Spring 4-1954

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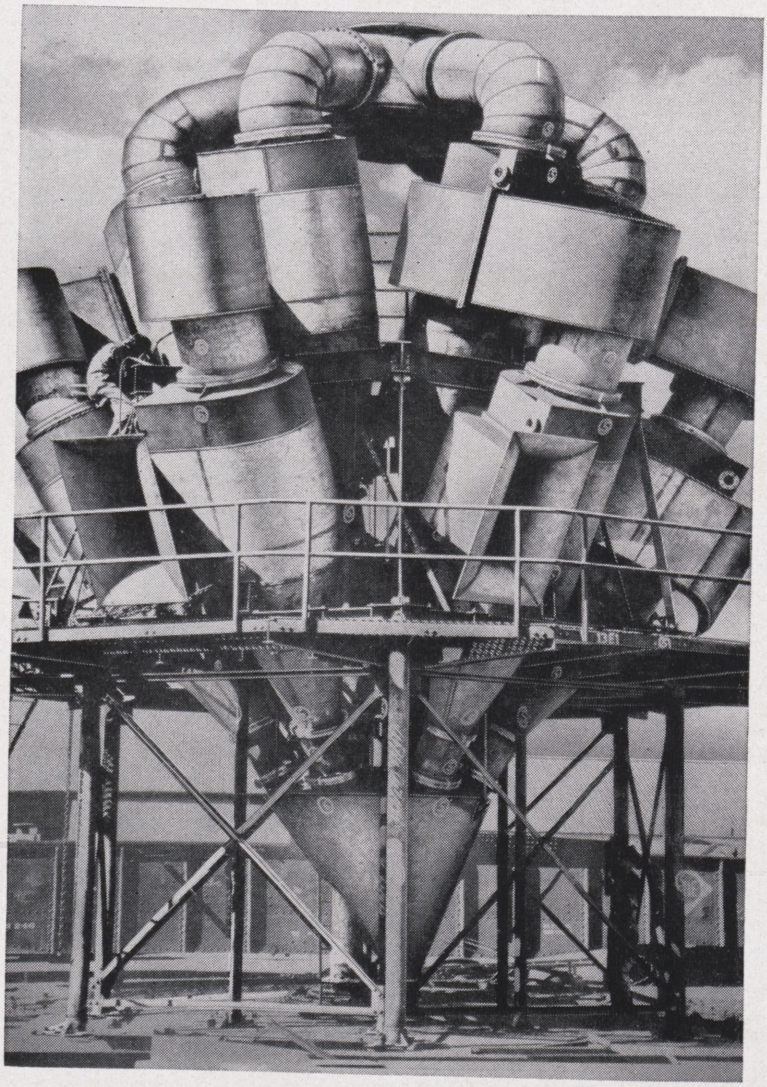
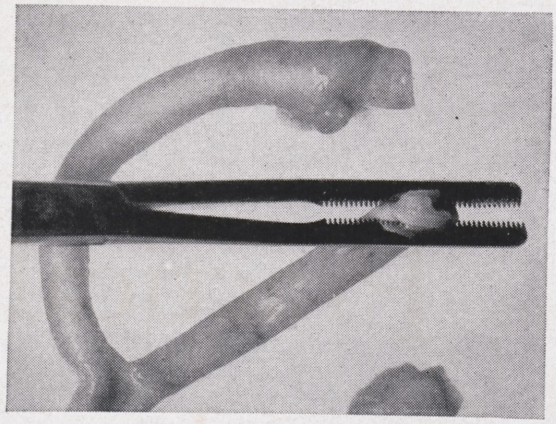
April 1954

Only STEEL can do so many jobs so well



Visitor from Outer Space? No, despite its strange, other-worldly appearance, this is no product of extra-terrestrial intelligence, no flying saucer. It's a perfectly practical, very down-to-earth catalyst collector in a large petroleum refinery. Noteworthy, however, is the extensive use of USS Stainless Steel in its fabrication . . . to provide corrosion resistance combined with great strength.



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4-622

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million watt spark plug . . .

Calling this jet engine ignitor a million watt spark plug is an understatement. Actually this picture shows a 1,500 kw discharge that occurred in 25 microseconds.

One of a series of photographs taken as we vary voltages and ignition system design, it helps us study the arc size and the penetration of the discharge into the combustion chamber. These and other studies provide the knowledge necessary for the design of dependable ignition systems — systems that will start combustion at 45,000 foot altitude and −65° temperature.

Good ignition is important. Yet ignition research is only one small phase of our development program.

But this work does suggest how completely we explore technical areas to produce dependable aircraft engines. And it illustrates the wide variety of tools and techniques we use to solve difficult problems.

Here, emphasis is put on "getting the facts" — *all the facts.* This makes good sense to recent graduates who want to do real engineering — explains why so many are attracted to a career at Pratt & Whitney Aircraft.

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Division of United Aircraft Corporation

East Hartford 8, Connecticut

Rose Technic

VOLUME LXV, NO. 7 APRIL, 1954

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Frontispiece

The clean, simple lines of this Army Ordnance test rocket designed and constructed by General Electric belie the skintight complement of intricate equipment within. Each cubic inch of its interior is crowded with delicate instruments, to enable it to do its research job more efficiently. Courtesy of GENERAL ELECTRIC.

The Cover

On the cover is the American Model 830 Diesel Electric Locomotive Crane owned by United Concrete Pipe Company of Baldwin Park, California. The picture shows the removal of a concrete pipe from a pouring form. Courtesy of AMERICAN HOIST and DERRICK COMPANY.

Photo Credits

Pages 11 and 14, Radio Corporation of America; page 12, General Electric; page 13, Westinghouse; page 20, Modulus Staff Photo.

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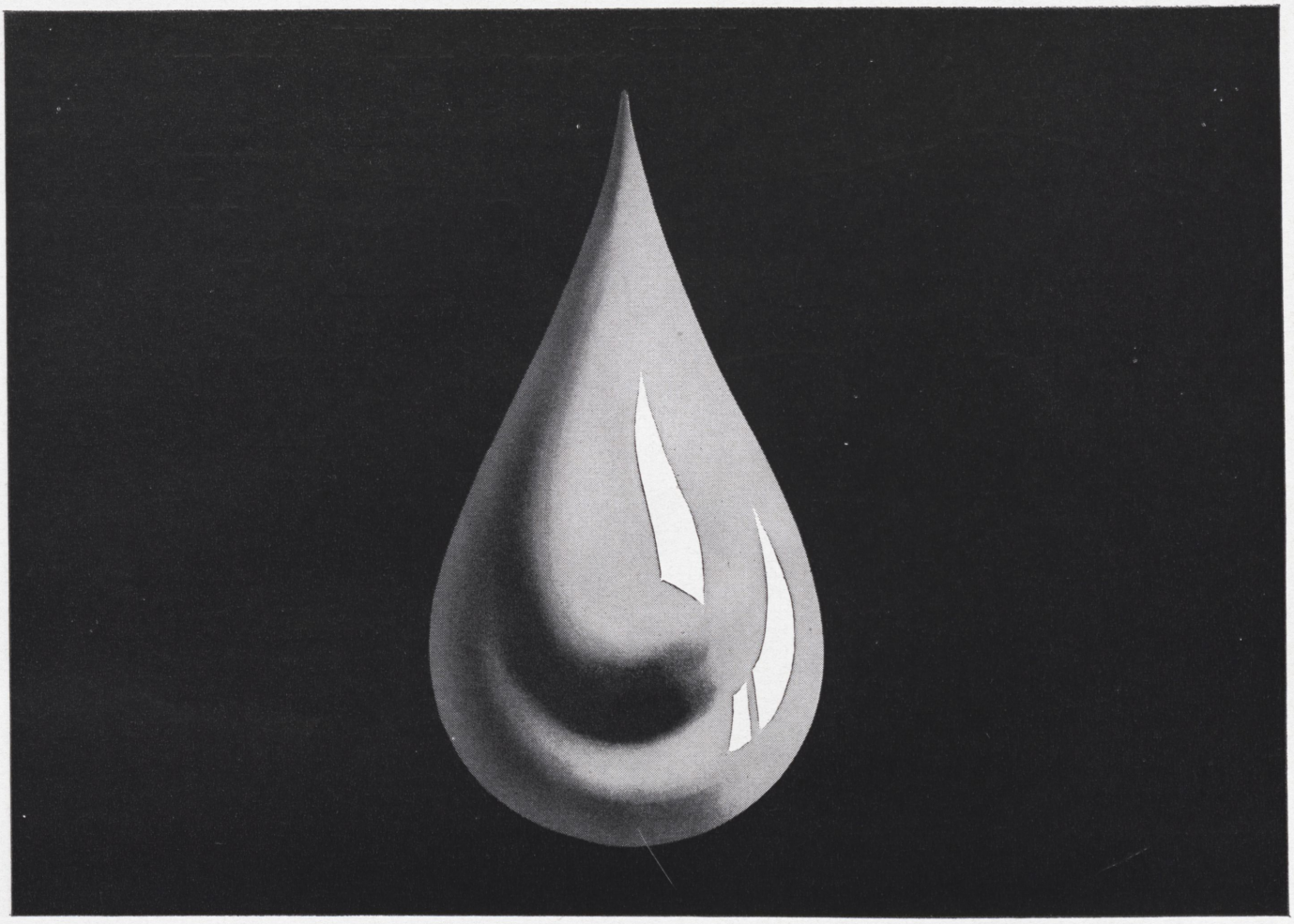

MOLECULE MAGIC . . .

This tiny drop of oil, say the chemists, contains hydrocarbons—the raw material for hundreds of thousands of organic chemicals . . . the makings for tires and textiles, for dyes, detergents and deodorants, for paints, plastics and polishes, for agricultural and industrial chemicals.

Oil—the ointment of the ancients and preservative for mummies—is old. It's Nature's billion-year alchemy that changed fish and lizard leftovers into black gold . . . chemical "gold" that is just now being developed.

DREAMLAND IN A DROP . . .

It wasn't until this century that the chemical and petroleum industries began the molecular magic that transformed a drop of oil into a two-and-a-half billion dollar enterprise.

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McGRAW-HILL FOR BUSINESS

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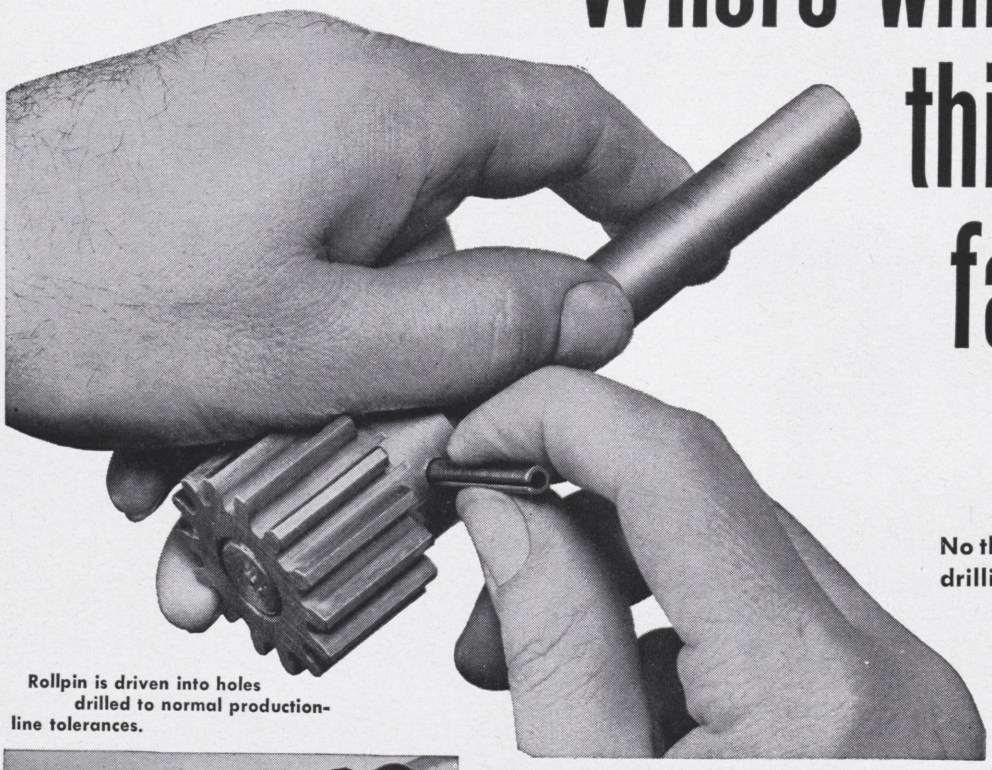
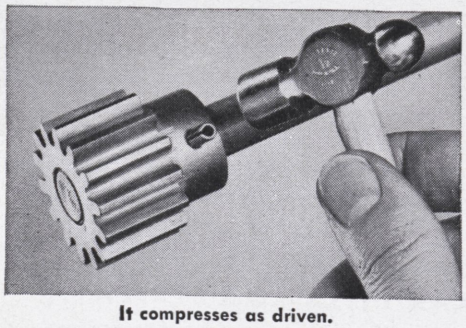
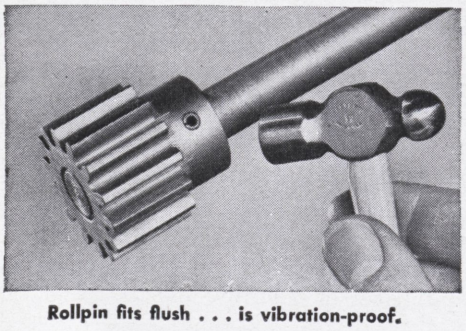


Rollpin is driven into holes drilled to normal production-line tolerances.

No threading, peening or precision drilling with ROLLPIN



It compresses as driven.



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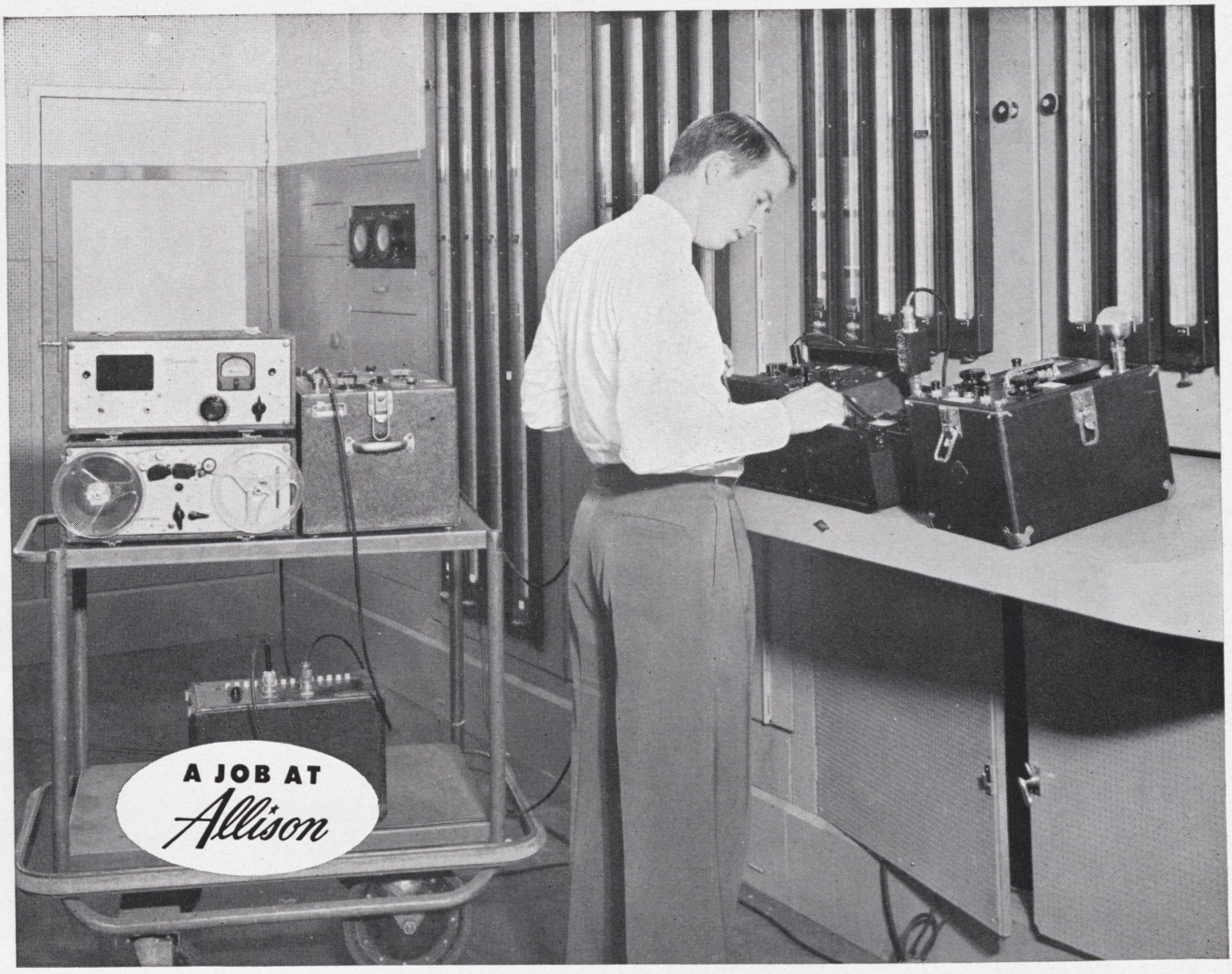

● Robert (Bob) McNew was graduated from Purdue University in 1950 with a B.S. in "double E."

He came to Allison the next year and currently is in the Instrumentation group, Electronics and Parts Test Department.

It's partly through his efforts that Allison has enjoyed considerable success in reducing noise conditions affecting both in-plant employes, as well as residents living in the vicinity of the Allison plants in Indianapolis. For example, noise coming from turbo-jet engines while on test stands now is being reduced in intensity by a ratio of 100,000 to 1 before it reaches the outside of the test cells.

In the photo above, Bob is adjusting the sound level indicating and recording instruments in preparation for measuring the silencer attenuation of a turbo-prop engine test cell. Equipment includes the latest type of general radio sound-level meter and octave-band noise analyzer, and the magnecord tape recorder.

The Allison equipment for instrumentation and testing is of the best. These complete facilities offer the young graduate engineer every opportunity for applying—and expanding—his technical training in his chosen field of engineering.

• • •

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For further information about YOUR engineering career at ALLISON, discuss it with your Placement Counselor and arrange for an early interview with the ALLISON representative the next time he visits your campus. Or, write now for further information: R. G. Greenwood, Engineering College Contact, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.

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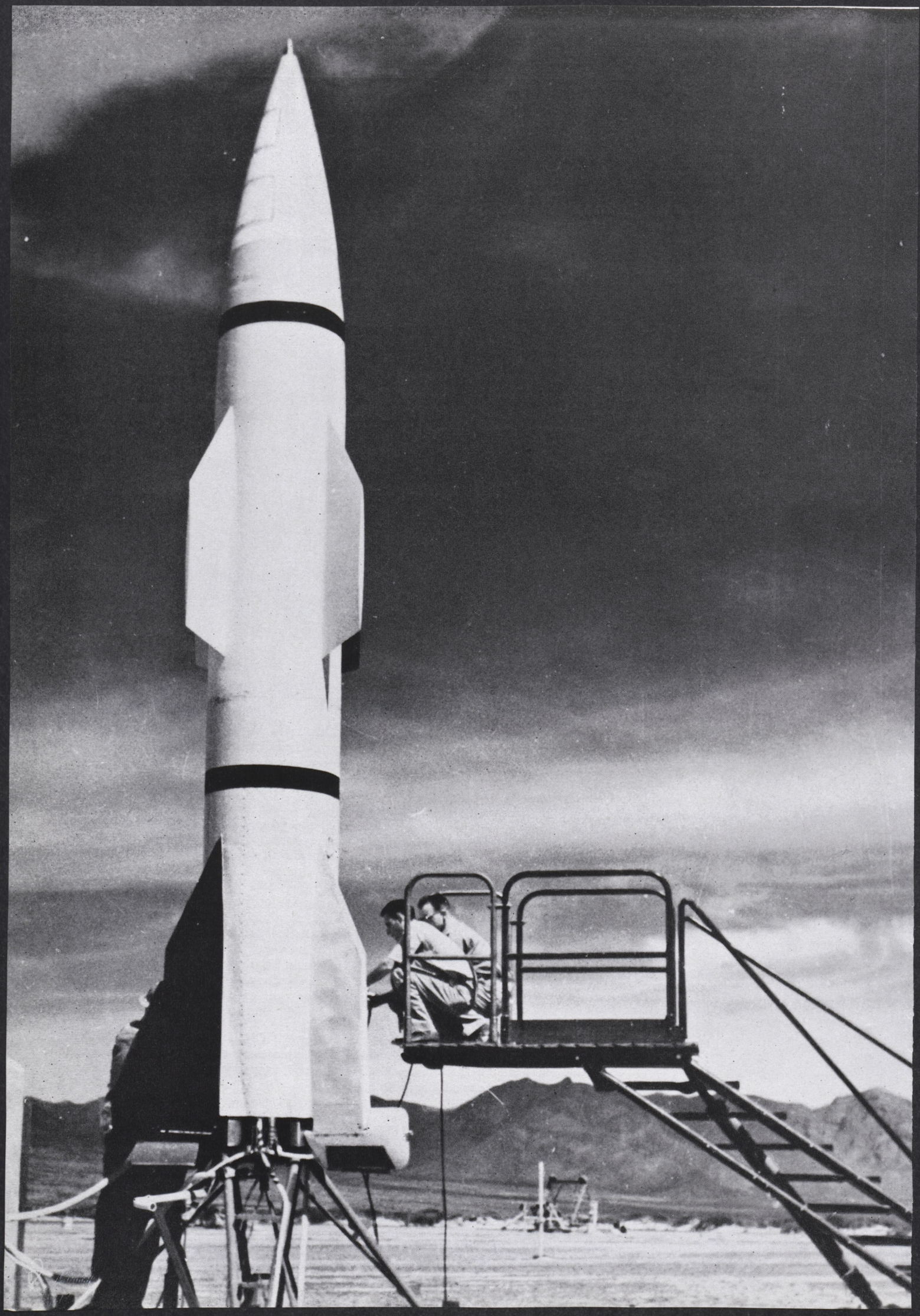


No Forty Hour Week

Just when organized labor has all but won its battle for the forty hour week, and John L. Lewis even speaks of a three day week, we at Rose are about to take a step in the other direction. At least one Saturday class is in progress this semester and more have been promised for the fall semester.

The first reaction to this policy, from the students at least, was one of dismay. School had long taken up their entire week; but now the faculty would have the weekend also. This was indeed something to be frowned upon. The author held these views along with the rest of the student body and together we tried to do something about it. But alas, nothing could be done, as the increased enrollment at the school was the main culprit. In view of this fact, we gave up the battle and became resigned to our fate.

Some time has passed since the original fireworks took place and the author, along with many other students, has a much different view on the subject. After all, why shouldn't we have Saturday classes? The same amount of work is involved; it just becomes spread over a longer time. This business of three and four tests in one day might be eliminated or at least cut down. There would be more time to prepare assignments and less of them to prepare for each day. An afternoon off during the week sounds like a good idea and after all who doesn't spend at least part of the weekend with a book in his hand? Yes, this Saturday class idea might be a good one after all. In fact it must be, other engineering schools adopted it years ago.

J.W.E.

The "New Look" in TV:

Photos on Tape

Last December the Radio Corporation of America demonstrated at their laboratories in Princeton, New Jersey, a system for recording either color or black-and-white television pictures on magnetic tape. The new method of recording sight is similar in basic respect to the tape recording of sound. It is hailed as the first major step into the era of "electronic photography," in which motion pictures will be produced quickly and economically, without any photographic development or processing.

In the recent demonstration, a color television program originating in National Broadcasting Company studios in Radio City, New York, was beamed by radio microwave across the 45-mile span to the David Sarnoff Research Center at Princeton.

This program was seen as it arrived. At the same instant, the tape recording system recorded the television picture on a strip of magnetically coated plastic tape as thin as paper, and one-half inch in width. During part of this transmission, both the live program from the microwave radio relay and an immediate playback of the magnetic tape recording were shown.

As soon as the tape reel was rewound, it was played back and the recorded television pictures appeared on two color television receivers which were viewed by a large group of press representatives, who witnessed the demonstration.

In the first part of the demonstration, previously recorded magnetic tapes were run through the equipment. This phase included the reproduction of both black-and-white television pictures and color television pictures that had been beamed over the same New York-to-Princeton microwave link at an earlier date.

The same apparatus handled both the recording and playback of the tape for both the color and black-and-white tests. While the equipment is still in the development stage, the basic principles of the system have been thoroughly tested and confirmed. It is hoped that within two years the system can be perfected to such an extent that its commercial use will become a reality.

At the present time, whenever a television program is to be recorded, it is done by a special process called kinescope recording. The pictures pass from the television camera through most of the television system and are reproduced on a small kinescope or picture tube. A special motion picture camera then photographs the program on motion picture film. The film must be chemically processed and, usually, a print made before the pictures can be reproduced. The reproduction of the film requires another installation in which a television camera tube picks up the scene from a motion picture projector for rebroadcast.

The current kinescope recording process is both costly and time consuming. Film processing requires several hours in most cases. Since the film is subject to the hazards of both the television and photographic systems, the picture quality is likely to be limited.

Magnetic tape recording, in contrast, stores the electrical signals directly as they come from the television camera. No processing, electronic or photographic, is necessary before the tape is played back. A single compact piece of equipment, which handles both recording and reproduction, will do the job of two installations needed with photographic methods.

Comparative estimates of operating costs are highly favorable to tape methods. Although magnetic tape today costs more per minute of program time than 35mm color film, the fact that tape needs no processing before playback compensates for the expense of raw tape. Engineers pointed out that what makes the savings on tape so great is the fact that the program can be electronically erased and the tape reused; in most normal operations it would be reused many times.

Recording black-and-white programs on film is estimated to be at least five times as costly as it would be on one-quarter inch magnetic tape, assuming that the tape would be reused many times. In making copies for distribution to television stations, a half-hour program could be taped for less than fifteen dollars per copy, provided the tape is reused many times.

Even greater economies are estimated for making the original tape recording of color television programs, which under normal operation circumstances could be handled for only five percent of the cost entailed in color film recording. In making copies on tape that is to be used over and over again, a tape recording of a half-hour color program would cost roughly twenty dollars.

The new method of video tape recording is similar to the techniques used to record speech and music with present-day magnetic tape sound equipment. Electrical signals are impressed through a recording head—a small horseshoe electromagnet—onto the magnetically treated surface of a plastic tape. As the tape is drawn across the recording head, the head

By
Gerald C. Rose
fresh.

continuously changes the magnetic polarity of the magnetic oxide particles on the tape so that they become a compact code of the original signal. For playback, the tape is drawn across the same, or a similar head. The magnetic impressions on the tape cause an alternating current to flow in the windings around the reproducing head. The reproduced current closely duplicates the original signal.

Although the principles are similar, the engineering problems are not; audio recording is today an easy task compared with video recording. The reason is that audio signals are in the range of 20 to 20,000 cycles per second; while video signals range up to 4,000,000 cycles per second. And color television signals, as now formulated, must carry at least twice as much pictorial information as black-and-white. Besides, video tape must carry the associated sound signals.

Extensive research has resulted in specialy developed recording and reproducing heads which respond to frequencies many times above the cut-off point for the recording heads used in sound recording on magnetic tape. This means that the speed of the tape across the head has been brought within manageable limits. The equipment demonstrated had a tape speed of thirty feet per second. This is contrasted to sound tapes which usually travel at seven and one-half inches per second. Advanced equipment now under construction will move the tape at a lower speed, and, with time, further reductions of tape speed appear likely.

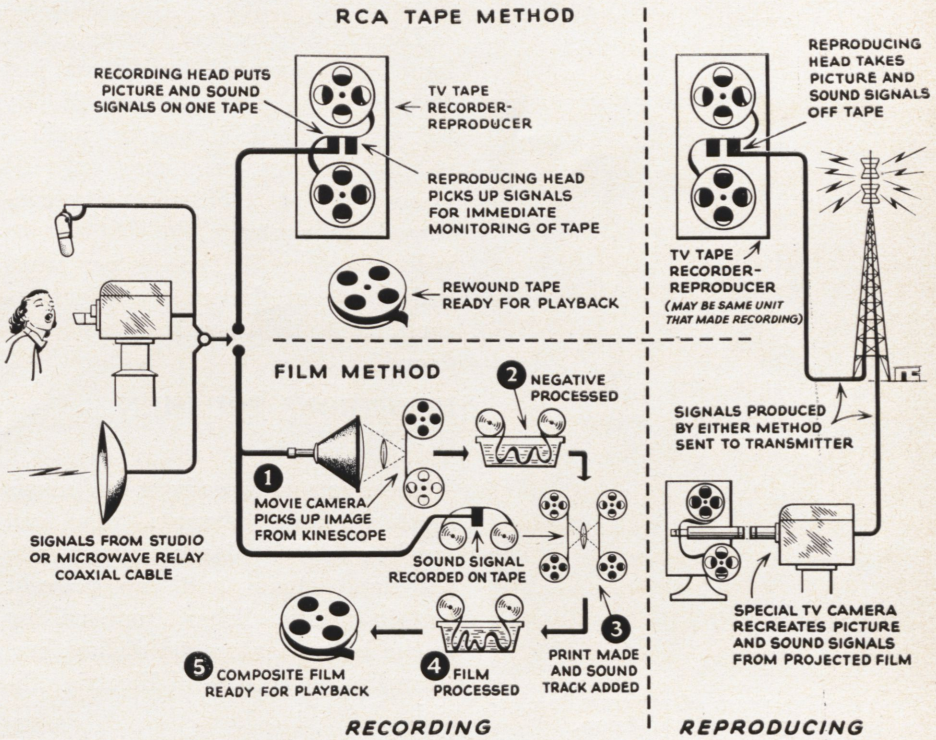
Another problem of video tape recording methods concerns the size of the tape reels. The ones used now are seventeen inches in diameter and will record only four minutes of a television program. However, work is under way for a reel nineteen inches in diameter which will carry a fifteen minute program.

Special recording and reproducing amplifiers have been designed to handle the signal inputs and the signal outputs. These take into account and compensate for the characteristics of the heads and the magnetic tape materials when recording the very wide bands of frequencies used in television.

Since even small variations in the speed of tape and in the pressure at which it bears on the head can create noticeable effects in the picture, it has been necessary to devise precision apparatus to control accurately the speed of the tape at the recording and reproducing points. The laboratory video tape equipment controls these many times more accurately than is necessary in magnetic tape recorders for sound. Even greater precision in regulating speed and pressure is now under way.

For video tape recording of color television, five parallel channels are recorded on a single magnetic tape one-half inch in width. There is one recorded channel for each of the primary color signals (red, green, and blue), for the synchronizing signal, and for the sound signal. For black-and-white recording the tape carries two recorded channels, one for the video signal and the synchronizing signal, and one for the sound signal. For black-and-white television, a one-quarter inch wide tape would suffice.

Although some technical problems must still be overcome to make the video tape equipment a commercial reality, engineers are confident that the most difficult ones have been conquered. Only continued research is needed to solve the remainder. Ω



Research and Development

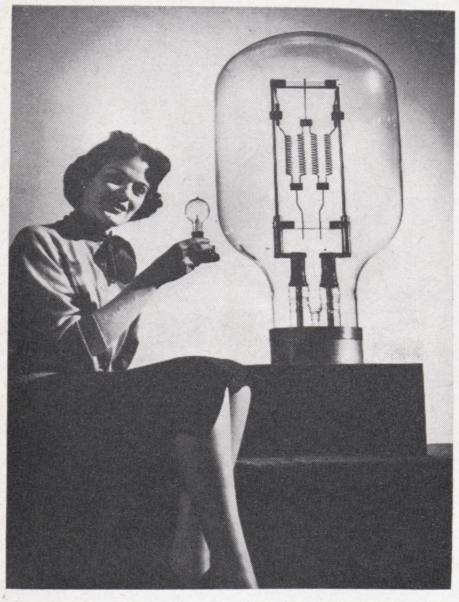
LARGEST LIGHT BULB PRODUCED BY G. E.

General Electric announced here today that it had developed and produced the world's largest and most impressive artificial light source.

A 75,000-watt incandescent bulb, it is half again as large as the previous largest bulb. It was developed as a feature of G.E.'s observance this year of the 75th birthday of Edison's most famous invention.

This giant among light bulbs was turned on officially for the first time on February 11, Edison's 107th birthday, during ceremonies at Rockefeller Center New York, overlooking the skating rink. It will be displayed and lighted throughout the year at Light's Diamond Jubilee celebrations, and at conventions, shows and fairs, in all sections of the country.

The lamp was conceived and assembled by G.E. lamp development scientists and engineers here at Nela Park, headquarters of G.E.'s Lamp Division. Its glass bulb, largest ever made, was hand blown by the Corning Glass Company, first producer of bulbs for Edison.



Seventy-five years of progress in electric lighting produced the lamp.

The lamp produces 2,400,00 lumens, or units of light. To produce this amount of light would require 2874 60-watt household bulbs, all burning simultaneously. This single light bulb uses enough electric energy to light 83 American homes as they are normally lighted today. Twenty-three of them could illuminate a major league baseball stadium according to modern standards.

The lamp's filament alone weighs 2.7 pounds, which is enough tungsten to make the coiled-coil filaments for 67,500 60-watt lamps. The filament is made of a tungsten ingot, hammered to a diameter of three-sixteenths of an inch. It is 12 and one-half feet long.

The filament was swaged at a G.E. wire factory in Cleveland, and the mount, or framework which supports the filament, was assembled in General Electric's Lamp Development Laboratory at Nela Park, where the lamp was completed and turned on and tested for the first time.

The huge lamp is so bright and hot that observers are advised not to look directly at it or stand close to it when it is burning at full brilliance.

The first practical incandescent lamp was invented by Edison just 75 years ago next October 21. By today's standards it was an inefficient light source, producing only 1.4 lumens per watt of electricity consumed. In contrast, the 75,000-watt bulb gives out 32 lumens per watt, and is one of the most efficient incandescent light sources yet produced.

ELECTRONS TOUGHEN PLASTICS

The electron, already one of man's most versatile servants, now can toughen flexible plastic containers to withstand steam and can prevent certain plastic dishes from wilting in the hottest automatic dishwasher, according to a General Electric official.

Dr. C. G. Suits, G.E. vice president and director of research, pointed out that scientists at the company's Research Laboratory, Schenectady, N. Y., recently found a new method for "curing" plastics by bombarding them with powerful electron beams. This "curing" process cross-links long, chain-like molecules called polymers which make up these plastics.

A few seconds' bombardment with electrons from a million-volt x-ray machine, Dr. Suits reported, makes polyethylene bottles stand up under steam-sterilization. This toughening permits more widespread use of these containers for packaging and storing pharmaceuticals and biological fluids. The latter include blood plasma, which formerly could be carried only in bulky, easily sterilized glass.

"Polyethylene bottles that are not irradiated collapse when subjected to high-temperature treatment" he explained.

"It now appears that polyethylene dishes exposed to electrons will retain their shape in the hottest dishwashers" the G.E. official continued. "Exposure to the powerful electron beam substantially raises the flow temperature of these plastics.

"This toughening process also increases the resistance of plastics to destructive action of many solvents. Before the 'curing' process was perfected, many plastics disintegrated swiftly in contact with such solutions."

Dr. Suits said that the new process was developed by radiation experts and chemists at the G.E. laboratory as a follow-up on previous discoveries. The company's Chemical Division at Pittsfield Mass., is now working on commercial development of the process.

The laboratory chemists at Schenectady first found that electron beams could turn certain liquid substances into solids. Their experi-

By

Bill Cade, soph., e.e.

ments also showed that these effects could be achieved at temperatures as low as 100 degrees below zero Fahrenheit.

By controlling the pattern of the electron beam they found that only portions of the liquid exposed to the beam were turned into solids, thus suggesting new methods of casting and forming plastic articles, Dr. Suits stated.

Further experiments showed that the high-energy beam changed other materials in many other valuable ways. The beam has been used successfully in depolymerizing (lowering the molecular weights) of natural products such as cellulose and wood. The electrons, it was found, disrupted the lignin-cellulose complex of wood by depolymerization, to allow bacteria in a cow's stomach to digest cellulose, thus furnishing the cow with adequate nourishment.

Recently G.E. scientists found that the electron beam can effectively sterilize bread, vegetables, and other foods so they remain fresh and appetizing over long periods of time. More recently they used these beams to sterilize certain biological fluids.

The beam is produced by removing the tungsten target from a million-volt resonant transformer-type X-ray apparatus, Dr. Suits pointed out. Instead of peppering the target to produce X-rays, the electrons shoot into the open air through a small metal window.

In most cases, not more than 15 seconds' exposure in the electron stream is needed to sterilize or toughen suitable materials.

Dr. Suits said that G.E. scientists are continually finding new work for "our tremendously versatile servants, the electrons."

Through their painstaking efforts, these research experts are effectively simplifying the work of millions of others, the research director added.

PROPULSION EQUIPMENT INSTALLED FOR WORLD'S LARGEST WIND TUNNEL

Installation of the most powerful electric motor ever built — 83,000 horsepower — completes the first major step in assembly of the 216,000-hp electric drive for the U. S. Air Force's new transonic and supersonic wind tunnels.

Completion of the two wind tunnels will permit the testing of full-size jet engines, guided missiles, and wing sections and fuselages of aircraft at speeds up to 2500 miles per hour.

The motor was installed at the Arnold Engineering Development Center, Tullahoma, Tenn. The Center houses important aeronautical research facilities available not only to the Air Force, Army and Navy, but also to all parties — in government, industry, and science—interested in aircraft development.

The giant synchronous motor is one of two such units built by the Westinghouse Electric Corporation in East Pittsburgh, Pa. The second unit will be installed in the near future, along with two 25,000-hp Westinghouse wound-rotor induction motors. Each 83,000-hp motor stands 21-½-feet high, and weighs 225 tons. Their 122-ton rotors will turn at 600 revolutions per minute.

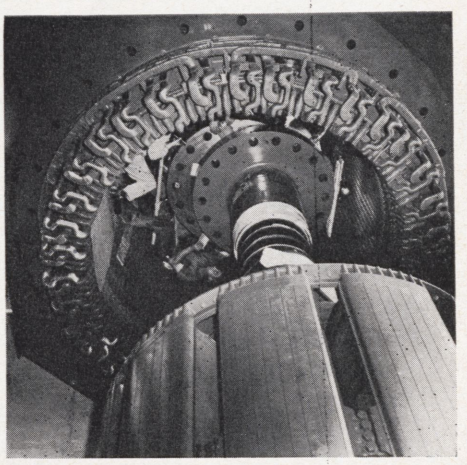
In addition to the 216,000-hp four-motor drive, the rotating machine will have five compressors, now under construction at the Westinghouse plant in Sunnyvale, Calif. Work on these transonic and supersonic compressors is not expected to be completed for at least another year. The transonic compressor will be a single unit, but the supersonic compressor will be made up of four compressors coupled as one.

Blades for the compressors measure two feet across the face, are six feet long, and will be mounted on a spindle 19 ft. in diameter. Weighing almost two thirds of a ton each, the blades will be solid forgings.

Although the machine will have the highest stored energy of any rotating mass ever built, it can be brought to a halt in about three minutes by using its wound-rotor motors as brakes, the energy being dissipated in liquid rheostats.

LARGEST D-C MOTORS TO POWER NAVY ICE BREAKER

Shown here on the test floor at Westinghouse Electric Corporation's East Pittsburgh, Pa. plant are two 10,500-hp d-c motors, the largest capacity single-armature d-c motors ever built. Each motor, more than 15 feet in diameter and with a four-hour current rating of 9,300 amperes at 900 volts, will drive a screw directly for the U.S. Navy's largest and fastest ice breaker. To keep the inertia as small as possible every available design trick was employed to reduce weight compatible with high-shock strength. Power for this pair of motors will be provided by ten diesel-driven, 1700-kw generators. Ω



Inserting the rotor into the stator of the 83,000 h.p. motor. Here the end of the rotor shaft is positioned against the shaft end of the 25,000 h.p. motor.

From R.C.A.

The "Hot" Battery

A new method which, for the first time in history, makes it possible to convert atomic energy directly and simply into small but usable quantities of electrical energy sufficient to operate a transitor, was announced today by Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America.

In his office at Radio City, General Sarnoff displayed an RCA Atomic Battery which operated the transitor to produce audible tones. This direct conversion of nuclear energy to electricity, he said, may prove to be as significant as Edison's conversion of electricity to light.

General Sarnoff said:

"For more than forty years, science has searched for a practical way of converting radiations from the atom's nucleus to electricity. Though our research is far from completed, successful operation of RCA's Atomic Battery in our laboratories represents a major breakthrough toward that goal.

"The conversion of nuclear energy into electricity is achieved by an experimental RCA Atomic Battery, powered by a minute quantity of a long-life strontium-90 radioactive isotope obtained as a by- product of atomic reactor operation. The electric current derived from this unique atomic battery exceeds by many times all previous results attained in attempts to generate usable electricity directly from radioactive material.

"This big stride has been achieved by coupling the battery's radioactive source to a transitor-like wafer, which instantaneously releases some 200,000 electrons for each electron it receives from the radioactive material.

"This development, though still in a pioneer stage, may prove to be the beginning of a new and basic chapter in man's efforts to utilize some of the enormous untapped energies within the nucleus of the atom for peaceful purposes and for the enrichment of human life rather than its destruction.

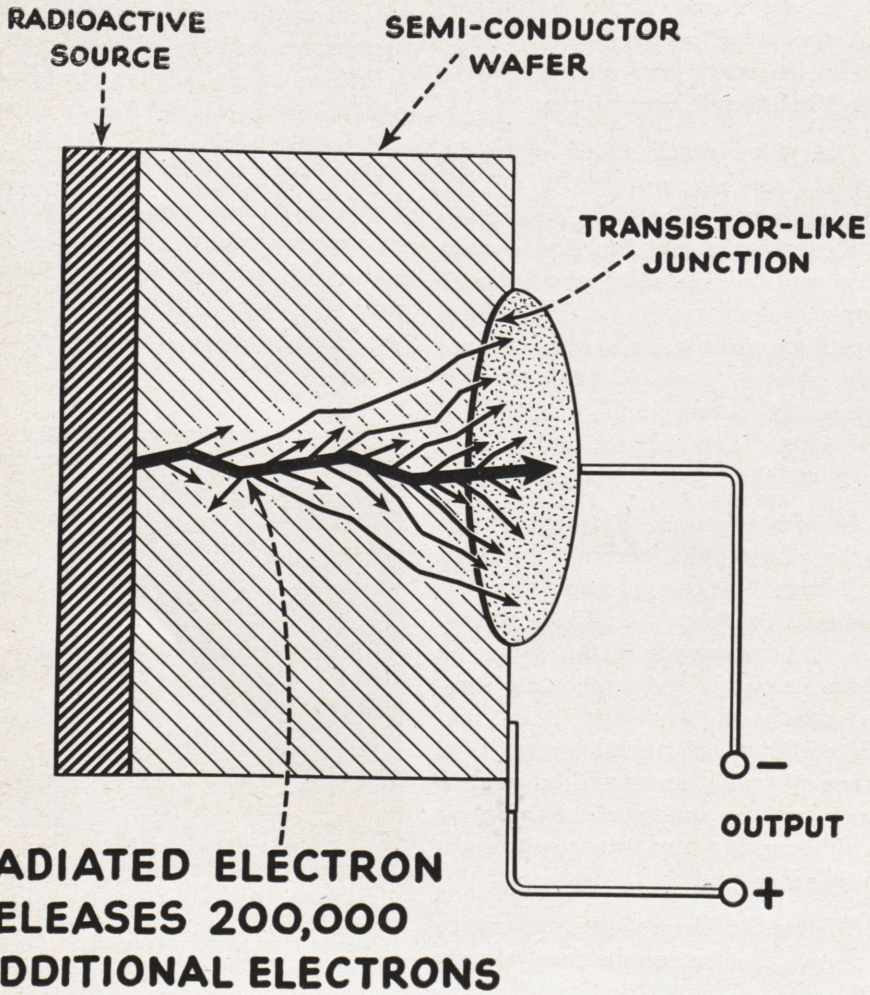
"Although it is still too soon to know all the uses to which this direct conversion of nuclear energy might be put, the prospect of an entirely different kind of power source is a particularly exciting one for the electronics industry.

"Perhaps as startling an advance as any in connection with the RCA Atomic Battery is the fact that a single rapidly moving electron, emitted from the radioactive atom, produces no less than 200,000 slower electrons in the bombarded semiconductor. It is this extraordinary multiplication in the number of available electrons which promises to make the atomic battery a usable device of practical significance.

"Progress in increasing the efficiency of the RCA Atomic Battery has been rapid during the past few months and is expected to continue. Results to date indicate the possibilities of producing thimble-size, atomic batteries. When these experimental batteries are developed to a commercial stage, they can supply power for radio receivers and other kinds of electronic apparatus, with-

(*Concluded on page* 28)

EXPERIMENTAL RCA ATOMIC BATTERY



This germanium refining method keeps impurities down to less than 5 parts in a billion

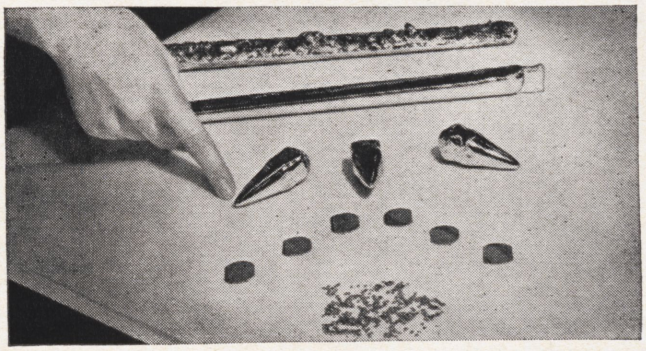
In this refining apparatus, at Western Electric's Allentown, Pa. plant, germanium is passing through multiple heating zones in tandem, producing a bar containing impurities of less than 5 parts in a billion for use in transistors. Note heating coils on the horizontal quartz tube.

A new method of metal refining, currently in use at the Western Electric plant at Allentown, results in the production of germanium that is better than 99.9999995% pure – the highest degree of purity ever attained in a manufactured product.

The need for germanium of such exceptional purity came about when research by Bell Telephone Laboratories in the field of semi-conductors led to the development of transistors, which are manufactured by Western Electric.

The transistor is a tiny crystal device which can amplify and oscillate. It reduces space requirements and power consumption to a minimum.

Various forms which germanium takes before being used in transistors are shown in this photo. Bar at top is an ingot of germanium after reduction from germanium dioxide. Next is shown the germanium ingot after the zone refining process used by Western Electric. Below the ingots are shown 3 germanium crystals grown by machine, 6 slices cut from these crystals, and several hundred germanium wafers ready for assembly into transistors.



Germanium crystals of the size required in transistors do not occur in nature; they are artificially grown at Western Electric. At this stage in transistor manufacture, other elements are introduced in microscopic quantities to aid in controlling the flow of electrons through the germanium. But before these elements can be introduced, it is necessary to start with germanium of exceptional purity, so that the impurities will not interfere with the elements that are deliberately added.

So Bell Telephone Laboratories devised an entirely new method of purification, known as zone refining, which was developed to a high-production stage by Western Electric engineers.

In zone refining a bar of germanium is passed through a heat zone so that a molten section traverses the length of the bar carrying the impurities with it and leaving behind a solidified section of higher purity. By the use of multiple heating zones in tandem, a number of molten sections traverse the bar. Each reduces the impurity content thus producing a bar which contains impurities in the amount of less than five parts per billion.

Because of the importance of the transistor in electronics, the zone refining process – like so many other Western Electric developments – has been made available to companies licensed by Western Electric to manufacture transistors.

This is one more example of creative engineering by Western Electric men. Engineers of all skills – mechanical, electrical, chemical, industrial, metallurgical, and civil – are needed to help us show the way in fundamental manufacturing techniques.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

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

Video Rainbow

By Frank Eppert, soph., e.e.

According to the big networks, color television is here to stay. It is estimated that by the end of this year 50,000 color television sets will be operating. All ready both NBC and CBS are telecasting color shows on the East Coast. NBC expects to send out several shows weekly in color next year starting with the Rose Bowl game. The first color television sets on the market will cost around $1,000. However, as the design of sets is simplified and they go into mass production the price is expected to drop to what manufacturers guess will be about $250. Repairs will be considerably more costly than on black and white sets since colored circuits are more complicated. The present black and white sets can be converted to color but even that will cost between $500 and $800. About the only part of the present day TV receivers that will work equally well for color reception is the antenna.

The first big step toward color television has been taken, that is, successfully televising shows in color. Until recently the development of color television was slowed down by the difficulties in choosing a system. At that time not all systems could be picked up by the black and white sets unless special adapters were used. Two systems chosen were RCA and CBS since both could be received on black and white sets and both transmitted identical signals. These signals are the same as those for black and white except that there are three signals riding together instead of a single signal carrying a picture. Of these three signals each carry a separate image. One shows all red values in the scene being shown, another all the green, and a third all the blue. Each network has its own camera and crew for breaking down the scene into these three colors.

In the RCA system the full color image is focused on special mirrors which reflect one color and allow the other two colors to pass. The color images are then focused on three camera tubes which produce three color signals. Part of the signals are combined to add the black and white signals to those being transmitted. This process is reversed in the receiver.

In the CBS system the camera sees the scene through a rapidly rotating color wheel. Signals from the camera are in a red-blue-green sequence. After passing through the monitors in the control room the signals go to a "Chromacoder" which converts them into three simultaneous signals for transmission. The "Chromacoder" is the heart of the CBS system.

A typical receiver for color signals has five or six knobs. Four are the familiar ones found on a standard black and white set, that is, channel selector, brightness, contrast, and focus control. One new one is the "Chromacontrol." Turning this knob from left to right will change the picture from a faded, washed out color to an intense and brilliant but hardly true color. In between lie the shadings to suit your taste. There is also a "convergence control," a delicate adjustment for aligning the three color signals coming into the tube so they strike the tube face in perfect register.

When the signal leaves the transmitter it is the same for all networks —three color signals riding in close frequency to black and white and sound signals. This electronic information is picked up on the color receiver. The black and white signals determine the brightness in the picture. Impulses for each of the three color images are separated and passed to three electron guns (one for green, one for red, and one for blue) at the base of the tri-color tube. The inner face of this tube, pioneered by RCA and recently modified by CBS, is coated with up to 75,000 dots of red, green, and blue phosphor, mechanically arranged in 250,000 tiny triads. Behind this surface is a perforated screen or "shadow mask" with 250,000 microscopic holes so perfectly registered over the triads that the electron beams angling through them hit only the right phosphors. The green beam piercing a tiny hole in the mask hits a green phospher of the triad and makes it glow. The red beam angling in from another direction through the same perferation is masked from the blue and green dots but strikes the red one and makes it glow. Thus, each beam lays down its own image in its own color. Since the dots are so tiny and so closely packed, they melt together into one picture in true to life color. As the image passes through the transmitter and receiver circuits, startling things may happen to the color. If the three guns in the tube are out of alignment you get a cascade of color flecks instead of the picture.

A new tube is being perfected in Paramount's laboratories. Instead of using three electron beams, perferated masks, and thousands of phosphor dots, this tube has a single gun —like a black and white tube. Across its screen are 900 vertical lines of red, blue, and green phospher. The gun fires red, green, and blue signals at the screen in ultra-rapid sequence through a grid of vertical wires. As each tiny color impulse passes between a pair of wires it is bent toward the right phospher by a magnetic field.

Though controls on present sets are

(*Concluded on page* 32)

Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America

Sees No. 1 wish come true!

Television Tape Recording by RCA Opens New Era of Electronic Photography

In 1956, RCA's General Sarnoff will celebrate his 50th year in the field of radio. Looking ahead to that occasion, three years ago, he asked his family of scientists and researchers for three gifts to mark that anniversary: (1) A television tape recorder, (2) An electronic air conditioner, (3) A true amplifier of light.

Gift No. 1—the video tape recorder—has already been successfully demonstrated, two years ahead of time! Both color and black-and-white TV pictures were instantly recorded without any photographic development or processing.

You can imagine the future importance of this development to television broadcasting, to motion pictures, education, industry and national defense. And you can see its entertainment value to you, in your own home. There the tape equipment could be used for home movies, and—by connecting it to your television set—you could make personal recordings of your favorite TV programs.

Expressing his gratitude for this "gift," Gen. Sarnoff said it was only a matter of time, perhaps two years, before the finishing touches would bring this recording system to commercial reality. He described it as the first major step into an era of "electronic photography."

Such achievements as this, stemming from continuous pioneering in research and engineering, make "RCA" an emblem of quality, dependability and progress.

INTRIGUING OPPORTUNITIES FOR GRADUATING ENGINEERS

You're sure to find the exact type of challenge *you* want in Engineering Development, Design, or Manufacturing at RCA. Men with Bachelor's, Master's or Doctor's degrees in EE, ME, IE or Physics are needed. *You'll find your optimum career work* among the hundreds of products RCA produces for the home, science, industry and Government.

If you have the necessary education and experience, you will be considered for a direct engineering assignment. Otherwise, you'll participate in our Specialized Training Program, in which you can explore RCA's many interesting engineering operations for a full year.

Your rapid professional advancement is enhanced at RCA by the free flow of engineering information.

Write today to: College Relations, RCA Victor, Camden, New Jersey. Or, see your Placement Director.

RADIO CORPORATION OF AMERICA

World leader in radio—first in television

Impregnation!

By Jack R. Hughes, jr., m.e.

Manufacturers found that for the uses to which some castings are put, gas porosity holes, which are inherently present in castings, make the castings unsuitable. This porosity is due to the tendency of metals at high temperatures and in the molten state to dissolve hydrogen. The hydrogen is released upon the solidification of the metal and the escaping gases cause what foundrymen call pinhole porosity, or small voids throughout the casting. Prior to the development of impregnation, an excessive amount of porosity required that the casting be discarded. Today's demand for closer tolerances and higher pressures make porosity even less desirable than before. Closer foundry control has helped to eliminate extremely bad cases of porosity, but impregnation will remain as the best method of eliminating all microporosity.

Impregnated castings are desirable for several purposes. The scaling of the pores prevents the leakage of all gaseous or liquid material through the walls of the casting. This, therefore, makes an airtight or waterproof container, a very desirable feature for many specific applications. Impregnation increases dielectric resistivity. The closing of the pores in castings, having metallic contacts or inserts, cuts out the passage of any moisture which act as a conductor between the inserts or contacts. An impregnationed casting can be plated, and the finish lasts much longer. Without impregnation the finish is likely to pit. Impregnation also prevents bacterial or fungus growth in the metal pores, and thus is of specific value to the food handling industry. Too, impregnation prevents electrolytic corrosion by breaking the electrolytic circles.

In the bonding of similar or dissimilar metals to each other impregnation has been found to be invaluable. The impregnant creates a mechanical wedge between the two parts which are being bonded together. This bonding process not only strengthens the bond between the two parts but also eliminates electroylsis and leakage. The method of processing for bonding is exactly the same as for impregnating a casting, which will be discussed later.

In the field of powder metallurgy, impregnation is playing a vital role. The powdered metal parts are made by compressing at high pressures, powdered metals. After the pressing operation many small voids . . . remain between the particles, resulting in a porosity in the metal parts. Due to the method of forming, these parts do not have the strength that a cast or forged part would have. Therefore, impregnation is used on them to increase the strength of the parts and to seal the pores of the parts.

Sealants

Sodium silicate, the chemical name for water glass, is used in cases where a high degree of closure is not required. The sodium silicate sealant is composed of approximately 50 per cent sodium silicate and 50 per cent water. The water is merely a carrying agent for the sodium silicate. Occasionally solid materials are added, such as finely ground asbestos, calcium carbonate, and metallic oxides. These solids help to increase the sealing properties of the sodium silicate. After proper curing operations, sodium silicate impregnated castings may withstand temperatures to 600° Fahrenheit.

Solvent types of impregnating compounds available are primarily phenolic resins or natural drying oils such as tung and linseed, usually mixed with xylol or alcohol. As with the sodium silicate-type sealant, the solvents lose some of their volume when cured; and therefore, they are somewhat restricted in their use.

Plastic-type sealants are by far the best in use at the present time because of their excellent physical characteristics. The plastic resins on the market today for the impregnation of metals are for the main part thermosetting copolymers. The term thermosetting copolymers is not a familiar one and is explained here.

A thermosetting plastic is a type of plastic that may be formed into shape under heat and pressure, and then it will remain permanently hard. Polymerization is a chemical process resulting in the formation of a new compound whose molecular weight is a multiple of that of the original substance. A copolymer is a complex product formed by simultaneous polymerization of two substances, the properties of which are different from either of the original polymers. Therefore, a thermosetting copolymer is a plastic formed by the union of two complex molecular forms; and upon setting, it remains permanently hard.

Any of these sealants may be used in any of the three methods of impregnating a casting. The three methods are: internal pressure, external pressure, and vacuum-pressure.

Impregnating Processes

Before a casting may be impregnated, it is important that it be clean and dry. This sometimes entails degreasing the castings to remove oils, grease, and dirt or preheating to drive excess moisture from the pores. Care must be exercised after preheating to allow the castings to return to room temperature, unless they are to be preheated for the im-

(*Concluded on page* 34)

Career Opportunities

There's a future for you seniors of 1954 at The Detroit Edison Company—a career opportunity best described by the fact that many of the executives in the organization at this time began their climb to success in positions similar to those offered graduates today. There are important jobs to be done in Power System Engineering; Engineering Planning, Design and Construction; Research.

When you join Detroit Edison, you are assured every opportunity to fit into the job you like best —and, once there, you will be encouraged to advance as rapidly as your ability and energy will carry you.

Detroit Edison is a fast-growing electric utility company. In the past year we started up two turbine generators at our new St. Clair Power Plant and broke ground for our sixth major power plant, River Rouge, where the world's largest steam turbine generators will be installed. We also moved forward with atomic energy research to be ready for the time when this great new power resource can be utilized by the electric industry.

To you young men thinking about your careers, expansion like this is heartening evidence of ever-growing opportunities for advancement. Detroit Edison offers a firm foundation on which to build a career. You may find just what you want in this thriving electric company.

Drop in and see us when you're in Detroit; or write . . .

THE DETROIT EDISON COMPANY

2000 Second Avenue,
Detroit 26, Michigan

For the full story of career opportunities at Detroit Edison, simply call or write for a free copy of this new booklet, "Detroit Edison Engineering."

Campus Survey

By Wayne Mason, jr., e.e., Herbert Smith, jr., e.e.
Dave Hackett, jr., e.e., John Bloxsome, fresh.

ALUMNI HONOR PHIL BROWN

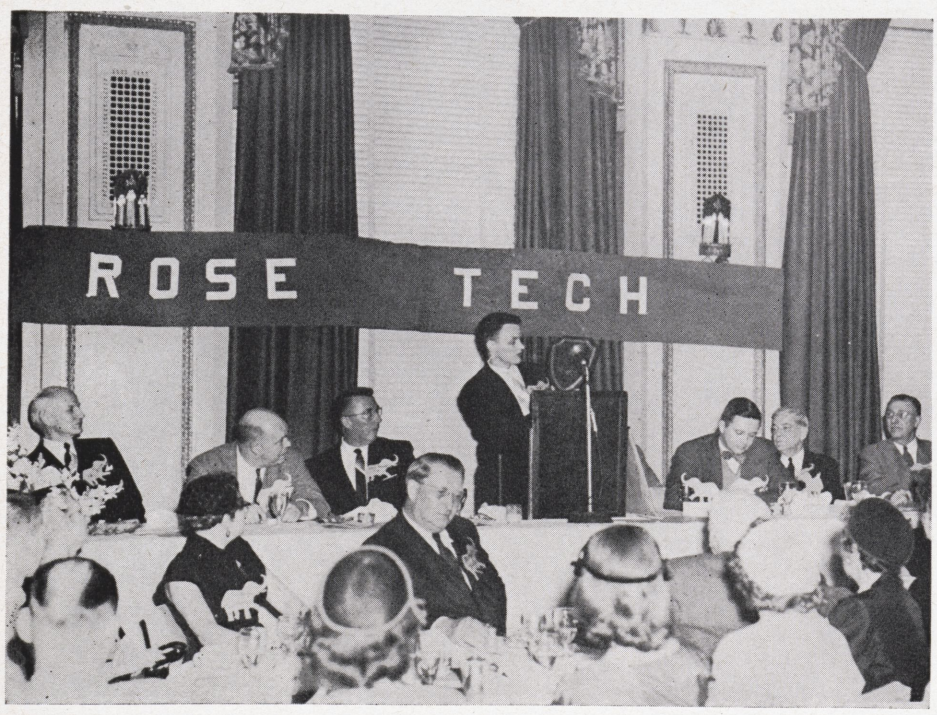
Three hundred alumni and friends of Rose met at the Indianapolis Athletic Club on St. Pat's Day, March 17, to honor Phil Brown for his twenty-six years as a football coach at Rose. This meeting was planned and arranged by the Indianapolis Rose Tech Club, under the co-chairmanship of George Cornelius Jr. and Bert L. Combs. It was not, however, exclusively an Indianapolis meeting since repreesntatives were in attendance from the following Rose Tech Clubs over the United States: New York, Cleveland, Miami Valley (Dayton), Fort Wayne, Louisville, Wabash Valley (Terre Haute), Saint Louis, and Detroit.

After an informal get-together and social hour, the guests were welcomed by the president of the Indianapolis Rose Tech Club, Mr. Russell C. Fisbeck, who presented the Rose Glee Club, which sang several numbers to the delight of the audience. After an excellent dinner, Mr. Fisbeck introduced the toastmaster for the evening, Harry H. "Bull" Richardson, '35, a former football player under Phil Brown and a member of the Detroit Rose Tech Club.

It was a hilarious evening and a fitting tribute to Phil Brown, who has one of the longest records of any football coach in the Middle West. "Bull" was in top form and kept the meeting going with dispatch and good humor. He introduced each of the following who gave short talks praising Phil Brown and the Rose athletic policy and record: Walter Osmer of Terre Haute, president of the RPI Alumni Association, John Royse of Terre Haute, vice-president of the Board of Managers, Professor John L. Bloxsome of the Rose faculty, Jim Matthews, president of the Rose Student Council, Dr. Ford L. Wilkinson Jr., president of the Institute, Dr. M. O. Ross, president of Butler University, from which Phil graduated, John Tonetti, an "R" letterman, a former basketball player, who presented the athletic director with a scroll signed by members of the Indianapolis Rose Tech Club. Two honored guests in the audience were Dr. Frank Sparks, president of Wabash College and William A. Hanley, vice-president of the Eli Lilly Company.

All in all, it was a fitting tribute to a fine coach, an inspiring leader of men, and a loyal faculty member. At the close of the meeting Coach Brown was presented with a ten-horsepower Johnson outboard motor, and Mrs. Brown was given a beautiful bouquet of flowers. The *Technic* wishes Phil Brown another twenty-six years at Rose.

Jim Mattews presents plaque to Phil Brown.



ENGINEERS DAY

Show off time again! Engineer's Day is one time when the whole student body, the faculty, and our friends work together. This year was no exception. We dragged out our overworked laboratory equipment and set up demonstrations which were aimed at amazing and enlightening the public. The projects were planned and initiated by the students. The faculty stood by to assist with advice and encouragement. Many projects were standard but student initiative was overworked.

Blue Key Fraternity furnished the personnel for planning the general organization. Richard Gordon was the chairman of the committee, being assisted by Roy England. They organized the efficient guides and appointed students to organize each department's displays. The department chairmen were: Chemical Department, Paul Elliott; Civil Department, Carl North; Electrical Department, Ervin Ulbrich; Mechanical Department, Bob Sutton;

(*Concluded on page* 30)

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

BILL PARLETT has learned that helpful engineering suggestions promote good customer relations.

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

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

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

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

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

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

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

WORTHINGTON

The Sign of Value Around the World

Fraternity Notes

LAMBDA CHI ALPHA

A new regime! In a recent chapter election the following men were voted to office: Wayne Mason, President; Don Snape, Vice-president; Bob Young, Secretary; Harv Greene, Treasurer; Walt Johanningsmeier, Social Chairman; Bill Gaither, Rush Chairman; Bud Hall, Pledge Trainer; Sam Hart, Ritualist. Supplementing the slate are Nathan Ritchie, continuing as Steward, and Dud Binford, replacing Dick Beard as House Manager. Other retiring administrators are Jack Freely, Dick Gordon, Jim McCulloch, Dave Hackett, Jim Lott, Bud Teague, Jack Hughes, and Bill Lamb.

March 27 marked the date of the Lambda Chi Pledge Dance. The event was held in the new Student Center, music being furnished by disc jockey Bob Letsinger. Chaperoning the dance were Dr. and Mrs. O. M. Knudsen, Mr. and Mrs. D. K. Anderson, and Mr. and Mrs. R. N. Tinker. A picnic was held on the following day at McCormick's Creek State Park. Owing to an overestimation of the attendance at McCormick's Creek, hot dogs were served at 912 South 6th on March 30, March 31, and April 1.

The 1954 softball season is heralded by sidewalk softball activity as "Casey" Teague maps his lineup in hopes of continuing last year's undefeated string of five games. The first game of the IF schedule slates the Chi nine against Theta Xi.

The chapter was recently honored by the return visit of Prof. O. L. Stock, Rose, '08. Prof. Stock was a member of the initial local, P. I. E. S., which evolved to Theta Kappa Zeta of Lambda Chi Alpha.

Ron Smith

SIGMA NU

Th pledge class has been further strengthened with the pledging of several new men. They are; John Bradshaw, Jim Freers, Herb Smith, Kent Sharp, Harry McGuire, and Ed Whitner. The pledge class is under the guidance of Jerry Hebb and Myron Clark.

Epsilon Mu of Butler was host chapter for Sigma Nu State Day on March 27. Beta Upsilon was eliminated in the second round of the basketball tournament by a strong DePauw outfit. The loss was compensated for by the fine dinner and dance that followed in the evening. The chapter had a large representation.

The house party following the St. Pat's Dance was a howling success. Many brothers and their dates were present along with guests from the other fraternities. To keep up with tradition, green was a prominent color at the party. *Owen March*

ALPHA TAU OMEGA

Immediately following the Saint Patrick's Day Dance, A.T.O. held its first house party at the new house on South Center Street. Highlights were the bunny hop (Schukai playing, Powers conducting) and Bob Miller's famous interpretation of Victor Borge. The following night brother Bosshardt provided a television set so that the Taus and their dates could view the State Finals. Everyone has a fine time, even "the Gerstmeyer fan."

Congratulations to Howie Junker, John King, Auggie Larr, Tom Pebworth, Larry Thomas, Bob Wertz, and Tom Roehm who recently pledged. Congratulations are also in order to Bill Supp who was tapped by Blue Key, John Gregory who was tapped by Tau Beta Pi, and Ralph Llewellyn who received his key from both fraternities.

Open house seems to be the order of the day for A.T.O. Four parties were planned the first two of which were given on March 28. In the afternoon a tea was held for the parents, neighbors, and members of the Rose faculty. Another party was held that evening for the Alumni.

On April sixth John Gregory was installed as the new worthy master of Gamma Gamma Chapter. Other officers included: Dick Bosshardt, Worthy Chaplain; Charlie Shukai, Keeper of the Exchequer; Art Masters, Keeper of the Annals; Kenneth Hannum, Worthy Scribe; Don Powers, Worthy Usher; and Carter Smith, Worthy Sentinel.

Art Masters

THETA XI

Kappa of Theta Xi extends its congratulations to its new pledges; Ron Bosenberg, Bill Came, George Moore, Gene Mrava, Ted Solmundson, Fred Von Allman, Bill Waggener, and Jack Wilcox.

The Indianapolis Theta Xi Club recently held its monthly meeting at Kappa's new house at 902 South Sixth Street. The most prominent of the many distinguished alumni present at the dinner meeting was Mr. M. S. McNay, national president of Theta Xi fraternity.

The open house after the Military Ball added to the enjoyment of the many Rose students who attended the formal affair.

Bets flew freely as the house was packed to see the Indiana state high school basketball finals. There seem to be a few of the Brothers quite disappointed with the outcome.

On St. Pat's day a number of Kappa's football players journeyed to Indianapolis to take part in the testimonial dinner given by the Indianapolis Rose Tech club in honor of our coach, athletic director, and friend Phil Brown.

The annual Bowery Ball was a huge success. The house jumped as the costumed couples danced to the music of Jimmy Holler. Prizes were awarded to the "best dressed" male and female of the bowery. Our thanks to Dr. and Mrs. Bankoff and Col. and Mrs. Jacobs who chaperoned the party.

Congratulations to Brother Sovereign who recently became engaged to Miss Pat Howard.

Charles Hirshfield

Boeing eight-jet B-52 global bomber

Which field of engineering interests you most?

Whether it's electrical, civil, mechanical, aeronautical or any related field, you'll find a rewarding career opportunity at Boeing.

Engineers of virtually every type are in increasing demand here—for Boeing is growing continuously, and today employs more engineers than even at the peak of World War II. That's the kind of situation in which positions up ahead keep opening up. Boeing fills them from within its own organization, and holds regular merit reviews to give you steady recognition.

As a Boeing engineer you'd be part of a team that, for 37 years, has pioneered successful, trail-blazing types of airplanes. You could look toward a stable future with such long-range Boeing projects as a pilotless aircraft program (one of the largest in the country), development of America's first jet transport, research on supersonic flight and nuclear power for aircraft, and the world's fastest multi-jet bombers, the B-47 and B-52.

You'll find a wide range of experience and contacts available to you at Boeing. The aviation industry is unique in its variety and breadth of application —from applied research to production design, all going on at once. Boeing is constantly alert to new materials and new techniques, and approaches them without limitations. In addition, Boeing's vast subcontracting program—requiring engineering co-ordination—offers an opportunity for contacts with a cross section of American industry.

At Boeing, you'd work in Seattle, Washington, or Wichita, Kansas—two fresh, modern cities with a wide variety of recreational facilities as well as universities which provide excellent graduate study courses. The company will arrange a reduced work week to permit time for such study and will reimburse tuition upon successful completion of each quarter's work.

For full details on career opportunities at Boeing,

consult your PLACEMENT OFFICE, or write

RAYMOND J. B. HOFFMAN, Admin. Engineer
Boeing Airplane Company, Wichita, Kansas

BOEING

Alumni News

By Birt Kellam, soph., e.e.

'13 Ostrander, Raymond M., E.E., Supervising Planning Engineer for the Commonwealth Edison Company, Chicago, is retiring as of April 1, 1954. After retirement, he is moving to Hendersonville, North Carolina.

'25 Bolin, Roger H., E.E., has been appointed manager of general advertising for Westinghouse Electric Corporation. Well known in advertising circles, Mr. Bolin has pioneered the adoption of many advertising techniques and directed the Westinghouse T. V. sponsorship of national collegiate football in 1951, professional football last fall, as well as the national political campaign coverage in 1952.

Within a few years after joining the company's advertising department as a graduate student trainee, he was supervising Westinghouse refrigeration and air conditioning advertising. In 1937, he was named advertising manager of the Westinghouse Appliance Division, Mansfield, Ohio.

In 1949, Mr. Bolin was appointed assistant to the vice-president and manager in charge of the Westinghouse consumer products divisions —from which duties he comes to his present assignment.

'30 O'Mara, John J., A.E., graduated from Rose Poly with honors and was formerly an Assistant Professor in the College of Engineering, Department of Civil Engineering, State University of Iowa. He is now working for the Joint Construction Agency. This organization is in charge of most of the United States military construction in Europe. He is at present located at Verdun, France, where the agency is located.

'31 Hurst, Ernest G., C.E., President of Hurst-Rosche, Inc., and a partner in Dura Crete Products, Peyton's Concrete Product Company, and the Krete Koater Service, was elected a director of the Mid-West Ready-Mixed Concrete Association at their annual meeting in Chicago.

'32 Stock, C. Chester, Ch.E., received his bachelor of science degree in chemical engineering from Rose Poly in 1932, at which time he was awarded the Hemingway Medal for highest scholastic achievement. In 1937, he was awarded a scholarship to Johns Hopkins University where he received the doctor of philosophy degree in physiological chemistry in 1947. New York University confered upon his the degree of master of science in medical bacteriology in 1941.

Dr. Stock, who was recently the recipient of the Garfield High School Alumni Association Award for Outstanding Achievement is at present the chief of the Division of Experimental Chemotherapy at the Sloan Kettering Institute of Cancer Research, New York City. He has done outstanding work in experiments which it is hoped will lead to a cure for cancer. He has written over 100 articles for scientific and medical journals and has lectured widely on this subject.

Dr. Stock, the son of Professor and Mrs. O. L. Stock, formerly of Terre Hapte, and now residing in Michigan, is currently a member of the following scientific and honorary organizations: Harvey Society, American Chemical Society, American Association for Cancer Research, New York Academy of Medicine, American Association for the Advancement of Science, Society of Experimental Biology and Medicine, American Society of Biological Chemists, Sigma Xi, Tau Beta Pi, and Alpha Chi Sigma.

During World War II, Dr. Stock was connected with the United States government in several capacities and in 1948 he was awarded the Certificate of Merit, Joint Army-Navy Award for Wartime Activities. He has held several teaching positions in the field of bacteriology and biological chemistry at New York University, Rockefeller Institute Hospital, and Cornell University Medical School.

'43 Peak, Frank W., E.E., graduated with honors and is at present working for The General Electric Company at Indianapolis as a Field Engineer. He has just left for Schenectady on an eighteen months temporary assignment.

'47 Broemmelsick, H. Eugene, Jr., Ch.E., formerly a 2nd Lieutenant in the Chemical Corps of the United States Army, has taken a new position with the Shell Oil Company at Norco, Louisiana. He is now in the Engineering Technology Department of the same company.

'48 Bowers, Maurice D., M.E., Ensign with the United States Coast Guard, has been released from active duty. He is now with the American Can Company in Terre Haute, Indiana.

'49 Garnich, Peter J., M.E., 1st Lieutenant in the United States Air Force, has been released from active duty, and is back with the De Laval Steam Turbine Company.

'50 Clingerman, Max Gene, M.E., has been released from service and is now with the Cummins Engine Company in Columbus, Indiana.

'50 Owens, Don, M.E., Lieutenant in the United States Army, is stationed: H & S Company, 94th Engineer Construction Battalion, as a Post Engineer at the Chinon Engineer Depot, France. He will be married in France soon.

'53 Brinson, Kenneth G., Ch.E., was recently graduated from the United States Air Force preflight school, Lackland Air Force Base, San Antonio, Texas.

'53 Klaus, Alan, Ch.E., of Terre Haute and formerly with Proctor and Gamble at Ivorydale, Ohio, has been called to service.

'53 Kawano, Robert Keisaku, E.-E., was recently married to Miss Kay Kazue Matsua in Honolulu, Hawaii. Ω

Case of the dry "oil" well

Not at all unusual, you say? But this well was *purposely* drilled that way! In fact, precautions were taken to see that the well wouldn't contact oil-bearing sands. It was to be a vital part of an elaborate waste-disposal system built into one of Du Pont's new plants near Victoria, Texas. It is an example of the unusual engineering problems which Du Pont technical men encounter.

The "well" itself is almost a mile deep—4900 feet, to be exact. Waste fluids from the plant are forced down this well, to be absorbed by non-oil-bearing sands—far below the level of any surface water. Piping near ground level is in the form of concentric shells, and fresh water is delivered to the annular opening around the waste pipe. Furthermore, the water pressure is higher than that of the fluids in the waste section. In this way, any leakage in the pipe system causes fresh water to enter the surrounding sands (or the inside waste system) and prevents objectionable materials from reaching the sands at surface levels.

Other interesting procedures are used throughout Du Pont's many plants to guard against river pollution. For example, scientists were asked to make a complete marine-life census on one river before a plant was built nearby. The company wanted to be certain that no waste would be discharged which would challenge the natural pattern of marine life.

Throughout the Du Pont Company, wherever there is a need for the services of technical men, there are varied and interesting problems that present a challenge to engineering skill and imagination.

Now available for student ASME chapters and other college groups, a 16-mm. sound color movie—"Mechanical Engineering at Du Pont." For further information, send post card to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Bldg., Wilmington 98, Delaware.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Watch "Cavalcade of America" on Television

Library Notes

By Carson W. Bennett and Nina J. Mahaffey

NOTABLE BOOKS OF 1953

Each year a committee of the American Library Association publishes a list of notable books. This year 51 titles were selected and of this number the RPI Library has the following:

Bartlett Vernon. *Struggle for Africa.*

A clear, authoritative survey of today's Africa giving a constructive, impartial picture of that continent's problems as a whole.

Brown, E. K. *Willa Cather, a Critical Biography.*

Sympathetic, illuminating, well-documented study of Willa Cather as artist and person.

Churchill Winston. *Triumph and Tragedy; the Second World War.*

With this volume, which covers the decisive period from D-Day to July 1945, the author concludes his brilliant narrative of the Second World War.

Cousins, Norman. *Who Speaks for Man?*

An outstanding commentator on world affairs writes with clarity and sincerity of his belief in the need for world citizenship.

Cousteau, Jacques and Dumas, Frederic. *The Silent World.*

Captain Cousteau's invention of the aqualung made possible the exciting undersea adventures which he describes in this fascinating book.

Dean, Gordon. *Report on the Atom.*

A realistic and sensible appraisal of the atomic energy program today by a former Chairman of the Atomic Energy Commission.

Heilbroner, Robert. *The Worldly Philosophers.*

An introduction to the great economic thinkers and their doctrines, presenting the subject in an objective, unbiased, thought-provoking manner.

Herzog, Maurice. *Annapurna.*

The ascent of one of the highest mountains ever climbed by man; achieved with suffering, skill and indomitable courage. Thrillingly told.

Highet, Gilbert. *People, Places and Books.*

A vivid collection of the author's lively and literate radio talks about books and reading.

Lindbergh, Charles A. *The Spirit of St. Louis.*

Beautifully and sensitively written account of the author's epic flight from New York to Paris in 1927 and of the incidents that led to the fulfillment of a young aviator's dream.

Maurois, Andre. *Lelia, the Life of George Sand.*

Written with deep psychological insight, this expert and sympathetic biography of a dynamic French novelist is also a lively picture of her times.

Paton, Alan. *Too Late the Phalarope.*

In lyrical, poetic prose, the story of Pieter Van Vlaanderan unfolds—his great goodness, his secret despair, his fall from grace, and his final salvation.

Sandburg, Carl. *Always the Young Strangers.*

Memorable American autobiography by the well-loved poet and biographer, recapturing the atmosphere of the prairie home of his youth.

The complete list of Notable Books of 1953 will be found in the March 15th issue of the *Library Journal.*

* * * * *

FOR THE BIRDS

A young woman entered a bookstore in a large city and asked a clerk to help in selecting a suitable book for reading. She wanted something about Kentucky, she said.

Clerk: "Why not try Allen's 'Kentucky Cardinal,' if you want a book on Kentucky?"

Miss Highbrow: "No, I don't care for theological stories."

Clerk: "But this cardinal was a bird."

Miss Highbrow: "I am not interested in the scandals of his private life."

* * * * *

HE COULD GET IT FOR YOU WHOLESALE

There are some singular discounts allowed in the book trade. They were happily illustrated on one occasion by Mark Twain. One day while the humorist was connected with a publishing house he went into a book store and picking up a volume asked the price. He then suggested that as a publisher he was entitled to a 50% discount. To this the clerk assented.

"As I am also an author," said Mark Twain, "it would appear that I am again entitled to a 50% discount."

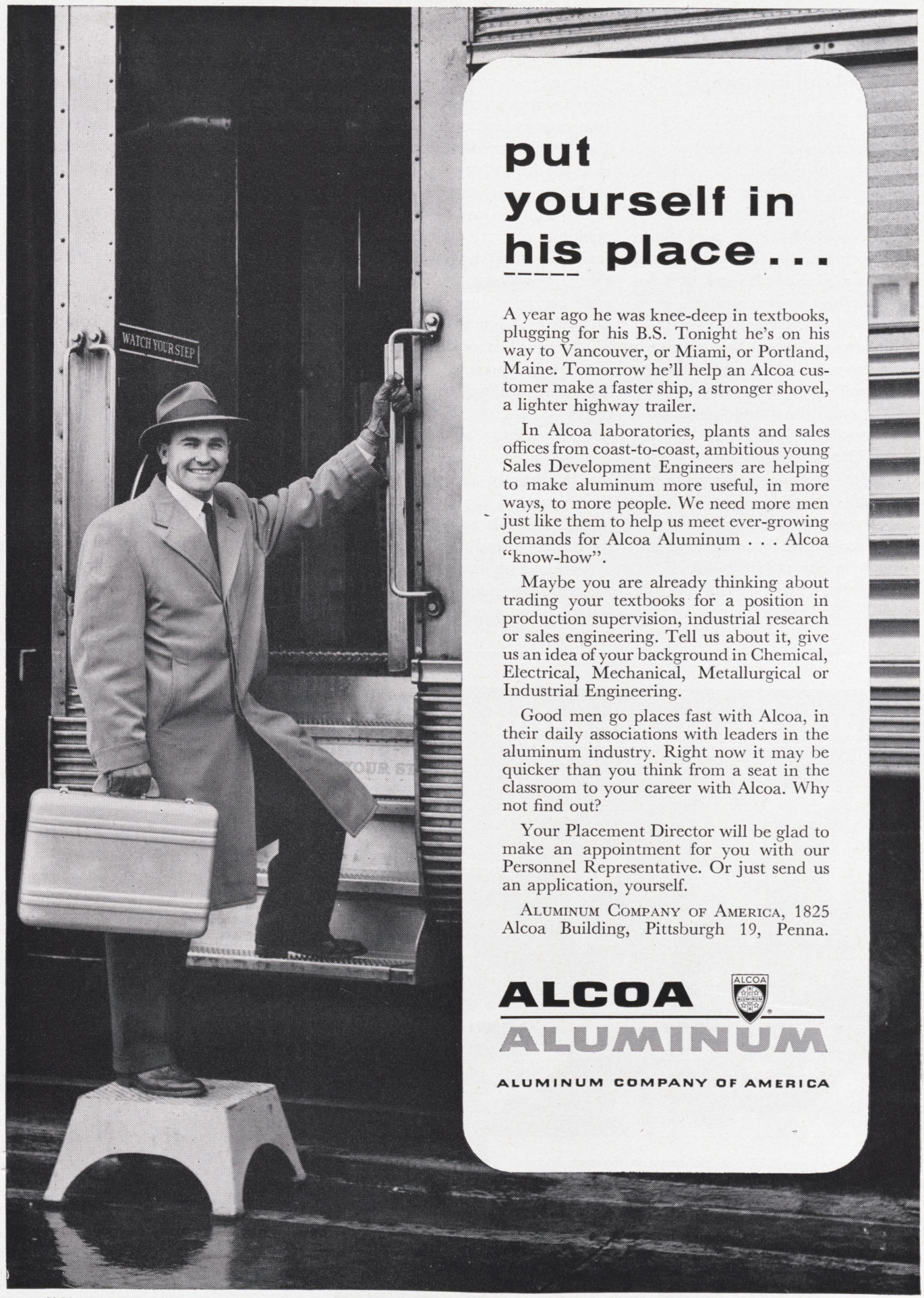
Again the clerk bowed.

"And as a personal friend of the proprietor," he modestly continued, "I presume that you will allow me the usual 25% discount."

Another bow from the salesman.

"Well," drawled the unblushing humorist, "under these conditions, I think I may as well take the book. What's the tax?"

The clerk took out his pencil and figured industriously. Then he said with the greatest nonchalance, "As near as I can calculate, we owe you the book and about 37½ cents." Ω



put yourself in his place...

A year ago he was knee-deep in textbooks, plugging for his B.S. Tonight he's on his way to Vancouver, or Miami, or Portland, Maine. Tomorrow he'll help an Alcoa customer make a faster ship, a stronger shovel, a lighter highway trailer.

In Alcoa laboratories, plants and sales offices from coast-to-coast, ambitious young Sales Development Engineers are helping to make aluminum more useful, in more ways, to more people. We need more men just like them to help us meet ever-growing demands for Alcoa Aluminum . . . Alcoa "know-how".

Maybe you are already thinking about trading your textbooks for a position in production supervision, industrial research or sales engineering. Tell us about it, give us an idea of your background in Chemical, Electrical, Mechanical, Metallurgical or Industrial Engineering.

Good men go places fast with Alcoa, in their daily associations with leaders in the aluminum industry. Right now it may be quicker than you think from a seat in the classroom to your career with Alcoa. Why not find out?

Your Placement Director will be glad to make an appointment for you with our Personnel Representative. Or just send us an application, yourself.

ALUMINUM COMPANY OF AMERICA, 1825 Alcoa Building, Pittsburgh 19, Penna.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

ALCOA ON TV brings the world to your armchair with "SEE IT NOW" featuring Edward R. Murrow. Tuesday evenings on most CBS-TV stations.

The "Hot" Battery

(*Concluded from page* 14)

out replenishment or attention for at least twenty years.

"The atomic battery is likely to be applied first to miniature devices such as portable and pocket-size radio receivers, hearing-aids, signal control, and similar devices that require reliable power sources with great length of service.

"This new and distinctive approach to the harnessing of the atoms energy for peaceful purposes is most timely. I have in mind the atomic peace proposals President Eisenhower laid before the United Nations on last December 8th. These proposals for international development of the peaceful uses of the atom are now being discussed between nations and are much in the public mind.

"This achievement of the atomic battery is further evidence of the opportunities which exist for American industry to develop the industrial uses of atomic energy. It is a step toward greater participation by free competitive enterprise in a field that challenges the imagination and calls for initiative and pioneering.

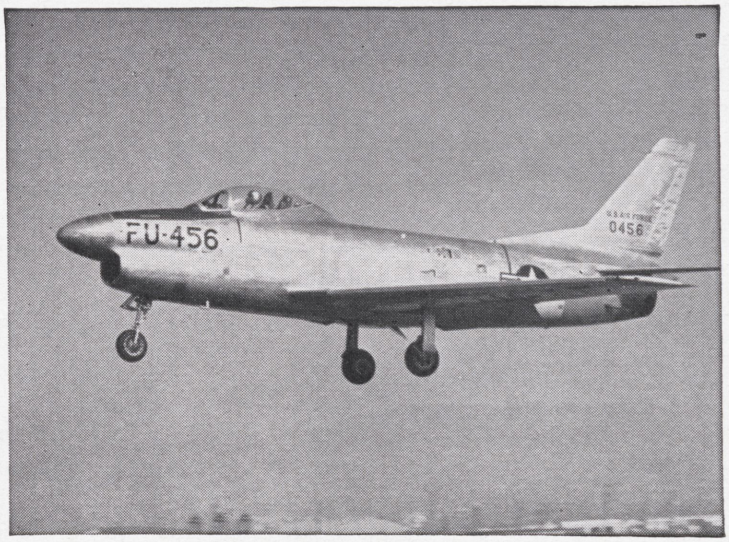
"No one can look far enough ahead to see all the ways in which a new principle or scientific method will find practical application. Some of these, however, we can anticipate, such as providing small quantities of power at low voltage for various kinds of electronic devices where extreme compactness, ruggedness and long life without attention are important factors. But when we deal with something as basic as capturing the energy of the atom and turning it directly into electricity, the first practical applications may not fortell the full scope and range of its future usefulness.

Although in theory, virtually any radio active material could be the source of an atomic battery, strontium-90 was chosen to activate the RCA device because of its high energy beta radiation, its relatively long life, its low shielding requirements and its availability in experimental quantities from the U. S. Atomic Energy Commission.

Strontium-90 costs about 50 cents for a thousandth of a curie today. A wide demand for the material in atomic batteries and other applications would warrant quantity processing of the material. This, it has been estimated, might bring its price down as low as two-tenths of a cent for a thousandth of a curie.

An aspect of Atomic Batteries that has yet to be determined accurately is the extent of the effect of the beta radiation on the crystal wafer. It is known that the crystal structure of many substances is gradually damaged by bombarding electrons. Further research is in progress to minimize these effects so as to make them negligible for the structures used in the Atomic Battery. Ω

Another page for **YOUR BEARING NOTEBOOK**

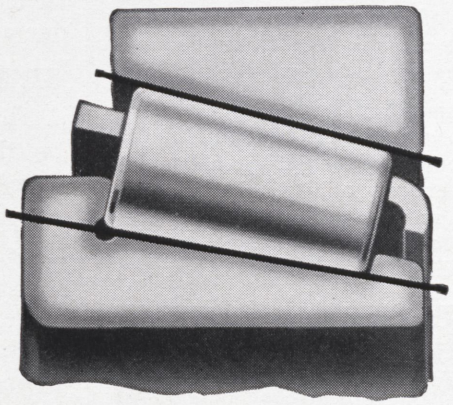


Jet's wheel bearings have to take three kinds of forces

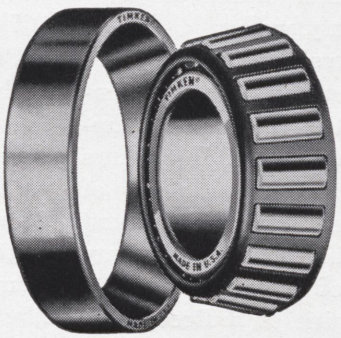
When the F86-D Sabre Jet lands—the wheel bearings take a triple beating. There's the initial landing shock, an almost instantaneous acceleration; and, if there's a crosswind, heavy thrust loads. Bendix and North American solved this triple punch problem by using Timken® tapered roller bearings for all three landing wheels. Their tapered design enables them to take radial and thrust loads in any combination. And Timken bearings' true rolling motion and incredibly smooth surface finish practically eliminate friction permitting rapid acceleration.

Line contact helps TIMKEN® bearings take jet landing load

This cross-section drawing shows one reason Timken bearings are ideal for taking the heavy landing load of the plane itself. Note the full line of contact between rollers and races. This gives Timken bearings high load capacity. It's a basic advantage of roller bearings.

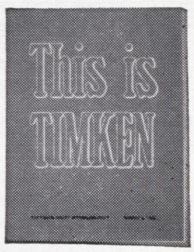


TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

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



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Campus Survey

(Concluded from page 20)

Physics Department, Frank Potts.

There were an estimated four-hundred-sixty people here to tour the school. They were divided into groups of about 20 and guided through the departments on a predetermined route. The tours began at 9:00 stopping at 11:30 for lunch in the cafeteria, and continuing into the afternoon.

A few of the more interesting displays were: Bill Lamb's radio controlled dirigible, Ulbrich's binary counter, A TV camera (borrowed), a simulated atomic reactor, and an ultraviolet light. Paul Lewis came through for the math department with an electronic logic machine and an electronic tic-tac-to machine (it never loses).

Everyone participating in Engineer's Day deserve congratulations for a successful program.

ST. PAT'S — RAH RAH

This year the St. Pat's activities on the Rose campus were a large success at least as far as the school administration and the sophomore class were concerned. The traditional sophomore-freshman activities were non-existent.

The administration felt that it was impossible to let the student body have another Friday afternoon off. There was a reason for this decision, but the decision was also a very convenient one for the administration to make, as it fit into its anti-hazing policy very well.

The sophomores used the administration's edict and an error in planning the activities to excuse themselves from taking part. It appears that the sophomores were afraid of the frosh, because they used the first excuse they could get to run away from any kind of contact.

Is this the spirit of a Rose man, to run away from a little fight? This is not the type of interest that builds strong school spirit, but it seems to be the rising spirit in the student body as operation "Eliminate Hazing" nears completion. Will the St. Pat's activities be saved, or are the screws being turned down on this for good?

The usual St. Pat's Dance was held in the auditorium on Friday, March 20. Jimmy Holler and his band provided the music. Only four men turned out at the dance with beards. The award for the best beard went to Dick Williams. His prize was a copy of Kinsey's *Sexual Behavior of Females*. The prize for the most unique beard was a cigarette lighter and went to Phil Boller. Thus the dance climaxed a very exciting weekend.

ITS SPRING AGAIN (ALMOST)

Maybe it isn't spring, but it seems warm enough for swimming. I'm certain I saw four Rose men swimming in March. Come to think of it they even had their clothes on. Do you suppose they *fell* into our wretched lake? Well the story is that Paul Elliott forgot for a short time which class he really belongs to. It was hard to tell. The sophomores resented his aid to the freshmen to the point of throwing him beautifully into the lake. He also took a little walk. Guess he needs the exercise.

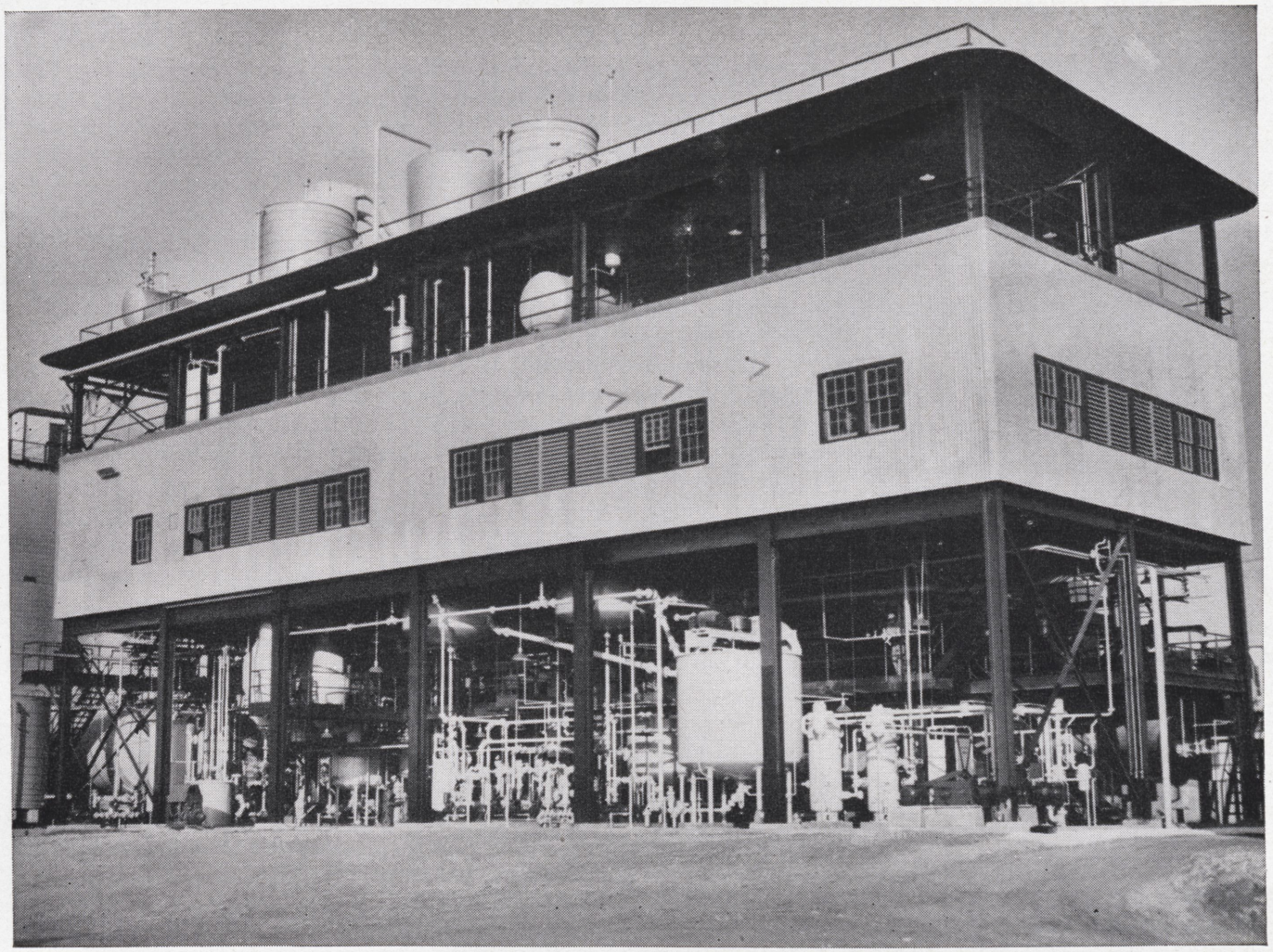
One thing leads to another so it was found that Sam Hart, Lou Hagaman, and Jack Hajjar, being new here, had never had the experience of flying out over the rippling water and descending awkwardly into the muddy solution. One noon period in March they all became initiated as Rose Men.

Said Mr. Hagaman, "Wooooooh!"

KNIPMEYER SPEAKS AT CONVOCATION

Professor C. C. Knipmeyer, former head of the Electrical Engineering Department at Rose, spoke on his trip to Turkey at a convocation on March 9. Professor Knipmeyer went to Turkey as an electrical engineering advisor for Paul Weir Company of Chicago as part of the Marshall Plan program for developing Turkish resources.

Professor Knipmeyer may be a stranger to some of the new members of the student body, but to most he is well remembered. He taught at Rose for 44 years before leaving for his post in Turkey. Ω



EXCESS HYDROCHLORIC ACID is put to work in this catalyst plant of the Morton Salt Company at Weeks Island, Louisiana. The acid is used in a process developed by a Standard Oil scientist to produce a top-quality catalyst.

What the scientist saw in the sandpile!

This story starts with a child's sandpile and a scientist's curiosity. It ends eight years later with a new top-quality catalyst—the result of a scientist's ingenuity.

One day a Standard Oil chemist took home some granular blast furnace slag from a neighboring steel mill for his children's sandpile. Suspecting that it had properties of potential value, he took a pailful back to his quarters in the Whiting Laboratory the next day.

Treating the slag with hydrochloric acid and then drying it in an oven produced 30 cc's of powder that proved to be an effective and active catalyst. However, commercial production of the catalyst was uneconomic because of the market price of hydrochloric acid. To overcome this obstacle, Standard Oil contacted the Bay Chemical Company, a salt cake producer which, at times, had difficulty marketing hydrochloric acid—a co-product of salt cake.

The Bay Company, of Weeks Island, Louisiana, now merged with Morton Salt Company, became interested in the new catalyst and built a plant with the aid of Standard Oil scientists. The output of this plant is a top-quality catalyst with unlimited new sources of raw materials.

This is only one example of what Standard Oil scientists accomplish in an atmosphere of independent research. In our constantly expanding laboratories, our scientists are free to investigate and pursue ideas, for Standard Oil knows that one of a scientist's greatest assets is his curiosity.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

Video Rainbow

(*Concluded from page* 16)

simple, you may find yourself twisting the knobs a lot more to get the picture you want than on black and white receivers. Color signals are more sensitive to interference than black and white and an accurate shade may be difficult to obtain.

Another problem to be considered is that of lighting. Indoors and out, color TV requires more light than black and white. RCA says at least three times as much, while CBS says six. This would make televising some things practically impossible.

While shooting color scene can be expensive in some respects; it is cutting costs in others. For instance, scenery can be colored by light instead of paint. By using gray cyclorama and shining different colored lights on it, it is possible to change the background up to 500 times per hour if necessary. That way a set can be varied continuously at practically no cost. Objects and costumes can also be colored in this way. The only thing that gives technicians a headache now is flesh tones. This does pose a problem since flesh is the key to all color TV. At NBC, cameramen "tune in" on what they call Gamma Chips—three bars of shading, one black, one white, and one a flesh tone—providing full color range. When these are right on the monitors, everything comes out right. To make sure, they run further tests on color bars.

Radical simplifications in technique and equipment are being announced every month. CBS claims that its new Colorton tube is a simplification of the shadow-mask type that makes possible mass production of one item that posed manufacturing problems six months ago. By next September, they expect to turn out 15,000 each month.

RCA's big three-tube color camera that does everything in one operation, but which is large and expensive, already is obsolete. At their Princeton labs, technicians are shooting successful color with a camera the size of a standard black and white job. Three miniature Vidicon tubes no bigger than two-cell flashlights do the work. They are also in the process of developing a new single tube camera that works like a color receiver in reverse. Another big headache has been the fact that color films don't work well on color TV, but that has been eliminated by the Princeton scientists. They have perfected a method for storing color signals on half-inch magnetic tape. It does away with all chemical processing. A color show can be stored indefinitely and played back anytime or the tape can be erased and used again.

The hurdles still confronting color television are both technical and economical but most TV executives are confident they will all be solved in a relatively short time with the effort that is being applied today. Ω

Helping the "stars" to shine

A tiny off-stage "sun" brings you brighter and better movies

As YOU SEE the Hollywood "stars" on the screen of the darkened theater—perhaps in 3-D—you can thank a man-made miracle of light—the carbon arc.

This brilliant light comes from tiny carbons not much larger than pencils. Yet their light is brighter than the sun itself—enlarging the tiny pictures on the film as much as 300,000 times!

THEY GIVE YOU THE RAINBOW—Besides the brilliance that brings you clear, sharp moving pictures, these carbons have a light quality almost exactly like that of the sun. This makes possible the production and showing of pictures with all colors of the rainbow.

LIGHT YOU DON'T SEE—The rays from these carbons go beyond the movies into places most of us never see. They reveal quickly how long a new paint will last, and whether colors will fade from new fabrics. They also tell scientists the exact chemical composition of many materials.

BETTER AND BETTER—Making and constantly improving hundreds of carbon and graphite products for industry and science is one of the many ways in which the people of Union Carbide help serve all of us.

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Impregnation!

(*Concluded from page* 18)

pregnation. That the casting be clean and dry are the only restrictions on impregnating. It may be impregnated at any stage in the process of manufacture, before or after machining, anodizing, or plating.

The size of a casting has no bearing on whether or not it may be impregnated. The only restriction is the size of the autoclave available; and even if a casting is of such size that it may not be placed in an autoclave, it is possible to use the internal pressure method.

The internal pressure method of impregnation is the easiest. It is an individual casting method. All openings in the casting except one are closed by means of plugs or pressure plates, and the remaining opening is fitted with an air valve in such a way as to allow pressure to be applied. The casting is then filled with the sealant and pressure is applied to the prepared opening until the sealant is observed to be leaking out through the pores or until it is believed all the pores are full. The pressure is then released, and the casting drained, rinsed, and cured. The main drawback to this method is the expensive tooling necessary to block all the openings, other than the leaks themselves. Also there is a great loss of chemicals in using this method.

The second most easy method to use is the external pressure method. In this method the castings are placed in an autoclave, the number of castings to depend on the capacity of the autoclave. Sealant is then introduced; the lid is sealed; and the autoclave is put under pressure. The length of time and amount of pressure is dependent upon the size of the casting and the wall thickness. The pressure forces the sealant into the pores of the casting, thereby effecting the seal. After the pressure cycle the castings are drained, rinsed, and cured. In this method, as well as for other methods the sealant is retained in the pores by capillary action. The external pressure method is disadvantageous in the fact that the sealant is forced into the pores from both sides; and the air trapped in the pores has the tendency to force the sealant out of the pores on release of the pressure. This gives only a partial seal at its best.

This disadvantage is eliminated in the vacuum-pressure method. This method involves, as its name indicates, both a vacuum and a pressure cycle. The castings are placed in the autoclave and the vacuum cycle is begun. The vacuum is run for approximately 30 minutes to exhaust as much air as possible from the autoclave and the pores of the castings. The amount of vacuum used varies and is largely dependent upon the sealant used. However, the greater the degree of vacuum used, the better the seal obtained. The sealant is drawn into the autoclave under vacuum until all the castings are completely covered. The pressure is then neutralized and the pressure cycle is begun. The pressure cycle is run with a pressure from 50 to 100 pounds per square inch, again dependent upon the sealant being used. In this method, the vacuum draws almost all of the air from the pores. When the sealant is introduced, it runs into the pores, partially filling them. When the pressure is applied, the sealant is forced into the pores, completely filling them. If a high degree of vacuum has been maintained during the vacuum cycle, the amount of air remaining in the pores is negligible. After 30 minutes the pressure is again neutralized, and the castings are removed from the autoclave, drained, rinsed, and cured. As in the pressure method, the length of the vacuum and pressure cycles is dependent upon the wall thickness. Thick walls require longer cycles. The vacuum-pressure is, certainly, the most effective to use even though it entails the additional expense of a vacuum pump.

The castings are allowed to drain excess sealant into the autoclave or they are removed to a draining table so constructed to gather and salvage the excess sealant.

Castings may be rinsed by any number of ways, dependent upon the sealant used. Sodium silicate may be rinsed very easily by dipping in water. Methods of rinsing plastics, however, differ according to the plastics used. One requires that the castings be agitated in three successive acetone rinses; another requires a succession of rinses with alkaline water, pure water, and butyl acetate. The alkaline action of the first rinses will cause etching of metal surfaces, and the pure water rinse is to stop the alkaline action. The temperature of the rinses should be raised to approximately 120°; Fahrenheit. One type of plastic sealant may be rinsed with hot plain water.

All types of sealants are cured by heating them in a dry heat oven. The length of time they are heated and the temperature used depend upon the type of sealant used. Sodium silicate may be cured by leaving the castings at room temperature for 24 hours. The curing serves to harden the plastic, which is a 100 per cent solid substance, therefore having no vehicle to evaporate and leave the pores partially filled. All other sealants have some type of liquid vehicle, water or alcohol, which evaporate and leave the pores partially filled.

After curing, the castings may be tested by the impregnator or contractor to determine the effectiveness of the impregnation. It sometimes occurs that a second operation may be necessary to seal a casting satisfactorily. This is particularly true of the sodium silicate and solvent methods.

Summary

The process of impregnation has become increasingly important in recent years. The government is requiring that many of its cast parts be impregnated as a preventative measure. Many sealants and methods of impregnating are approved by the government, although there are some restrictions placed on inferior type sealants. There are several end uses to which a casting may be put in which these sealants might not be satisfactory. Ω

Appearing in the January 18, 1954 *issue of* AVIATION WEEK

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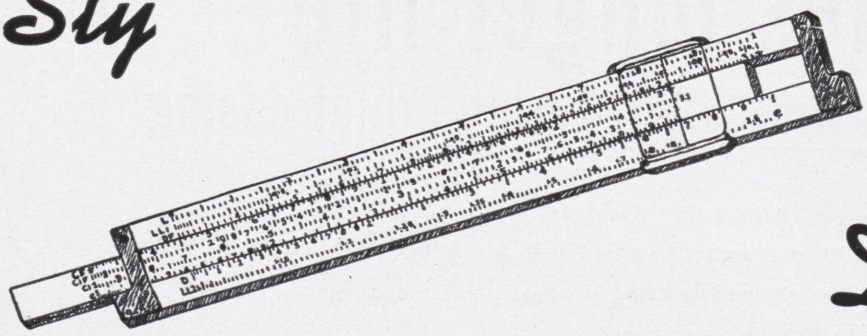
Sly Droolings



Stolen by Ralph Branson, m.e., jr., and Frank Potts, m.e., soph.

Lady (to streetcar conductor): Will I get a shock if I put my foot on the track?

Conductor: No, lady, not unless you put your other foot on the trolley wire.

* * * *

Circus actress: This is my first job. You better tell me what to do to keep from making any mistakes.

Manager: Well, girlie, just don't undress in front of the bearded lady.

* * * *

Angry Father: What do you mean by bringing my daughter in at this hour of the morning?

Student: Have to be at class at eight.

* * * *

Let's cut classes, Paul, and take in a movie.

Can't do it, old boy; I need the sleep.

* * * *

People grasping cocktail glasses,
People smoking, people drinking,
Coughing, choking, getting stinking
Some discreetly.
Boiled or fried, some completely Ossified.
Liquor spilling, trousers sopping,
Steady swilling, bodies dropping,
Glasses falling on the floor,
People calling, "Drop some more."
Bodies steaming, morals stretching,
Women screaming, freshmen retching.
Heavy smoking, air gets thicker,
Some chroaking, "No more liquor."
WHAT? WHAT? NO MORE LIQUOR . . .
People snicker, unbelieving,
No more liquor, let's be leaving.
No more drinking?
Groans and hisses, what a stinking Party this is.

* * * *

A man came home at four in the morning and found a man in the closet of his bedroom.

"Where were you until four o'clock in the morning?" screamed his wife. The husband countered, "Who is this man with you?" The wife said, "Don't change the subject!"

* * * *

He: (with hands over her eyes) If you can't guess who it is in three guesses, I'm going to kiss you.

She: Jack Frost: Davy Jones: Santa Claus.

* * * *

The newly married hostess at her first cocktail party was passing out cocktails and comments and doing her level best to make everyone feel at ease. She smiled sweetly at a middleaged guest and said, "I won't offer you a cocktail, Mr. Smith, since you are president of the Temperance League."

"No," he corrected, "I'm the president of the Anti-Vice League."

She nodded absently and said, "Oh, yes, I knew there was something I shouldn't offer you."

* * * *

Two old maids lived together and each one owned a cat which she kept shut up for fear it would go tomcatting. One of the old maids got married and after honeymooning for a few days wired the other old maid as follows:

"You can keep your cat shut up if you want to, but turn mine out."

Definitions:

Nylons: Sheer today and gone tomorrow.

Ginger Ale: A drink that tastes like your foot feels when it's gone to sleep.

Golddigger: A girl who breaks dates by going out with them.

Alcoholic rheumatism: Getting stiff in every joint.

Home: Where you can scratch any place it itches.

Mixed Company: What you are in when you think of a story you can't tell.

Fraternity pin: An increase in privilege.

Alimony: A system by which when two people make a mistake, one of them continues to pay for it.

* * * *

They told us college was the school
Where we'd acquire that wondrous tool,
Of education, which would rule
Our lives and earning power.
Some even went so far's to say,
A quest for knowledge is the only way
To receive the fullest pay
From invested brains and hours.
"A quest for knowledge,"—pretty phrase,
Coined no doubt in bygone days
When learning meant more than a maze
Of quizzes, quizzes, quizzes.
I ask you, comrade without hope,
You, groggy from no-doze and dope;
Are you "questing," when you race to cope
With these damned infernal quizzes?

Richmond Station of the Philadelphia Electric Co.

Weeks of work shrink to days as

photography weighs mountains of coal

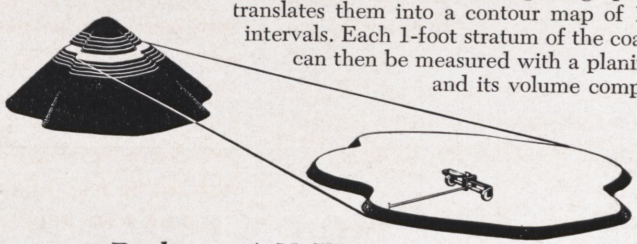
Aero Service Corporation takes stereo pictures of the coal piles at a utility's 10 storage sites—reports the fuel reserves on a single inventory date at 25% lower cost than with other methods

It used to take a surveying crew weeks to measure and figure the contents of the Philadelphia Electric Co.'s big coal piles. Now a camera and an airplane work together to cut the time to days. Overlapping pictures are taken from the air. Then with stereo plotting equipment the volume of the heap is calculated.

Streamlining the inventory job is a natural for photography. It's being used to count metal rods, automotive parts, telephone calls as well as tons of coal. But photography works for business in many other ways as well—saving time, reducing error, cutting costs, improving production.

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

Aero Service Corporation takes its stereo photographs and translates them into a contour map of 1-foot intervals. Each 1-foot stratum of the coal pile can then be measured with a planimeter and its volume computed.



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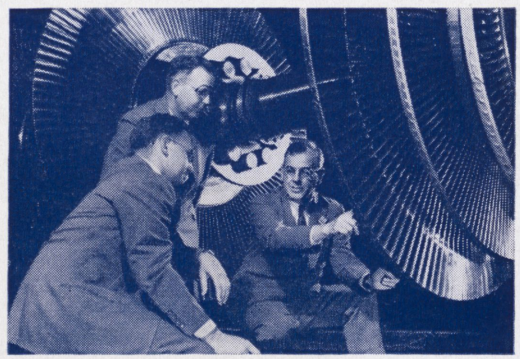

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