Rose-Hulman Institute of Technology
Rose-Hulman Scholar

Technic | Student Newspaper

Winter 12-1944

Volume 55 - Issue 5 - December, 1944

Rose Technic Staff
Rose-Hulman Institute of Technology

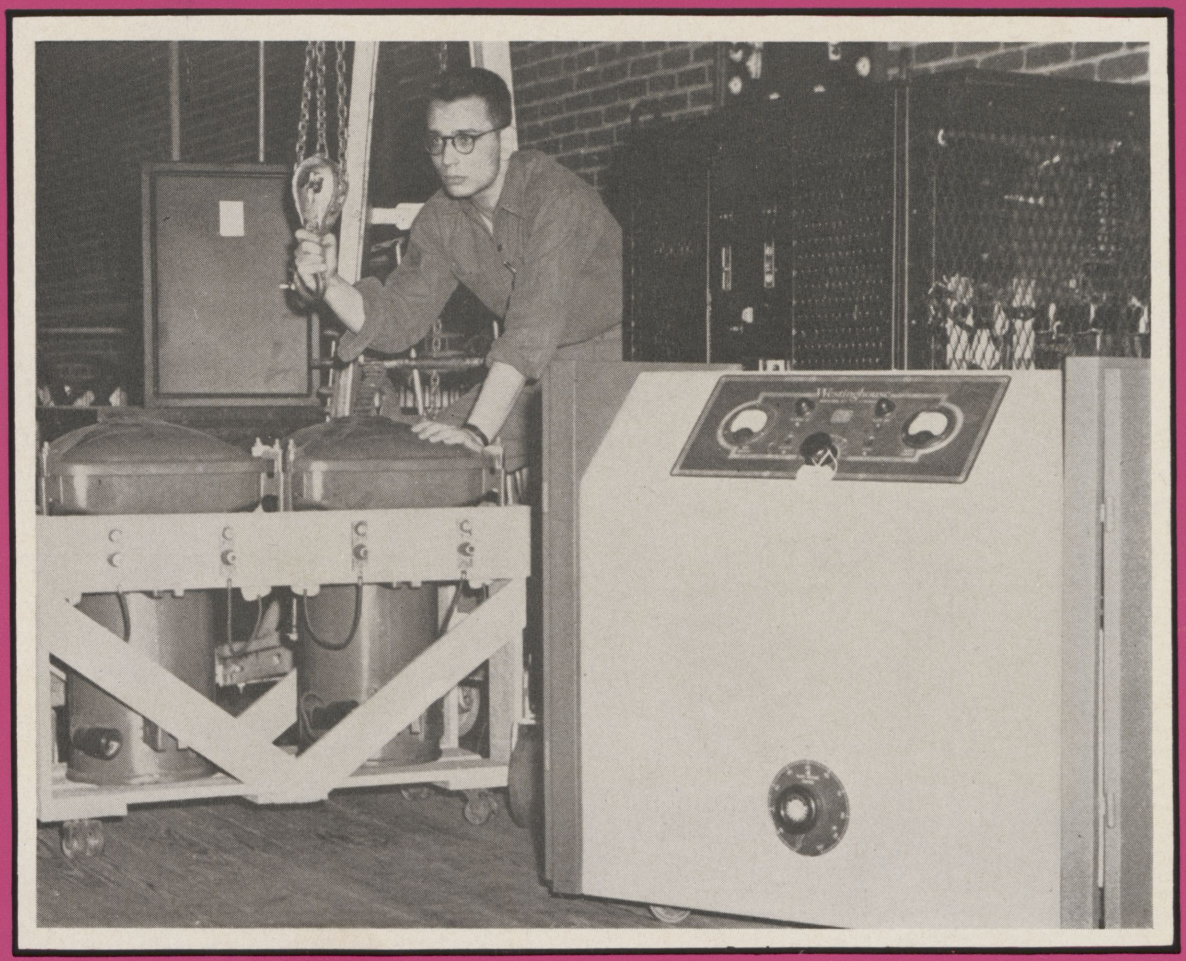
Follow this and additional works at: https://scholar.rose-hulman.edu/technic

Recommended Citation
Staff, Rose Technic, "Volume 55 - Issue 5 - December, 1944" (1944). *Technic*. 572.
https://scholar.rose-hulman.edu/technic/572

Disclaimer: Archived issues of the Rose-Hulman yearbook, which were compiled by students, may contain stereotyped, insensitive or inappropriate content, such as images, that reflected prejudicial attitudes of their day--attitudes that should not have been acceptable then, and which would be widely condemned by today's standards. Rose-Hulman is presenting the yearbooks as originally published because they are an archival record of a point in time. To remove offensive material now would, in essence, sanitize history by erasing the stereotypes and prejudices from historical record as if they never existed.

This Book is brought to you for free and open access by the Student Newspaper at Rose-Hulman Scholar. It has been accepted for inclusion in Technic by an authorized administrator of Rose-Hulman Scholar. For more information, please contact weir1@rose-hulman.edu.

ROSE TECHNIC



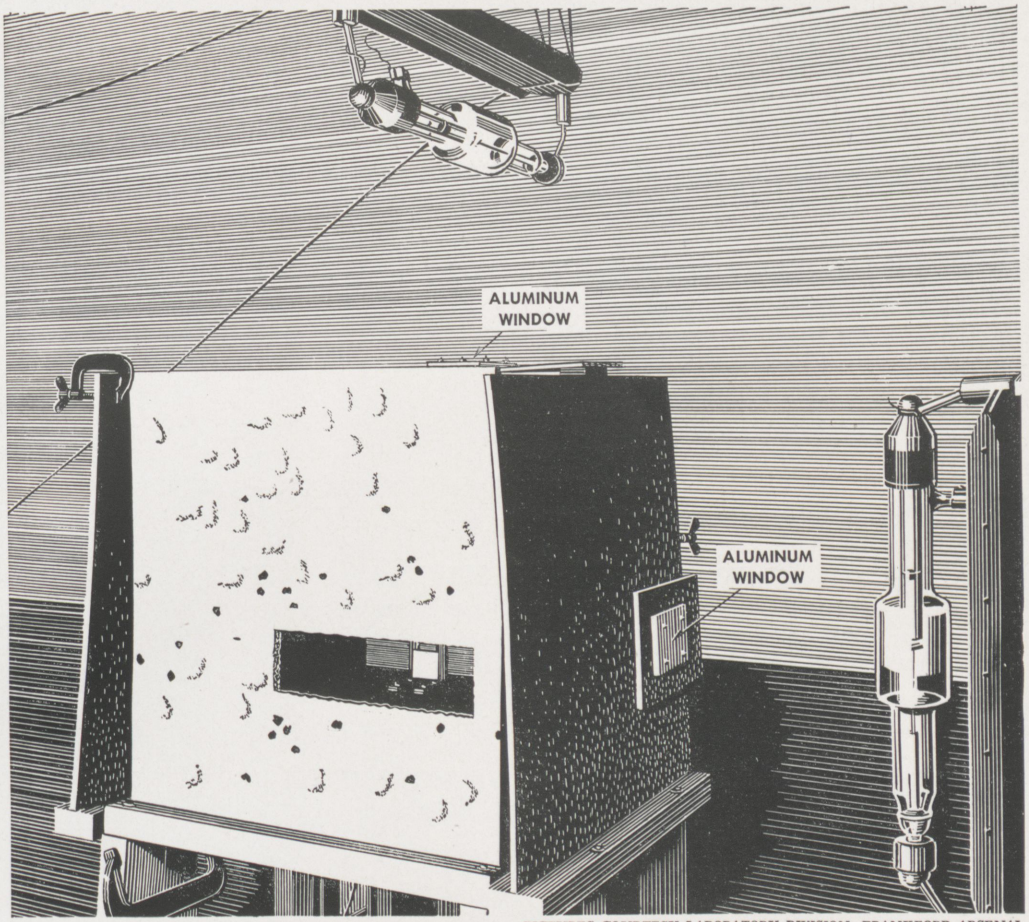
DECEMBER, 1944

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Rose Polytechnic Institute proposes to offer refresher courses for all undergraduates and recent graduates when they return from military service. For the undergraduates, the refresher courses will serve as preparation for resuming the regular program; for the graduates who went directly into service, the courses will provide a review of college work before entering industrial employment.

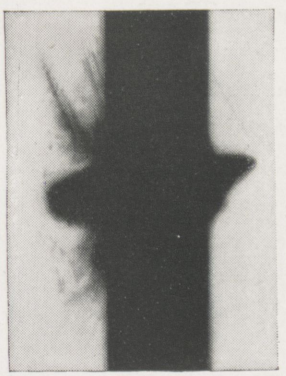
ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA



PICTURES COURTESY LABORATORY DIVISION, FRANKFORD ARSENAL

High-speed X-ray picture of cal. .30 bullet penetrating 1/2 inch thick armor



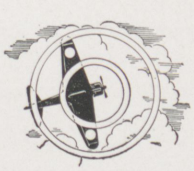
High-speed X-ray picture of same bullet 20 millionths of a second later

14,285 times quicker than a wink

KEEPING UP WITH *Electricity*

MAN-MADE HURRICANE BLOWS OUT ELECTRICITY. Engineers can now "blow out" electricity as easily as you extinguish the flame from your cigarette lighter. Circuit breakers built by Westinghouse unleash a 600-mile-an-hour blast of compressed air to snuff out powerful short-circuit arcs and prevent damage to vital electrical equipment on power lines. The hurricane of air can smother a 1,000,000-kilowatt electric arc in less than a hundredth of a second.

REPRESENTATIVES OF 257 PRE-WAR PROFESSIONS, businesses, and trades are now employed at the Westinghouse operated Naval Gun Plant at Louisville, Kentucky. Included are: former circus performers, several embalmers, a former professional hill-billy musician, and a pipe-organ builder. Despite their unusual peace-time occupations, all here have been able to learn the amazing high precision needed in making Naval guns.



A NEW GUNSIGHT LAMP that enables American gunners to aim *directly into the sun* and yet fire with deadly accuracy has been developed for the Army and Navy by Westinghouse Lamp Engineers. Former gunsight lamps allowed gunners to aim within only 15 degrees of the sun, leaving a dreaded "blind spot."

FREE . . . "Engineering Highlights of 1944"—a 32 page book, filled with interesting articles on new developments in electrical research and engineering in wartime. Write: Westinghouse Engineer (EC-124).

Westinghouse research engineers have developed an ultra-high speed X-ray tube that makes possible X-ray pictures, taken at the terrific speed of *one-millionth of a second.* These pictures show armor-piercing bullets penetrating ½ inch of solid steel armor plate.

The action is 10,000 times faster than any conventional X-ray—literally 14,285 times *quicker than a wink!*

Secret of this revolutionary X-ray is the new type tube that can handle a jolt of 2000 amperes, at 300,000 volts. This is applied in a flash by electrostatic condensers—creating a tremendous surge of *X-radiation.*

With this new X-ray, U.S. Army ballistic experts can "freeze" the image of a bullet, while it travels within a gun barrel at 2600 feet per second—or study the action of projectiles as they smash through armor plate.

When peace returns, this new example of Westinghouse *skill in research* will enable machine builders to study the strains in rapidly moving parts—improve performance and increase the life of peacetime products.

Westinghouse Electric & Manufacturing Company, Pittsburgh 30, Pennsylvania.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

TUNE IN: John Charles Thomas, *Sunday* 2:30, EWT, NBC
Ted Malone, *Mon. Wed. Fri.*, 10:15 pm, EWT, *Blue Network*

ROSE TECHNIC

VOLUME LV DECEMBER, 1944 NUMBER 5

STAFF

Fred Maienschein ..... Editor-in-Chief
Charles A. Stringfellow ..... Business Manager
John W. Murdock ..... Associate Editor
Robert Logsdon ..... Associate Editor
Robert A. Manhart ..... Contributing Editor
E. James Hegarty ..... Advertising Manager
Joseph B. Durra ..... Circulation Manager
J. Prewitt Wehle ..... Photography Editor
Charles H. Eanes ..... Staff Photographer
C. Gordon Hayes ..... Campus Editor
John R. Lee ..... Humor Editor
Howard P. Freers ..... Alumni Editor
Keith A. Sutton ..... Research & Development
Robert Bannister ..... Contributing Staff
Ted Blickwedel ..... Contributing Staff
Hal Cultice ..... Circulation Staff
Warren Haverkamp ..... Circulation Staff
Ned Koonmen ..... Circulation Staff
Lubo Chelich ..... Advertising Staff
C. Max Duggins ..... Advertising Staff
Arnold M. Hannum ..... Advertising Staff

FACULTY ADVISER
Fred Genschmer

COVER—

View of an electrical installing new electronic equipment in the Rose E.E. laboratory. See page 5 for complete description of this equipment.

—Photo by Wehle and Eanes

FRONTISPIECE—

18,000-horsepower Westinghouse motor used for producing a wind tunnel at the Seattle, Washington, aeronautical laboratories of the Boeing Aircraft Company. The behavior of planes of new design is investigated by the use of models. The workman is taking the temperature of the air stream which cools the inner parts of the huge motor when in operation.

—Courtesy Westinghouse

TABLE OF CONTENTS

ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Chairman, John W. Ramsey, Tennessee Eastman Corporation, Oak Ridge, Tennessee.

Advertising Representative, Littell-Murray-Barnhill, Inc.
101 Park Avenue, New York.
605 N. Michigan Ave., Chicago.

Arkansas Engineer
Colorado Engineer
Cornell Engineer
Illinois Technograph
Iowa Engineer
Iowa Transit
Kansas State Engineer
Marquette Engineer
Michigan Technic
Minnesota Techno-Log
Missouri Shamrock
Nebraska Blue Print
N. Y. U. Quadrangle
Ohio State Engineer
Oklahoma State Engineer
Pennsylvania Triangle
Purdue Engineer
Rose Technic
Tech Engineering News
Wayne Engineer
Wisconsin Engineer

Published Monthly except June and July by the Students and Alumni of Rose Polytechnic Institute. This publishing schedule is subject to change due to war conditions.

SUBSCRIPTION, $2.00 PER 8 ISSUES. ADDRESS ALL COMMUNICATIONS TO THE ROSE TECHNIC, TERRE HAUTE, INDIANA. ENTERED IN THE POST-OFFICE AT TERRE HAUTE AS SECOND-CLASS MATTER, AS A MONTHLY DURING THE SCHOOL YEAR, UNDER THE ACT OF MARCH 3, 1879. ACCEPTANCE FOR MAILING AT SPECIAL RATE OF POSTAGE PROVIDED FOR IN SECTION 1103, ACT OF OCTOBER 3, 1917, AUTHORIZED DECEMBER 13, 1918.

THE PLACE OF THE COLLEGE MAGAZINE IN WARTIME

To begin with, the purposes of the college magazine in wartime are essentially the same as those of peacetime. The publication may be more difficult to achieve because of lack of staff members and the quality might even suffer, but the magazine will still fulfill its purposes.

The school publication, like all other school functions, is operated primarily to aid in the training of the student. It gives excellent practical training in the problems of leadership and management that can never be secured in the classroom. The technical articles of the magazines are excellent preparation for future work for the writers and these articles, together with articles written by faculty members, contribute a good source of technical information. The management of the publication's business matters is excellent training too. Some graduates have stated that they learned more by actually handling the finances of a college magazine than from several accounting courses.

The student publication is the best uniting link in the life of the student body, especially in a situation such as we have here at Rose, where athletics and other activities have been temporarily abandoned. Through its various features, it serves as a record of student activities. On its editorial pages the various controversial matters of campus life may be discussed. The college magazine is probably the only thing that keeps the alumni in touch with the school. It also is one of the leading factors in presenting the college to the outside world and showing the layman something of college life. Another function, not to be neglected, is that of serving as an advertising medium for those who wish to reach the college student. It may seem after reading this long list of functions, that some are exaggerated and others are not even fulfilled at all, but if the situation is viewed as a whole it is easy to see that the college magazine, even under the hurried influence of wartime, has a definite place in college life.

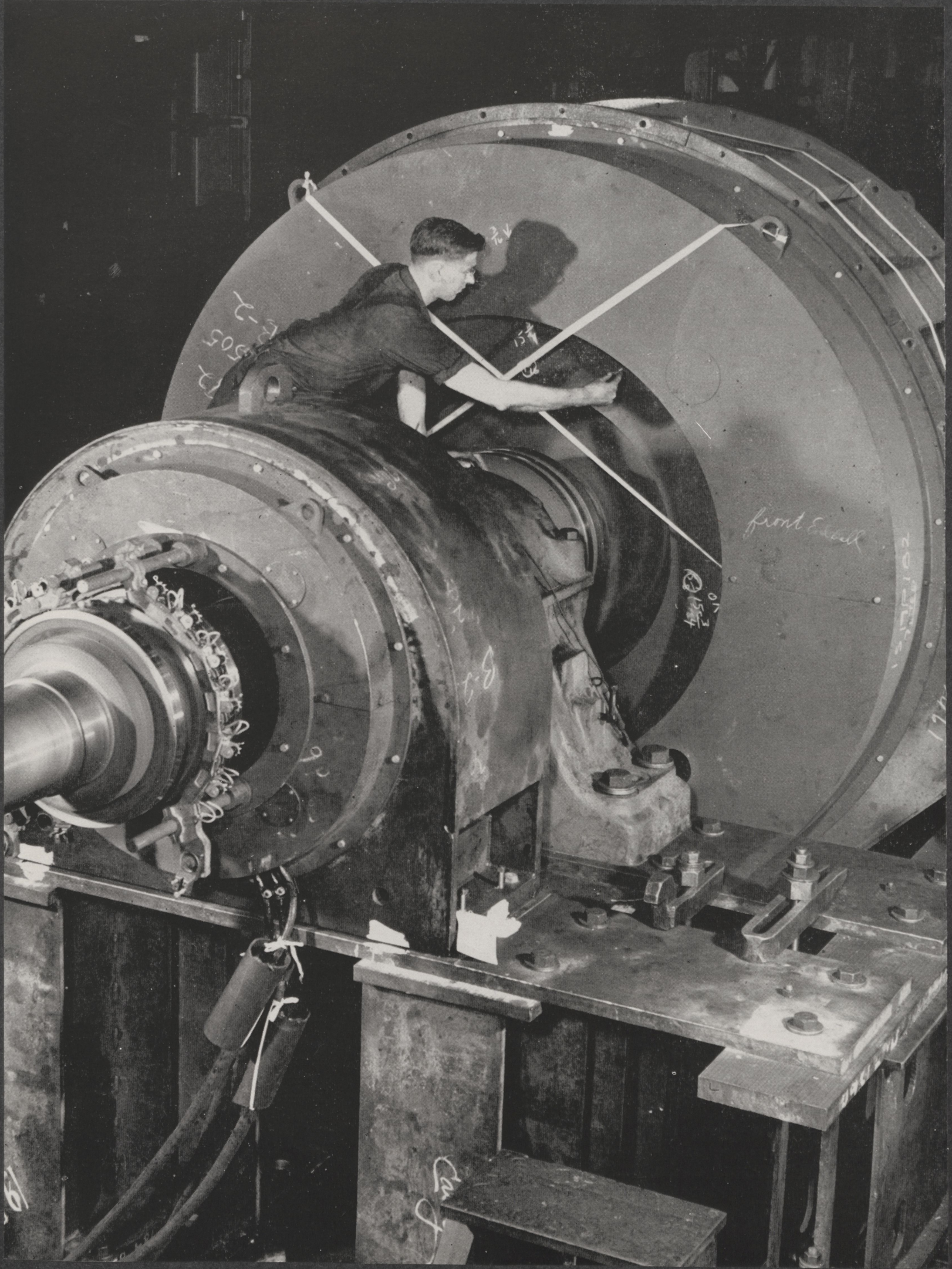
WE NEED YOUR HELP

At the opening of each new term since the beginning of the war, we have noticed an appreciable decrease in the size of the student body at Rose. The Rose Technic has felt this decline in attendance through the changes it has produced in the size and organization of the staff and through the rapidity with which most of these changes have taken place. In spite of these conditions, every attempt has been made to continue the publication of the Technic in a normal manner, although this has required a great deal of extra work on the part of everyone concerned.

As the enrollment continues to decrease, we have reached the point where, if the Technic is to go on, we must urgently request the cooperation of all of the students at Rose. The members of the staff are agreed that, if the interest and response of the students can be secured, no good reason has yet appeared for discontinuing the publication of the Technic; and that, if the Technic does continue, we will not be justified in permitting any depreciation in the quality of the material contained in the magazine.

All that is required is a few conscientious men who will take sufficient interest in their duties as staff members to lighten the work of the small number now carrying the entire burden. The student will find the experience gained in working on the Technic a worthwhile reward for the small amount of outside time required.

The Technic has always been one of the strongest ties between the students and alumni of Rose. It is also read each month by a large number of men who have been called into the service during their course at Rose and who are very much interested in the activities of their former classmates. For these reasons alone it is certainly worth a sincere effort on our part to continue publishing the Technic.


front end wall

Electronic Instruments

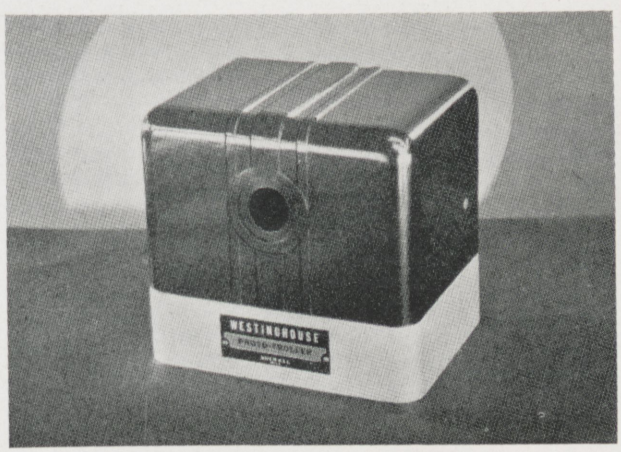
HERB. BAILEY, jr., e.e

With electronics playing a role of ever-increasing importance in modern industry, the Rose Polytechnic Institute has found it advisable to expand its Industrial Electronics Department. Through the kind cooperation of one of our alumni and the Westinghouse Electric and Manufacturing Company, the Institute has recently received a large amount of the latest industrial electronic equipment. Mr. Bailey explains the operation and importance of some of this new apparatus.

Since the invention of the vacuum tube, electronics has become one of the most important fields of electrical engineering. Rose with the help of Westinghouse and Mr. Oscar Bauer has kept up with the most recent developments.

Westinghouse has made up a laboratory course in which the construction and operation of industrial electronic equipment is studied. Industrial electronic equipment does not include the field of communication. Westinghouse manufactured a limited number of sets of this equipment to be sold at a great reduction in price. Rose was chosen as one of the schools to be offered this equipment. The money for the equipment was given by Oscar Bauer, Rose, '87.

The electronic equipment was selected to give a representative cross system of the ways the industrial electrical engineer has put electronics to work. Beginning with a group of basic and typical tubes, the experiments proceed to the more involved equipment. Each experiment is divided into three parts: (1) general description and its applications; of the equipment (2) the principles upon which the apparatus depends; (3) detailed instructions for performance of the experiment.



Cut Courtesy Westinghouse

Photo-troller

Industrial Electronic Tubes

The one part common to every electronic equipment is the tube. The tube that distinguishes an is the basic element electronic device from any other electrical mechanism. The number of different tubes is large, but the basic types are few. The tubes described are representative of their respective types.

Cut Courtesy Westinghouse

Complete Precipitron Assembly.

The Precipitron

The precipitron is a device for removing, by electrostatic means, solid or liquid particles such as dust, smoke, soot, pollen or oil mist from ventilating air. In the precipitron particles are removed by first giving them an electrostatic charge and then attracting them to metal plates. As a result, the filtering action is virtually independent of the particle size. This gives the precipitron an outstanding advantage over the mechanical filters, which depend on sieve action or particle inertia for removal of solids from gases. It is effective in removing particles so small that they never settle out by gravity alone. These include solids as small as cigarette smoke, the dimensions of which are small fractions of a micron.

The air cleaning action of the precipitron is shown in the sketch. The air or gas to be rid of solids enters the ionizing zone of the precipitron cell. Here an ionizing d-c potential of about 13,000 volts is maintained between two grounded-rod negative terminals and a single positive centrally-located wire. Particles passing through the electrostatic field thus established receive a positive charge, and in this condition are swept on with the conveying air into the collection zone. The collector consists of many metal plates disposed edgewise to the air flow. Alternate plates are charged

positive and negative, at about 6000 volts. The positively charged particles are repelled by the positive plates and are attracted by the negative plates, and are thus drawn out of the air stream. The particles collect on the negative plates where they give up their charge but continue to be held thereon by friction, by molecular forces or by an oil film that may have been given the plates —depending on the size and kind of particles in the particular application.

Normally the precipitron is built into the ducts of an air conditioning system in which the air is circulated by a blower. Individual units can handle up to 350,000 cubic feet per minute.

The Ignitron Rectifier

The Ignitron rectifier is an improved type of mercury-arc rectifier, in which the starting of each conduction cycle of the arc is controlled by an ignitor. This principle of arc control was first introduced in 1932 and makes possible a rectifier construction that is relatively free from arc backs and has a low arc drop as compared with the multi-anode-tank type of mercury-arc rectifier. Because the Ignitron has a high order of efficiency, quietness, and reliability and has no moving parts, it is now used extensively wherever d-c power in the 250 to 900-volt range is required. The Ignitron is supplying almost all of the d-c power used in the electrolytic production of aluminum and magnesium. It is supplanting rotating machines in coal mines, in railway service, in factories, and in the electrochemical industry in general. It has been used to supply auxiliary power for tandem-mill drives in the industry.

Cut Courtesy Westinghouse

Industrial radio-frequency generator.

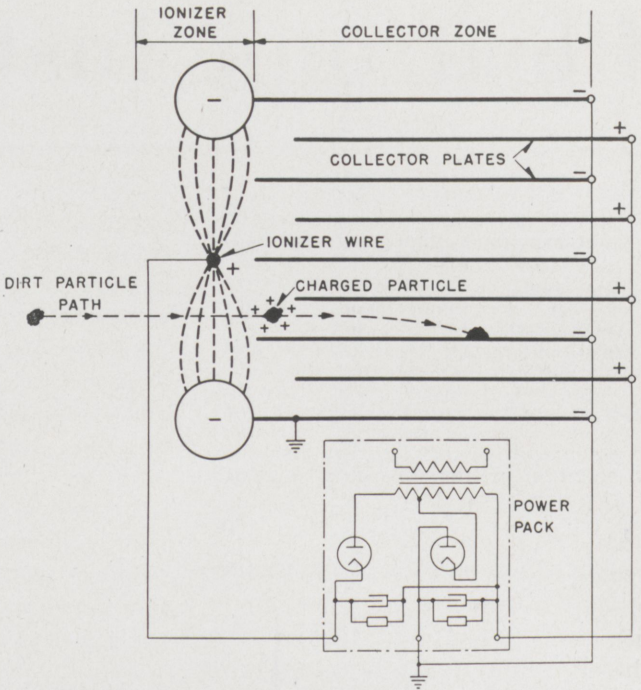
General Purpose Timer

Many operations require that a definite time be interposed between two steps in the process. Also, it is often desired that this same time delay be repeated with each operation of the initiating switch for the same dial setting of the timing device used. Such timing operations can be controlled electronically, using a device such as the General Purpose Timer, Type HA. This timer can be adjusted in a large number of steps to provide time intervals between 1/10 and 45 seconds.

Among the many applications for these timers are the timing of:

Spot-welder current
Heat treatment of steel
X--ray exposures
Photographic exposures
Photoprinting
Motor acceleration
Scale removing spray for rolling mills
Spray for coal cars
Starting flying shear operation
Process sequences
Sequence motor starting

The Type HA Electronic Timer is recommended when it is desired that an electric circuit be maintained open or closed for a preset period immediately following the momentary closure of an initiating push button contact or any type of pilot contact. The unit then resets to normal after timing-out and does not repeat until the initiating contact is again momentarily closed. A time interval of at least 1/2 second is required between the end of the timing period and the next initiation of the circuit.



Cut Courtesy Westinghouse

Simplified sketch illustrating the principle of the precipitron.

Light-Sensitive Electronic Control

The Photo-Troller, type RQ is a low-cost photoelectric control relay —often referred to as an "electric eye". Its function is to close or open an electric circuit when a light beam is either applied to or removed from the light-sensitive element or phototube. When a beam of light strikes the phototube, a sensitive thyratron tube, ceases to carry current, thereby de-energizing a small multipole-control relay. The contacts of this relay close or open the circuit to an externally mounted device such as a counter or signaling light.

Only a few of the possible applications of the Photo-Troller are listed as follows:

1 As a limit switch or "flag" switch.

a In paper or rubber mills to indicate break in paper or rub-

(*Continued on Page* 24)

Developments In Aviation

By ROBERT BANNISTER, Freshman

This discussion of recent aircraft equipment improvement by Mr. Bannister covers not only the recent developments in the spectacular fields of jet propulsion and rocket-assisted takeoffs but also less publized fields such as power generation, control, and communications.

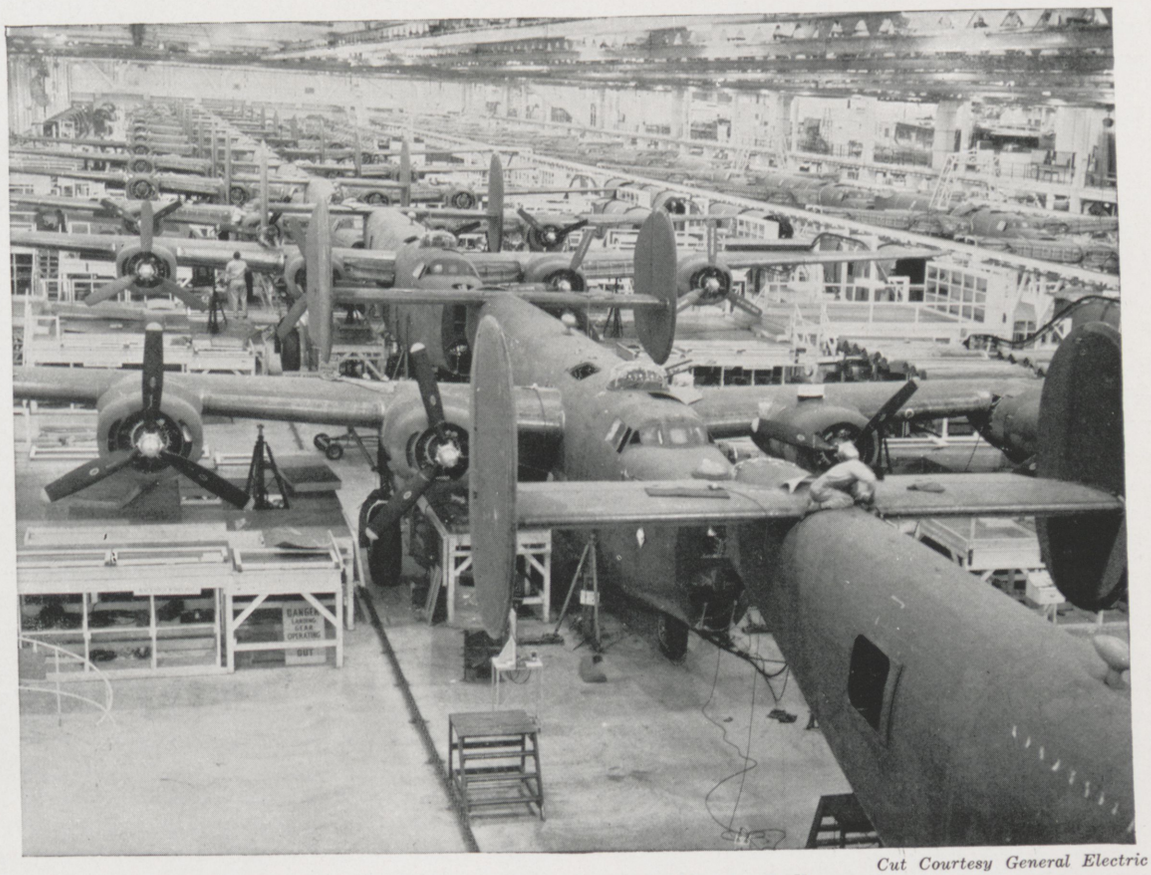
Although wartime secrecy has shrouded the details of recent advances in aviation, the fundamental principles of many new devices have been outlined publicly. As the result of wartime research, important modifications have been introduced into the precision of control, automatic operation, fire power, range, altitude, and speed of America's aircraft.

Particular interest has centered lately on the development of jet propulsion. News reports have indicated that the first large-scale applications of jet propulsion to aircraft were made in Germany, but allied scientists have not been far behind. The results of initial allied experiments, which took place in England, guided workers in this country in the production of a modified American plane. The first successful American flight of a jet propelled plane took place in October, 1942. In both Britain and America jet propelled planes are now getting into full production.

Additional work in this field has enabled the navy to adopt rocket propulsion as auxiliary power for airplane take-offs. The rocket tubes supply enough power to reduce take-off runs up to 60%. Once in the air, the plane jettisons its burned-out rocket tubes and continues on normal engine power. The use of rocket propulsion not only makes possible the use of smaller airstrips, but also permits the carrying of heavier loads.

Another development of widespread importance was the improvement in design of turbosuperchargers as used on Flying Fortresses, Liberators, and Thunderbolts. The superchargers have been given greater speed and capacity, improved cooling and lubrication systems, and reduced weight. The use of new and stronger alloys has permitted utilization of increased exhaust-gas temperature. These improvements have all tended to increase the ceiling of the planes. At the same time the cockpit controls of turbosupercharged combat aircraft have been simplified by the introduction of a single lever to coordinate all the mechanism.

Other improvements have continued the recent trend toward simplification of controls. A new electro-hydraulic automatic pilot system maintains the course set by the pilot and relieves him of the physical duty of controlling the flight. Any pitch, roll, or yaw of the airplane causes an electrical signal from instruments associated with the gyroscopic controls. The plane is then brought back to its correct altitude and course by hydraulic power actuated by the amplified electrical impulse. The gyroscopic controls and direction indicators for this system are driven electrically rather than by air pressure as in previous types. The performance of air-driven types had been subject to



Cut Courtesy General Electric

The B-24 (Liberator(assembly line in Dallas.

variation due to altitude, air density, and temperature changes, while the electric rotor operates consistently even under adverse low-temperature conditions. Moreover, the sealed construction of motor and gimbals keeps out dust and minimizes moisture condensation.

An improved wide-range altitude indicator now gives sensitive readings at both low and high altitudes. This is accomplished by the use of a two-range switch mechanism which alters its electrical sensitivity and simultaneously changes the numbers on the scale. Another device placed in production was a new ratio-type pressure indicator used in conjunction with a new resistance-type temperature bulb or detector. In place of the usual moving element carrying two coils of fine wire and actuated by the field of a fixed permanent magnet, the new instrument has the permanent magnet mounted on a shaft and the two coils stationary. This design produces much higher torque and eliminates elecical connections to the moving part, with a consequent increase in reliability and sturdiness. The device is used in measuring temperature and pressure of lubricating oil and effective pressure of fuel.

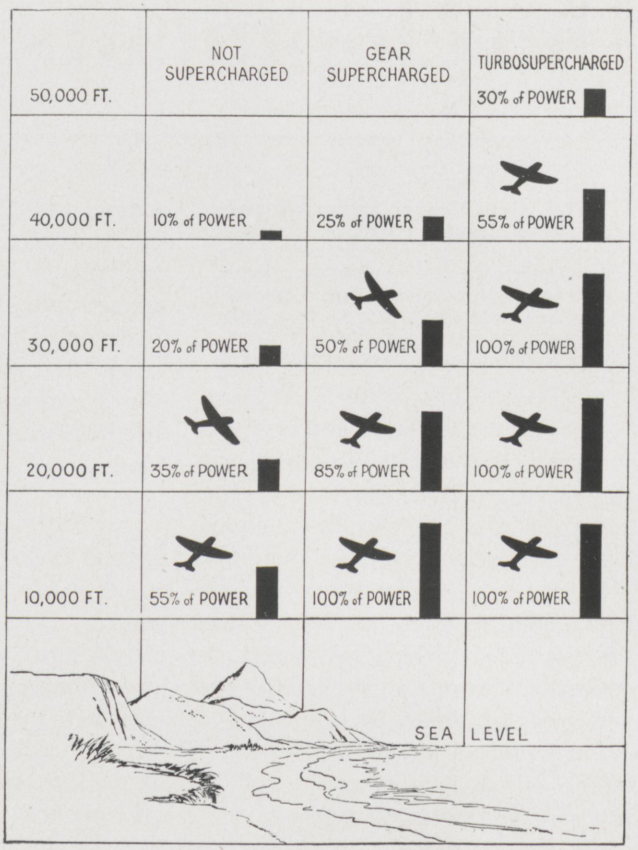
Electrical Systems

Particular emphasis has been placed in today's aircraft upon the co-ordinated design of electrical systems to provide for the complete functioning of all devices as part of a common control system. In view of the great complexity of aircraft applications and the amount of power involved, stable and safe generating systems must be further assured by the proper application of loads and control devices.

One such control device is a d-c reverse-current air circuit breaker weighing only 20 oz. When an electric fault occurs in the generator or generator circuit, the breaker trips instantaneously, interrupting the current and disconnecting the faulted circuit. The remaining generators and battery continue to operate.

Much work recently has been centered on new devices for a-c generating systems. New a-c generators of large capacity, weighing only two pounds per kilowatt, were developed. Standby d-c power in a-c powered planes was provided for in a novel rectifying unit capable of holding a constant d-c voltage (30 volts) within close limits throughout a wide range of a-c voltages and frequencies. The rectifier consists of a transformer with a saturable-coil winding, a dry-plate selenium rectifier, and an automatic regulator.

A combination a-c /d-c aircraft generator was also developed, the d-c generator and a-c inductor-alternator being combined in one frame with rotors mounted on the same shaft. It is mounted on an aircraft engine and operates at 4,400 to 10,000 r.p.m. Though possessing a large power capacity, the complete unit weighs only 47 pounds. Another generator is a 30 kilowatt aircraft-type alternator with a built-in d-c exciter. This unit weighs only about 80 pounds.



Cut Courtesy General Electric

Increased ceilings for aircraft as a result of supercharging.

Thousands of aircraft motors, amplidynes, dynamos, alternators, and generators were supplied both for armature operation and for actuating parts of the plane. One special type developed was a master synchronizer motor consisting of a speed-regulated amplidyne motor with controls and relays, which is being used to synchronize the speeds of large airplane motors.

Power-Operated Turrets

With ever-increasing airplane speeds and demands for heavier defensive armament for bombers, power-operated gun turrets have become a virtual necessity. For this reason aircraft and electrical equipment manufacturers, working with the Army air Forces, developed an amplidyne drive and control system suited to the needs of gun turrets. Since 1940 tremendous quantities of complete turret drive and control equipment have been included in army planes. Similar drive and control equipment has been utilized in the turrets of U. S. Navy planes. With the advent of the large new super-bombers have come radically new all-electric armament systems, consisting of a multiplicity of turrets.

The satisfaction of wartime needs has also brought improvements in the mechanical operation of other parts of the plane and extended the list of mechanically-controlled devices. Throttles, regulating devices, and flaps of very large airplanes are now positioned remotely by motors, while a small pilot controller in the cockpit regulates the motors. The systems function with great accuracy and are independent of the distances between cockpit and control ele-

ment. Dependable control is thus achieved in places where manually-operated cables would be impractical or totally unsatisfactory.

Another improvement is the use of "ball bearing screw jack" in a motor unit operating landing gears and flaps and other control surfaces. The very high efficiency at high and low temperatures, approximately 90%, permits a much smaller motor to be used.

An ingenious torque-limiting device was introduced into the gear train furnished with drives for motor-operated mechanisms such as landing gears and landing flaps. The device automatically shuts off the motor and disconnects it from the load in event of serious overload on the system. This prevents undue stress in the framework of the airplane or serious demage to the framework or landing mechanism if the system jams or limit switches fail to function.

Communications

Some time ago 10- and 28-volt versions of a liason transmitter designed specifically for the Signal Corps were developed. Recently these were installed in large quantities in the army's medium and heavy bombers, and also were used in mobile ground equipment and as portable infantry stations. Continuous-wave telegraph, voice, and modulated continuous-wave transmissions can be made throughout a continuous frequency range through the use of plug-in tuning units. Great flexibility of installation is possible through the provision for tuning a variety of antennas.

Another advance in communications was made possible by the development of a new type of sound recorder which can record 66 minutes of continuous speech. The observer's words are recorded magnetically on steel wire which is only .004 inches in diameter. The machine uses about 11,500 feet of this wire, which is wound on a spool no larger than a doughnut. When there is no further use for a recording, the speech can be "wiped off" magnetically and the wire can be used for other recordings. One hundred thousand recordings have failed to alter its quality in any respect.

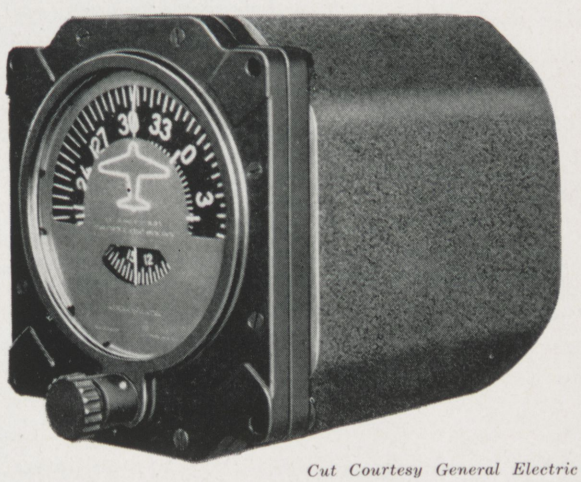
Cut Courtesy General Electric

Demonstration of magnetic wire recorders.

Aviation Production

Some of the most significant recent advances in aviation have been made in the solution of design, testing, and production problems. Without the successful solution of these problems our huge aviation production goals could not have been met.

One difficult problem involved the finding of adequate substitutes for materials in great demand because of the war. The use of plastics and light metals alleviated this to some extent. Other difficulties were imposed by the development of a concerted mass-production assembly system and the need for expansion. Additional changes in machine design are constantly required as new equipment is developed. The successful accommodation of our aviation industry to such new situations as these has made possible the production of safer and faster planes with much greater efficiency than before the war.



Cut Courtesy General Electric

Electrically driven Directional Gyroscope Indicator.

New Gunsight Lamp Developed for Army and Navy

A new gunsight lamp that enables American gunners to aim directly into the sun and yet to fire with deadly accuracy has been developed for the Army and Navy by lamp engineers of the Westinghouse Electric and Manufacturing Company.

Protecting airmen against enemy planes which dive out of the sun to attack, the miniature lamp of unique design is already being produced for all types of optical gunsights as well as for torpedo directors.

"Present gunsights, first used in this war, allow gunners to aim within only about 15 degrees of the sun, thus leaving a dreaded 'blind spot'," explained J. H. Kurlander, Westinghouse engineer who developed the new lamp. "If the gunner aims more directly into the sun, he is unable to see his sight lines and has to fire almost blindly. With this new lamp illuminating his gunsight, the sight lines or 'reticle' will be visible even against a glaring sun, and it will no longer be necessary to use a dark filter which tends to obscure the target."

This new gunsight lamp also makes possible greater shooting accuracy. No longer must the gunner "glue" his eye to an eyepiece in order to draw a deadly bead on his target. Now his head can move an inch or two without impairing his aim.

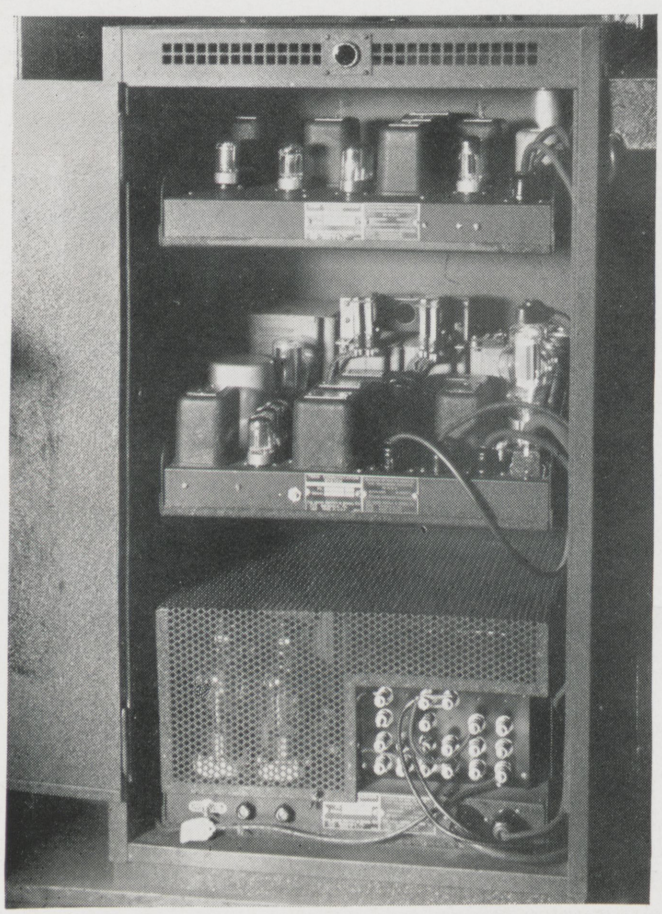
Train Communication On The

Mr. Manhart discusses here a system of railway communication now being installed on the Pennsylvania Railroad. This method has already been tested in a small-scale, experimental installation on a portion of that railroad and has been found to save much time and increase efficiency of railroad operation.

A long felt need for a means of communication between railroad trains, whether moving or standing, and between railroad trains and wayside stations is believed to have been met by the communication system now being installed on the main line of the Pennsylvania Railroad.

This installation is to be a two-way carrier current telephone system. The system has been in trial use on the Belvidere-Delaware branch of the Pennsylvania Railroad since June, 1942. There, it is used over a length of track extending approximately 67 miles north from Trenton, New Jersey, to Phillipsburg, New Jersey. To date, ten locomotives, ten cabooses, and two wayside stations have been equipped. The new installation is being made on two main line four-track divisions, between Harrisburg, Pennsylvania and Pittsburgh, Pennsylvania, a distance of approximately 245 miles. Approximately 300 passenger and freight locomotives, 90 cabooses, and 6 wayside towers are to be equipped. The cost is expected to exceed $1,000,000.

Ever since railroad trains first came into existence, attempts have been made to provide two-way communication with them. Until the discovery of radio, no practical means had been found. As soon as radio was discovered, attemps were made to adapt it to this use. At present, the Baltimore and Ohio, the Denver and Rio Grande, and several other railroads are experimenting with extremely high frequency radio. The Pennsylvania Railroad has experimented with radio, but they have decided the carrier current system is better. There are several difficulties with using radio. In the first place, the radio spectrum is extremely crowded, with no room for any new services without causing additional interference. Until just recently, nature also presented an obstacle in atmospheric static, but the recent development of frequency modulation has practically eliminated that. The one other difficulty is government regulation of the radio spectrum. In using radio, the railroad may not do as it pleases.



Cuts Courtesy Railway Signaling

Train telephone wayside equipment cabinet installed in the station at Frenchtown, N. J.

The Pennsylvania's system was developed for it by the Union Switch and Signal Company and the General Electric Company. The system is similar to one used for some years over existing commercial power transmission lines between generating plants. In this system a voice telephone signal is used to modulate a radio frequency carrier much the same as in radio broadcasting. The difference between radio and carrier current is that the carrier current transmitter output is not fed to an antenna to be radiated, but instead is fed by induction into some form of transmission line, which carries the radio signal to the receiver. The receiver resembles an ordinary broadcast radio receiver with the exception that its input comes from an inductive coupling with the transmission line instead of from an antenna. If the transmission line is properly built, no radiation will occur, and the radio signal will be confined entirely to the line and anything coupled to it. Thus, carrier current communication is not subject to government regulation. Also, it is comparatively private, because, unlike radio, where anyone may listen to a particular signal by tuning his receiver to its frequency, in the carrier current system, only receivers coupled to the transmission line may listen to the communication. The Pennsylvania Railroad uses a carrier frequency of 5700 cycles per second. Frequency modulation is used to overcome interference from natural static and interference caused by switch machines, motors, wayside equipment, and other electrical machinery used

Pennsylvania Railroad

By ROBERT MANHART, sr., e.e.

Cuts Courtesy Railway Signaling

he bar of metal shown before the sylinder is an end of receiving coil. The equipment box may be seen above the cylinder.

on the railroad and in the yards. The transmission line is between the rails and telephone and telegraph lines parallel to them, and the ground. The Belvidere-Delaware branch of the Pennsylvania has no automatic block signals, and thus the track rails were not bonded. When the carrier current system was installed, it was found desirable for the most satisfactory operation to install bond wires across every rail joint and resistance shunts across every insulated joint.

The two pickup coils on the engines are located between the leading wheels and the front drivers, about four inches above each rail. On the caboose, these coils are located between the trucks, about four inches above each rail. The electronic equipment is placed in a weatherproof box on the outside of the engine, on the running board. In the caboose, the electronic equipment and necessary batteries are placed under one of the seats. Power for operating the locomotive equipment is provided by the headlight generator. Batteries are used to supply power for the caboose equipment, and commercial power for way-side station equipment. The power required is about 150 watts for receiving, and a maximum of about 550 watts for signalting. Ordinary French type cradle handsets are used for conversation. When the telephone is to be used, a calling signal is first sent out by meansof a push button on the control panel, which causes an audible signal to sound in loud speakers of receiving sets at the wayside stations and on locomotives and cabooses within the radius of operation. The person calling then broadcasts the name of the station or the locomotive number of the train being called, and whether locomotive or caboose is wanted, until a response is received and telephone communication is established. The telephone conversation between two units is not simultaneously transmitted through loud speakers of other units within the radius of operation, any one of which can break into the conversation by the calling signal and voice broadcast, should the necessity arise. The receivers are ordinarily kept on in the receiving position, as long as the train is in the carrier current district. The loud speakers are used only for signaling. When conversation is desired, lifting the handset off its hook connects it to the receiver and disconnects the loud speaker. The range of communication between the locomotives and caboose of one train with those of another has been kept to within relatively short distances. Good transmission is provided between trains for distances up to about four

(*Continued on Page* 22)

Cuts Courtesy Railway Signaling

Engineman using the train telephone to talk with his conductor at rear of train.

Research and Development

Edited by KEITH SUTTON, freshman

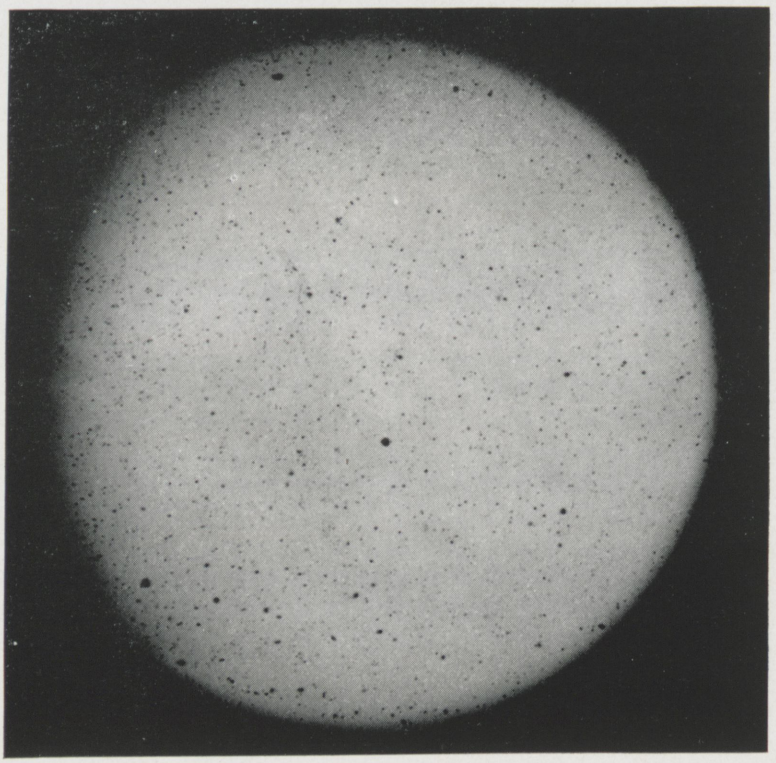
Spray Analyzer May Help Carburetor Study

A new electric spark photographic device for snapping split-second portraits of liquid spray has recently been disclosed as a possible aid in squeezing more automobile miles out of each gallon of gasoline.

The spray analyzer, developed by Samuel Gilman, 30 year old research engineer at the Westinghouse Research Laboratories, has been used by other engineers to study liquid sprays inside carburetors, Diesel engine fuel injecto systems, milk evaporators, and similar machinery. Automotive engineers will be able to determine the exact size of gasoline drops in the carburetor and find out whether the spray is uniformly distributed. Now automobile carburetors giving more miles per gallon may result.

By means of a high-intensity flash from a 5500 volt spark gap, pictures are taken in ten-millionths of a second, for the water drops studied are so tiny that ordinary exposures cannot be used. The tiny particles cut off the light passing from the electrical spark to the camera and are recorded on the photographic plate. These prints are enlarged 65 times by throwing their images upon a ruled screen where they can be measured easily.

Before clear pictures were obtained the lens action of the particles had to be counteracted by putting a condensing lens between the spray and the spark gap. This lens concentrates the light on the lens of the camera and keeps the light away from all the droplets except those directly in the concentrated beam. The drops still act as lenses, but the light they transmit is so feeble in comparison to the condensed beam from the spark gap that they appear black against it.



Cut Courtesy Westinghouse

Portrait of water drops taken with new spray analyzer.

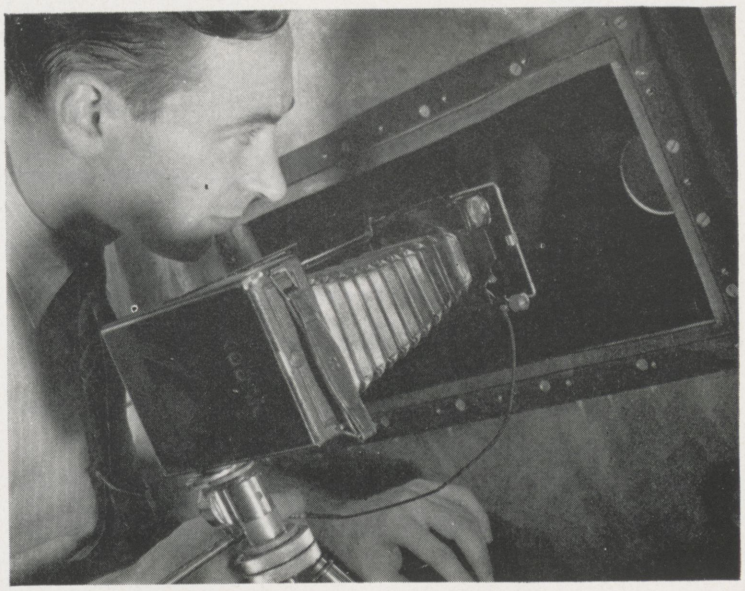
Temperature-Resistant Silicone Rubber is Announced

Silicone rubber, a new material which retains its elastic properties at temperatures as low as 60 degrees below zero F. or as high as 575 degrees, has been developed in the General Electric Research Laboratory. It has many important war uses. One is in the turbosuperchargers on the B-29 superfortresses making regular bombing missions over Japan; another is in searchlights for the Navy.

For a number of years chemists have been studying the curious chemical compounds known as "silicones," of which an important constituent is the element silicon, present in such common things as sand and glass. Chemically speaking, silicon is a close relative of carbon, upon which the vast family of organic compounds is based. Both elements can form long, chain-like molecules called polymers. Organic polymers, such as rubber (either natural or synthetic) have as a backbone a string of carbon atoms which are joined directly to each other by primary valence forces. Silicone rubber is also a polymer. Its backbone consists of a series of units each consisting of a silicon and oxygen atom linked together. On the side, attached to the atoms of silicon, are groups of hydrogen and carbon, called hycarbons. In these silicone polymers, where the carbon atoms in the backbone are replaced by the silicon-oxygen likages, the thermal stability is greatly improved in most cases.

Silicone rubber is the latest in a series of these materials which have been developed in the General Electric laboratory.

Developed entirely apart from the vast governmental synthetic rubber program, silicone rubber is now being manufactured in a pilot plant in the General Electric Company's



Cut Courtesy Westinghouse

Research engineer snapping portraits with new spray analyzer.

Resin and Insulation Materials division. While government synthetic rubber is being made by tons, present silicone rubber output is measured in pounds, all of it going into high-priority war jobs.

One of the most important of these is a gasket for the turbosuperchargers in B-29 bombers. In this device, a turbine drives the supercharger which compresses the thin air at great altitudes and feeds it to the engines at sea level density. Gases from the exhaust, at a temperature well above a thousand degrees, are used to drive the turbine, which is thus subjected to high temperatures even though the air outside may be very cold when the plane is flying through the sub-stratosphere.

The compressor casing of the turbosupercharger is stamped from sheet steel and a gasket is needed to seal the cover plate over an opening about a foot in diameter. Natural ruber will not provide for a protracted period of time the required resiliency over the temperature range encountered in this application. One synthetic ruber was tried but became hard and brittle after a hundred hours operation at 300 degrees F. In contrast, a gasket of silicone rubber, even after operating continuously for 150 hours, is still soft and can be used over again satisfactorily. This is due to lack of "compression set" at high temperatures. Silicone rubber can be compressed between metal plates to two-thirds its original thickness, held that way for several hours at 300 degrees, and, when released, it returns to 90 per cent of its former dimensions.

Navy searchlights are another important application. Used to control the fire of guns at night they must be as close as possible to the battery, which subjects them to severe jarring every time a gun is fired. To prevent breakage, the front glass has to be mounted with some sort of shock absorber, and the high temperature of the electric arc inside requires that it resist heat.

Formerly asbestos had to be used, since it has the heat resistance, even though it lacks resiliency, a necessary property of the shock mounting to prevent breakage of the glass during gun blast. Any rubber would be satisfactory as far as this requirement is concerned, but only silicone rubber combines the desired resiliency with heat resistance.

It has also been used in 12-inch signalling searchlights for the Navy. Official specifications for the gasket material to mount the front door glass and the reflector state that "it shall be adequately pliable and of sufficient thickness to provide necessary cushioning effect; it shall not absorb moisture; it shall be able to withstand temperature variations from -40° C. to 170° C. without charring or volatilizing; it shall not separate, shrink or become hard and brittle in service; it shall be capable of retaining its shape in service." Thus far, silicone rubber is the only material submitted that meets those specifications.

The raw materials from which it is made are easily available, and silicone rubber can be prepared in a wide variety of physical properties. Some types are quite soft, while others are hard. In its present state of development it is not suitable for tires and other uses where high tensile strength is required.

A by-product of the research in silicone rubber is a curious material referred to as "bouncing putty." It looks and feels like putty and can be pulled and kneaded in the same way. Yet when rolled into a ball and dropped on a hard surface it bounces like rubber. A putty ball would just flatten out without bouncing at all.

Cut Courtesy Westinghouse

CENTER SPREAD

"Ray Guns" for War Research

AT LEFT:

These electronic "ray guns" are 300,000 volt X-ray tubes which are to be used by the Army to make X-ray pictures of bullets as they crash through steel armor plate. Inside the tubes, a withering fire of tiny electrons produces a tremendous surge of X-radiation that will make a picture in a millionth of a second. The ultra high-speed X-ray machines, first developed in Westinghouse research laboratories, aid military ballistic experts to study the action of bullets in flight; in industry the machines make possible the study of rapidly moving machine parts. L. F. Ehrke, Westinghouse research engineer, is shown examining an unfinished tube.

AT RIGHT:

Glass Test Apparatus

Research is seldom wasted. This research set-up determines by heat and cold what type paper serves best as insulating layers in electrical condensers. To prepare for this test, a glass blower in the Westinghouse Research laboratories worked for two weeks sealing 16 tiny condensers in glass vacuum tubes strong enough to withstand temperature extremes ranging from 300 degrees below zero Fahrenheit to 250 degrees above. The extreme cold was produced by liquid air and the heat was caused by a burner. Electrical instruments recorded the efficiency of the various kinds of paper used as separators in the condensers.

Campus Survey

By GORDON HAYES, Freshman

Bonfire

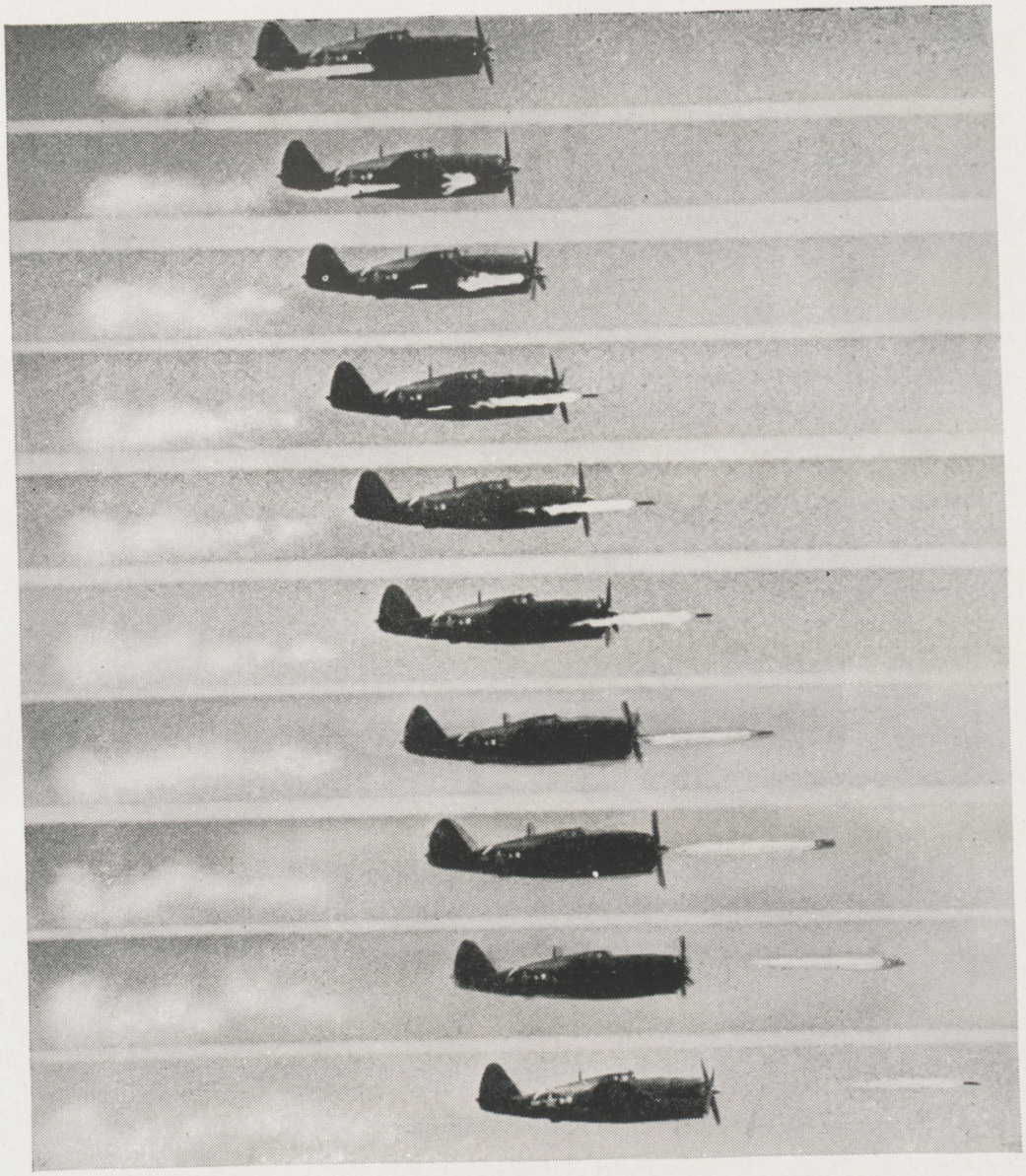
On November 4, 1944, the annual Rose Polytechnic bonfire was burned. The freshman class, who had worked hard to have a good bonfire for the occasion, touched it off at eight o'clock. Because of the war and prevailing conditions there was no homecoming held at school this year. Since there was no homecoming dance the sophomore class held a dance in the Rose gym following the bonfire for the students and faculty. The dance committee under the chairmanship of Pete Lee converted the gym into a ballroom for the evening. The music was furnished for the dancing by a nickelodian. The gym was decorated to resemble an outside dance pavillion with a white lattice work fence around it to give the proper effect. The Student Council provided refreshments for those at the dance. The Army AST RP students at Rose and the faculty were the guests of the students at the bonfire. Rev. and Mrs. Brown and Mr. and Mrs. Eanes acted as chaperons for the evening.

Liberation

On Wednesday, November 22, the July freshmen at Rose Poly were formally given the privileges of upperclassmen. At twelve noon the freshmen were assembled on the campus awaiting the upperclassmen. As soon as they appeared action began between the groups of students. Within ten or fifteen minutes all of the freshmen and most of the upperclassmen had been dispossessed of their trousers. The freshmen, who slightly outnumbered the upperclassmen, did a reasonably good job of collecting apparel from the latter, and after about thirty minutes of this struggle, everyone beginning to get chilly, both classes withdrew to the building to outfit themselves for their afternoon classes. The freshmen had been well liberated and immediately began enjoying the privileges of upperclassmen.

Thanksgiving Dance

The annual Rose Tech Thanksgiving Dance was held on the evening of Wednesday, November 22, 1944, at the Indiana State Student Union Building ballroom from nine until twelve o'clock. Leo Baxter and his orchestra furnished a very fine dance program for the evening. The dance was a closed affair given for the students and faculty of Rose Poly. The dance, which was planned and given by the Student Council, proved to be an enjoyable evening's entertainment for all those who attended. Almost the entire student body turned out for the occasion and everyone there had a very pleasant and enjoyable evening. We were very glad to have Miss Gilbert and Prof. and Mrs. Knight, who acted as chaperons for the evening, at the dance.



NEW CAMERA "SHOOTS" FLYING PROJECTILES

WHEN Army ballistics experts needed to photograph speeding rockets, scientists at Bell Telephone Laboratories built the special "ribbon-frame" camera.

Their experience came from making high speed cameras to study tiny movements in telephone equipment parts.

The new camera gets its name from the narrow slot that exposes a ribbon of film at a speed of one ten-thousandth of a second. These "stills," taken on ordinary film, show a fast flying P-47 firing its under-wing rocket.

This is an example of the many ways Bell System research is helping to provide better weapons, better equipment for war and peace-time telephone service.

BELL TELEPHONE SYSTEM

Service to the Nation in Peace and War

Alumni News

Edited By HOWARD FREERS, soph., m.e.

The Grads Advance

'27 Fred L. Trautman, m.e., has moved to Denver, Colorado, and established his own business, Trautman Engineering Company. He left a position as Air Conditioning Engineer with Jardine and Knight in Colorado Springs, Colorado.

'28 Harold A. York, ch.e., has been transferred to Indianapolis by the Indiana Bell Telephone Company. He was District Traffic Superintendent at South Bend, Indiana.

ex-'34 Eugene H. Hartman writes from Trois Rivieres, Quebec, where he is plant manager for the Dominion Rubber Munitions Ltd. He has been with this company for ten years. He would appreciate any communications from his old friends.

'40 Lloyd O. Krause, e.e., with high honors, has been transferred to Syracuse, New York, where he is occupied with design and production of radar and communications equipment.

'43 (Feb.) William F. Rumbley, m.e., has been transferred from Fort Wayne, Indiana, to Schenectady, New York, by the General Electric Company.

In The Service

'34 Captain Harry L. McGurk, m.e., has been sent to the Civil Affairs Training School at Harvard.

'41 Major Quentin R. Jeffries, ch.e., with honors, has just been raised from Captain in the Chemical Warfare Service.

'45 Lieutenant Leon L. O'Dell, ch.e., has been awarded the Distinguished Flying Cross and the Air Medal with three Clusters.

ex-'45 S/2c Warren R. Pugh has completed an intensive sixteen-week training program at the Naval Academic Refresher Unit at California Polytechnic College, San Luis Obisbo, California. Pugh will now be sent to Iowa Pre-Flight School, Iowa City, Iowa, where he will become an aviation cadet. While he was at California Tech Pugh was on the staff of their magazine, "Mustang Roundup."

Lieutenant Dale E. Wallenbrock has been awarded the Air Medal with two Oak Leaf Clusters. He saved the life of his ball-turret gunner by ordering a routine oxygen check after flying through very heavy flack. In the check one man did not answer so Lieutenant Wallenbrock had the tail gunner investigate, and he found that the mask had frozen and the ball gunner was receiving no oxygen. The mask was rectified and the gunner recovered.

Marriages

The marriage of Ensign Frank W. Guthrie to Miss Jane O'Connel took place November 28 in Terre Haute. Ensign Robert H. Dinkel was married to Miss Jean Cotton on November 24.

The marriage of Warren C. Letsinger to Miss Marjorie Routledge took place on November 5 in Terre Haute.

Births

Brian Dennis Hogan son of Raymond C. Hogan, a Heminway Medal winner, was born at New Kensigton, Pa., on October 28.

Daniel Peter Morisseau, Jr., son of Daniel Peter Morisseau, was born November 21 at Augusta, Georgia.

Recent Visitors

'03 H. Edmund Reedy, ch.e.

'11 Wilbur B. Shook, a.e.

'21 Carl H. Penno, ch.e.

'31 Richard E. Biller, ch.e.

'35 John K. Loman, m.e., Paul H. Reedy, e.e., with honors.

'37 Lieutenant Clyde E. Cromwell, m.e.

'39 Edward A. Coons, ch.e., with honors.

'40 Captain Robert H. Colwell, m.e., Clarence E. Wilkinson, e.e.

'41 Linn D. Burk, ch.e., Lieutenant Joseph W. Dreher, e.e.

'42 Martin J. Cavanaugh, ch.e.

'43 (Feb.) Fred Hill, ch.e., Robert E. Miller, e.e.

'43 (Oct.) Kenneth R. Allison, c.e., Harry D. Frye, m.e., Donald E. McHenry, m.e., Charles R. McKinney, e.e., Thomas J. Wier, m.e.

'44 (July) Robert N. Thompson, m.e. Bernard V. Vonderschmitt, e.e., with honors.

'44 Ensign Charles R. Fox, c.e., Ensign Frank W. Guthrie, m.e., James H. Hanes, ch.e., Warren C. Letsinger, e.e.

ex-'39 Stout.

ex-'43 J. F. King.

ex-'44 William G. Cornell, Frederick M. Lundgren, F. Richard Pence, C. Graham Weibel.

ex-'45 J. Clinton Hoskinson, Robert LaFollette, Robert L. Kylander, Don G. Stuart, McLaughlin.

ex-'46 Earl W. Rich.

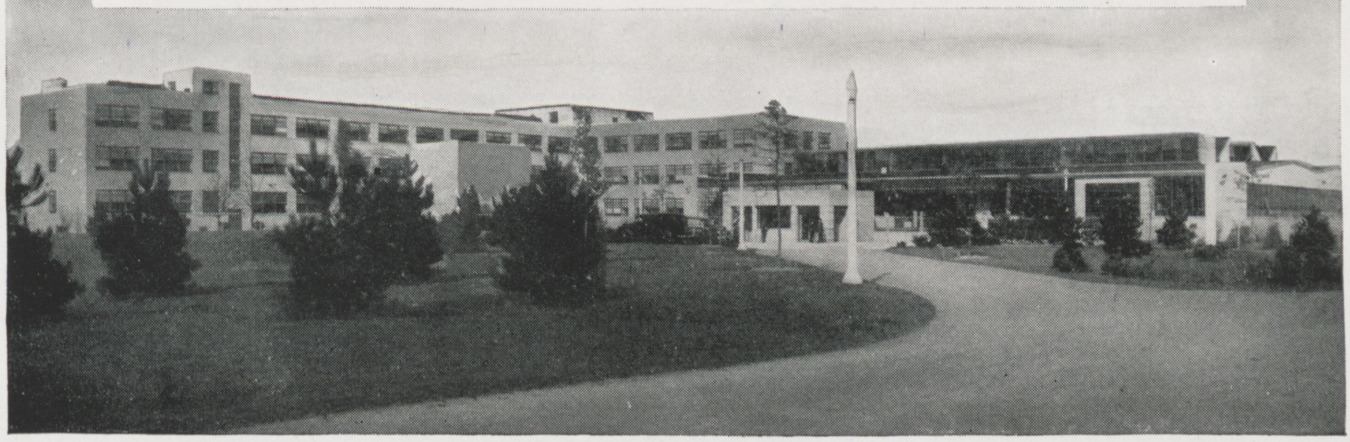
A.S.T.P. Finley, Morris, Nelson, Romme, Albert, Bush.

Bringing New Worlds into Focus

• BACTERIOLOGISTS are able to watch the attack as penicillin comes in contact with clusters of disease-causing bacteria . . . Looking through the RCA electron microscope they see how the infectious germs vanish as the new wonder drug destroys them.

New RCA electron microscopes—including a desk-size model with the same power of magnification as the standard instrument—bring this super-eye within reach of schools, hospitals, and laboratories at the same time extending its use in science and industry.

The electron microscope, acclaimed as one of the most important scientific tools of the Twentieth Century, makes possible magnifications of 100,000 diameters—50 to 100 times more powerful than the strongest optical microscope. Electronically it promises to make the peacetime world a happier, healthier place in which to live.



RADIO CORPORATION OF AMERICA
RCA LABORATORIES • PRINCETON • NEW JERSEY

RCA
leads the way in
radio—television—
phonographs—records
—tubes—electronics

RCA

Listen to RCA's "The Music America Loves Best"—Sundays, 4:30 P.M., E.W.T., over the NBC Network ★ **BUY WAR BONDS EVERY PAY DAY** ★

Fraternity Notes

Lambda Chi Alpha

Theta Kappa Zeta congratulates Ted Blickwedel and Eugene Broemmelsiek upon being initiated into the Fraternity. They proved themselves worthy of this honor during the week ending on November 11, by doing the unusual and somewhat difficult tasks assigned them. The chapter was invited to Alpha Omicron Zeta at Indiana University on Friday, November 17, for the initiation ceremony. Also present were actives and pledges of Kappa Gamma Zeta of Franklin College. All guests attended a dinner after which the three chapters held a joint initiation ceremony. The brothers at Alpha Omicron went to a great deal of trouble to prepare for an especially impressive initiation, for which we are very grateful to them. Following the initiation the entire group attended an open house held by the AOP sorority.

Brother Phil Bowne, who graduated from OCS recently with the rank of Second Lieutenant, was home for a visit several weeks ago. He is now stationed at Camp Shelby, Mississippi, waiting to be sent overseas. The chapter wishes him the best of luck.

Alpha Tau Omega

Indiana Gamma Gamma of Alpha Tau Omega is proud to announce that pledging ceremonies were held for Carl Hildebrand and Gene Glass on Monday, November 27. The fraternity extends its formal congratulations to these men. Gamma Gamma is planning its traditional Hell Week from December the 5th to December the 9th with initiation to be held on Sunday, December the 10th. A full round of work and miscellaneous diversions has been prepared and it is assumed that a good time will be had by all. The chapter was honored with a visit from brother Frank Guthrie, or to be correct, Ensign Guthrie. Frank has spent some time at Hollywood, Florida, as has Chuck Fox another vistor in recent days. To the surprise of all present Frank announced his intentions of becoming a domestic creature, namely a husband. The lucky girl is Miss Jane O'Connel of Terre Haute and the date is Tuesday, November 28. The chapter extends its most sincere congratulations to both and hopes that cigars will follow. Frank, Please Note!

Purification was held for brother Howard Freers in the anticipation of his induction into the armed forces. Congrats Howard.

Plans are now being formulated for a Christmas party in the early part of December.

Sigma Nu

December finds the members of the Beta Upsilon chapter of Sigma Nu very busy. Plans are being made for the coming "Fun" week and initiation for our pledges. This affair is bound to prove interesting.

On November 25 and 26, the actives and pledges took a short journey to Indianapolis to see Sonja Henie's Ice Revue. After the Revue a theater party was held. On Sunday we were served a delicious turkey dinner at the home of Pledge Brother Newkirk. Sunday evening, tired but happy, we returned to old Terre Haute to study once more.

The chapter was honored recently by visits from Brothers Charles Fox and Robert Dinkel, both home on leave after eight strenuous weeks of indoctrination school. Both boys were in fine shape and looked swell in Navy blues and gold braid. While at home Brother Dinkel was married to Miss Jean Cotton of this city. The chapter extends its hearty congratulations.

Theta Xi

At the present time the actives of Kappa chapter of Theta Xi are making plans for the initiation of their pledges, December 9, 1944. "Hell Week" or "Fun Week," as it is called by the actives, will begin on December 6. Needless to report, everyone is looking forward to the momentous occasion.

Brother Jim Hanes visited the house recently on his way to Florida to report for a naval assignment. Jim recently received his commission as an ensign in the U. S. Navy.

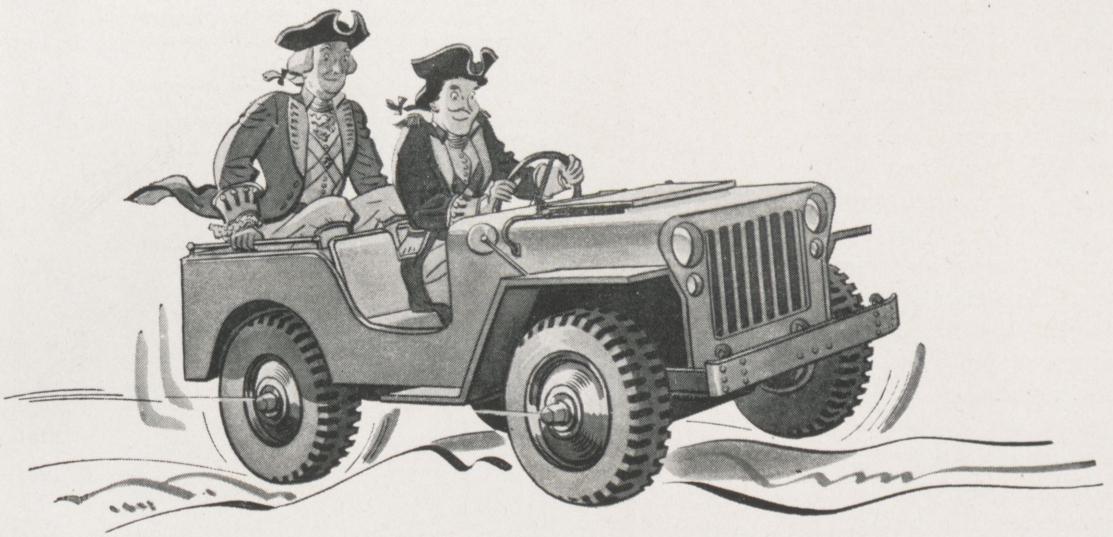
The brothers were glad to see Brother Dedert back in school after being gone for a few weeks due to a leg operation.

One of Theta Xi's famous stag parties has been planned for December 16. A dinner in honor of our graduating seniors, Brothers Kays and Stringfellow, will be held immediately preceding the stag. We are hoping to make this stag one of the most successful stags yet held.

Electronic Time-Saver

Finishing time in machining an aircraft part has been reduced from 131/2 hours to five minutes with the help of General Electric Thy-mo-trol, an electronic control widely used in war production.

George Washington could have had a Jeep



All the raw materials needed to build a jeep were obtainable in George Washington's time.

Only the knowledge of how to obtain them, refine them and fabricate them into such a vehicle was lacking.

At Alcoa, we call this important ingredient "Imagineering". That's our handy word for letting imagination soar and then engineering it down to practical use. And this is the kind of a job that has a special appeal for young men interested in the future.

It's exciting and exhilarating work to let your imagination have free reign on the possibilities of light, strong aluminum—then engineer it down to earth. So there is plenty of opportunity in the aluminum industry for young men with imaginations that refuse to be limited by traditions.

There is almost no limit to imagineering with Alcoa Alloys in making things lighter, more attractive, more economical. All this adds up to making Alcoa Aluminum available in a greater number of ways, to a greater number of people at the lowest possible cost.

You can let your imagination soar on the future of Alcoa Aluminum and the part it will play in building a better world. It will be used in places and for things undreamed of now.

And we hope that many young men with vision will build their own future in the aluminum industry or in the many industries which will be using more aluminum than they have ever used before.

A PARENTHETICAL ASIDE: FROM THE AUTOBIOGRAPHY OF

ALCOA ALUMINUM

• This message is printed by Aluminum Company of America to help people to understand *what we do* and *what sort of men* make aluminum grow in usefulness.

COMMUNICATION

(*Continued from Page* 11)

miles; beyond that distance neither safety nor efficiency of operation would be served; in fact, it would unnecessarily load the telephones with undesired conversations.

Experience with the daily use of the system on the Belvidere-Delaware branch has shown numerous advantages in movement of trains by reason of the close contact which is constantly available between the train crew members and the wayside operators. The operator finds out by telephone from the engineman and conductor just what is occurring in their movements and keeps the train dispatcher fully advised, thus facilitating the planning of all train movements affected. When anything unusual happens, all persons interested are promptly advised, reducing delays which otherwise would occur if wayside telephones had to be used for reporting the circumstances. Communication between the enginemen and conductor incidental to the movements of their train has been found to improve operations and reduce delays; starting and stopping, switching, setting off and picking up cars, testing air brakes, taking water and coal, handling equipment becoming defective enroute, and many other matters affecting the prompt movement of trains are subjects of telephone conversations carried on daily.

The Pennsylvania Railroad's experience on the Belvidere-Delaware branch has shown the system to be practical and advantageous, both in avoiding delays and in increasing the safety of men and equipment. Thus they have decided to install it for further testing on their main line. If this main line test proves satisfactory, it may be expected that the use of carrier current train telephone communication will be increased.

HERB LEACH
QUALITY SHOP
Things to Wear for Men who Care
523 Wabash

VIQUESNEY'S
"The Fountain Pen Store"
Drawing Equipment and Supplies
604 Wab. Ave. 815 Ohio St.

DRINK
Coca-Cola
IN BOTTLES
"The Pause That Refreshes"
COCA COLA
BOTTLING COMPANY
924 Lafayette Ave. C-7094

Compliments of
WILLIAM L. WHITE
CONCRETE CONTRACTOR
Terre Haute, Indiana

FISCHER'S
Auto Supply
Stores
Auto Accessories and Necessities of All Kinds
We Welcome Your Patronage
329 OHIO ST. 901-3 WABASH AVE.

Prompt Personal Service
Choice Flowers
THE BLOSSOM SHOP
GLADYS COWAN POUND
Telephone Crawford 3828
113 North 7th Street, Terre Haute, Ind.

Life  FROM A PLASTIC BAG!

THE MAN ADRIFT here is drinking sea water. But it is sea water that he has made drinkable by chemicals and a filter contained in a VINYLITE plastic bag*. The plastic—produced by CARBIDE AND CARBON CHEMICALS CORPORATION—has been made possible by the availability of synthetic organic chemicals, in which this Unit of UCC specializes.

But the story behind VINYLITE plastics is far more than just the history of another chemical development.

Rather, this unusual substance is indicative of the way man can learn—through years of uninterrupted research in the basic and applied sciences—to make better material than nature. It is one more confirmation of the continuing progress that is achieved by co-ordinating research, development and engineering.

The importance of VINYLITE plastic in helping to solve such vital needs as fresh water at sea is typical, in terms of human progress, of the stature already attained by many of the 160 synthetic organic chemicals that CARBIDE AND CARBON CHEMICALS CORPORATION now has in commercial production.

▼

**There are good reasons why a VINYLITE plastic is used in desalting bags. It can't mildew or rust. It is strong and tough, scuff-proof and shock-proof. It is chemical-resistant and sun-resistant. It is lightweight, transparent and flexible. It is non-flammable and cleanable . . . Engineers and executives interested in this material are invited to write for the booklet P-12 "Vinylite Plastic Sheet and Sheeting."*

BUY UNITED STATES WAR BONDS AND STAMPS

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N.Y.

Principal Units in the United States and their Products

ALLOYS AND METALS—Electro Metallurgical Company, Haynes Stellite Company, United States Vanadium Corporation

CHEMICALS—Carbide and Carbon Chemicals Corporation **ELECTRODES, CARBONS & BATTERIES**—National Carbon Company, Inc.

INDUSTRIAL GASES AND CARBIDE—The Linde Air Products Company, The Oxweld Railroad Service Company, The Prest-O-Lite Company, Inc.

PLASTICS—Bakelite Corporation

INSTRUMENTS

(*Continued from Page 6*

ber web.

b For automatic weighing.

c For stopping of mechanical devices at accurate or limit positions.

d For liquid-level control.

e For initiation of sheer, press, or other machines.

2 As a safety device for:

a Elevator doors.

b Pulverized fuel furnaces.

c Punch presses, bending, and shearing machines.

d Railroad crossings on industrial sidings.

e Electrical test floors.

f Signaling approach to dangerous areas in chemical plants, powder mills, overhead cranes. etc.

g Signaling approach of unauthorized persons to forbbidden areas.

3 For counting of:

a Parts on production lines such as boxes, tin or paper sheets, packages, crankshafts, or other items.

b People entering or leaving buildings.

c Automobile traffic.

High Frequency Oscillator

Magnetic materials can be heated inductively, and insulators can be heated dielectrically. When an alternating flux is established in a magnetic field the flux causes eddy current to flow around the surface of the magnetic material. These currents meet the ohmic resistance of the metal and the ensuing I^2R loss results in heating.

In dielectric heating an insulating material is placed between two metallic plates. One plate is connected to one side of the oscillator tank circuit and the second plate to the opposite side of the tank circuit. Two metallic surfaces separated by an insulating material, by definition, flows through the capacitor and consequently through the material. This material has a high resistance associated with it and the I^2R loss again causes the material to heat. The main advantage of dielectric heating is that the heat is applied homogeneously throughout the material. Consequently the heat does not have to flow from the surface to the inside of the material as is the case with other heating methods, which involve time and unequal temperatures.

The oscillator described here is a small unit of the same type that has been applied extensively in induction and dielectric heating for industry. This demonstration unit is special only in that it has two tank circuits instead of one. It will deliver 1 kw either at 10 megacycles for dielectric heating or at 300 kilocycles for induction heating. The power supply is a single-phase, 60-cycle, 110-volt system from which the set will draw about 3.6 kw when delivering rated output. The effective a-c voltage output of the electrostatic-heating circuit can be varied over a wide range to accommodate changes in the materials to be treated. The effective a-c voltage across the induction-heating tank is approximately 1800 volts. The tank current in this circuit is approximately 18 amperes.

Louisville Bridge & Iron Company

Incorporated 1865

Engineers, Fabricators and Erectors of Steel Bridges,
Steel Buildings

Stock Steel for Prompt Shipment

DO YOUR PART **BUY MORE WAR BONDS**

Offices: 11th and Oak Streets

Louisville Kentucky

NITROGEN takes Betsy's Best to the Fighting Front

Milk, too, is styled for modern war... streamlined by dehydration to save weight... armored by nitrogen to avoid deterioration. In fact, dehydrated foods of infinite variety are protected by Nitrogen and Carbon Dioxide, two of the many gases produced by Air Reduction.

In the food field these Air Reduction products are helping to build a new industry.

In other fields Airco products and processes are revolutionizing war production—providing faster manufacturing methods that will help build a better world after V day.

★ BUY UNITED STATES WAR BONDS ★

AIR REDUCTION SALES COMPANY
MAGNOLIA AIRCO GAS PRODUCTS CO.
NATIONAL CARBIDE CORPORATION
PURE CARBONIC, INCORPORATED
THE OHIO CHEMICAL & MFG. CO.
WILSON WELDER & METALS CO., INC.

AIRCO

AIR REDUCTION

60 EAST 42nd STREET • NEW YORK 17, N. Y.

OXYGEN, ACETYLENE AND OTHER ATMOSPHERIC GASES • GAS WELDING AND CUTTING APPARATUS • CALCIUM CARBIDE
ARC WELDING MACHINES AND SUPPLIES • CARBON DIOXIDE • "DRY ICE" • ANAESTHETIC AND THERAPEUTIC GASES AND APPARATUS

Men of Rose

May we call attention to our

Complete Printing Service

Rapid, accurate execution of your printing requirements at reasonable prices

Moore-Langen Ptg. & Pub. Co.

140 North 6th St.

TERRE HAUTE, IND.

D and H LAUNDRY
and
ODORLESS DRY CLEANING
C-6901—C-6228 12th & Chestnut
Chas. H. Dill - Frank Hoff

Hunter, Gillum & Streeter, Inc.
GENERAL INSURANCE—BONDS
Phone C-1400
16 So. 7th St. Terre Haute, Ind.

Carl Riggs Drugs
PRESCRIPTIONS
8th & Wabash Ave.

HEINL'S FLOWER SHOP
129 So. 7th St.
Largest Orchid Growers in Western Indiana

BORDENS
PURE MILK & ICE CREAM

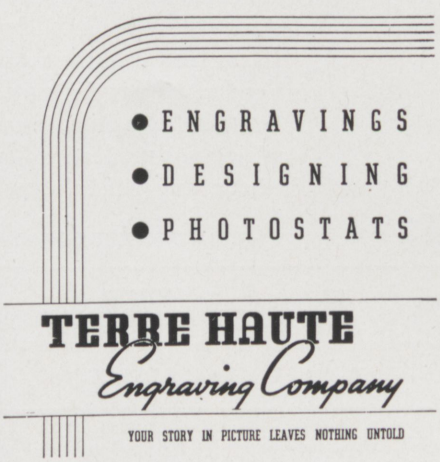
Freitag-Weinhardt, Inc.
Over 40 Years Experience
Plumbing and Heating
30-32 N. 6th St.
Phone C-2394

HERM ERMISCH
CLEANERS
16th & Poplar C-5056

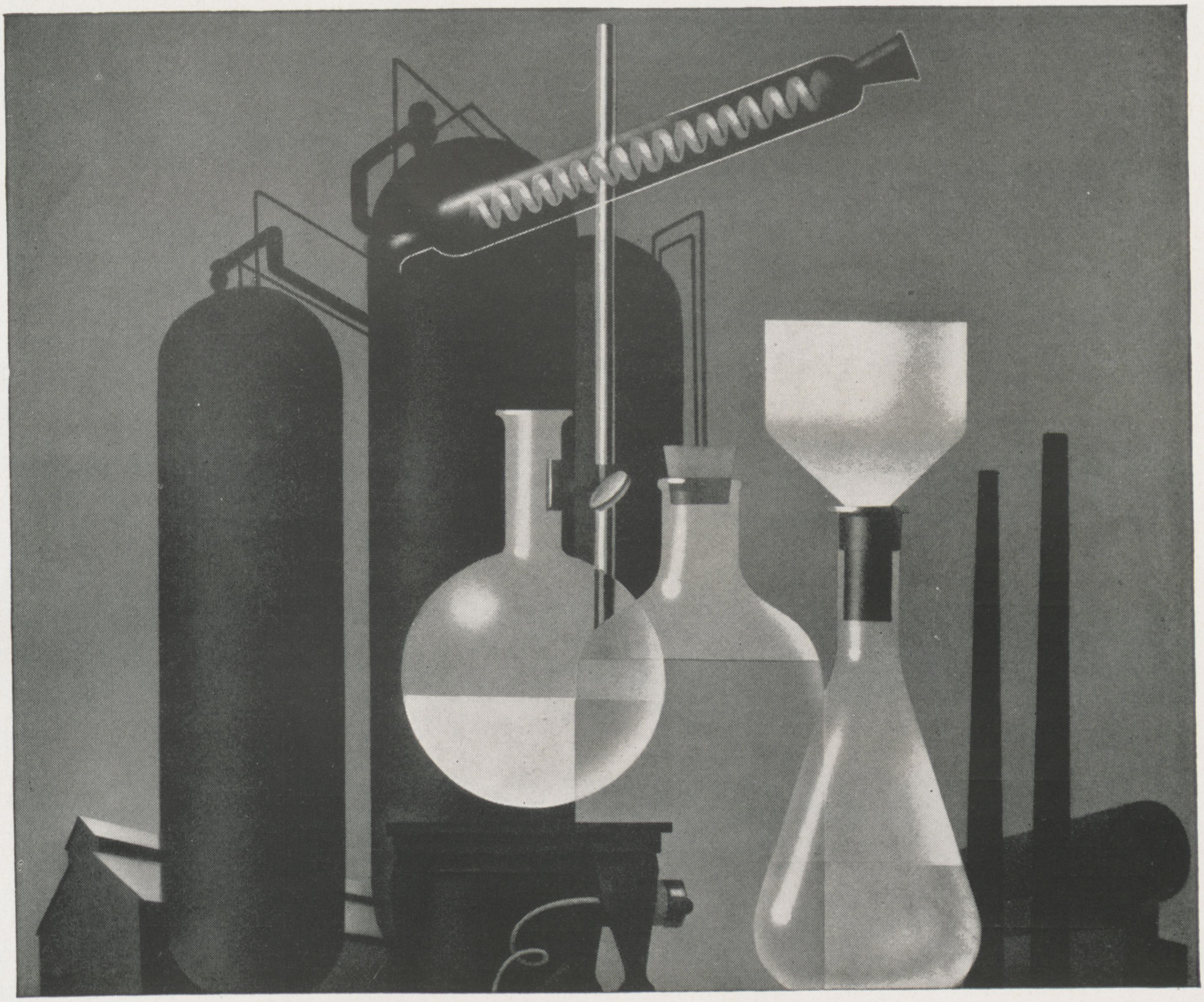
EDW. S. LAMMERS
PAINT & GLASS CO.
1201 Wabash Ave.
C-2226

COLLEGE AVENUE
FLORISTS
Say It With Flowers
SPECIALISTS IN
CORSAGES
Tel. C-1580—C-2523
Office 657 Wabash
Terre Haute, Ind.

McMillan
ATHLETIC GOODS CO.
Your Sporting Goods Store
726 Wabash Ave.
TERRE HAUTE INDIANA



CRAFTSMAN
INSURANCE CO.
C. M. HAYES
Home Office Rep.
404-406 Rea Bldg., Terre Haute
Phone Crawford 8429
HEALTH - - ACCIDENT
HOSPITALIZATION



STAINLESS STEEL... METAL Par-excellence FOR THE PROCESS INDUSTRIES

MERITS OF ALLEGHENY METAL

- ★Highly corrosion and heat-resistant
- ★Easy to form and weld
- ★Easy to clean and keep clean
- ★Requires little maintenance
- ★Low depreciation

THERE are a lot of new faces along the street—high-octane gas, synthetic rubber, magnesium, dehydrated foods, war chemicals and explosives, just to name a few.

But Allegheny Metal kept pace—with new grades, new techniques to meet the requirements for processing these products. There was the need for high resistance to chemical attack, and to oxidation at heat—the need for great strength, long life, easy cleaning and freedom from contamination—requirements, all of them, that stainless steel answers best.

No matter where your business future may take you—into the manufacture of food and dairy products, drugs and chemicals, oil and plastics, textiles and paper, or elsewhere—remember Allegheny Metal's special qualifications. ● Allegheny Ludlum Steel Corporation, Brackenridge, Pa., and principal cities.

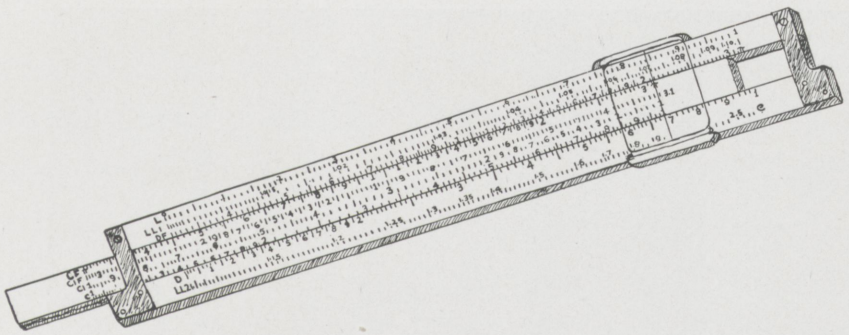
Producers of Special Steels: Corrosion and Heat Resistant, Tool and Die, Electrical, Valve and Nitriding Steels, also "Carmet" Carbide Tools and Blanks.

ALLEGHENY METAL

The Time-Tested Stainless Steel

W&D 9370-E

REMEMBER THE NAME TODAY FOR THE NEEDS OF TOMORROW



Sly Droolings

Edited by PETE LEE, jr., m.e.

"Won't you give a shilling to the Lord?" said a Salvation Army girl to an old Aberdonian.

"How auld are ye, lassie?" he inquired of her.

"Nineteen sir."

"Ah, weel, I'm past seventy-five. I'll be seein' Him afore you, so I'll hand it to Him myself."

Our idea of an optimist is of the man who took the marriage vows at the ripe old age of 87 and started house hunting for a nice place close to a school.

"I got the socks you knitted for me," wrote the soldier to the dear young thing he had left behind him, "but I love you just the same."

Heard in the A. T. O. fraternity house: "Is this dance formal, or can I wear my own clothes?"

A romantic pair were in the throes of silence as the car rolled smoothly along an enchanting woodland path, when the lady broke the spell:

"John, dear," she asked softly, "can you drive with one hand?"

"Yes, my sweet," he cooed in ectasy of anticipation.

"Then," said the lovely one, "you'd better wipe your nose, it's running."

The train came to a sudden grinding stop.

"What has happened, Conductor?" asked a nervous, old lady.

"Nothing much, we just ran over a cow."

"Was it on the track?"

"No," replied the disgusted conductor. "We chased it into the barn."

Grandma (looking at her granddaughter's new bathing suit): "If I could've dressed like that when I was a girl, you'd be six years older today, Missy."

Many a woman thinks she bought a gown for a ridiculous price when in reality she bought it for an absurd figure.

The old gray mare had her faults —That's why they put dashboards on buggies.

Starkle, starkle, little twink,
Who the hell you are, I think.
I'm not under the alchofluence of
inkohol,
Though some tinkle peep I am.

A small boy was leading a donkey down the road through an Army camp. Some soldiers, thinking to have some fun, attempted to engage the kid in conversation. He wouldn't respond. Finally, one of them asked, "Why are you holding onto your brother so tightly?"

And then the kid came right back. "So he won't run off and join the Army," said he without blinking an eye.

There's the sagging skin of a rhino,
The pendulous stern of a coot,
But from here to Wrangel
There's nothing can dangle
Like a trap-door union suit.

He knelt beside her bed. She gasped, "Hubby, I'm dying. And I can't go without telling you something. I've been unfaithful to you."

"I know," he answered. "I found that out. And that's why I poisoned you, don't you think?"

HER MEN

There have been four men in my life.

The first attempted to guide me in the direction of my own best interests.

I hated him!

The second insisted that I guide myself.

I ignored him!

The third forced his interests upon me and denied me the right of choice.

I loved him!

The fourth had interests which happened to be my own.

I married him!

Anyone can play bridge, but it takes a cannibal to throw up a hand.

Two men got off a bus. One had come to town for *good*. The other was a Marine on a furlough.

Hint to all young men: The stork is the bird with the biggest bill.

A new bride was asked what she had found to be the biggest thrill of marriage. It was certainly thrilling when Henry took me to the license bureau. It was another thrill when the minister pronounced us man and wife. I got an awful bang out of seeing Henry sign the register 'Mr. and Mrs.' I do believe though, that my biggest thrill was thumbing my nose at the house detective."

There was a young lady from Niger,
Who smiled as she rode on a tiger.
They came back from the ride
With the lady inside,
And the smile on the face of the
tiger.

GE Campus News

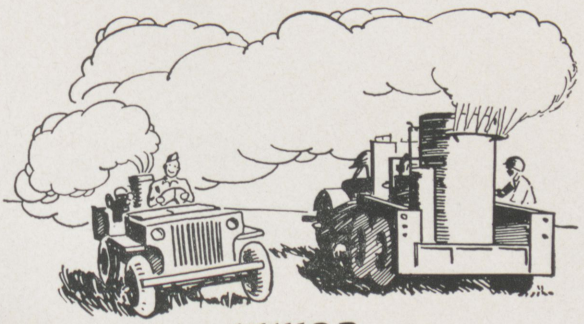
RESEARCH AND ENGINEERING KEEP GENERAL ELECTRIC YEARS AHEAD

CHRISTMAS DINNER IN THE TROPICS

IT is more than likely that many of the American boys in the South Pacific will have turkey for dinner this Christmas. It's not a military necessity, but it's good for morale, and high morale is an asset for any fighting force.

Good refrigeration equipment—the same sort that cools blood plasma, medical supplies, drinking water, and stores of ammunition—will make this possible.

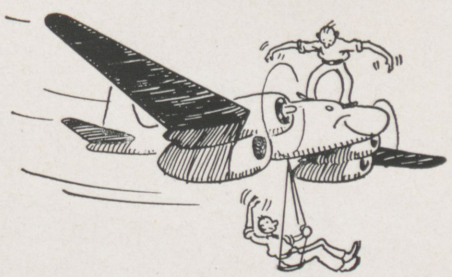
Recently, in collaboration with U.S. maritime and naval architects, General Electric engineers designed new, prefabricated refrigeration equipment for Victory ships which saves cargo space and materially reduces shipyard installation time. These refrigeration systems furnish 3½ tons of refrigeration for low temperature meat and fish rooms, and 3 tons of refrigeration at 40° F for vegetable, dairy, and thaw rooms. And six and a half tons is a lot of Christmas dinner in anybody's language.



JUNIOR

A LARGE smoke generator, principles for which were worked out by Dr. Irving Langmuir and Vincent Schaefer of the G-E Research Laboratory, produces a heavy blanket of smoke which has been used frequently to protect our men during landing operations. Now the Chemical Warfare Service has designed a smaller model.

"Junior" will fit into a jeep or a foxhole; can be carried by two men. With favorable wind conditions, it can blot out an area five miles long and 200 yards wide. The smoke will help the doughboys when the going is tough on jungle trails, mountain passes, and other vulnerable places.



NO STREAMLINING HERE

MOST airplanes look smooth. But some are definitely "lumpy." The plane which General Electric calls its flying workshop is of the lumpy variety.

It cruises high over Brownsville, Texas, carrying engineers and new equipment. Many new aircraft products and systems built in the laboratories and experimental shops of General Electric receive their first trial by air in this strangely shaped plane. It's one way G.E. makes certain that its aircraft equipment can stand the rigors of high altitude flying. *General Electric Company, Schenectady, New York.*

Hear the General Electric radio programs: "The G-E All-girl Orchestra" Sunday 10 p.m. EWT, NBC—"The World Today" news, every weekday 6:45 p.m. EWT, CBS.

The best investment in the world is in this country's future. Keep all the Bonds you Buy.

GENERAL ELECTRIC

953-96-211

Both far and near to ALL—Good Cheer

Your Chesterfield Santa Claus reminding you that at Christmastime when you get together the best of everything for real enjoyment . . . the cigarette that Satisfies belongs on top.

The reason is ★ ★ ★

CHESTERFIELD'S RIGHT COMBINATION
WORLD'S BEST TOBACCOS

LIGHT UP **Chesterfield** *They Satisfy*

Copyright 1944, Liggett & Myers Tobacco Co.