMISTRY

GENERAL MOTORS CORPORATION

Personnel Staff, Detroit 2, Michigan

Rose Technic

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Contents

Cover

Spherical Tanks at Standard Oil Refinery at Richmond, California.
Courtesy—**The Water Tower.**

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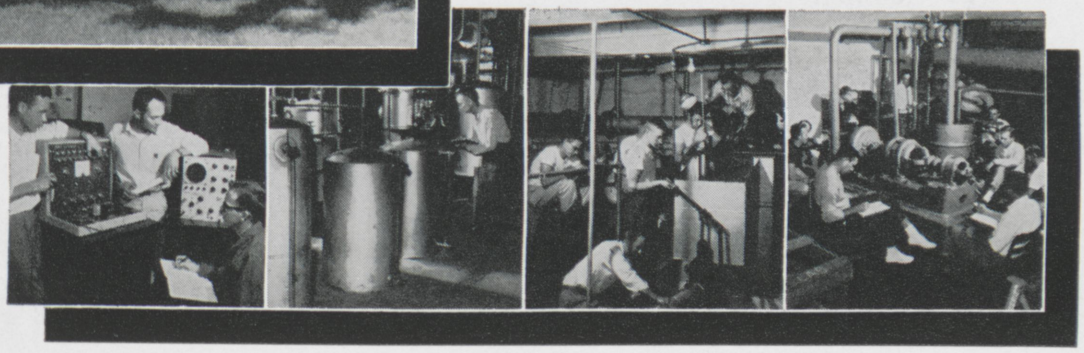
ROSE



ROSE POLYTECHNIC INSTITUTE

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HIGH SCHOOL GRADUATES OF 1958

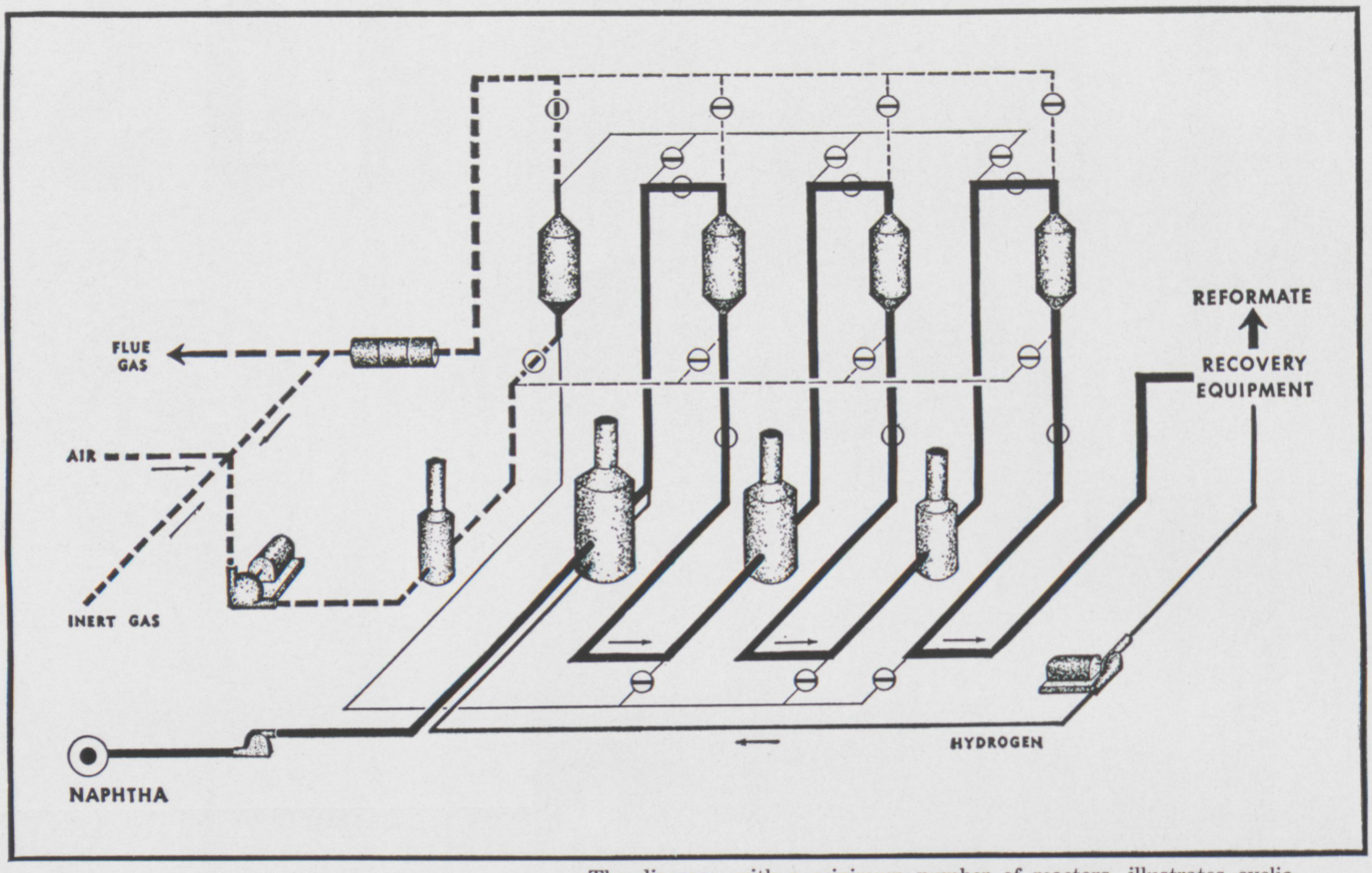
You are cordially invited to visit Rose Polytechnic Institute where you can earn a degree in:

CHEMICAL ENGINEERING
ELECTRICAL ENGINEERING
MECHANICAL ENGINEERING
CIVIL ENGINEERING

The next freshman class will be admitted
September 8, 1958

Office OF ADMISSIONS

ROSE POLYTECHNIC
INSTITUTE
TERRE HAUTE, INDIANA



The diagram, with a minimum number of reactors, illustrates cyclic regeneration. Piping arrangement permits the swing reactor to substitute for any other reactor in the system. High activity of catalyst is maintained —without interrupting production—in the ULTRAFORMING process.

HOW TO KEEP $1,000,000 WORTH OF CATALYST ON THE JOB

When you have a million dollars' worth of platinum catalyst in a single refinery unit, you hope you can keep it steadily on the job. That's too much money to be standing around idle. Also, you'd like to keep the catalyst working at high efficiency.

Most catalysts lose activity with use. The platinum that "reforms" 40-octane gasoline to 100-octane gasoline is no exception. And the higher the octane number, the faster the catalyst loses activity.

For years activity could be restored only by taking the catalyst out of the unit and sending it away for special treatment. To keep from having too many of these shutdowns, refiners had to operate at relatively low octane numbers.

Standard Oil research scientists came up with a better answer. They developed a new type of platinum catalyst, and they learned how to regenerate it repeatedly—while it is still in the unit. When a swing reactor is provided, the unit need not even be shut down. The new process is called ULTRAFORMING.

During a year of ULTRAFORMING at Texas City, one reactor was regenerated 53 times. The unit is still producing 100-octane gasoline.

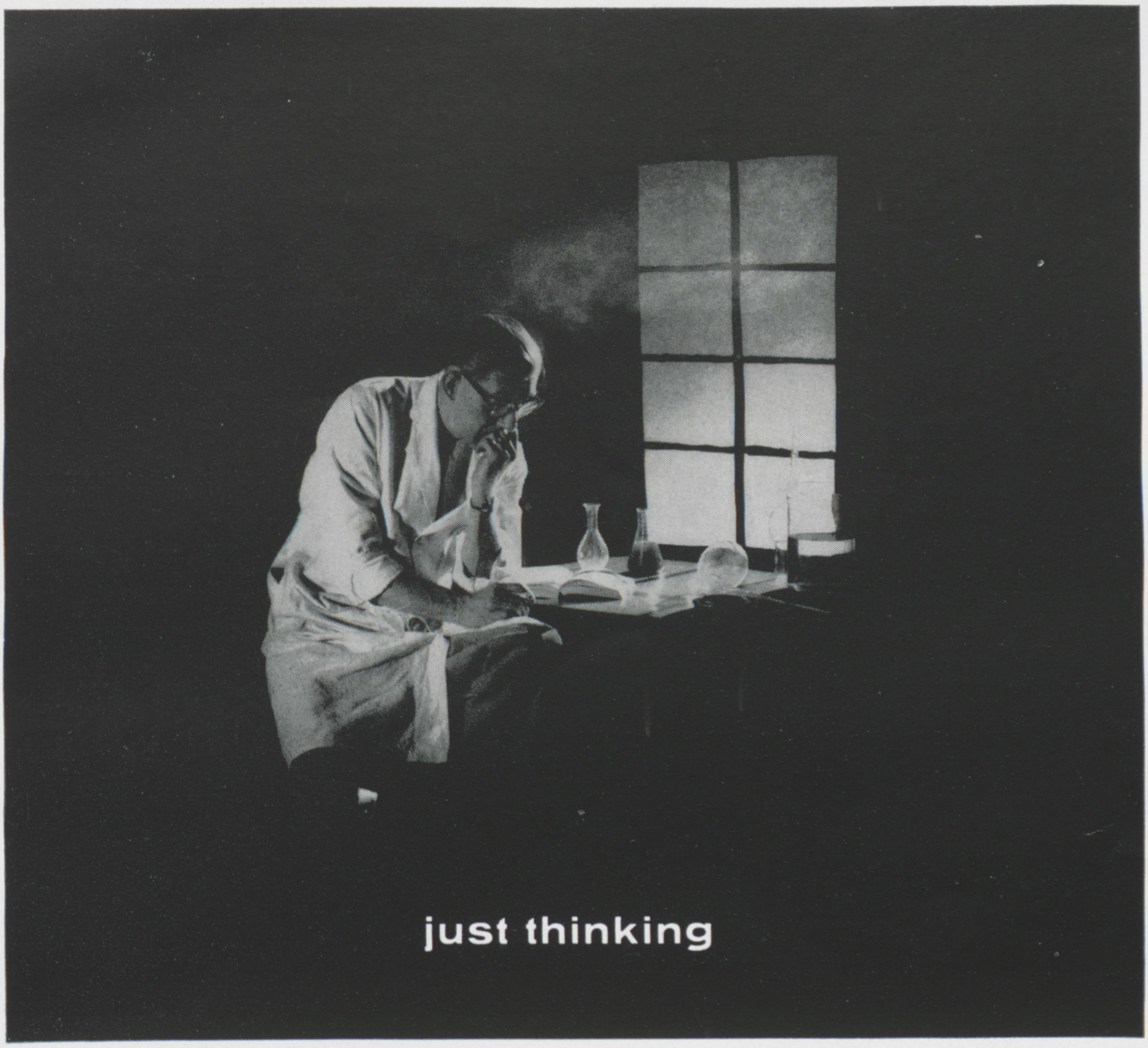
ULTRAFORMING also gives high yields of by-product hydrogen. The hydrogen can be used in upgrading other oil products. Or, it can be reacted with nitrogen from the air to make ammonia.

ULTRAFORMING is only one of the many major achievements credited to the scientists who have made careers at Standard Oil.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD



Chemical progress is autoclaves, test tubes, distillation towers . . . hydrocarbons, heterocyclic compounds . . . processes, polymerizations, products.

But mostly, chemical progress is thinking . . . men thinking. Little men, big men, medium size men . . . in lab coats, business suits, overalls . . . all of them, always, thinking.

Thinking up new products . . . new ways to make chemicals and new ways to use them. Thinking up more comfort, more convenience, better health, for everyone.

Always, the old things have to be improved, and the new things have to be proved. It takes more thinking. The thinking never stops. And so chemical progress never stops. It's that way at Koppers.

You can be one of these men, thinking. You can create some of the chemical progress that's made at Koppers. The products are many . . . the opportunities myriad. Consider a career with Koppers; send the coupon today.

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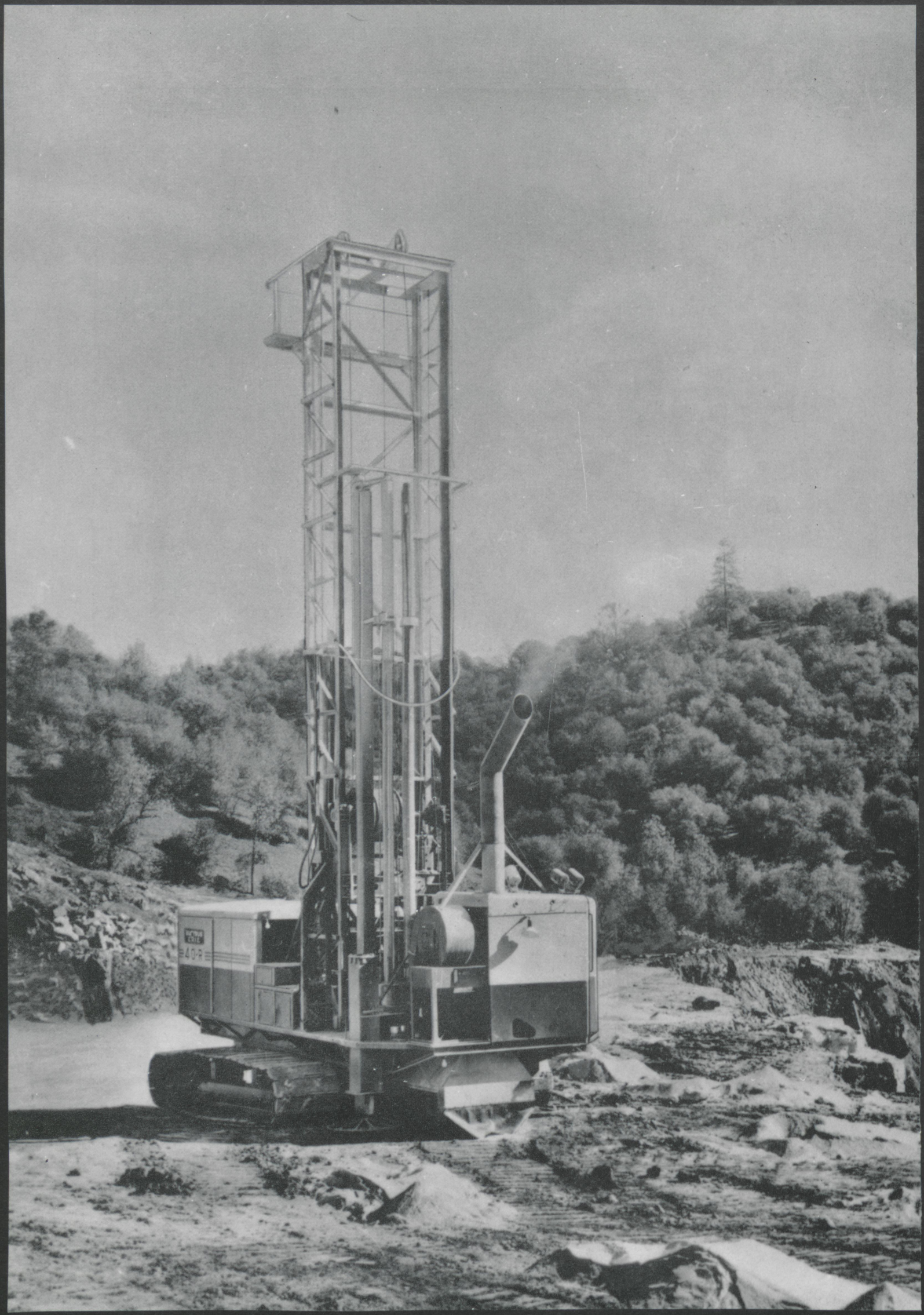


Four Years - - - Or Five?

The intense need for technically trained personnel has maneuvered today's engineering student into a very precarious position. He has been forced to practically abandon the hope of getting more than a few hours of humanities courses in his short four years in college.

Is this fair to the individual? Although well educated in his particular field, can he hope to hold his place in society as a "professional" man? What are his chances for becoming a leading citizen of his community, as compared to a Doctor or a Lawyer?

The five-year curriculum is now required at several colleges in this country. This plan not only gives an opportunity for more badly-needed diversification, but lightens the ever-increasing burden of credit hours per semester. Valuable courses in Psychology, English, History, Business Administration, and many others could be appreciated by every student and not by just a few individuals who have a chance to take them as electives.

How does this apply to Rose? With the modifications in curriculum planned for next year, Rose will be in an enviable position among colleges in the United States. Granted, every one of us can be justly proud of our school. But could we benefit more? Why must we spend four years struggling to become a graduate engineer when we could spend five and be well on the way to becoming an educated man.

Careful consideration should be given to the feasibility of lengthening our present program. Education is a sound investment; it pays dividends accordingly.

D.G.M.

Frontispiece—Rotary blast hole drill now at work on St. Lawrence Seaway project. Up to 22.5 tons of force can be exerted on the bit. — Courtesy - Westinghouse Electric Corp.

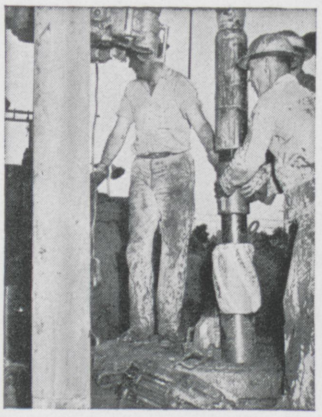
There's a Metal Problem in your future that Inco can help you solve

In the meantime, see if you can tell which Inco Nickel Alloy proved to be the answer to these problems.

Number the picture captions!

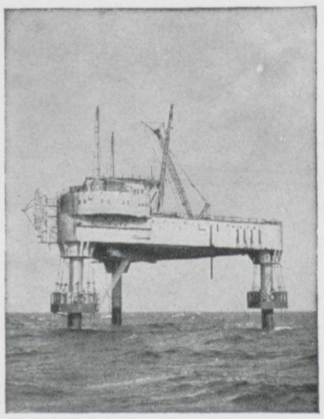
1. **"S" Monel** hard-grade nickel-copper cast alloy
2. **Inco Nickel**
3. **"K" Monel** age-hardenable nickel-copper alloy
4. **Inconel** nickel-chromium alloy
5. **Monel** nickel-copper alloy
6. **Inconel "X"** age-hardenable nickel-chromium alloy
7. **Monel "403"** non-magnetic nickel-copper alloy

See answers below

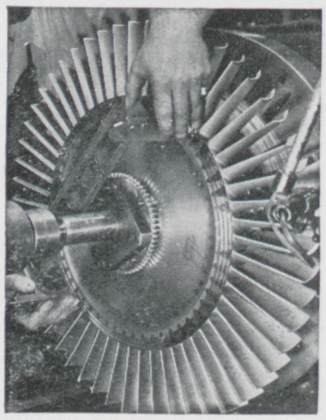


☐ **Oil well drill collar** — Needed: non-magnetic metal with high strength. Which Inco Nickel Alloy . . . ?

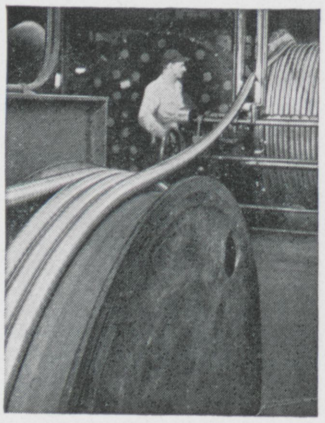
☐ **Jet engine flame tube**—Needed: oxidation and corrosion resistance at jet engine temperatures. Which Inco Nickel Alloy . . . ?



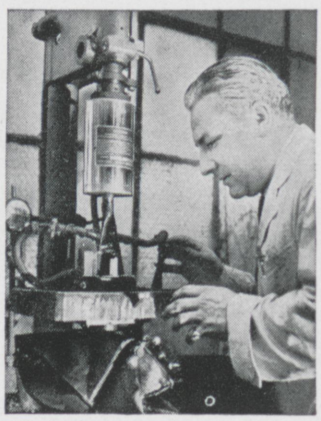
☐ **Radar platform "leggings"** — Needed: resistance to abrasion and marine corrosion. Which Inco Nickel Alloy . . . ?



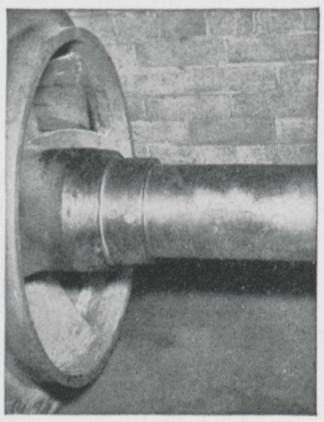
☐ **Gas turbine blades** — Needed: hot strength up to 1500°F., low coefficient of expansion. Which Inco Nickel Alloy . . . ?



☐ **Submarine cable sheathing** — Needed: non-magnetic metal resistant to marine corrosion. Which Inco Nickel Alloy . . . ?



☐ **Ultrasonic drill** — Needed: high magnetostrictive ability to produce ultrasonic vibrations. Which Inco Nickel Alloy . . . ?



☐ **Shaft sleeve for salt water pump** — Needed: extra-hard casting alloy that resists corrosion. Which one . . . ?

You may have to take this kind of quiz *again*. You may be designing a machine which requires a metal that resists corrosion . . . or wear . . . or high temperatures. Or one that meets some destructive *combination* of conditions.

When you start to design equipment, you will have to select the proper material to meet given service conditions. Over the years, Inco Development and Research has successfully solved many metal problems, and has compiled a wealth of information to help you.

For more on special problems solved with Inco Alloys, send for "Standard Alloys." Write The International Nickel Company, Inc., Dept. 00, New York 5, N. Y.

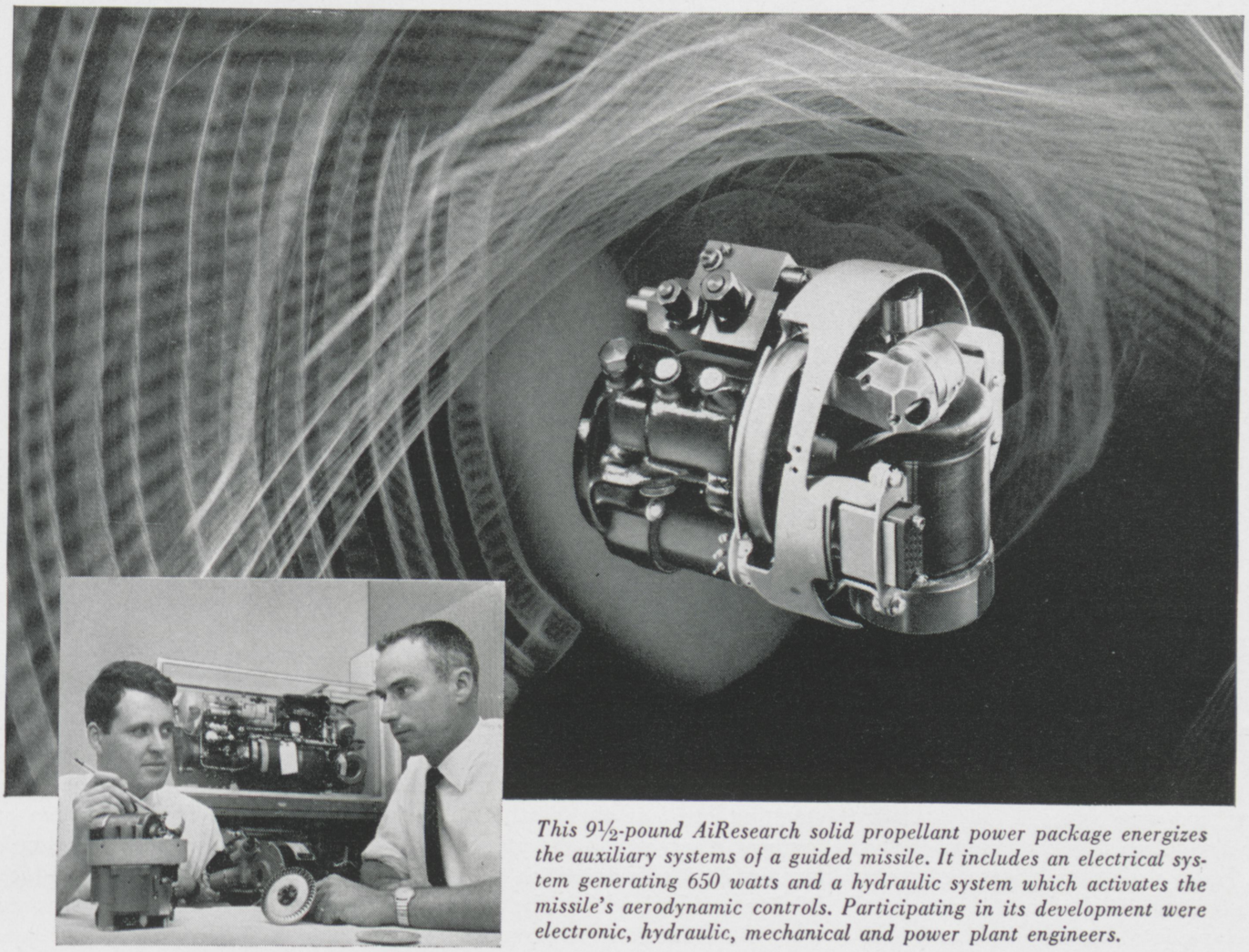
The International Nickel Company, Inc.
New York 5, N. Y.

Oil well drill collar: 3. "K" Monel; Jet Engine flame tube: 4. Inconel; Radar platform "leggings": 5. Monel; Gas turbine blades: 6. Inconel "X"; Submarine cable sheathing: 7. Monel "403"; Ultrasonic drill: 2. Inco Nickel; Pump's shaft sleeve: 1. "S" Monel

Inco Nickel

makes metals perform better longer

IF you're looking beyond tomorrow...



This 9½-pound AiResearch solid propellant power package energizes the auxiliary systems of a guided missile. It includes an electrical system generating 650 watts and a hydraulic system which activates the missile's aerodynamic controls. Participating in its development were electronic, hydraulic, mechanical and power plant engineers.

Your first position after graduation will determine the direction in which you will grow in engineering knowledge and ability.

Garrett offers engineering career opportunities which will expand for many years to come.

They include the following in the fields of aircraft, missiles and technological industry: system electronics; computers and flight instruments; gas turbine engines and turbine motors; prime engine development; cryogenic and nuclear systems; pneumatic valves; servo control units and air motors; industrial turbochargers; air conditioning and pressurization and heat transfer.

In addition to direct assignments, a 9-month orientation program is available to aid you in selecting your field of interest. This permits you to survey project, laboratory and administrative aspects of engineering at Garrett. With company financial assistance you can continue your education at outstanding universities within easy reach of your employment.

Project work is conducted by small groups where individual effort is more quickly recognized and opportunities for learning and advancement are enhanced. For full information write to Mr. G. D. Bradley.

THE GARRETT CORPORATION

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3-D SOUND

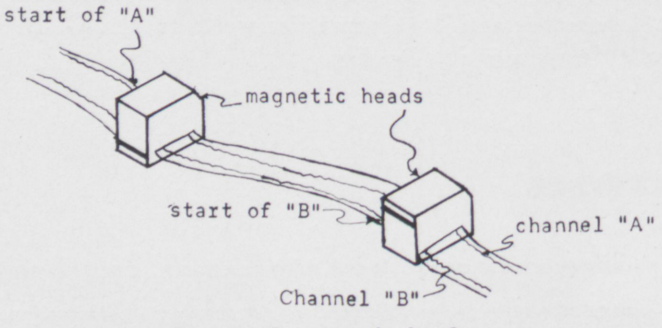
By Bob Jackson, jr., e.e.

Just what is high-fidelity? Eveyone has their own definition. Mr. Hartley of the Hartley Company Inc., of England, gives his definition: "If a musically trained listener, fully aware of what a particular symphony sounds like in a properly designed concert hall when played by a competent orchestra, can hear the same work through a reproducing system in an ordinary living room and get the same aesthetic enjoyment from it, then he will be listening to what I call high-fidelity reproduction...." This is high-fidelity.

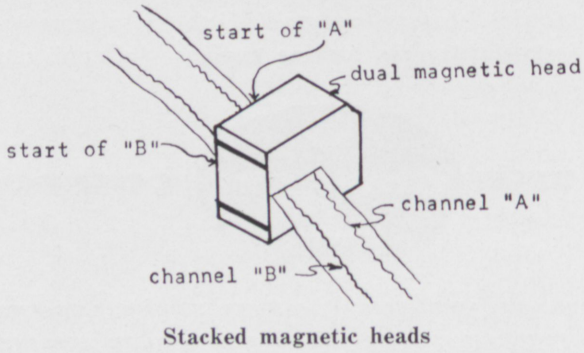
The high-fidelity systems of earier design consisted of one input signal feeding into one amplifier and coming from one speaker or speaker system. This type of system is known as binaural reproduction or one channel. In listening to binaural reproduction one factor is lost, direction. To illustrate this, everything in the world around us we perceive through two channels, two eyes, and two ears. In using two eyes or ears the third dimension or depth is added. If one eye is closed the depth of the picture is lost. If one ear is covered the direction and the depth of the sound is lost.

To give another example of the sound direction and depth. Suppose a listener is sitting in the concert hall listening to the orchestra. In covering one ear the aesthetic enjoyment that would be necessary for Mr. Hartley's definition of high-fidelity would be lost. The same is true when listening to binaural reproduction. All the sounds come from one source and a directional effect cannot be realized.

To give sound reproduction the directional effects realized at the concert hall a multi-channel reproducing system has been developed. Usually two channels are sufficient if the speakers are properly placed. This new system is called stereophonic sound or simply stereo. The idea of stereo is not new. The earliest experiments with it were in 1881 at the Paris Exposition. In 1933 Bell Telephone Laboratories gave a successful demonstration of stereo transmission of a concert in Philadelphia for a large audience in Washington. The war came and eveything was forgotten, During the war another system of reproducing sound was developed. This was magnetic tape. With the introduction of tape the stereo reproduction industry really started. The same requirements for stereo apply as for binaural except that two completely different channels are used for the



Staggered magnetic heads



Stacked magnetic heads

signal. Therefore the cost of a stereo system is approximately twice the cost of a binaural system.

There are at present three different methods for producing stereo sound. They are magnetic tape, stereo broadcasting, and stereo records. Of the three stereo tape is the most important and at this time the most practical. In the stereo tape two tape heads are used on one tape deck.

There are two arrangements of playback. They are the staggered and the stacked or in-line. The figure shows the two different systems. In the staggered the program material must be recorded in a similarly displaced positions or staggered along the tape. This method comes from converting binaural systems to several channel systems. In the stacked model the two heads are positioned one over the other or stacked. In buying tapes for stereo it is very important to specify which type of playback machine it will be used on.

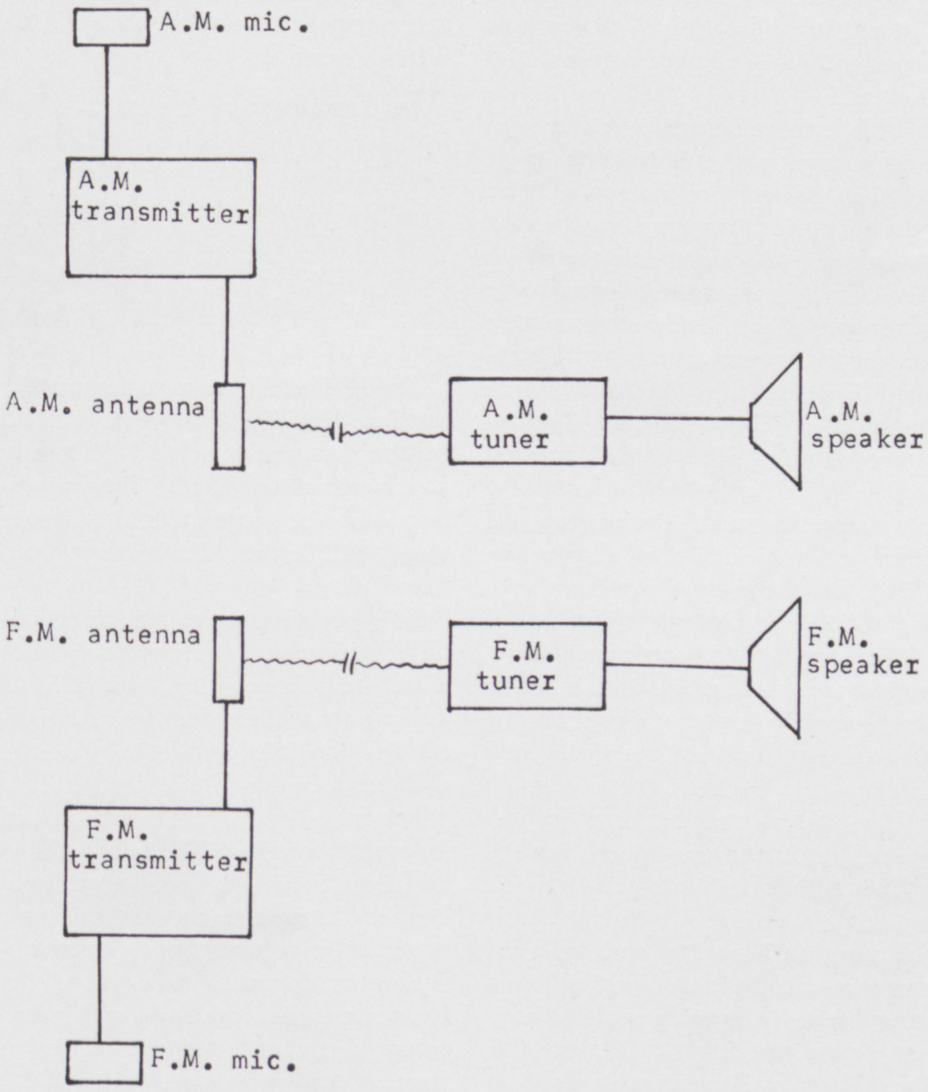
In stereo broadcasting a radio station must broadcast on two channels. Each of the two channels are picked up on its respective tuner and then into two different channels. A block drawing appears in the second figure. The use of A.M. and F.M. are by far the most popular method of stereo broadcasting. Since most of the program material is usually concert performances the pickups or microphones must be widely spaced to get the most directional effects. Solo performances do not carry the same realism as a full orchestra or choirs. There is one main disadvantage to using A.M. and F.M. The A.M. band does not have near the frequency response of F.M. and some difficulty may be encountered at the higher volumes.

The third method, stereophonic records, appears to be the most practical for the future. The big difficulty here is the two channels. If two separate records with identical turntables and pickup arms the almost insoluble problem of properly synchronizing is found. There are several systems which are at present being tested. They are the Westrex, Faidchild, and the Pickering and Company systems. Of the three the Fairchild and Pickering systems seem to be the most promising.

There are advantages and disadvantages in each of the three systems. First there are not many broadcasting companies that are set up to broadcast stereo sound. Until this is changed the use of stereo broadcastingis rather limited. In using the records the recording time is divided by half and can prove unsatisfactory for long playing concerts.

We then come to tape as the most realistic at present. Tape has several advantages. First it is unlimited in playing time. The equipment needed is at a minimum and the fidelity compares with the other two systems described. Several signals may be placed on one tape and kept in perfect synchronism as the tape is played back. Many of the broadcasting companies use stereo tapes for a variety of programs. Also, tapes are available for home use. There is one big disadvantage, cost. For a tape of 30 minute duration the price is approximately $18.00.

Research is going on at all times and improvements are being made in all three of the methods of stereo reproduction. Each of the three systems has its advantages and its use in the high-fidelity field.



Basic Arrangement employed for stereo broadcasting

Campus Survey

By Bill Johnson, soph., e.e., Larry Snapp, soph., e.e., and Frank Jett, frosh.

The Student Council will submit a revised constitution to the student body for approval in the near future. Proposed revisions call for a seventeen man Council to be elected directly from the classes and a Sub-Council to allot funds to various organizations on approval of the Council.

Of late there seems to be renewed controversy over the right to tread on the "sacred" senior path. Last year's enterprising frosh undertook one night to claim sole right to tread on it, and were informed one afternoon of the displeasure created among the upper classes by this action. In the past few weeks the large numeral on the path has changed shape from "60" to "61" several times. There have been accompanying changes in color, running a cycle from white to black to chartreuse.

All this time an attitude of lethargic disinterest prevails among the upperclassmen; this arouses puzzlement as to whether the path is really the "sacred" property of the seniors, or is a plaything for freshmen and sophomores. Perhaps some night it will go the way of the "immovable" senior bench and disappear entirely.

The ASME is having its annual regional meeting at Notre Dame this year on May 2nd and 3rd. The meeting will be accompanied by a banquet and a speech contest. Contest prizes are $150, $100, and $50. Dan Mook will represent Rose at the contest. A national convention will be held at a later date.

The Junior Prom was held on April 19, 1958, in the Mayflower Room of the Terre Haute House. Al Cobine's orchestra, "The Midlanders," supplied the music for the occasion. The theme was "Moulin Rouge" and the French motif was enhanced by a 27-foot replica of the Eiffel Tower.

An Intrafraternity Council Help Day was also held on April 19. Sixteen thousand paper bags were passed out over the entire city of Terre Haute for Goodwill Industries. These bags will be used by Goodwill to collect clothes and cloth to be used in their activities.

The IF Dance has been tentatively set for May 10 this year and all fraternities are working diligently at song practice. The IF Sing promises to be very enjoyable also. Dance music will be provided by the "Moniters."

This year has been an exceptionally busy one for the Rose Glee Club, and the coming months hold many appearances for the group also. For the first time, this year the club made a tour of Central Indiana where they were met with much favorable comment. They have thus far given concerts for a large number of high schools and various community organizations. These appearances do much to improve the Rose reputation and also aid in encouraging young men to come to Rose.

However, the club does a great deal more than simply act as a good will group, for it also does much to aid the community as well. On Friday April 18th, for instance, the group gave their services in a benefit show to raise money for the Beacon School of the Valley at the Student Union Building on the Indiana State Teachers College Campus. The group has also given concerts at all the Terre Haute high schools and will present a special concert in the Rose auditorium on Thursday May 8th at 11:00 A.M.

The climax of this year's schedule of appearances will be two special concerts which are to be given by the Glee Club.

The first of the two is a concert to be given with the Terre Haute Choral Union on May 18th at Indiana State Teacher's College. This concert is by invitation and is a great compliment to the Glee Club. The second of the two concerts is one that will be given on May 24th at the Deming Hotel for the Indiana Society of Professional Engineers.

The Club is directed by Miss Gertrude Meyer, of Indiana State Teacher's College, who has contributed immensely to the success the club has had this year. The club's very fine accompanist is Mrs. Edrice Bennett, who has been with the Glee Club for over twenty-five years.

The Club's president is Mick Adams, and business management is ably handled by Mr. Tom Reed. The Club's sponsor is Prof. Theodore Palmer.

(*Continued on Page* 33)

Inertial Guidance

By Larry Logue, jr., m.e.

A short time ago the Vanguard rocket successfully launched an artificial sattelite into space. This launching was a triumph of the application of the newest development in guidance systems. An inertial guidance system is used in this rocket which marks th opening of a new horizon in navigating systems.

The inertial guidance equipment is the only type of automatic navigation which does not rely on any external influences. It is entirely contained within the carrier. Unlike systems which require radar or radio contact with the earth or stars, it is invulnerable to enemy jamming or natural phenomena and requires no ground facilities. The principal disadvantage of the system is that its course cannot be changed once it is in operation. All the data concerning course and destination must be set in the machine before it is placed in operation.

The basic element of such a system is the gyroscope, which strongly resists any effort to change its plane of rotation. Gyroscopes can be produced of sufficient accuracy to remain in a fixed direction independent of the actions of the carrier. Because this is true, these gyroscopes can be used to measure any change in the direction of the carrier. The gyros used in inertial systems are of the Hermetiv Integrating type. This unit consists of a gyro wheel turning in a small cylinder which is suspended in a heavy fluid by virtually frictionless sapphire bearings. Bearing tolerances are in the order of 10 millionths of an inch.

The second device necessary for an inertial guidance system is a device which will always indicate the vertical independent of the position of its carrier. On a stationary platform an ordinary pendulum would satify this need. However, if this system were subjected to an accelaration it would swing away from the vertical. A special type of pendulum was developed from a principle first proposed by a German professor named Schuler in 1923. The so called "Schuler Pendulum" simulates a pendulum with a radius equal to the radius of the earth. This pendulum has a period of about 84.4 minutes and since its bob would be at the center of the earth it will always be vertical independent of the position or motion of its point of support.

Inertial navigation then depends on the combination of the effects of these two devices. The gyroscope always pointing the same direction and the Schuler pendulum always remaining vertical. The relative position of the two instruments then is used to indicate the exact position of the carrier in space.

Actually the system does not directly measure the displacement of the carrier from its starting point, but instead it measures the accelerations of the craft and relates them as functions of time. Forces due to the accelerations can be measured and the accelerations determined from them. By integrating twice, the displacement of the craft can be determined. Integraters similar to those used in analog computers are used to accomplish the mathematical operations. Three such accelerometer units are used to measure displacement in three dimensional space.

Since these accelerometers must be able to distinguish between vehicle accelerations and accelerations due to gravity, they are carried in a gyro stabilized container which must remain perfectly horizontal. Any effect of gravitational accelerations will cause serious navigational errors. The container must also remain stable with respect to the other axes.

The electronic computing section of the navigation system must take into account many variables. It must compensate for the fact that the earth is neither a flat nor a perfect sphere. It must account for the "Coriolis effect" due to the rotation of the earth, accelerations due to gravity, and other disturbing influences. These problems are gradually being solved. The end result will be a system capable of navigating a craft from point to point without being influenced by any external conditions.

Considering the earth as a non-rotating sphere, the gyro-platform will remain pointing in one direction. In order to keep this platform level it must be rotated at a velocity equal to the angular velocity at

(*Continued on Page* 24)

Locker Rumors

By John C. Fenoglio, jr., ch.e. and Elwood Stroupe, soph., ch.e.

VARSITY TRACK

The track team this year is a very small group that is taking hygiene and good sportsmanship. It is a very small squad that might possibly win some meets if the other team shows up with an equal number of men (about ten). Co-Capt. Bill Washburn is running the 100, 220, and leg of the mile relay. Also running the mile relay is Co-Capt. Larry Logue. Logue runs the 440 also. Letterman Larry Berger is back this year after a foot injury late last year and will do a good job this year on the hurdles. The only letterman returning in the field events is Bill Kuchar. Bill's specialties are in the shot and discus. Freshmen Ray and McCardle are hitting right around the six foot mark in the high jump. If everyone on the team gets inspired at the same time, they might come through with a team win.

BASEBALL

As usual the spring rains have kept the baseballers inside, but with the seven returning lettermen and several promising freshmen, the future seems bright for this year's squad.

The pitching staff looks very strong with Bob Manning and Wes Spoonamore returning from last year's squad and Larry Kirts coming back after a season's absence.

With lettermen Jerry Waltz, Dale White, and Carl Herakovich covering second, shortstop, and third, Rose's opponents are going to find it plenty tough to pierce this combination. Graduation left a hole at first but veteran Louie Roehm is taking over very well.

However, things don't look as bright in the outfield unless the freshmen give letterman Gene Blastic some help.

1958 SCHEDULE

April 12	Marian College	2 games home
April 15	Indiana Central	1 game home
April 12	McKendree	2 games home
April 25	Principia	2 games away
April 30	Greenville	2 games away
May 3	Concordia	2 games away
May 6	Franklin	1 game home
May 10	Illinois College	2 games away

ALL INTRAMURAL TROPHY

The race for the all-intramural trophy is nearing the three-quarter pole. The present standings are as follows:

Seniors	218
Ind. Fr.	198
Deming	185
BSB II	183
BSB 1	157
Soph.'s	120
Juniors	87

(*Continued on Page* 24)

Down the home stretch

SHIPPINGPORT PLANT

Nuclear Power

By Ray Clark, frosh.

Recently the Shippingport Atomic Power Station was put into operation. This was an historic event since it was the first large-scale nuclear electric power plant in peacetime use. Although only on the threshold of this new era of power, the first attempt is a highly efficient, truly ingenious device.

The primary difference between this and an ordinary plant is the pressurized-water reactor system. This system supplies the heat energy to make the steam which drives the generators in the ordinary manner.

This article will be concerned only with the primary system which includes the reactor and the coolant loop. Before going to specific details of this plant one must understand the basic principles behind a nuclear reactor. The reactor must contain enough radioactive material to sustain a chain reaction. This reaction can be controlled by neutron-absorbing control rods which are inserted to lower the power level or withdrawn to increase the activity. A heat transfer substance is circulated among the fuel cells to absorb heat which is then carried to the secondary system. In this case the heat transfer substance is pressurized water. Pressurized water is used as it serves a dual purpose. The water serves as a coolant and as a neutron moderator. In a fission process the neutrons are traveling at high speed. The water molecules serve to dissipate some of their energy and to slow them down to the thermal level where they are most efficient in causing fission in uranium 235. If water were allowed to boil it would not be as good a moderator and it would not be as efficient, since steam is not as good a coolant as water.

The Shippingport reactor consists of three main elements— the pressure vessel, the core, and the control-rod assembly. The pressure vessel is a cylindrical structure with hemispherical ends. The inside dimensions are approximately thirty-one feet high by nine feet in diameter. The inner surface is plated with a quarter-inch coating of stainless steel. The top hemisphere has forty-six openings for control rods, instrumentation, and refueling purposes.

The fuel assembly or core, uses both enriched uranium 235 and natural uranium oxide. The core is about 70 inches long and contains 145 fuel assemblies. Thirty-two of these assemblies are seed clusters while the remaining 113 are blanket assemblies. The seed-and-blanket concept has several important features. The highly enriched uranium 235 seed not only makes the chain reaction possible, but gives off a great supply of neutrons. The uranium oxide blanket contains only one part uranium 235 in 140 parts of uranium 238. The uranium 238 will not react with thermal neutrons and so it absorbs them. As uranium 238 absorbs neutrons it becomes uranium 239 which decays to neptunium and then to plutonium 239 which is suitable fuel for use with thermal neutrons. Actually about 6 plutonium atoms are formed for every ten uranium 235 atoms destroyed. This gives the reactor a longer life than that of the seed alone. The seed is designed for a minimum full power life of 3000 hours while the blanket portion has a minimum life of 8000 hours. When the amount of fissionable fuel falls below the point of criticality, reactivity ceases. The fuel that is left is not wasted however, since it can be reprocessed.

The control of the reactor is carried on largely by a system of control rods. The rods are cruciform shaped to fit into the openings in the fuel assembly. The lower 70 inches of the rod is made of hafnium which is a good neutron absorber. The remaining portion of the rod is made of a zirconium alloy. The rods are moved up and down and held in position by a low current motor. If the current should go off, springs would pull the motor away and the rods would fall into position. The control rods are used only for major changes of output since the negative temperature coefficient will take care of small deviations. The reactor is designed to maintain an average coolant temperature. If the load on the generator increases the temperature of the returning coolant water goes down and the

(Continued on Page 24)

Fraternity Notes

Lambda Chi

Theta Kappa chapter is proud to announce the pledging of another freshman, bringing the total pledges to nineteen. The latest addition is William Pike, of Terre Haute. Congratulations, Bill.

The annual White Rose Dance of Lambda Chi Alpha was held Saturday night, March 22, at the Mayflower Ballroom. This year's dance was put together by our chapter and the Lambda Chi chapter at Indiana State. The music was furnished by Rick Kirkham's band, and the decorations were extensive, even including a fountain. Miss Colleen Downham, escorted by Bill Payne, was crowned the 1958 Crescent Girl, of Theta Kappa. Her attendants were Misses Marilyn Tope and Sandy Findley, escorted by Bart Gronberg and Tom Feutz, resp. The new Crescent Girl and her court made a pleasing picture indeed.

At the Honors Assembly on March 13, Theta Kappa retained possession of the I-F scholarship trophy. Also coming in for honors were Larry Logue, who was tapped for Tau Beta Pi and Blue Key, John Jardine, tapped for TBP, and Carl Herakovich, tapped for Blue Key.

The Midwest Conclave of Lambda Chi Alpha is being held at Butler University, Indianapolis, on April 11. We are planning on having a good representation at this meeting of the chapters in this area.

Now that spring is finally upon us, it is time to get our voices in shape for the I-F sing which is coming up. Frank Molinaro has again been chosen as our director and we feel he will repeat the great job that he did last year.

For the first time this year I find that a senior has broken into the pinning column. He is Fred Fowler, a chemical, who lost his pin to Miss Diana Haus, of Plainfield.

Well this is about it for another month, so take it easy until we meet again.

Jim Barrick

Alpha Tau Omega

The Indiana Gamma Gamma Chapter of Alpha Tau Imega is proud to announce the election of its officers for the coming year.

Worthy Master (President) — Jack Fenoglio
Worthy Chaplain (Vice-president) — Bob Mewhinney
Worthy Keeper of Exchequer (Treasurer) — Bob Hall
Worthy Keeper of Annals (Historian) — Bob Schukai
Worthy Scribe (Secretary) — Mike Munro
Worthy Usher — Harry Bitner
Worthy Sentinel — Joe Vendel
Fiscal Assistant — Larry Berger
Pledge Trainer — Bill Kuchar

The whole chapter feels that these brothers are capable of leading ATO successfully through 1958 In fact, even though we believe the outgoing officers did an excellent job, we have much higher expectations from the new officers.

March 22 was a big day for all the ATO's in Indiana. All four chapters in the state (I.U., Purdue, DePauw, Rose) met at Purdue University for our annual State Day. Gamma Gamma was disappointed with its second-place finish in both the attendance contest and the song fest. We are sorry to say that Purdue took the attendance award and Indiana carried home the singing trophy. The climax of the day was supplied by an informal dance in the Purdue Student Union Ballroom.

Gamma Gamma's new social chairman, Larry Grimes, is really on the ball. Already the redhead has six parties lined up before the end of school. Upcoming events include open houses with Chi Omega Sorority on April 11 and Delta Gamma Sorority on April 26, a party before the Junior Prom on April 19, and a picnic on Sunday, May 11, after the Intrafraternity Dance on Saturday night.

The Alpha Tau softball squad, under the mentorship of Louis Roehm, athletic director, can hardly wait for that April 17 opening date against Lambda Chi Alpha.

Congratulations are in order for our new Pledge Brothers Jerry Waltz and Paul Pirtle. Welcome aboard, fellows!

Congratulations also must be passed out to Brother Jack Smith and Miss Judy Kirkham, who recently announced their engagement. July 19 has been set as the date when Jack will take that final, fatal binding step.

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Critique

By James Funk, frosh.

The analysis below, written as an English theme by a Rose freshman, illustrates part of the training afforded by the humanities: logical thinking and effective communication.

For those unfamiliar with "The Catbird Seat," a short synopsis will help. Mr. Martin, a mild and extremely conscientious file clerk, is so upset by Mrs. Barrows, a brash and conniving secretary who threatens to take his job away from him, that he plans to kill her. With murder in mind, he visits her, but cannot go through with it. However, in the midst of his failure, he concieves a brilliant plan: he does nothing, that is, except to drink, smoke and swear in a thoroughly un-Martin-like manner. The following day at the office his plan bears delicious fruit, for Mrs. Barrows' accusations of his loose conduct fall upon unbelieving ears, so sterling is Martin's reputation. And when, in reply to the boss's questioning, Martin calmly denies any and all of her charges, Mrs. Barrows is fired.

Dr. Donald K. Anderson, Jr.

Why I Enjoyed "The Catbird Seat"

It is my opinion that James Thurber's "The Catbird Seat" is one of the better short stories in our anthology. I certainly got more pleasure out of it than any of the others. And I feel that the reason that I enjoyed it so, is that "The Catbird Seat" excels in every consideration usually given in judging a short story. Let's see why.

First of all, it is highly concentrated. Every minute detail is an integral part of a grand build-up for the surprise ending. An example of this is the casual mention Thurber makes of Mr. Martin's drinking a glass of milk in the opening lines. This small, seemingly insignificant fact crystallizes the notion in the reader's mind that here we have a full-grown man who, when alone, drinks milk rather than whiskey, beer, or even coke. It gives a remarkable insight into Mr. Martin's Puritan character.

The characterization of Mr. Martin's astute foe, Mrs. Barrows, is somewhat more obviously revealed. Furthermore, her effect on Martin's equilibrium is quite apparent. We immediately realize that we are to sit in on a personality clash between a quiet, easy-going, intensely efficient man and a loud, brash, domineering woman who evidently has an "in" with their mutual boss, Mr. F. The charming Mrs. Barrows couples this crude personality with her constant repitition of annoying, childish expressions. Although Mr. Martin denied it in his own thoughts, I feel that these vexing exclamations so frequently uttered by the ostentatious Mrs. Barrows played a far greater part in Mr. Martin's hatred of her than her efforts to undermine him all the accomplishments of Mr. Martin in the office. You might say that by capitalizing on her influence with the boss, Mrs. Barrows was stabbing Martin in the back. But these maddening, masking remarks of hers were turning the knife and were causing a constant mental enguish, in Martin that was to lead him to drastic action.

Our interest in this clash is intensified as Mr. Martin, applying his thorough, efficient manner to the task of killing Mrs. Barrows, executes the first phase of the maneuver. Thurber masterfully pyramids the suspense as Martin, alone with the woman in her apartment, declines to remove his gloves and, in her absence, pokes about for an effective weapon. But then Thurber's true genius is revealed as he has Martin suddenly drop this plan to kill Mrs. Barrows and decide instead to let the woman "rub herself out" so to speak. This suspends the element of suspense momentarily and leaves us up in the air since the reasons for Martin's reversal of tactics are not clear. These motives are clear to Martin, however, as we learn in the final paragraphs that they permit him to destroy Mrs. Barrows without effecting his own destruction, as would have been the case had he actually murdered her.

Due to the fact that the main character, Mr. Martin, did not himself realize his final plan of action until he pursued it, we are given no indication as to the outcome beforehand. However, since Martin's whole scheme depended upon his stainless reputation, we can cee that Thurber, by mentioning Martin's

(*Continued on Page* 33)

Research & Development

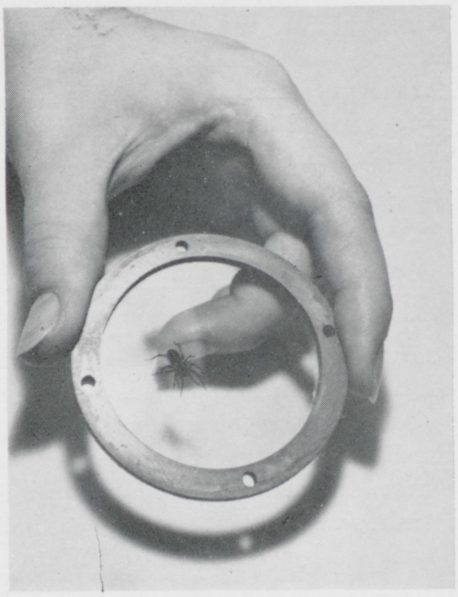
Jack Milnes, fresh.

MILLIONTH OF AN INCH RUST

Scientists at the Westinghouse Research Laboratories are using aluminum foil — household variety — in delcate scientific experiments and in the construction of evperimental electronic tubes.

However, the scientists do not employ the complete foil, instead they discard about 99.9 per cent of it by chemically dissolving away all the aluminum metal and saving the thin aluminum "rust," or oxide which coats the foil to a depth of less than a millionth of an inch.

The Westinghouse scientists use this film of aluminum oxide to support the layers of sensitive material required in electronic imaging tubes. Because of the rust's extreme thinness, electrons traveling through the tube can penetrate the sensitive layers without being interrupted by a supporting structure.



Two-dimensional matter

Preparing an aluminum oxide film to serve this purpose is not easy. It must be extremely thin, but also be large enough to serve as a miniature screen within the tube. While the films themselves have been known for several years, only recently have they been made thin enough and large enough to be practical.

In spite of their delicacy and exactness, the ultrathin films are prepared by simple techniques which require no unusually precise apparatus.

A piece of aluminum foil, free of wrinkles, is pressed flat. The aluminum oxide coating on one surface on the foil is removed by rubbing with a solution similar to common lye, exposing the aluminum metal underneath.

With the oxide on one side removed, the foil is washed in distilled water, dried, and placed in an acid solution. The acid "eats" away all the aluminum metal, leaving only the thin coating of oxide on the other side of the foil. This film is washed, dried and mounted on a round metal ring of the desired diameter.

Since the ordinary oxide coating on the surface of aluminum foil is usually too thin, the Westinhouse scientist may first "build-up" this coating before preparing the film. To do this they electrically deposit an additional oxide film on the foil in an acid solution. By controlling the voltage a perfect coating of any desired thickness can be prepared.

As a matter of routine they now make self-supporting aluminum oxide films only one-millionth of an inch thick and two inches or more in diameter.

The Westinghouse scientists estimate that their aluminum oxide films are only from 25 to 50 molecules thick. The films are almost perfectly transparent and colorless, since their thickness is only about one-twentieth of the wave length of the light rays passing through them. Yet, for their thickness, the films have tremendous strength; they support themselves over relatively large surface areas and withstand comparatively large external forces applied to them during their preparation and normal handling. The tensile strength of the films is estimated to be about equal to ordinary steel.

Another feature of the films is their unusual uniformity. Measurements show that a film may vary in thickness over its entire surface by not more than a single molecule. The measurements are made by interference of light — the same effect which produces colors seen in thin films of oil and in soap bubbles.

These films are essentially, two dimensional solid matter — a solid having length and width but no thickness.

ELECTRO DIGITAL INDICATOR

Scientists at the Westinghouse Research Laboratories in Pittsburg, Pa., have developed a practical

technique for displacing numerals or other symbols on a thin flat, glowing electroluminescent screen.

Before a meeting of the American Institute of Electrical Engineers in New York, Dr. E. A. Sack, manager of the Laboratories' dielectric devices section, termed the device an "electroluminescent digital indicator." He described it as bright enough for use in broad daylight and said it is the first instrument of its kind to be built entirely of solid slate elements.

A digital display screen has advantages over conventional methods of displaying numerical information, particularly where speed and accuracy of reading is important. There are no dials to watch, no markings to estimate in order to get an exact reading.

At any given time, such a screen displays only the exact information desired, and most of the screen is active in displaying it. In contrast, only a small part — often less than one per cent— of the face of a conventional meter actually is active in informing the observer of a desired reading. This is not only poor utilization of existing space, but the multitude of lines and markings on the conventional instrument is confusing to the observer. Hesitation in reading, errors in estimation and observer fatigue result.

A digital display system goes a long way toward overcoming these disadvantages. Consider, for example, the information needed by the pilot of a modern aircraft moving at the speed of sevral hundred miles an hour. Data concerning engine performance, position of the plane and related information must be conveyed to the pilot in the fastest, most accurate, and clearest way possible. Displaying the information as actual numbers, as the score is displayed on a basketball scoreboard, meets these requirements.

For the most practical applications, however, digital indicators have been too bulky, too dim, inadequate in numeral size, not reliable enough, or too high in their power requirements. But a digital display that employs electroluminesence removes the objections.

An electroluminescent digital indicator is unusually compact for display device. The numbers are shown on thin panels which can be of any desired size and no thicker than a sheet of ordinary glass. These panels are simple, rugged, low in power consumption, and inexpensive. Their brightness can be changed at will and they can be made in a wide choice of colors for identifying different kinds of data.

The Westinghouse digital indicator is essentially a flat screen having a series of phosphor-coated electroluminescent strips which glow when they are energized electrically. When properly energized, seven such strips will form any number from zero through nine; 21 strips, therefore, switched in and out of the circuit, display any number from 0 to 999. By a different design, a screen with 14 segments can display any letter from A to Z and, in addition, show the numerals 0 through 9.

Switching of the electroluminescent strips to form the desired numbers has been done in several ways, but no matter how done, information in the form of electrical signals is received by the switching mechanism, interpreted, and fed to the correct strips to display the information as numbers on the screen.

Because of their small size, ruggedness, low-power requirements and reliability — characteristics which match those of the electroluminescent screen itself — transistors have been used as switching elements for the digital indicator.

A unique switching device called an Elpak relay has also been used for switching purposes. This device consists of small electroluminescent cells placed face-to-face with photoconductor cells. The electrical signals received by the electroluminescent cells cause them to glow, turning on the corresponding photoconductors and allowing them to activate the proper strips in the electroluminescent display screen.

Its power handling capabilities and electrical matching to the electroluminescent screen make the Elpak relay an excellent device for energizing the electroluminescent display screen. In addition, being a solid state device with no moving parts, it has the advantages of long life, reliability and ruggedness.

Among the other advantages of the display are: the size of the panel and the numbers it displays is limited only by manufacturing convenience with one-foot-square panels already available; the numbers are displayed on a single plane, and can be viewed through a wide viewing angle without distortion; the high brightness of the numbers makes the display suitable for use under both light and dark viewing conditions; the low-power requirements of the display are easily met with miniature power supplies; the good detail, or resolution, of the screen permits display of numerals only a fraction of an inch high if desired; the possibility of verying the color of the numbers gives an additional degree of freedom in interpreting the information displayed.

While military and other nonconsumer applications will most likely be the first to materialize, an electroluminescent display of this type could have many interesting and useful everyday applications. For example, the speedometer, oil pressure temperature and generator

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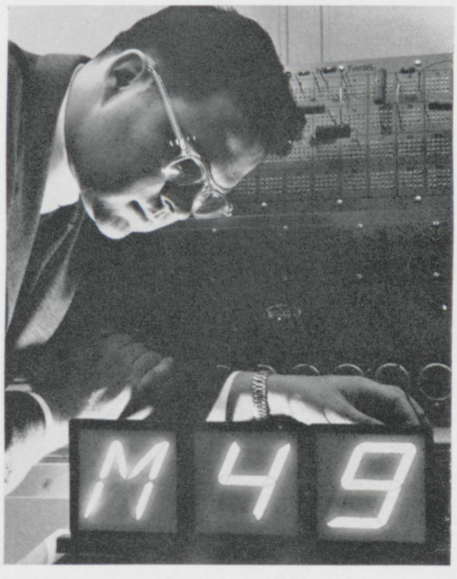


No dials to watch

You Never Had It So Good

By Harry R. Hyder

Editor's Note: Reprinted by permission of the copywright owners from "Pacific Electronics Monthly" for April, 1957. Mr. Hyder's article appeared as a letter to the editor of that publication. Title courtesy of The Bent of Tau Beta Pi.

Why do engineers spend so much of their time worrying about their social standing? The Letters-to-the-Editor columns of those which solicit the opinions of engineers are full of tearful epistles bemoaning the fact that engineers do not enjoy the same prestige in the community as, say, Doctors of Medicine.

It is surprising that in a supposedly democratic country, there should be so many people who want to be considered superior to, or in a separate class, from, the common herd. Or is it so surprising?

Aristocracies stretch back into pre-history; democracy is less than two hundred years old. Perhaps we still have an anterior craving for a rigidly stratified society, where the superiority of a person is established not by natural abilities, but by legally-sanctioned titles and privileges. Americans are notoriously more adulatory of foreign hereitary potentates than those potentates' own subjects. Why does the American public virtually lose its when a motion picture star marries a distinctly minor, almost spurious prince, of whom most had never heard of before the engagement? The title, and implied superiority makes the difference. Scholars have even connected the popularity, peculiar to this country, of lodges wherein the members assume grandiose titles and resplendent costumes to this same subconscious craving for aristocracy.

What has all this to do with the engineer? Nothing and everything. Nothing, if he is satisfied to be a reasonably well-paid, but undistinguished citizen, getting what satisfaction he can from his work alone. But everything, if he desires public recognition of his superiority to the neighborhood butcher or publican.

Engineers always look with envy at the other professions. But there is every reason why the engineer should not enjoy the same prestige as the doctor, lawyer, or clergyman, which are the three oldest established professions. (No remarks, please, about the *very* oldest.) The practitioners of these three professions were originally drawn exclusively from the upper class. That is, they had the prestige before they had the professions. Engineers, on the other hand, were originally drawn from the class of mechanics and artisans, and by the time engineering became important, the social structure had started to break down; class lines were less distinct, and the engineers were left in limbo. But the older professions managed to keep most of their prestige, which derived only in part from their vocations.

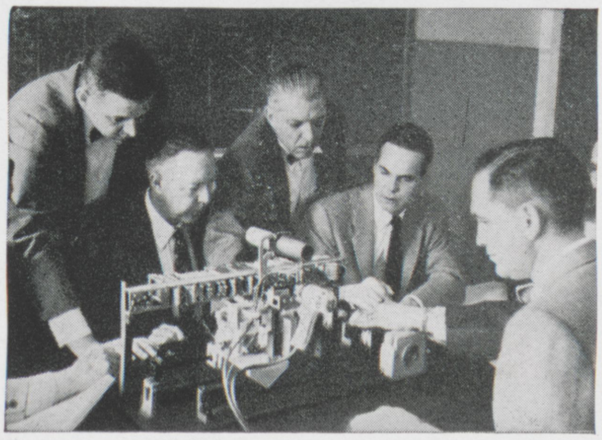
That is one reason. But there is a far more important and subtle reason, which engineers may find it very hard to accept. It is this: People *want* doctors, lawyers, and clergymen. People *do not* want engineers and physicists. I mean that at times during his life, the average person has an acute personal need for one or the other of these three. I find it difficult to imagine anyone having an *acute personal need* for an engineer or physicist. And this, in a nutshell, is why the engineering profession will never be esteemed as are the older ones.

Who needs an engineer or physicist anyway? The X Aircraft Co., the Y Electronics Corp., or the Z Motor Co. all need engineers. But the average man doesn't need us, and therefore will not esteem us. And he is right.

The doctor can cure his ills, the lawyer can uphold his personal rights before the colossus of the law, the clergyman can make his earthly troubles easier to bear. But what can the engineer or physicist do for him?

We may say that he needs us but does not realize it. This is not strictly true; the needs that the engineer fills are as a rule not even needed until the engineer has already filled them. The man of centuries ago knew he needed a cure for his diseases before he dreamed that it was possible; he desired freedom from arbitrary power, and spiritual consolation. But he didn't need the auto-

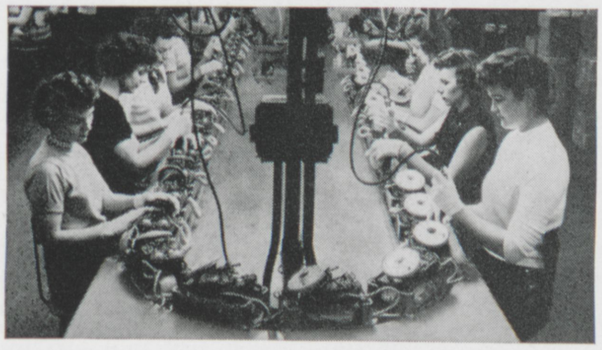
(*Continued on Page* 28)



Your professional advancement is accelerated by our company-sponsored self-development programs: our full-time, off-the-job Graduate Engineering Training Program and the Tuition Refund Plan for after-hours college study. Engineers are important to all phases of Western Electric's job as manufacturer, purchaser, distributor and installer for the Bell System.

Your professional advancement

Western Electric offers real opportunity. Some 55% of the college graduates in our upper levels of management have engineering degrees. And 7,000 management positions must be filled by newly promoted people in the next ten years. Many of these positions will be taken by Western Electric engineers.



Opportunities spring from the work we do. As the Bell System's manufacturing unit, Western Electric is the world's largest maker of communications equipment. We are equipped to produce some 65,000 different parts which are assembled into a vast variety of apparatus and equipment. Add to this our steady, varied defense assignments, and you see why engineering skill gets top priority here at Western Electric.

CHOOSING a company with which to spend your professional life is one of the most important decisions you have to make. Choose carefully, for your professional advancement and rewards depend to a large degree on the opportunities presented you.

Be sure the company itself is growing on a solid foundation . . . doing important work that has a permanent part in the nation's economy and future. Be sure the company offers challenging work and opportunities in your chosen field . . . for you will be happiest and develop faster doing what you like. Be sure the company you choose is "engineering-minded" . . . and has demonstrated an active interest in the development of its engineers.

Before you decide, look around . . . ask . . . compare. You will find all these opportunities at Western Electric.

Opportunities exist for mechanical, electrical, chemical and civil engineers, and physical scientists. For more information pick up a copy of "Your Opportunity at Western Electric" from your Placement Officer. Or write College Relations, Room 1111D, Western Electric Co., 195 Broadway, New York 7, N. Y. And be sure to sign up for a Western Electric interview when the Bell System recruiting team visits your campus.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

Principal manufacturing locations at Chicago and Decatur, Ill.; Kearny, N. J.; Baltimore, Md.; Indianapolis, Ind; Allentown and Laureldale, Pa.; Burlington, Greensboro and Winston-Salem, N. C.; Buffalo, N. Y.; North Andover, Mass.; Lincoln and Omaha, Neb.; St. Paul and Duluth, Minn.; Kansas City, Mo.; Columbus, Ohio; Oklahoma City, Okla. and Teletype Corporation, Chicago 14, Ill. and Little Rock, Ark. Also Western Electric Distribution Centers in 32 cities and Installation headquarters in 16 cities. General headquarters: 195 Broadway, New York 7, N. Y.

Library Notes

By Carson W. Bennett and Anita Walden

THANKS TO BOOKS

The following commentary by Stefan Zweig (1881-1942), German novelist and critic, first appeared in 1937 in a volume of occasional pieces entitled "Begegnungen mit Menschen, Büchern, Stadten" and was recently reprinted in the February 8, 1958 issue of Saturday Review. It was translated for Saturday Review by Harry Zohn, professor of German at Brandies University.

They are there, waiting and silent. They neither urge, nor call, nor press their claims. Mutely they are ranged along the wall. They seem to be asleep and yet from each one a name looks at you like an open eye. If you direct your glances their way or move your hands over them, they do not call out to you in supplication, nor do they obtrude themselves upon you. They make no demands. They wait until you are receptive to them; only then do they open up. First, there has to be quiet about us, peace within us; then we are ready for them. Of an evening, on returning home from tiresome errands; some day at noon when one is weary of his fellow men; in the morning when one is cloudily half-awake after dream-laden sleep—only then is one ready for books. You would like to have a conversation and yet be alone. You would like to dream, but in music. With the agreeable anticipation of sweet sampling you step to the bookcase: a hundred eyes, a hundred names meet your searching glance silently and patiently, the way the slave women of a seraglio greet their master, humbly awaiting the call and yet blissful to be chosen, to be enjoyed. And then—as the finger gropes around on the piano to find the key for the inner melody, gently it nestles against the hand, this dumb white thing, this closed violin; in it all the voices of God are locked up. You open up a book, you read a line, a verse, but it does not ring clear at the moment. Disappointed, almost rudely, you put it back. Finally, the right one is at hand, the book that is right for this hour—and suddenly you are gripped, your breath mingles with another's breath, as though the warm, naked body of a woman were lying next to yours. And as you carry it away to your lamp, The Book, the happily chosen one, glows with inner light. Magic has been done; from delicate dream clouds a r i s e s phantasmorphia. Broad vistas open up and your senses fade away into space.

Somewhere a clock ticks. But it does not penetrate into this time which has escaped from itself. Here the hours are measured by another unit. There are books which have traveled through many centuries before their words came to our lips; there are new books, born only yesterday, just yesterday begotten out of the confusion and distress of a beardless boy. But they speak with magic tongues, and one like the other soothes and quickens our breathing. And as they excite, they also comfort; as they seduce, they also soothe the open mind. Gradually you sink down into them; you experience repose and contemplation, a relaxed floating in their melody in a world beyond this world.

You pure leisure hours, transporting us away from the tumult of the day; you books, truest and most silent companions, how can we thank you for your ever-present readiness, for this eternally uplifting, infinitely elevating influence of your presence! What have you not been in the darkest days of the soul's solitude! In military hospitals and army camps, in prisons and on beds of pain, in all places, you, the eternally wakeful, have given men dreams and a hand's breadth of tranquility amidst unrest and torment. God's gentle magnets, you have always been able to draw out the soul into its very own sphere when it was buried in everyday routine. In all periods of gloom you have always widened the expanse of our inner horizon.

Tiny fragments of eternity, mutely ranged along an unadorned wall, you stand there unpretentiously in our home. Yet when a hand frees you, when a heart touches you, you imperceptibly break through the workaday surroundings, and as in a fiery chariot your words lead us upward from narrowness into eternity. ,

....Stefan Zweig

"They all agree..."

"Since the day we decided to get married, I've been doing a lot of thinking about our future. It's time I made a choice on a career. I've talked to the Dean of Engineering, most of my professors, and to some of the fellows who have graduated, and you know, they all said the same thing.

"They all agree that the aircraft and missile industry holds the best opportunities and the brightest future for an engineer these days. What they said makes sense, too, because developments in this field today really give a fellow an opportunity to make important contributions on vital projects.

"Not only that, but the aircraft industry is noted for its good salaries. Generous benefits, too. And advancement in both salary and position is limited only by how far I want to go."

Unlimited opportunities, high salaries, company-paid benefits unheard of until a few years ago — these are only a few of the reasons why so many young engineers with a keen eye to the future are choosing the aircraft industry.

It is only natural that many engineering graduates should consider joining Northrop Aircraft, Inc., because the company shares its many successes with every member of its engineering and scientific team. Advanced projects at Northrop are now in production, and active top-priority projects mean rapid advancement and success for the individual engineer.

Such projects include the famous Snark SM-62, world's first intercontinental guided missile, now being activated in the first United States Air Force missile squadron; the USAF T-38 supersonic twin-jet advanced trainer; and other important missile and manned aircraft weapon systems and components.

Engineers in more than thirty categories contribute to Northrop's success in an ideal environment with the latest tools of science, in its new Engineering Science Center. Here you will work with leading scientists and engineers who respect, acknowledge, and reward your individual ideas and abilities.

Why not write us now . . . regardless of your class at college. Ask us how you might best gain a career with Northrop. Write to Manager of Engineering Industrial Relations, Northrop Division, Northrop Aircraft, Inc., 1033 East Broadway, Hawthorne, California.

NORTHROP

A Division of Northrop Aircraft, Inc.

BUILDERS OF THE FIRST INTERCONTINENTAL GUIDED MISSILE

INERTIAL GUIDANCE

(*Continued from Page* 15)

which the carrier travels around the earth. This is equal to the linear velocity (output of the first integrator for the accelerometers) divided by the earth's radius. A signal proportional to this magnitude is applied to a small motor which rotates the platform. The input to this motor then is the velocity and its output is the angle of the platform. If this angle is not accurately maintained, then the accelerometers will be in error since it will indicate accelerations due to gravity as well as accelerations of the carrier. This portion of the control circuit has a natural frequency of Vg|R, which is the frequency of the "Schuler pendulum" referred to earlier. Thus, the system will always keep the platform horizontal.

The effect of the earth's rotation must also be accounted for in the computations. If the earth were not rotating, a plane flying a straight track between two points on the earth's surface would fly a straight path in space. Since the earth is actually rotating in space, the plane must actually travel a curved path in space. These corrections are computed as a function of velocity and latitude and added to the accelerometer signal.

The size of an automatic navigation system is an important consideration in modern aircraft design. In the case of inertial navigation, it is very difficult to assign any particular size to the complete system since military security is very rigid concerning this subject. It is now being developed for use in ballistics missiles as well as manned aircraft and even short-haul helicopters. The systems may weigh between 75 and 2,000 pounds, depending on the application.

The science of inertial navigation has made much progress in the past several years. At present there is still much to be learned, however. With an increasing amout of scientific effort being directed to this study, practical inertial navigation systems will be a reality within the very near future.

LOCKER RUMORS

(*Continued from Page* 16)

The trophy has arrived and it has met all expectations of the stuent body. It is a large gold goddess of victory standing on a platform supported by four pillars. It stands about two and one-half feet high. It will be a traveling trophy. The name of the winning team will be inscribed upon the base of the trophy. Good luck to you, men, and may the best team win.

INTRAMURAL

Golf — The latest addition to the Rose Intramural program is the golf competition. Although only six men have signed up for play so far, there will probably be many more when play starts. The intramural director has obtained the use of the Phoenix Country Club on Monday and Friday afternoons. The abilities of golfers around Rose have been hidden for many years, but this should provide the men of Rose with a new way to spend those lazy spring afternoons.

Tennis — The tennis courts have been in the process of repair for the past few weeks, and are now ready for play. The backstops have been repaired and reinforced. Several of the men on campus have shown great interest in the tennis program in the past and the program this spring should draw a good number of men to the tennis courts. There will be both doubles and singles competition in the league play.

Horseshoes — The familiar clang of the old horseshoes will soon be heard from the fieldhouse courts. The courts are now in good condition and are ready and waiting for the players.

Softball — There have already been some practice games held to get the men back in some semblance of condition. The competition in the regular and interfraternity leagues will start in the next week or two. There should be some red-hot games this year, if previous games give any indication of the future. The diamond has been taken care of by Phil Brown and Max Kidd and is ready for the seasons play.

NUCLEAR POWER

(*Continued from Page* 17)

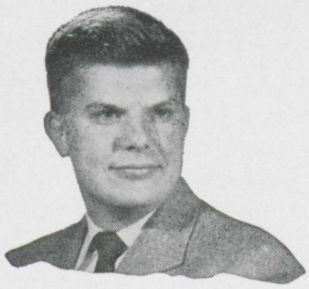
reactor produces more heat which increases the outlet temperature and keeps the average temperature the same. The opposite applies if the drain on the turbine should decrease. This negative temperature coefficient will make up for power deviations of 10 per cent.

In the Shippingport reactor, there are four heat exchangers, two of which are the straight-through type and the other two the "U" type. In the straight through type, the coolant passes through 2096 stainless steel tubes a half-inch in diameter and 36 feet long. Water flowing into the "U" bend exchangers passes through 921 three-quarter inch stainless-steel tubes. These tubes average 50 feet long and are bent into a "U." The main difference between the two types is that the "U" type can use carbon steel plated with stainless steel so it is less expensive.

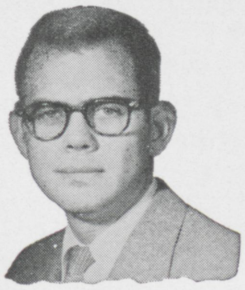
Developing a nuclear reactor is analogous to making the first rocket flight to the moon. In both cases the stockpile of knowledge is very slim and one mistake could be disastrous. For this reason reactors of the future will probably be less expensive and more efficient, but until we gain more experience every precaution possible is taken to eliminate chances for error.

This power plant is rather expensive due to the extensive use of high cost metals but there is a possibility that new metals will be discovered which will be as efficient. There is still much to be learned in this field, but this reactor is teaching us more than theoretical work can ever do.

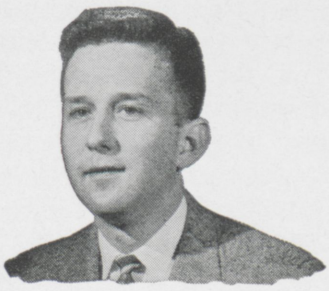
The Shippingport plant started operation December 2, 1957, the 15th anniversary of the first self-sustaining nuclear fission reactor designed and built under the supervision of the late Curico Fermi. If the same rate of progress is made for the next 15 years, great things lie ahead.



Pump-turbine design is now the work . . . hydraulics, the field . . . of John Jandovitz, BSME graduate of College of City of New York, '52.



Water conditioning chemical, service, and equipment specialist in Houston is new assignment of Arthur Brunn, BS Chem. E., University of Tennessee, '56.



Field sales engineering of America's widest range of industrial products is choice of Roy Goodwill, BSME, Michigan State College, '54.

Recent Training Course Graduates

select wide choice of careers at Allis-Chalmers

Starting up a cement plant in Mexico after coordinating all work on it is latest job of John Gibson, BS Met. E., University of California, '54.

Nucleonics is chosen field of R. A. Hartfield, BME, Rensselaer Polytechnic Institute, '53. Currently he is working on design and development of new nuclear power plant.

THERE'S variety at Allis-Chalmers. Whether you're thinking in terms of types of industries, kinds of equipment, types of jobs, or fields of work, the diversification of Allis-Chalmers provides unsurpassed variety. For example:

Types of jobs	Industries	Equipment	Fields
Research	Agriculture	Tractors	Metallurgy
Design	Cement	Kilns	Process Engineering
Manufacturing	Chemical	Screens	Mechanical Design
Application	Construction	Earth Movers	High Voltage Phenomenon
Sales	Electric Power	Transformers	Stress Analysis
	Mining	Crushers	Nucleonics
	Nuclear Power	Reactors	Electronics
	Paper	Control	Hydraulics
	Petroleum	Pumps	Acoustics
		Motors	Thermodynamics
		Steam Turbines	

An outstanding training program, started in 1904, is designed to help you find the activity within these groupings for which you are best suited. Up to two years of theoretical and practical training are offered. Direct employment at Allis-Chalmers is available for those with sufficient background.

Learn more about Allis-Chalmers and its training program. Ask the A-C district office manager in your area or write Allis-Chalmers, Graduate Training Section, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

FRATERNITY NOTES

(*Continued from Page* 18)

Theta Xi

Well here it is almost Easter and all the brothers are preparing for a nice rest away from studies. I guess all the classes have been pushed pretty hard, so it will be very nice to just relax for awhile.

Last week Kappa was very happy to have Sigma Kappa of State in for a mixer. And for once, there was plenty of feminine attentions to go around. Everyone seemed to fully enjoy himself, especially Brother Hitchcock, who danced with all the girls.

Just another note on Brother Hitchcock; I understand that he had two dates in one weekend! Yes, I said two. Who knows, we may have another potential Wilcox in the crowd!

Softball practice began this week, leaving many aching backs and sore muscles. But keep at it guys, I think we've got the talent for another championship team. Let's see, that would make about three trophies.

Our deepest sympathies and best wishes for a quick recovery to our beloved housemother, Clara Archer, who is in the hospital. We miss you an awful lot, Mom, so just remember that forty-odd guys are in there pulling for you.

The annual Founder's Day Celebration will be held in Indianapolis this year. Around twenty of the brothers have expressed wishes to attend, so Kappa should have a good representation there.

The pledge class is shaping up very well, and to date have two projects in mind, a car wash, and a Bowery Ball. They both promise to be loads of fun.

Eugene Amick

Sigma Nu

Hi again, it's time for the latest pertinent scoop from the Serpent center. The year is fast closing out on us and so come all the events that wind up the spring term. The good 'ol week that pledges love so well is here and rumor has it that one group of twenty-four young nov-

(*Continued on Page* 33)

RESEARCH AND DEVELOPMENT

(*Continued from Page* 20)

readings in an automobile lend themselves very well to this type of display.

"UNION DOME"

An all-steel "Union Dome" — the world's largest circular building without internal supports—is under construction in Baton Rouge, La., by Union Tank Car Company of Chicago.

The new building is believed to be the first major industrial use of a dome structure in this country. Ten stories high, it will house regional maintenance and tank car repair facilities.

Dimensions of the "Union Dome" are 375 feet across its interior base, —and 116 feet high at the center. Total floor area enclosed by the dome is 110,000 square feet. It is a clear span dome, containing no internal supports whatsoever. It is also the first geodesic dome to made entirely of steel.

Several major advantages of a clear-span structure such as the "Union Dome" for industrial use include economy in the cost per square foot of area covered, visual control of all working areas from one central point, and unimpeded materials and work flow.

Designs for the dome are based on patents for a geodesic dome held by R. Buckminster Fuller and were developed by his firm, Synergetics, Inc., of Raleigh, N.C.

This particular dome will consist solely of 320 steel, panels fabricated in 12 basic sizes and welded together. The panels were specially fabricated 1/8 inch steel sheet and 4 inch tubing, on location at Baton Rouge.

A tunnel-shaped point building made of similar steel panels connects with the main circular repair shop area. The paint building is 200 feet long and 20 feet high.

* * * * *

Slipsticking: The art of rubbing two sticks together and looking through a rock with a line on it to get the wrong answer.

YOU NEVER HAD IT SO GOOD

(*Continued from Page* 22)

mobile, electricity, and nuclear energy. And he only needs them now because the irreversible advance of technology creates needs, and usually creates two in the process of satisfying one. And I believe the common man subconsciously resents these new needs which are constantly being thrust on him, and perhaps resents the creator of these needs. Does he need his 1957 car, which is less efficient and safe a means of transportation than the ones he owned ten years ago? Does he need a television set, which will undermine his sanity in full color? Does he need a jet airliner, which will take him nowhere in particular faster and less safely and enjoyably than the Super Chief? Does he need rocket travel to other planets, multiplying a thousand-fold the problems which have not yet been solved on this one?

No; he would much rather need a doctor to set his broken leg, a lawyer to get him a *habeas corpus*, or a clergyman to ease his mind. And I am with him.

I suspect that even engineers sometimes realize that this is true. They seem to be looking for some ethical justification for their work. But they are not really equipped to handle these problems. They deal with things, not values. Doctors, lawyers, and clergymen are much more liable to have a realistic view of the human situation than engineers or physicists. The philosophical and political opinions of the most prominent physical scientists have an amazing ingenuousness about them; Pollyanna mixed up with Tom Swift. This is why science fiction is so popular among engineers and physicists: it presents no complex philosophical or ethical problems. It also explains why physicists are constantly dashing behind the Iron Curtain: it is a relief to be forbidden to wonder why you are doing what you are doing.

Someday the people may revolt against these engineer-begotten needs, unwantedly served to them,

(*Continued on Page* 32)

INDIANAPOLIS, IND.: (Special) Lockheed Aircraft Corporation and the Allison Division of General Motors Corporation have teamed up to produce a commercial passenger transport that promises to revolutionize air transportation on the medium-and-short-range flights. Cruising at more than 400-mph the Allison Prop-jet Lockheed Electra will bring jet-age speed and comfort to passengers and set new standards of operating economy for air lines of the world.

Teamwork within Allison, just like the Lockheed-Allison team, is highly prized by newly graduated engineers. If you would like to know more about the Allison team, write Personnel Department, College Relations, Allison Division of General Motors Corporation, Indianapolis, Indiana.

Alumni News

By Richard Carter, fresh.

'37 Col. Harry J. Halberstadt, e.e., M.S., Purdue, '50, was recently assigned to the Air Force Missile Test Center as director of cruise missile tests. Before coming to Patrick Air Force Base, Florida, he served in the office of the Assistant Secretary of Defense for Research and Engineering.

'43 Oct. Raymond C. France, ch.e., is a member of the Technical Staff of Hughes Aircraft Company, Culver City, California. Mr. France was previously Chief Engineer, Tantalum Division, United States Electronic Development Corporation, Glendale, California.

'43 Harry D. Frye, m.e., has accepted a position with the Owens-Illinois Glass Company, Toledo, Ohio, where he will work in the Technical Center on glass furnace design.

'52 James T. Norman, ch.e., is a Chemical Engineer for the Japanese Geon Company Ltd., Tokyo, Japan.

'52 Robert C. Miller, c.e., was presented the Distinguished Service Award for 1957 by the Jaycees of Ravenswood, West Virginia. Each nominee was judged on three attributes; (1) Contribution to community welfare, (2) Evidence of personal or business progress. Mr. Miller was nominated by the Town Council and the Lions Club and was considered on eight points for the year: (1) Is engineer and vice-chairman of Ravenswood Sanitary Board (2) Is active as chaperone for teenage activities (3) Was a committee member for $5 banquet (4) Is a junior member of the American Society of Civil Engineers (5) Is a licensed professional engineer in the state of West Virginia (6) Is on the legal committee of the Ravenswood Civic Improvement League (7) Is chairman of the Lions Club "Band to Chicago" committee, (8) Is present-chairman of the Ravenswood Minstrel Show, sponsored by the Lions Club.

The spring meeting of the Board of Directors of the Rose Alumni met last week in Terre Haute. The officers are: Robert Shattuck, '36, Washington, West Virginia; Vice-president, John L. Phelps, '33, Terre Haute; Secretary-Treasurer and district representative, Darrell E. Criss, '43, Terre Haute; Indiana. Representing their respective districts were W. C. Heidenreich, '33, (1), New York City, New York; G. A. Zwerner, '34, (2) Schnectady, New York; R. P. Brettell, '25, (4) Detroit, Michigan; E. M. Griffeth, '23, (5) Racine, Wisconsin; W. R. Kniptash, Oct. '43, (6) Indianapolis, Indiana; S. S. Forsythe, '24, (7) St. Louis, Missouri; E. F. Donham, '23, (5) Chicago, Illinois; C. R. Wischmyer, '37, (7) Houston, Texas.

The Alumni member on the Board of Managers is Wilbur B. Shook, '11, Indianapolis, Indiana. The Chairman of the Alumni Fund Committee is Paul J. Grafe, '20, Los Angeles, California. Representing the Institute were Dr. Wilkinson, Dean Moench, '29, and Professor Smith, '50.

YOU NEVER HAD IT SO GOOD

(*Continued from Page 28*)

and destroy the whole technological edifice, as the French revolutionists destroyed the Bastille, the symbol of their slavery. In the meanwhile, it would be better for the engineer or physicist to conceal his desire for prestige and recognition. Put in your eight hours, doing the work which you should enjoy for its own sake; take your quite-reasonable paycheck home to your ranch-style or split-level in the valley; kiss your wife and tell her that she probably won't get mink this year; tinker with your hi-fi system or sports car; and for Heaven's sake, forget about prestige and recognition! You never had it so good!

* * * * *

C.E. Prof.: "Describe the mechanism of a steam shovel."

C.E. Student: "Don't kid me, you can't shovel steam."

* * * * *

Luck is what happens when preparation meets opportunity.

FRATERNITY NOTES

Sigma Nu

(*Continued from Page 28*)

ices can hardly wait. All we can say is—Ha!

The social schedule is chuck full of events from here on out. There was an informal party with the T.K.E.'s from State recently and this turned out to be a gala affair. Or so Brother Irey thought. Also there was a good 'ol country Hoedown held with the ChiO's, also from State of course.

After all these pinnings I have been reporting, I thought we were about finished with such things, but Brother Onnen fooled us all when he pinned Miss Melanie Fesler, lately elected Miss "Big Wheel" of I.S.T.C. Brother Jim finally found out that there were other things to talk about than the weather and economics. Congrat's Jim.

Time to close for now you all, so, 'til next time, Auf Weiders-weidert? —Good bye.

Fred Ryker

CRITIQUE

(*Continued from Page 19*)

milk drinking habit and so forth, was actually leading us by the nose all the time. Nevertheless, it is highly improbable that anyone could foretell the final outcome of this enticing drama.

The setting contributes nothing to the story. Indeed, little mention is made of surroundings by Thurber. Instead, the general atmosphere is created by the double hypocrisy involved: Mrs. Barrows' duplicity, not only to Martin, but to the whole office staff as she plans everyone's eventual eviction while maintaining an overly nice attitude toward her intended victims; and Martin, efficient, withdrawn Martin, planning the elimination of Mrs. Barrows.

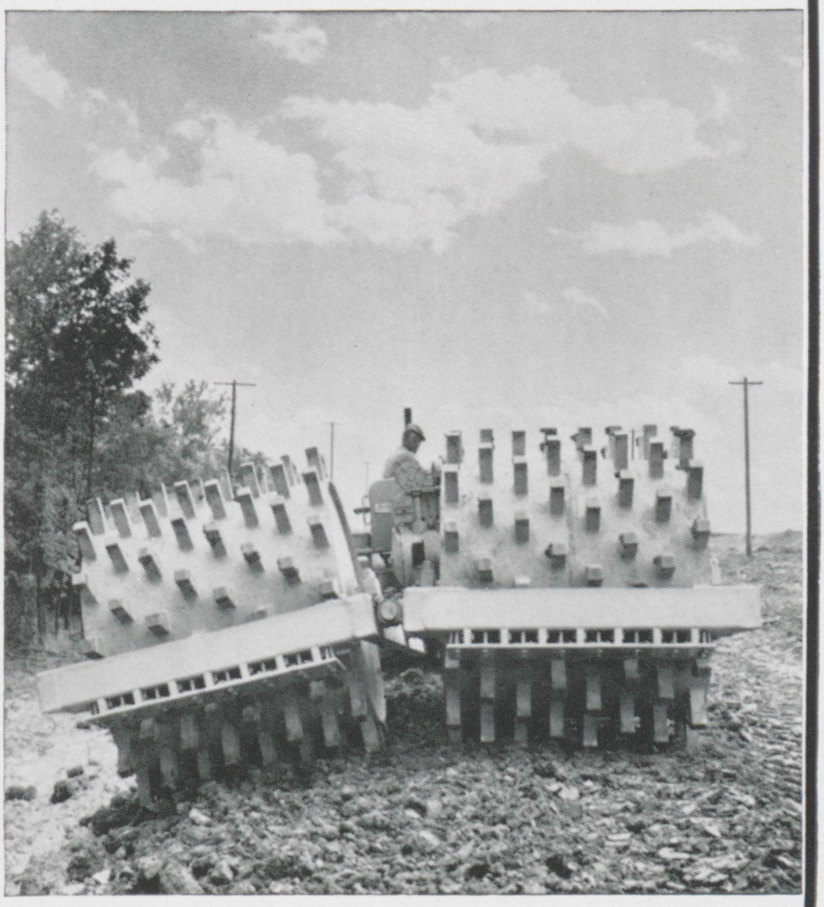
Perhaps the main attraction of this story for me is the eventual triumph of hounded, underdog man over boisterous, scheming, big-mouthed woman. But no matter what the reasons, I still consider it a masterpiece of writing.

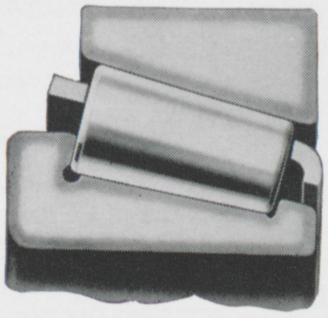
Advertising Index

Tear out this page for **YOUR BEARING NOTEBOOK...**

How to take 22½ ton impacts on drum axle

The designers who built this giant tamping roller had to contend with impacts as high as 1450 psi on the drum axle. To take these terrific loads, designers mounted the drum axle on Timken® tapered roller bearings. Timken bearings are case-carburized to produce hard, wear-resistant surfaces over tough, shock-resistant cores. Their full-line contact between rollers and races gives them extra load-carrying capacity. And because they practically eliminate friction, they help heavy construction machinery start and roll more easily.





Slice a Timken bearing in half and see why it takes shocks

The picture at left shows what you'd see if you cut through a Timken bearing: hard, wear-resistant surfaces and tough, shock-resistant cores.

Want to learn more about job opportunities? Timken bearings help make better machines—machines that enrich our lives. It's what the Timken Company calls Better-ness. If you'd like a career helping to create the machines that create Better-ness, write for: "BETTER-ness and your career at the Timken Company". The Timken Roller Bearing Company, Canton 6, Ohio.

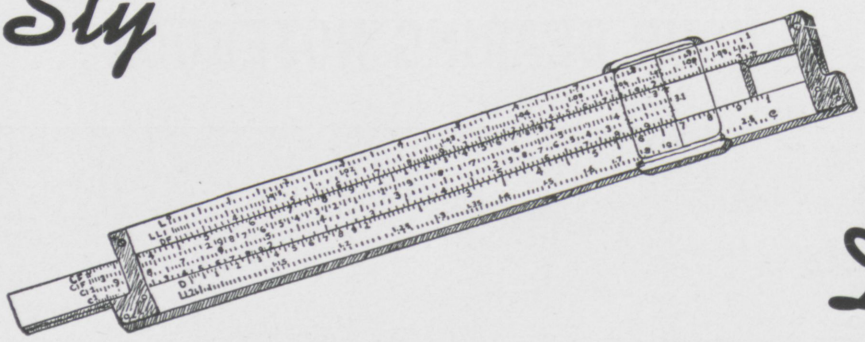
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ↓ AND THRUST →←LOADS OR ANY COMBINATION

Sly Droolings



Stolen by Tom Feutz, soph., c.e., and Dick Kirby, jr., m.e.

The best way to drive a baby buggy is to tickle his feet.

* * * * *

A young divinity student whose father was a bishop admitted that he had used profanity.

"It was like this," he said to his father. "The ball had been passed to me . . . . a long pass . . . . and I caught it tight under my arm. There were only two men between me and the goal line. Interference took care of one and I dodged the other: I was within two yards of the goal post and I looked down and the ball wasn't under my arm. It just wasn't there, Father. I couldn't help saying, "Where the hell is the ball?"

"Well, where the hell was it?" cried the bishop impatiently.

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It might be said that a wedding ring is a sort of tourniquet which is worn on a girl's left hand to stop her circulation.

* * * * *

"May I come in?" he said. "It's the room I had when I was in college in '09."

"Yes, sir," he said, lost in reverie. "Same old windows. Same old view of the campus. Same old closet."

He opened the door, and there stood a girl, greatly embarassed.

"This is my sister," I said quickly.

"Yes, sir. Same old story."

* * * * *

He: "You're not afraid of the big bad wolf?"

She: "No, why?"

He: "That's odd, the other three pigs were."

The children were discussing their origin.

"I came from the hospital," said one.

"The doctor brought me," said the second.

"Not me," said third. "I came with the stork."

"My folks were poor," said the fourth. "I'm home-made."

* * * * *

I have a wife, a lovely wife,
No man could ask for more:
She's deaf and dumb and oversexed,
And owns a liquor store.

* * * * *

I eat my peas with honey—
I've done it all my life.
It does make the peas taste funny,
But it keeps them on my knife.

* * * * *

A musician was practicing on his saxaphone late at night when the landlord came in.

"Do you know there's a little old lady sick upstairs?" asked the landlord.

"No," replied the musician, "hum a little of it."

* * * * *

Salesman: "Is your mother home, Sonny?"

Three-year-old: "No, but my sister is."

Salesman, happily: "Would you please send her to the door."

The salesman waited impatiently, then after a long delay, the vocie of the small child was heard, "I can't lift her out of the play pen."

During the recent Kansas drought, everything was so dry that the trees were going to the dogs.

* * * * *

A wise woman is who makes her husband feel as if he is head of the house when actually he is only chairman of the entertainment committee.

* * * * *

The old enginer pulled his favorite steam engine up to the water tank and briefed the new fireman. The fireman got up on the tender and brought the spout down all right, but somehow his foot caught in the chain and he stepped into the tank.

As he floundered in the water, the engineer watched him with a jaundiced eye.

"Just fill the tank with water, Sonny," he drawled. "No need to stomp the stuff down."

* * * * *

A flight of bombers had ranged far and wide over Germany, spreading tons of propaganda leaflets over the Third Reich. All planes returned safely to their base except one. Hours passed. Night fell. Still no plane. Finally, its engines were heard. As it landed, the operations officer ran out to the plane. "Where have you been anyway?" he yelled.

"I delivered the leaflets, that's all," was the reply.

"How long does it take you to drop leaflets?"

"Drop 'em?" said the pilot. "We were pushing them under people's doors."

1,000 styles—750 stores—yet photography gives headquarters inventory figures overnight

Thom McAn ends ten-day hand-copying jobs with Kodak's Verifax Copier—now gets complicated sales, size and style data off in a day.

BEFORE, when Thom McAn's merchandise manager or stylist needed word on sales or style trends in certain stores, it took as much as ten days to hand-copy the records.

But today, when headquarters located in New York requests information on any shoe style or store, the New England merchandising center gets the latest facts and figures away in that night's mail. And styling, buying and distributing functions get 24-hour—instead of ten-day—service on vital stock allotment statistics.

This is because the facts, kept on files of removable panels and cards, can be slipped into a Kodak Verifax Copier and copied, photographically accurate, in a minute.

Photocopying is just one of hundreds of ways photography works today for all kinds of businesses, large and small. It helps with product design, takes kinks out of production, increases sales, improves customer and personnel relations.

Thom McAn calls the Verifax Copier "the kingpin of the allotment control system." It copies a store's style allotment records and width breakdowns and in less than 60 seconds has a dry print ready for the mails.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

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TRADE MARK

One of a series*

Interview with General Electric's Earl G. Abbott Manager—Sales Training

Advancement in a Large Company: How it Works

Where do you find better advancement opportunities—in a large company or a small one? To help you, the college student, resolve that problem, Mr. Abbott answers the following questions concerning advancement opportunities in engineering, manufacturing and technical marketing at General Electric.

Q. In a large Company such as General Electric, how can you assure that every man deserving of recognition will get it? Don't some capable people become lost?

A. No, they don't. And it's because of the way G.E. has been organized. By decentralizing into more than a hundred smaller operating departments, we've been able to pinpoint both authority and responsibility. Our products are engineered, manufactured and marketed by many departments comparable to small companies. Since each is completely responsible for its success and profitability, each individual within the department has a defined share of that responsibility. Therefore, outstanding performance is readily recognized.

Q. If that's the case, are opportunities for advancement limited to openings within the department?

A. Not at all. That's one of the advantages of our decentralized organization. It creates small operations that individuals can "get their arms around", and still reserves and enhances the inherent advantages of a large company. Widely diverse opportunities and promotions are available on a Company-wide basis.

Q. But how does a department find the best man, Company-wide?

A. We've developed personnel registers to assure that the best qualified men for the job are not overlooked. The registers contain complete appraisals of professional employees. They enable a manager to make a thorough and objective search of the entire General Electric Company and come up with the man best qualified for the job.

Q. How do advancement opportunities for technical graduates stack-up with those of other graduates?

A. Very well. General Electric is recognized as a Company with outstanding technical skills and facilities. One out of every thirteen employees is a scientist or engineer. And approximately 50 per cent of our Department General Managers have technical backgrounds.

Q. How about speed of advancement? Is G.E. a "young man's Company"?

A. Definitely. A majority of all supervisors, managers and outstanding individual contributors working in the engineering function are below the age of forty. We believe that a job should be one for which you are qualified, but above all it should be one that challenges your ability. As you master one job we feel that consideration should be given to moving you to a position of greater responsibility. This is working, for in the professional field, one out of four of our people are in positions of greater responsibility today than they were a year ago.

Q. Some men want to remain in a specialized technical job rather than go into managerial work. How does this affect their advancement?

A. At G.E. there are many paths which lead to higher positions of recognition and prestige. Every man is essentially free to select the course which best fits both his abilities and interests. Furthermore, he may modify that course if his interests change as his career progresses. Along any of these paths he may advance within the Company to very high levels of recognition and salary.

Q. What aids to advancement does General Electric provide?

A. We believe that it's just sound business policy to provide a stimulating climate for personal development. As the individual develops, through his own efforts, the Company benefits from his contributions. General Electric has done much to provide the right kind of opportunity for its employees. Outstanding college graduates are given graduate study aid through the G-E Honors Program and Tuition Refund Program. Technical graduates entering the Engineering, Manufacturing, or Technical Marketing Programs start with on-the-job training and related study as preparation for more responsible positions. Throughout their G-E careers they receive frequent appraisals as a guide for self development. Company-conducted courses are offered again at all levels of the organization. These help professionals gain the increasingly higher levels of education demanded by the complexities of modern business. Our goal is to see every man advance to the full limits of his capabilities.

If you have other questions or want information on our programs for technical graduates, write to E. G. Abbott, Section 959-9, General Electric Co., Schenectady 5, N. Y.

***LOOK FOR other interviews discussing: • Qualities We Look For in Young Engineers • Personal Development • Salary.**

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