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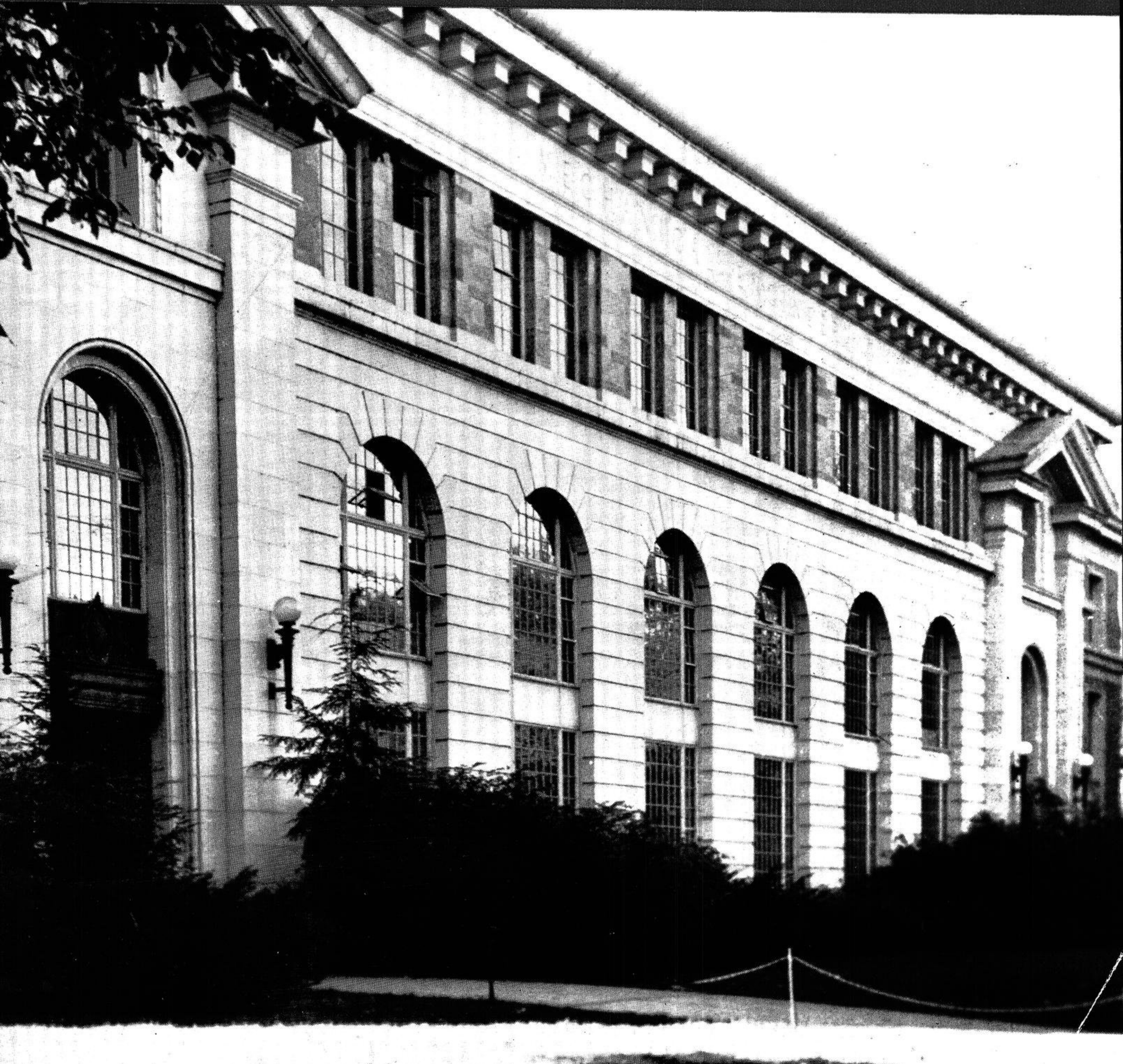
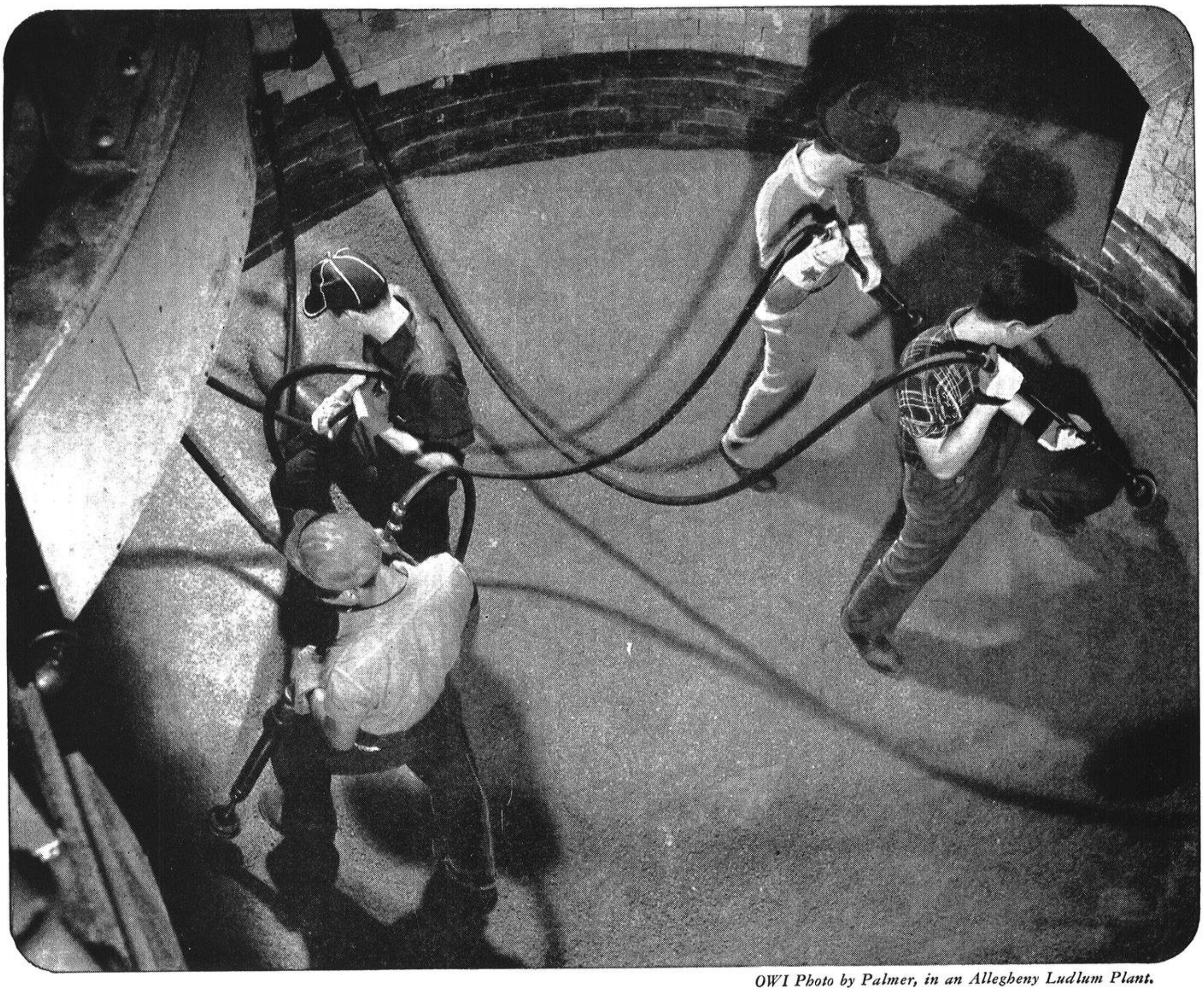
WISCONSIN ENGINEER

November, 1944

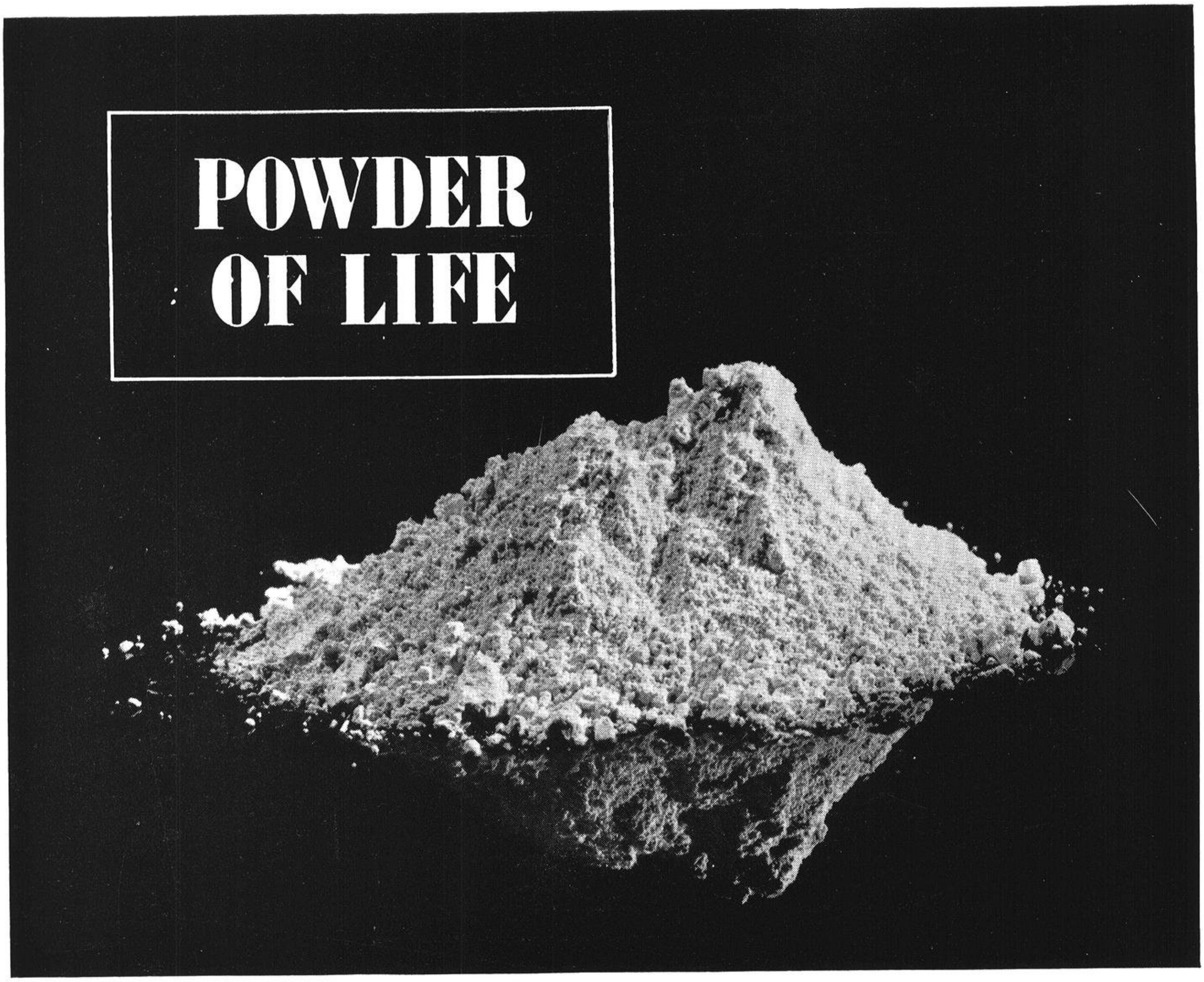


MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED



OWI Photo by Palmer, in an Allegheny Ludlum Plant.


"THAR'S GOLD IN THEM THAR PILLS!"
CELESTIAL NAVIGATION
CALCULUS
RADIO ENGINEERING
ADVANCED PHYSICS
Hard to swallow now—but—after the war they can help you to a swell job in the Aviation Industry
Pioneers in lighter-than-air, Goodyear Aircraft Corporation now produces major components for sixteen important Army and Navy aircraft, including complete Corsairs, the famed Navy fighters, and airships, guardians of the shipping lanes. Believers in the ability of American youth to accomplish the impossible, Goodyear has always employed and will continue to make full use of young American minds, trained in the scientific fields which are the backbone of Goodyear enterprise.
GOODYEAR
GOODYEAR
A GREAT NAME IN AIRCRAFT
Akron
Ohio
BUY WAR BONDS — BUY FOR KEEPS



This is a handful of penicillin.

Yesterday it was amber drops of liquid excreted by *penicillium notatum* or common mold.

Today it is a powder ready to be shipped to some battlefield.

Tomorrow it may save a life.

In a great measure the triumph of penicillin is a triumph for air conditioning and refrigeration.

At Cheplin, Hayden, Lederle, Pfizer and Reichel—mass producers of penicillin—York-built air conditioning systems keep the nurturing tanks at just the right temperature for proper growth.

After the golden drops are extracted from the parent mold, York refrigeration takes over.

The liquid penicillin is frozen enabling evaporation to take place in a high vacuum at temperatures low enough to keep alive the bacteria-killing properties of the drug. The result is the stable powder that you see above.

Although penicillin has been put on a mass production basis, research still goes on. Scientific medicine will certainly discover new types of disease-killing molds and develop new and better methods of production.

Just as certainly the science of cooling will match their efforts with the necessary equipment to perform the tasks they require.

York Corporation, York, Penna.

YORK REFRIGERATION AND AIR CONDITIONING

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

Yes, zinc does double duty when applied to metals. It gives mechanical protection, with a sheath of rust-resistant metal; the durability depends on the thickness of the zinc. Zinc is also a rust inhibitor—it literally "stops rust before it starts", through electro-chemical action. The U. S. Bureau of Standards says Zinc is "by far the best" protective metallic coating for rust-proofing iron or steel.

Lifetime Galvanized Roofing

With reasonable care, galvanized (zinc-coated) roofing will last a lifetime. Its care is a simple matter—a few precautions taken at the right time is all that is necessary. These are fully described in a booklet, "How to Make Galvanized Roofing Last Longer", which will be sent free to anyone upon request. A post-card will do—send it today.

AMERICAN ZINC INSTITUTE
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Welcome to Wisconsin and to the College of Engineering

OUR year-'round operation notwithstanding, registration for the winter term marks the beginning of another cycle, another academic year. Therefore, it should be not only a time of greeting and good wishes but a time for evaluation and re-dedication.

With the war going well we can be grateful this Thanksgiving for the prospect of victory. But whether or not we are privileged to be identified by a uniform as lending our effort to our country's cause, we can well temper our thanksgiving by new and higher resolutions.

It was a worthy resolution to resolve to accept our place of duty wherever it might be in our country's need. It was a wise resolution to resolve to seek or to accept special training to make our service more effective. But now we can join in a more noble, a more far-seeing resolution. Let us look beyond the defeat of our enemies and beyond the aid of nations in distress to the future of our own country at peace. Let us as individuals firmly resolve to re-dedicate our lives and our way of living to the proposition that "it shall **not** happen here"; that indeed "government of the people, by the people and for the people shall not perish from the earth"; that our children's children shall know the joy of free choices and the reward of unlimited opportunity that has made America great.

To us as individuals, we can prove these high-sounding phrases have real meaning if each day we:

1. Perform our personal duties with our might.
2. Build our health so we can be more effective.
3. Read and listen to inform ourselves on national and international affairs.
4. Take sides earnestly and fairly as good citizens.
5. Cooperate gaily in a democratic spirit.

So—study hard, have fun, make friends of each other and of your instructors, consult your adviser freely—and may this year be the best one yet!

—F. ELLIS JOHNSON

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Buck Rogers In Our Time?

Rockets and Their Future

A Tau Beta Pi Article by Vet. V. Holmes

BY FAR and way the greatest single forward step taken during this war, both from the standpoint of being a boon to man and also of being the most terrifying destroyer of life ever devised, has been in the field of jet propulsion and rocket power for aircraft. Everyone is familiar with the terrifying "Doodle bombs" the Germans have been blasting at England with since early June and much speculating has been done as to the applications of the rocket to transportation after the war. The wind has barely blown open the door to this giant, novel field as yet, but the future is very promising.

In theory, the jet plane and the rocket differ not at all from the conventional method of propeller propulsion. Each develops thrust to propel the craft forward by expelling air rearward at great velocity, thus changing the momentum of the air. Newton's third law of "action and reaction" is utilized. A force, in the form of a stream of air, is applied in one direction and the reaction of this stream of air projects the plane in the opposite direction. The internal combustion reciprocating engine turns a propeller, which is no more than a rotary airfoil, causing air to be drawn from ahead of the craft and moving it swiftly backward outside of the plane in a stream which is equivalent to a jet stemming from the arc of the propeller. In the jet propulsion motor, thrust is developed by sucking air into an orifice, heating it until a tremendous pressure is developed, and then expanding and ejecting it through a nozzle to the outside atmosphere. This creates a slipstream which has a much greater speed relative to the airplane itself than the slipstream caused by a propeller. The rocket operates on exactly the same principle as the jet, but under slightly different conditions. The rocket carries with it, as well as the fuel itself, the oxygen which is required to burn the fuel, while the jet propelled plane carries only the fuel itself, depending upon the atmosphere for the oxygen with which to burn the fuel. Thus the uninformed newsmen often confuse themselves and the public by announcing the use of a new "rocket" plane, when the craft is, technically, not that at all. It should be noted that, at present, no man-carrying rocket is in existence. The "Buzz bombs" are true rockets, but are merely haphazardly directed, rocket propelled, flying bombs. All of the major powers, on the other hand, are known to have man-carrying jet planes either in production or in the advanced testing stage.

The advantage of the jet plane are many. The velocity of the slipstream of a jet plane (and hereafter "jet" will include the rockets also) is very nearly equal to the speed of the plane itself, while the slipstream of the propeller driven plane is very much less than the speed of the plane. This difference in speed causes the slipstream of the propeller type plane to have a tendency to be pulled along with the plane resulting in large air friction and turbulence losses. These are greatly reduced by the equality of speeds in the jet plane. A propeller reaches a maximum in its efficiency at high altitudes because it literally screws its way through the air and must have dense air to "bite" into. The jet is entirely free from this trouble; in fact, it is much more effective and efficient at high altitudes because the air friction losses are cut down while the reaction of the jet is always present in its full degree of effectiveness. Indeed, the rocket would perform ideally at an altitude where absolutely no air existed since it is not dependent upon the atmosphere for its oxygen. The speeds attainable with the jet unit is limited only by the limit of human endurance, while the speed of the propeller driven craft is limited to about 500 miles per hour, due to the fact that the air molecules pile up on the edge of the propeller blades at these high speeds, causing huge losses in efficiency. Stability and ease of handling on the ground are greatly increased in the jet plane because it possesses no huge propeller for which ground clearance must be provided. The jet plane can thus be built closer to the ground than the conventional aircraft, with resulting better ground handling characteristics.

Yes, the jet propelled plane is here to stay and the rocket is just around the corner. After the war intensified research will lead to even more startling discoveries and improvements. The brain of man has hardly switched to this huge new field and further study will reveal that the possibilities are almost unlimited. Dr. John C. Stewart, professor of Astronomical Physics at Princeton, predicts that by 1950 rocket propulsion will produce speeds of 1,000 miles per hour and that shortly after the year 2050 rockets will be flying to the moon at 25,000 miles per hour. So, who knows, maybe your grandson and my grandson will own adjacent summer homes on the moon!

FIRE CONTROL ON A BATTLESHIP

—George Bunn, ee'44

THE main object of a gun, actually hitting the target, becomes a more and more intricate problem as the science of warfare progresses. However, on a battleship, the problem is still one of getting the proper deflection and range angles so that when the gun is fired, the shell will find its mark.

Directing gunfire illustrates well the engineering principle of superposition of effects. The effect of each factor can be considered separately, and the final result is the sum of the individual results.

Range tables have been set up which give the range for a particular range angle and powder charge when the other effects are zero. These tables can be computed approximately from the laws of a freely falling body. They are corrected for air resistance and gauged in actual practice. The problem has only been just begun for there are many other forces acting on a shell.

The effect of a wind can be compensated for by first resolving it into force components along the line of sight and perpendicular to the line of sight. The gun must be elevated to compensate for the component along the line of sight and deflected to overcome the cross-wind influence. Now disregard the effect of the wind. Since the target is moving, we would miss it if we fired directly at it for the target would move while the shell was in the air. Therefore, the speed and direction of the target as well as its relative angle must be known. Again we resolve along and across the line of sight. The gun is elevated or depressed to account for the target's motion along the line of sight and deflected to the right or left to compensate for motion across the line. Then, since we were moving when the shell was fired, we must deflect and elevate or depress our gun again to make up for this initial component of velocity. Now our gun is set correctly provided our assumptions were correct and all other conditions are standard.

The course and speed components of our own ship and of the target along the line of sight can be obtained to give the rate of change of range. The components across the line can be combined to give the rate at which the bearing of the target is changing. If the correct values of bearing and range are known now, and the rate at which each is changing, the values for any time in the future can be computed. It may be noted, however, that these rates are

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SYNTHETIC MOTOR FUELS

—Toru Iura, me'45

DUE to our increasing demands for motor and aviation fuels, Congress has recently completed a detailed investigation of synthetic gasoline production methods and has authorized $30,000,000 for the development of synthetic fuel processes. It is estimated that more than fifty billion barrels of oil will be needed in the next twenty years to maintain the present ratios of reserves to consumption. This is as much as has been found since the beginning of the oil industry eighty years ago, yet it now requires three times as much drilling per barrel as it did five years ago. While we are assured of a natural supply of oil for the next 25 to 50 years, the development of synthetic fuel processes must be carried on in order that this country may be fully prepared to produce synthetic gasoline when our present petroleum resources become exhausted.

The principal synthetic fuel processes are the distillation of oil shale and the liquification of coal. Petroleum, like oil, can be obtained from oil shale by heating, and this oil can be treated by standard refining methods to yield a satisfactory motor fuel. Shale oil is the simplest and most easily usable substitute for natural petroleum, but is not used in this country because of the added cost of distillation which results in too high a price for motor fuel. At present, shale oil costs about $1.75 to $2.00 per barrel as compared with $1.25 for petroleum. The United States has over ninety billion barrels of reclaimable oil from oil shale which constitutes about five times the size of the present estimated petroleum reserve. As much as 80% of the shale oil can be made into gasoline by hydrogenation, and this gasoline which has an octane number of 65 can be made into 83 octane gasoline by the addition of tetraethyl lead.

Liquid fuels can be produced from coal by carbonization, berginization, and synthesis from water gas by the Fischer-Tropsch method.

In the carbonization of coal to produce coke, liquid hydrocarbons are obtained which can be used to yield a satisfactory motor fuel. The maximum gasoline yield is about ten gallons per ton of coal or about eighteen million gallons per year if all the carbonization plants in the country were utilized. This would only supply about three per cent of the national requirement; however, it must be

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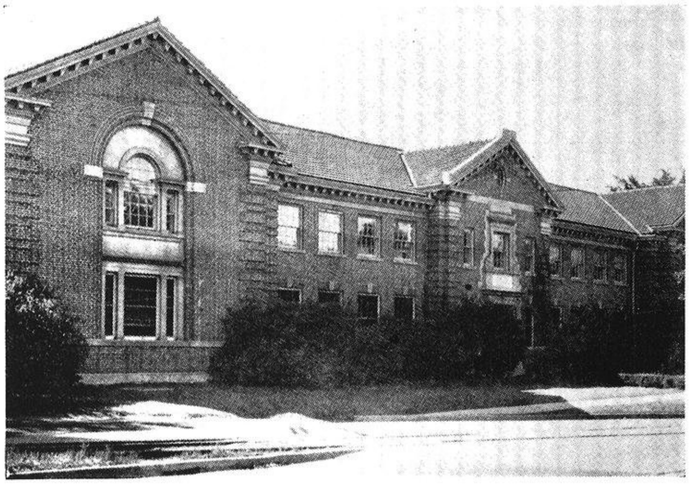
University of Wisconsin

THE first real start of engineering began in Science Hall, which housed engineering classes after 1897. At this time, about one-fifth of the building was occupied by engineering, including some rooms in the basement, on the first floor and one-third of a large room on the second floor. In 1901, when the Education-Engineering building was built the classes moved to that building. Other engineering buildings were built and the College of Engineering expanded. The buildings as they appear today have their own history—



Mining and Metallurgy Building

MINING AND METALLURGY

Originally the United States Forest Products Laboratory, the present Mining and Metallurgy building was built in 1910. As the forest products work expanded, a larger lab was needed. A new one was built on the present site and in 1932, the University acquired the building according to the original agreement—the building was built on University property and the U. S. was given the title to the land by the University. But when they moved it was to be turned back to the University. When the building was being used by the United States, some of the workers lectured to engineering students and as long as it did not interfere with research and work being carried on, the students were free to work in the labs under their instruction.

At this time, the Mining and Metallurgy labs were in the present Radio Hall. The radio station on the campus then occupied one room in Sterling Hall.

Located on University Avenue next to the "M.E." building, the Mining and Metallurgy building contains many labs and classrooms to prepare the future mining or metallurgical engineer. Included among the labs are: the ceramics lab which is equipped for the manufacture of clay products, including the making, burning and testing of ware and the application and preparation of glazes; the crushing lab with equipment for large and small scale crushing and grinding; the metallographic lab with equipment for mounting and polishing specimens; the metallurgical furnace lab which is equipped with acid and basic lined converters, a blast furnace, a tilting arc furnace, and several assay and metallurgical furnaces; the pyrometric standards lab in which work is carried on in the calibration of pyrometers by comparison with standards that have already been calibrated by the United States Bureau of Standards. In the classrooms, there is instruction for courses in mining methods, mineral properties, excavation and tunneling, assaying, metallurgy of various metals and advanced studies, besides many others.

The building, when built in 1910, cost approximately fifty-five thousand dollars. The amount of floor space is given by the figures that it contains 509,840 cubic feet. As it was originally the United States Forest Products Laboratory, the appropriation for the cost came from them.

Although acquired only a relatively few years ago, the Mining and Metallurgy building is now an integral part of the College of Engineering campus.

ELECTRIC LAB

The Electrical lab and Art Education building as it stands today is a product of many additions to the original building built in 1888. This, however, was not originally part of the lab. In 1894, an addition was made to the back of the original section, an electric furnace room was added to it, the west wing was built and a furnace room also built on to that. Again in 1903, another addition was made; this time on to the back of the west wing.

Today the building stands, not only as the electrical labs, but also as art education. A little more than one-third of the building is used for ee labs.

Labs included here are the dynamo lab, the gaseous conduction lab, the sophomore electrodynamic lab, the communications lab, the important Electrical Standards

Engineering Buildings

by Three ee's: Francis Hyland, ee'44
Harry Hanson, ee'46
June Hartnell, ee'46

Laboratory, and the high voltage lab. The Electrical Standards Lab is operated in connection with the work done by the Wisconsin Public Service Commission for different tests and the important work of standardizing electrical metering devices. The high voltage lab is equipped so as to supply 300,000 volts, and the communications lab has an artificial open-wire line which is equivalent to 200 miles and an artificial cable circuit with loading equal to 68 miles. The dynamo lab is equipped for research and apparatus and machinery for verifying certain electrical theory.

Because of the fact that the building was constructed in sections, it is almost impossible to state the cost of the building. As for its size, it has 689,410 cubic feet of space; of this roughly 250,000 cubic feet are used for electrical labs. The building was built at the time the different sciences were expanding so rapidly and so much that it was impossible for Science Hall to house them all. It was built in the same year that the Chemical Engineering building was built, but about thirteen years before all the engineering classes moved out of Science Hall to the Education-Engineering building.

AGRICULTURAL ENGINEERING

Although not always looked upon as a part of the College of Engineering, the Agricultural Engineering Department was founded about 1900. The present building, on the Ag campus, was built in 1907. Arthur Peabody was the state architect. It was the first reinforced concrete building on the campus, which of course has its advantages and its disadvantages. Mr. Duffee, chairman of the department, says, "But it's still standing."

In this building, on December 27, 1907, the American Society of Agricultural Engineers was founded.

The building is relatively small, has only 337,000 cubic feet of space. The cost of the building is given as $45,760. The money was state appropriated.

Among the classes carried on in the Agricultural Engineering building are those in farm power and machinery, farm mechanics, tractors and tractor machinery, drainage and irrigation engineering problems, and seminary. Besides these courses given in ag engineering, the student engineer here divides his time between other engineering subjects and agricultural subjects. The course is five years and gives a degree in both agriculture and engineering—civil, mechanical, or electrical. For this reason, the course is a halfway mark between engineering and agriculture. But it must be considered a part of the College of Engineering!

CHEMICAL ENGINEERING

Standing since 1888, the present Chemical Engineering building cost approximately $71,500. The money was appropriated by the state. It has about 452,900 cubic feet of space. The building was originally the Chemistry building but became the home of chemical engineering when the new and present Chemical building was built. No new additions have been made here, the building stands as built, except for maintenance and remodeling done several times—enlarging and modernizing some of the rooms and labs.

Important classes to the engineer-to-be in and around (might we say—especially in lab work) the building are industrial chemistry, technical analysis, applied electrochemistry, courses that apply the engineering chemistry to industries, and other related subjects.

To the freshman and sophomore engineer the realms of the Chemical Engineering building are little known. He spends most of his time with chemistry in the Chemistry building. It is not until he is a junior that he advances on the more technical detailed subjects which lead him into the Chemical Engineering building.

Located next to the Union and the E.E. labs, the Chemical Engineering building also looks out over Lake Mendota. And closeness of the Union and Rathskeller is always very tempting during free hours—'specially if your last and your next class is right across the street.

(next page please)

ENGINEERING BUILDINGS . . .

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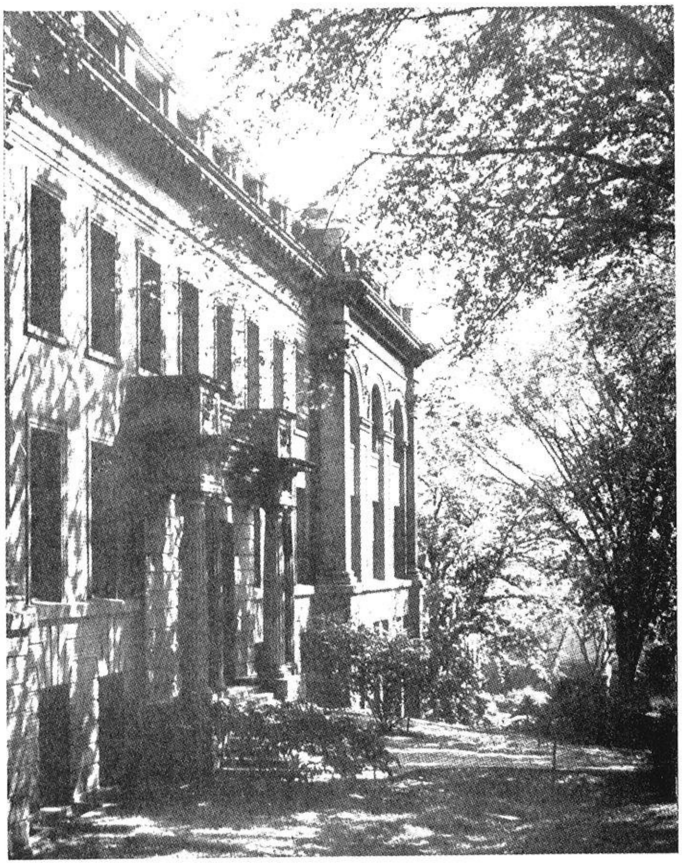

Education and Engineering Building

EDUCATION - ENGINEERING

The Education and Engineering building, or, as it is more commonly known by members of the faculty, the Old Engineering building, was completed and ready for use in the fall of 1900. At that time it was considerably smaller than it is now, the west wing having been added in 1910, when the expanding engineering courses required additional space.

The building was originally designed for engineering work exclusively, and until the new Mechanical Engineering building was completed in 1931, it was the center of all the engineering departments on the campus except chemistry. These included the Mechanical, Electrical, Topographical and Mining and Metallurgy departments. The gas products laboratory and the hydraulic laboratory were also located in the building. For many years, too, the Highway Commission of Madison had its offices there and maintained a testing laboratory in the basement. The building also has a colorful history as a social center and a gathering-place for convocations and general assemblies of the whole Engineering college. Before the Memorial Union building was made, the old Engineering building was the site of many teas and parties that were given for the engineering students and dancing was held in the corridors. These social functions were marked by close fraternization between faculty and students, for which the Engineering college has always been known.

The Old Engineering building, however, was just too small to accommodate all of the engineering departments on the campus. Since the enrollment in the College of Engineering has always increased faster than space and facilities could be provided to meet its demands, the courses given at that time soon became dangerously overcrowded. The completion of the new Mechanical Engineering building on University Avenue in 1931 provided room for the necessary expansion in the mechanical field. The gas products and hydraulic laboratories were transferred to the new location together with all of the equipment of the Machine Shop building, which subsequently provided space for the electrical laboratories and offices.

The last reorganization of the old building took place in 1940, when many more of the engineering classes moved out to the Mechanical Engineering building and the Education department moved in, hence the name of Education-Engineering as applied to this building is relatively new. Perhaps its most important function at the present time is that of headquarters of the freshman class advisors, although a great variety of subjects are represented. All of the engineering departments had their offices in the building at one time, but have gradually moved out until only the Topographical Engineering department remains completely in the building. The top floor and half of the third floor are occupied by the Drawing department, and the Mechanics department maintains its offices and testing laboratories in the basement.

An interesting detail concerning the construction of the building that all but a few of the older members of the faculty have no doubt forgotten is its position relative to the other buildings on Bascom Hill. While the Law building, North Hall and South Hall are built parallel to the sidewalks which converge toward Bascom Hall, the Old Engineering building was built parallel to State Street, a fact scarcely discernible except through close observation. This feature, together with its rich tradition and history in the College of Engineering, insures a lasting remembrance of the Education-Engineering building on the Wisconsin campus.

MECHANICAL ENGINEERING

The Mechanical Engineering building, the newest and most modern on the Wisconsin campus, represents the first step of a farsighted plan embracing the removal of the Engineering college from its present site on Lake Mendota to Camp Randall. In future decades this building will serve as a nucleus for several more engineering buildings which will be located near Camp Randall.

The completion of this building in 1931 represented an important milestone in the history of the Engineering college. Previous to that time the Mechanical Engineering department, which was by far the largest and best devel-

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FREQUENCY MODULATION

—Francis Hyland, ee'44

MORE and more now, the general public is hearing the term frequency modulation or F M as it is abbreviated. The chief reason why more and more stations and radios are adopting this new form of radio signal transmission is that noise is greatly reduced in this type of signal.

In F M the signal is put on the carrier wave by varying the frequency in proportion to the signal. The amount the frequency deviates from a center carrier frequency is proportional to the amplitude of the signal; the rapidity with which this frequency deviates back and forth depends on the frequency of the signal. The amplitude of the final modulated wave is constant.

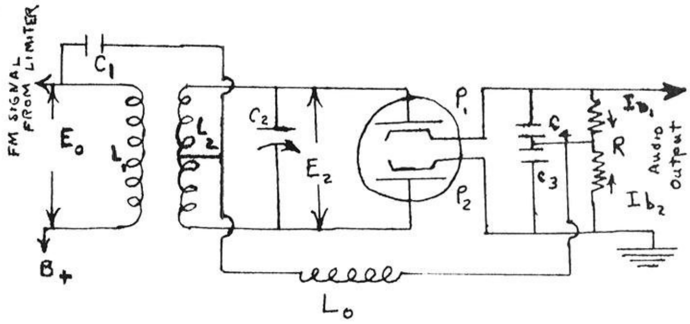
A brief discussion of one method of producing such a wave follows: Suppose we have an oscillator. The frequency of this oscillator depends on the values of inductance and capacitance in its resonant tank circuit; $f = \frac{1}{2\pi\sqrt{LC}}$ Now suppose it were possible to vary the condenser of the tank circuit in proportion to the square of the signal we wish to transmit. A hypothetical illustration of such a thing would be a solenoid coil connected mechanically to the tuning condenser in such a manner that the amount the capacitance changed was proportional to the square of the signal voltage across the solenoid.

Such a system is obviously impractical mostly because of the high rate with which this would have to move. It is possible to connect a tube in such a manner that the voltage across it and the current through it are almost at right angles as with a condenser. Thus the tube simulates a condenser. A tube connected in this way is called a reactance tube. The equivalent capacitance that such a tube can present can be varied by varying the transconductance of the tube. This can be done very simply by varying the bias to the grid in proportion to the signal wave. If this equivalent capacitance is shunted across the tank condenser of the oscillator the frequency modulated wave described earlier is produced. This wave can then be amplified, multiplied in frequency, and transmitted as any other wave would be. The frequency of transmission of F M stations is high; around 45 megacycles. The chief reason for this high frequency carrier is that F M requires a very wide band to transmit all signals. The band width allowed for commercial F M transmitters is 200 kilocycles as compared with ten kilocycles width for broadcast band stations. At forty-five megacycles, 200 k. c. is a relatively small percentage change in frequency. Since percentage deviation from center frequency is usually what determines whether the signal will be passed or suppressed in the receiver, this is a satisfactory arrangement.

Now that we have the F M signal on the air, let us now go to the receiver and see how this wave is broken down to produce the audio signal After the signal is received from the antennas, it is amplified by an R. F. amplifier, mixed with the voltage from a local oscillator, and amplified further by the I F amplifier at a reduced frequency as in any standard superheterodyne receiver.

Next the signal is sent through what is known as a limiter. This can be a pentode tube operating at saturation. In the limiter the top of all the waves are cut off to a constant level so that almost all of the noise which has been picked up by the modulated wave will be eliminated. Most noise amplitude modulates the wave. However the amplitude of all the waves coming from the limiter is constant. Thus the noise which in an ordinary radio would be amplified with the regular signal, is almost completely cut out by this simple device.

From the limiter the amplified, constant magnitude, F M voltage wave enters another device called the discriminator. A diagram of a discriminator is shown in the figure.



A brief explanation of its operation follows:

The full F M voltage E_0 is across the coil L_1. There is a negligible voltage drop at radio frequency across C_1, C_3

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BALONIUM

—Elizabeth Lean, ch c'47

DISCOVERY of a new element, number 93, has been revealed by several scientists here on the university campus. However, for reasons of personal safety, names of these researchers must be withheld for the duration. This new metal has been named balonium (BO) and has an atomic weight of -275 with eighteen empty orbits about the nucleus. Few definite facts concerning physical or chemical properties are available because such information is of great value to the enemy. It is known, however, that balonium lies in Group VI of the periodic table—following uranium—and behaves like tungsten in some reactions. As one of the radio-active elements BO shows the nuclear disintegration characteristic of this group. The end product is an isotope of lead, and the half-life of the substance is estimated at about .015683467 seconds. This short half-life accounts for the extreme scarcity of the element.

First indications of the possibility of such an element came when routine analyses of lake road dirt were being carried out by sophomore chemical engineers in the quant. lab. When one determination could not be dehydrated at Meker burner temperatures, the presence of a foreign sub--stance was suspected. Upon more careful analysis, an active constituent was revealed that held water in compound. The substance was finally isolated after months of intensive research and titled α Balonium per-bunkate. The great affinity this salt shows for water is now being utilized in several types of silver polish. From this complex salt, α balonium may be prepared by the reaction with suburynal nitro-selenium under definite conditions of temperature and pressure and in the presence of finally divided osmium on a wire screen.

This element is soluble in hot concentrated HNO_3 forming $BO(NO_3)x$ which crystallizes out on a smooth surface in sausage shaped agglomerates that glow in the dark. It is this peculiar configuration that caused its discoverers to give this new metal the name balonium. Under special conditions, a chain of these "sausages" has reached a length of three meters. If the crystals are grown on a green surface, they show maximum size of 10 microns in diameter.

Dirt taken from the lake road between Elizabeth Waters and the Navy barracks shows the richest percentage of the element. The ore is treated with a mixture of HCl and H_2SO_4, then precipitated with NaOH and the BO salts dissolved in excess HCN. This solution is subjected to fractional distillation, and the first fractions are combined with two secret organic acids to precipitate the α balonium complex.

Artificial balonium has also been produced through bombardment of phosphorous by electrons in a vacuum tube at a temperature of 128,356° C. Some medicinal values have been claimed for this substance.

Work on the vital element has been carried out through the combined efforts of electrical engineers, chemical engineers, and chemists. Special commendation goes to several members of the V-12 graduating class for their great help in making possible this work.

All enemy agents please take careful note of the above article. With expensive equipment, and vast research, they may find their own BO.

News Items--

A new type of bazooka has been designed by General Electric for use in the field artillery. It is known officially as "Rocket Launcher M12." The M12 is portable, weighs 35 pounds when loaded, and can be carried and fired by one man.

Looking like and as pliable as soft putty is a new synthetic rubber. This new synthetic rubber, however, still possesses its elastic qualities at temperatures as low as 60 degrees below zero and as high as 575 degrees above zero, revealed recently by General Electric.

Six frequency modulation radio transmitters, of which five will be installed on railroad locomotives and one on the site of the first world's scheduled broadcast will soon be forming the nation's newest communications network. (Released by Westinghouse.)

Alumni Notes

—Mel Sater, ch'45

Chemicals

ABIG, ALBERT, ch e'44, has transferred from the merchant marine to the navy. He recently visited Madison and is awaiting assignment.

COX, F. A., ch e'43, is with the Goodyear Synthetic Division and doing work with the Akron Chemical Service Engineering Division and in plant operation and development problems. Prior to this he was a materials analyst doing analytical work in connection with the Goodyear - California Development program and he was also with the Vega Aircraft Corporation as an engineering assistant.

SCHMALZ, HENRY H., ch e'42, has just completed boot training at Great Lakes. He has been assigned to radio technicians' school and will be stationed in Chicago. Before enlisting in the navy, Schmalz was with R.C.A. until May of 1944. He was married to Grace Roberts in April, 1943. Mrs. Schmalz formerly attended the University of Wisconsin. They have a son, Henry, Jr. Mrs. Schmalz and Henry, Jr., are now at Mt. Pleasant, Michigan, where they will stay as long as Henry, Sr., is in service.

SOIT, RICHARD H., ch e'44, is with the Shell Development Company as junior engineer. He is working with the petroleum process development.

LARSON, KENNETH R., ch e'43, was commissioned a 2nd lieutenant March 4, 1944, in the Chemical Warfare Service. He is now stationed at Camp Rucker, Alabama. His unit has completed training and is ready for maneuvers. It is the 93rd Chemical Battalion.

Mechanicals

BENFER, MAURICE M., me'27, who was formerly with the Consolidated Vultee, is now working as installer of cost control systems.

CAREY, THAIN, me'44, is with the research and development division of Bell Aircraft Co.

RASSMUSSEN, DONOVAN, me'44, is in the manufacturing training program of Standard Oil Company of California. He reports seeing Bob Taecker and other Wisconsin students there.

Civils

HOWSON DIES

Elmer Thomas Howson, ce'06, died September 1 in the Presbyterian Hospital, Chicago. He had been editor of Railway Engineering and Maintenance, editor of the Railway and Engineering and Maintenance Cyclopedia, western editor of the Railway Age, director and vice-president of the Simmons-Boardman Publishing Corporation, and the publisher of these and other railway publications.

Mr. Howson was born in Folletts, Iowa, May 23, 1884. He attended the University of Wisconsin and received his Bachelor of Science degree in civil engineering in 1906. While here, he became a member of Sigma Xi, honorary engineering society. He later received a full degree in civil engineering in 1914.

Before becoming editor of the Railway Age, Mr. Howson worked for the Iowa and Illinois and the Chicago, Burlington, and Quincy railroads, being division engineer on the latter. In 1911 he became the engineering editor of the Railway Age, later the name being changed to Railway Engineering and Maintenance. All this time he was interested in making known information about construction, maintenance, and engineering problems in the field of railroads. Mr. Howson was appointed editor of the Railway Engineering and Maintenance Cyclopedia in 1919, published three times each year.

Besides all his other activities, he has been a member of many clubs, societies, and associations. Among these were: American Society of Civil Engineers—president of the Illinois section in 1927; American Railway Engineering Association of which he was a director, chairman of its Committee on Co-operative Relations With Universities, chairman of its Arrangements committee; the Western Society of Engineers—president in 1924-25; president of the American Wood-Preservers' Association in 1932; chairman of the Program and Arrangements committee in 1921 of the Maintenance of Way Club of Chicago; the American Railway Bridge and Building Association, of which he was president in 1927; besides a host of others.

Mr. Howson, throughout his life-time, gave much of his energy and time and work to the public. He was a man of action.

Top Rankers

During the past semester, the following freshman engineers have ranked at the top of their class.

Second term:

HIGH HONORS

Young, R. G.	2.824
Hyink, Roy	2.813

HONORS

Leach, F. C.	2.722
Michaels, C. J.	2.611
Martin, C. F.	2.556
Shaffer, J. W.	2.389
Smart, E. D.	2.294

First term:

HIGH HONORS

Michael, R. G.	3.000
Slater, J. G.	3.000
Ullmann, W. A.	3.000
Wentorf, R. H.	2.889
Bump, L. D.	2.833
Gower, C. H.	2.833
Ryan, T. M.	2.833

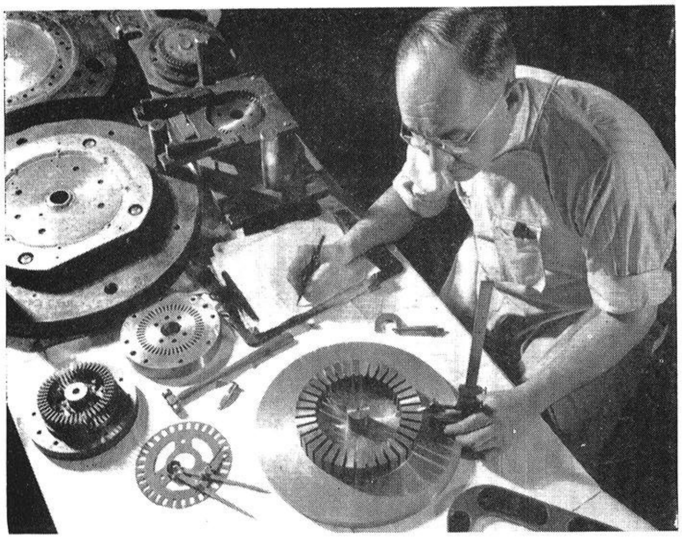
HONORS

Dalby, T. G.	2.722
Griswold, H. S.	2.722
Pahnke, A. J.	2.722
Price, J. R.	2.722
Carter, W. W.	2.667
Finken, W. E.	2.667
Tausche, P. E.	2.611
Fay, C. W.	2.556
Neitzel, R. E.	2.556
Rose, G. R.	2.556
Scofield, H. W.	2.556
Webster, T. C.	2.556
Bligard, E. J.	2.444
Marshall, W. E.	2.444
Scott, J. E.	2.444
Cox, H. C.	2.389
Montie, L. A.	2.389
Wick, J. F.	2.389
Johnson, D. M.	2.313
Gosewehr, C. L.	2.278
Scarborough, E. D.	2.278
Shafer, A. J.	2.278

Mass Precision

—Don Hyzer, me'46

AT ONE time or another all engineering students are required to take a course in mechanical drawing. Different machine parts are drawn in one part of this course. Some of these parts, if they were made, would be precision parts with accuracy according to the specifications put on the drawing. The draftsman's work is only the beginning of a long train of events which ultimately leads to the production of precision machine parts.



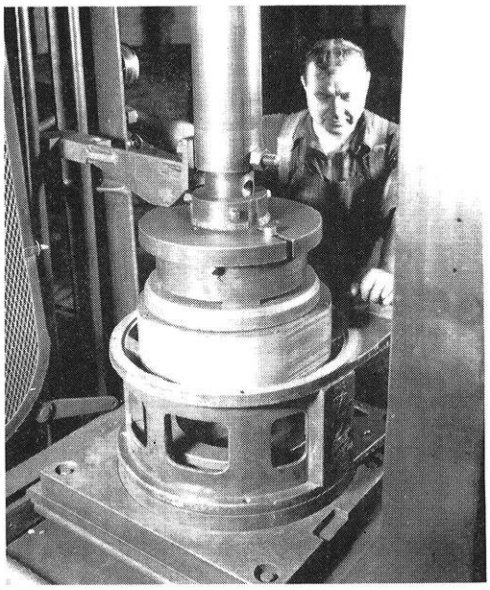
THERE'S SKILL IN THOSE HANDS and precision in the instruments as a Westinghouse craftsman checks dies for accuracy.

Years ago each precision part was made individually and fitted in its place by a skilled machinist. Once a part was fitted it could not be installed on any other machine and when a new part was needed the factory or repairman had to make it separately.

Today this is all done by mass production and with such accuracy that every part fits any machine. "Mass production" is a phrase defined by Lieut. General Knudsen as "fabrication of detailed parts so accurate that they go to final assembly and into the assemblies without reworks."

Thousands "of detailed parts so accurate" that even with careful inspection very little difference could be found between any two of them. How accurate is this "so accurate" which must be attained to make possible mass production?

Take an average human hair which has a thickness of 0.025 inch and start dividing it in half. Do this until you have divided it eleven times. The piece left after the eleventh division is the size of error commonly tolerated today and is equal to 0.00001 inch. Or perhaps you say it is easy to divide something eleven times. If you start with a twelve inch piece of paper, by the time you have cut the remaining piece in two eleven times the last piece will measure 3/512 inch in size.

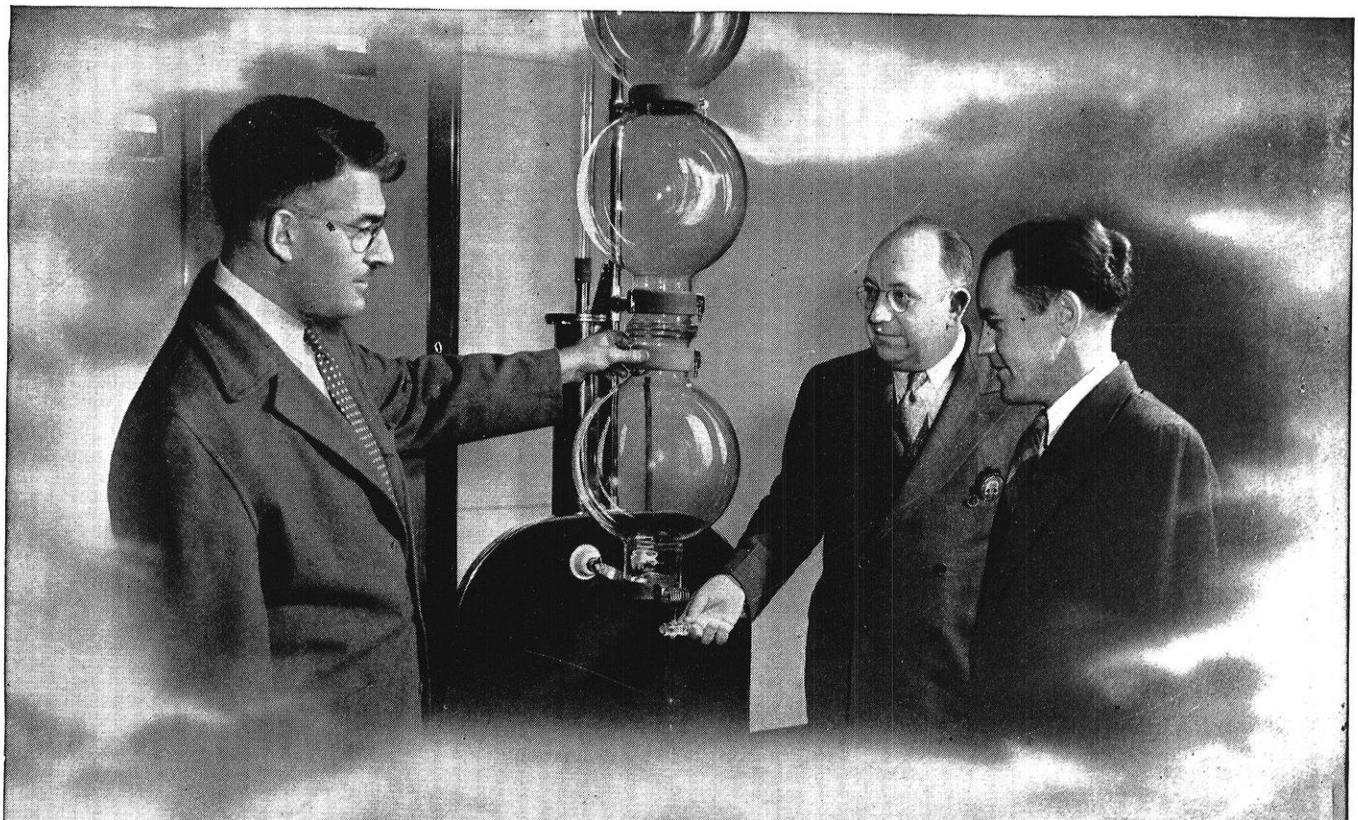


LARGE PARTS . . . Frame and core have been so accurately machined that they can be assembled into a mechanical unit by pressure of a hydraulic press — no bolts, no rivets.

A few years ago only the most skilled machinist could get accuracy of 0.00001 inch with ideal conditions, but today with modern machines even unskilled workers can achieve it. The accuracy which is hard to get today but will be gotten commonly in the future is 0.000001 inch.

With such accuracy our factories are putting together

(please turn to page 29)



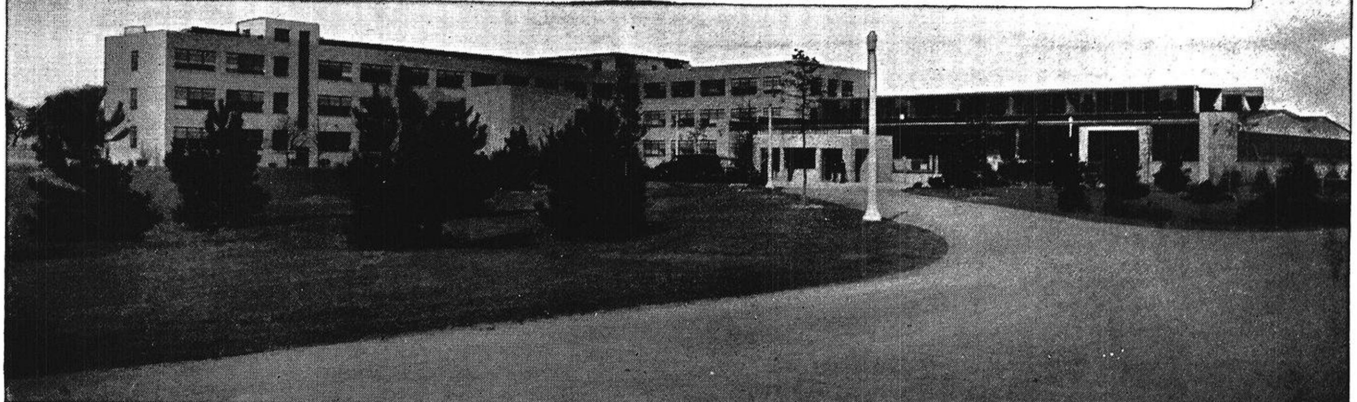
New RCA Penicillin Process Speeds Production!

TODAY, when the wonder-drug penicillin is so vitally needed on the fighting fronts and in the home-front sickrooms, the Radio Corporation of America reveals that a revolutionary method of production has been perfected in RCA Laboratories.

Tests at the Squibb Penicillin production center at New Brunswick, N. J., show that a single RCA electronic installation can concentrate two billion Oxford units of Penicillin in 24 hours—enough to administer 100,000 individual doses.

Besides streamlining the elaborate evaporation method, the new RCA Electronic system includes these important advantages: reduction of operation costs, lowered maintenance costs, less possibility of mechanical difficulties and production delays, great savings in floor space, and impressive reduction in initial equipment costs.

The new RCA electronic dehydrator of penicillin is shown here in regular operation at the plant of E. R. Squibb & Sons.



RADIO CORPORATION OF AMERICA

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

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

S-T-A-T-I-C---

—Fran Tennis and
Bob Clayton

Hello, all you die-hards who are still hoping this column will get out of the rut. The odor even got Tennis and now yours truly is carrying on as well as possible. Don't worry —he'll be back and the jokes (?) will again take on their usual color and flavor. Now let's look over this month's crop . . .

•

Doctor: "How's the patient this morning?"

Nurse: "I think he's regaining consciousness. This morning he tried to blow the foam off his medicine."

(One of Shorty's regular customers, no doubt.)

•

She: "I'm really an old-fashioned girl."

He: "Is that a fact?"

She: "Indeed—it's my favorite cocktail."

•

Policeman (to woman driver): "Use your noodle, Miss, use your noodle."

Menace to Society: "My goodness, where is the noodle? I've pushed and pulled everything else in here."

•

Then there was the gay young lad who became slightly inebriated and was brought before the local magistrate for trial. When asked how he came to be in such a condition, he replied that he got in bad company. It seems that he had a bottle of whiskey and the other three didn't touch the stuff.

(What sad, sad sacks.)

•

Communique No. 1 from Navy Barracks:

"The boys in our barracks caught twelve rats last night. One of our traps is missing."

(Looks like even the V-12 is getting into the spirit of the war.)

•

The bomber, after a tough run over enemy territory, was approaching its base. The pilot had just given instructions for the crew to prepare for landing when the engineer rushed up, obviously agitated. "Sir," he said, "we're almost out of gas, and I just discovered that our landing gear has been shot away."

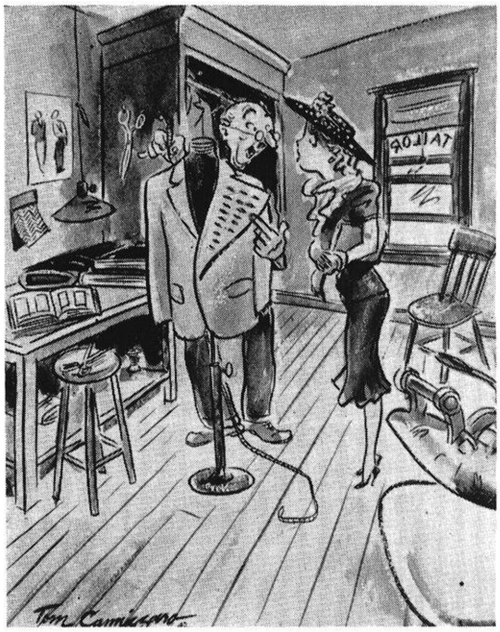
The pilot hesitated a moment, then turned to the bombardier. "Hey, George," he shouted, "we're out of gas and we've lost our landing gear. You'd better stick your feet out of the bomb bay and run like hell."

We have heard that love is the only game that is never called because of darkness.

On the contrary!

•

For all you engineers who arrive at class without breakfast, this column introduces the new Kentucky breakfast. It is light, compact, and portable. The one and only course consists of a quart of Bourbon, a bull dog, and a steak . . . (the dog eats the steak).



"This style features a buttonhole — identification badge, Army-Navy-E badge, Red Cross badge, Blood Donor badge, Red Cross, etc., etc." (Westinghouse)

A tramp was sleeping behind a bunker on a golf course when the club secretary, prowling around, kicked him none too gently.

The tramp jumped to his feet and demanded, "Who are you?"

"I'm the secretary of the club," replied the official.

"Well, that's a hell of a way to get new members," said the tramp.

(please turn to page 32)

FIRE CONTROL . . .

(continued from page 9)

only for the present instant and will not be quite correct when the shell lands.

It can be seen that it would be next to impossible to make all these calculations necessary in as short a period of time as is available. Practically all the work is done by a precise computing machine called the rangekeeper. The required data is supplied to it from many sources. The instantaneous range comes from rangefinders located in each turret. The ship's course is given by a gyro-compass, and its speed by the speed indicator system. Both of these values are supplied electrically. An estimate is made of the wind velocity and direction and this set manually on the rangekeeper. High up in the mast of the ship is the spotter. He controls an instrument called the director which measures the relative bearing of the target to the ship and the deflection of the target. He sets the vertical wire of his telescope on the target and keeps it on. The horizontal wire is set on the target level at the midpoint of the ship's roll and left there. The spotter also judges target speed and observes where the shells hit. This data is transmitted electrically to the rangekeeper where all the corrections and settings are made. Compensations have to be made for muzzle velocity loss due to gun erosion and changes in powder temperature, air density and other non-standard conditions.

The rangekeeper sends out, electrically, an order that sets a pointer for elevation and one for deflection at the turret trainer's station. There are also two pointers connected to the gun itself which will coincide with the first two when the gun is aimed correctly. The gun is fired by the spotter when the ship reaches the middle of its roll.

This is but a brief discussion of the problems involved in fire control. When a hit is scored by a battleship, it is the result of the leadership and judgment of fire control and gunnery officers, the coordination of the entire personnel, and a remarkable feat of practical engineering.

Eager Audience

CAMPUS NOTES--

—Mae E. Zimmerman

Overheard by an engineer . . .

two freshman girls arguing in Bascom Hall—one declaring it was North Hall, the other swearing it was Education and Engineering.

Roses and a new pair of pants . . .

to Eddie Daub, V-12 engineer and Wisconsin cheerleader. His spirit really sends them. Let's not get too anxious, Ed—you know what happened the last time!!!

And then . . .

there's the time yours truly got excited in a calc final and carried the square root of one through the whole problem.

Speaking of exams . . .

What would college be without 'em!! . . . Am I kidding????

Balonium . . .

Ever heard of it? (See article on page 15.) Well, we hadn't either until one bright ee taking chem 2a decided to inform an unsuspecting freshman about a new discovery the chem department had made with its 93rd element called balonium. Ah, balonium . . .

And then there's the story about the "poor little puddy tat" . . .

A dog this time . . .

visited the psych class during the final exam, wandering around looking at the papers. If only dogs could talk!

Any volunteers . . .

to work on the WISCONSIN ENGINEER? Come on, you V-12's, especially civils and mining and metallurgicals. But everyone will be welcome. Let's hear from you!

The editor and business manager . . .

attended an E.C.M.A. convention with Professor Van Hagan at Northwestern University on October 7, expenses paid. During the day, there were discussions of editorial and business problems with a business meeting, all of which was followed by a banquet at the North Shore Hotel. Everyone had a fine time, even to the V-12 from Marquette who miscalculated and found himself in the fish pond. Any missing goldfish in the shrimp cocktail were not noticed.

New semester . . .

new faces and old faces, new and more work. Welcome back to those who have just returned after a four months' rest and glad to see the rest of you again.

Lucky engineers . . .

who will find themselves going to classes on the 23rd while L&S take the day off to relax. What's the occasion? Remember? It's Thanksgiving Day!

Get your stockings out . . .

in preparation for the visit of good old Saint Nick who will be here in less than a month. Better start being good so he can fill out his list of the newest slide rules and wrenches. Don't forget to sew up the toes, and stretch them out to hold a little more!

M.E. smoker . . .

opened the winter semester for MESW on November 7, election night incidentally. Officers for the new term are:

President: William Wendt
Vice-president: John Koetting
Secretary: Irving Weinberg
ASME treasurer: Ted Schweitzer
SAE treasurer: Robert Maas

ENGINEERING BUILDINGS . . .

(continued from page 12)

oped department of engineering on the campus, had undergone slow and torturous growth because of lack of room and facilities, and was broken up among several different buildings. In 1920, the Randall Shop building, better known as the old Sawtooth building, was completed and provided space for limited expansion.

In 1927, when the cramped condition of the Engineering college demanded badly needed room, the State Legislature appropriated $577,000 for the new Mechanical Engineering building. This appropriation was held up for a considerable length of time by the refusal of the governor to sign the bill, and the governor was subsequently accused of playing politics with the State University. The appropriation finally came through, however, and the building, when completed in 1931, relieved the crowded conditions of the other departments of engineering.

The meeting and display lobby in the front part of the building extends through two floors to form a balcony on the second floor. This space satisfies the great need for a general meeting lobby for technical meetings and conventions where models and sections of engineering apparatus can be placed on display for the benefit of students and public alike. The wall space is used for photographs and drawings, and a Wright Whirlwind Motored Fighting Type Aeroplane now hangs from the ceiling for exhibit purposes.

The sophomore, junior, and senior drafting classes are located on the third floor, and the Machine Design department has a thirty by forty foot laboratory in the basement under the Steam Laboratory work room, where tests of power transmission and machine design are conducted. The Steam and Internal Combustion Engine Laboratory is in the east wing and extends two stories in height from the first floor. This department has a five-ton crane to facilitate movement of steam and gas units for various tests, and special data tables are provided for each large machine. Located conveniently by are the wash rooms, locker rooms, apparatus storage rooms, tool rooms, and the work shop. The Automotive Laboratory is in the basement under the south end of the east wing, and has an electric dynamometer mounted on a movable truck which operates on tracks provided in the concrete floor to facilitate shifting from one engine set-up to another.

In the rear portion of the former Randall Shop is located the Heating, Ventilating and Refrigerating Laboratory because of the good solid floor necessary to support the movement of heavy wall sections used in test work. Adjoining this section is the Boiler room, which extends two stories in height from the basement floor level, and has both heating and power boilers for testing purposes. The modern machine shop is located on the first floor of the west wing and has passing through it the only elevator in the building, which serves as freight elevator for the whole building and as a service elevator for the foundry. The foundry is on the second floor at the rear of the west wing and extends through the third floor to the roof of the building, and the conveying and pouring of molten metal is done by an overhead crane. Adjoining the foundry is the Carpentry Shop Laboratory and nearby is the Pattern Shop Laboratories where the students make patterns for casting moulds which are later made in the foundry. Also located in the building are the Forging Laboratory, Welding Laboratory, Sheet Metal Laboratory and the Mechanician Repair Shop.

One of the greatest needs of the Engineering college in the last several years has been space and facilities where research could be carried on by students and faculty. Such accommodations are provided by the new building and it is hoped that all branches of Mechanical Engineering will benefit by increased research.

We wish to extend our gratitude to:

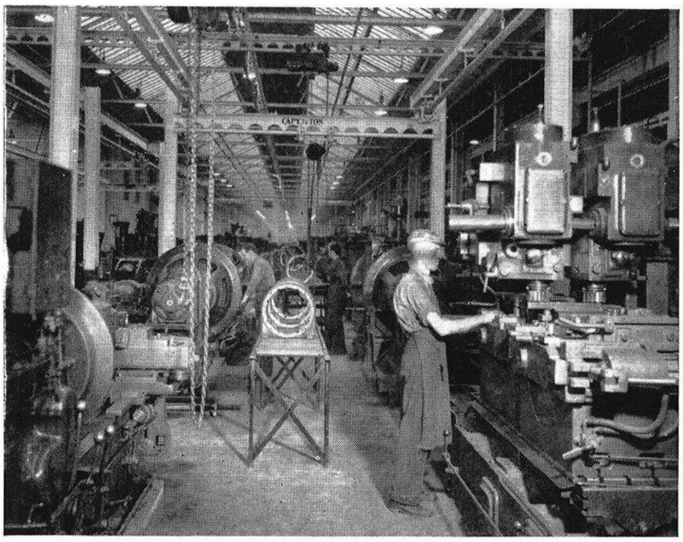
DEAN MILLAR
MR. WILCOX
PROF. OWEN
MR. DUFFEE
PROF. G. L. LARSON

in giving us the needed information for this article.

MASS PRECISION . . .

(continued from page 18)

the tanks, guns, and airplanes which are rolling off the assembly lines today. Tomorrow these same factories with



MOTOR WINDING. Chain-wound coils are fitted into the insulated, partially enclosed slots of the stator. End turns are securely taped.

greater speed and accuracy will be producing cheaply prefabricated houses, family airplanes, and all articles to make the lives of all people worth living.

—Cuts courtesy Westinghouse.

SYNTHETIC FUELS . . .

(continued from page 9)

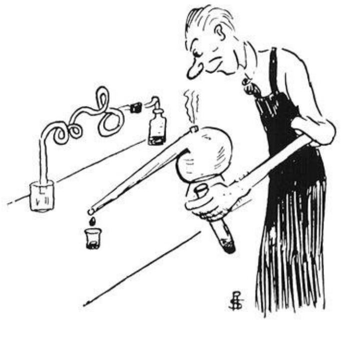
remembered that the liquid hydrocarbon obtained by this process is simply a by-product.

In the Bergius hydrogenation process, hydrogen is added directly to the coal to reduce the carbon hydrogen ratio, which breaks down the complex molecules and increases the amount of organic material convertible to oil. German production by this method is estimated to be about thirty million barrels per year, while the Billingham plant of the Imperial Chemical Industries in England produces about a million barrels per year. Gasoline made by the Bergius process has an octane rating of 70 to 75, which can be raised to 90 by the addition of tetraethyl lead; however, satisfactory lubricating and diesel oils have not yet been produced from this process.

In the Fischer-Tropsch method, water gas made from coal is converted to a gas composed of carbon monoxide and hydrogen. These gases are passed over suitable catalysts to produce hydrocarbons. This process produces poor gasoline, but yields a good diesel fraction with an octane number as high as 100 to 120. At present, about 63 gallons of gasoline can be obtained from a ton of coke. Both Germany and Japan have made extensive use of this process.

Shale oil seems to be the most promising of the petroleum substitutes, and our shale resources probably will be developed in the near future. The shale oil supply should provide enough fuel for another fifty years.

While it is not yet necessary for this country to use synthetic gasoline, it will be necessary to keep abreast of the European countries who are concentrating their efforts toward the development of synthetic fuels.

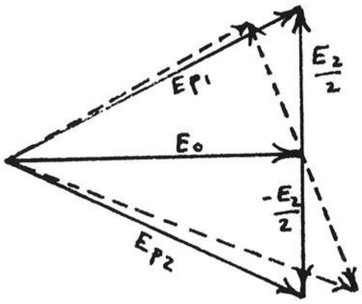


What happens now?

FREQUENCY MODULATION . . .

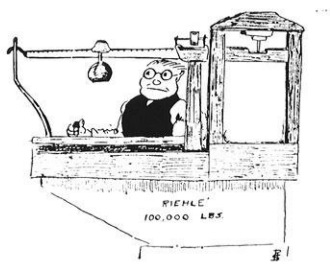
(continued from page 13)

and C_1. Thus the full F M voltage E_0 is also across L_0. To this voltage is added vectorially the voltage from the respective half of the coil L_2 to obtain the voltage E-p of each plate. When the frequency is that to which the circuit L_2-C_2 is tuned the voltage E_2 across L_2 is 90 degrees out of phase with E_0. The vector diagram shows how the voltage of each half of the coil L_2 is added to E_0 to obtain the respective plate voltages, E-p_1 and E-p_2. Since these two voltages are of the same magnitude, the currents I-b_1 and I-b_2 will both be the same and towards the midpoint of resistance, R. Thus no voltage will be developed across R.



When the frequency shifts, the L_2.C_2 circuit is out of tune and the voltage E_2 shifts in phase with respect to E_0 as shown by the dotted line on the vector diagram. This causes the magnitude of the plate voltages to be different and thus the current through the respective halves of R to be different. Thus a voltage is developed across R. This voltage is proportional to the shift in frequency of the input wave. The voltage across A then is a regular audio voltage which is amplified by a regular audio amplifier and reproduced in the loud speaker.

We have now completed the journey of the original audio signal which was changed to an F M wave at the transmitter and then changed to an audio signal again in the receiver.



Accuracy

Take It or Leave It--

THE engineer is continually making decisions—sometimes they are forced on him, other times they are not as eminent. Yet they are decisions—each one important. One of the first he had to make was the matter of education. Was he going to take it or leave it?

The average engineer, on entering college, is faced with mixed emotions. Two paths lie before him. Let us call them A and B. The signpost on A carries the motto, "Do not mix pleasure with business." It is a wide path and those who travel it are never faced with bills for midnight oil. The person who emerges from here after eight semesters is the "know-all," the egotist. Path B points toward success. The path is narrower. The bill for midnight oil is higher. At times the path runs into A with a chance for fun and relaxation, but soon again B winds away. From this path emerges the person with the well-rounded, broad education.

Which path he takes depends on his ideas of education and the advantages and disadvantages of storing something new in the old "bean." He can take either path—or he can leave either one. He can take his education with him—use it and apply it in his future decisions. With this basis he can be the engineer of tomorrow. Or he can leave it—leave it behind in the dust at college. He could not even be the engineer of yesterday!

The decision is now up to you. Are you going to take it or leave it?

In Memorium

Little has been left unsaid in the way of tributes to Allen Shafer. But to the many tributes made to him, we wish to add ours. He was our friend and classmate, a freshman in the College of Engineering. Many of us knew him, if not in classes, on the football field. And everyone who did not know him had heard of him.

His spirit will always live with Wisconsin football teams. He fought clean and hard in the game that he loved. He died when he was young, but it was while he was doing something he wanted to do.

Allen Shafer won't be forgotten here at Wisconsin. He will live on, on the football field, in the classroom, in the hearts of those who knew him. It is our hope that we may carry on in the traditions and in the true spirit of Allen Shafer.

STATIC . . .

(continued from page 20)

The perpetual drunk was wending his way home from one of his nightly orgies and came face to face with a lamp post. After two or three unsuccessful attempts to get past, he sat down on the curb, muttering, "Just have to wait here until the crowd passes."

•

There was once the vaudeville agent who was telephoned at 4 a.m. at his private number by a very British voice that explained itself:

"Sorry to disturb you at this hour, but you see I just got off the boat after a frightfully sticky passage. It was a terrible trip with everything blacked out because of the submarines and all. I've been on the stage for years and always most appallingly successful. I've a most unusual act."

The agent rubbed the sleep from his eyes and asked: "All right, all right—what's the act?"

"Oh, I just come out and talk," replied the voice.

"Talk?" said the agent. "Monologues are dead."

"Not monologues," said the voice, "nothing so formal. I just talk—the alphabet, multiplication tables, headlines of the day—whatever comes to mind."

The agent began to yell: "You mean to tell me," he said, "that you phoned me at this time of night with a proposition like that? Hang up and stop wasting my time."

"But," said the voice, "you see, I'm a dog."

(Congratulations to all you patient people that lasted through that one.)

—Westinghouse

He'll soon be here, kids!

Daffynition—Barracks: A row of beds surrounded by crap games.

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Itch: Itch is something that when you are standing at attention your nose always.

(And not always your nose either, eh boys?)

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A hobo won't work. If he won't work, he's a politician. If he's a politician, he gives away cigars. If he gives away cigars, he lights them for you. If he lights them for you, he is a cigar-lighter. If he is a cigar-lighter, he won't work, and if he won't work, he is a tramp.

(Yeah team. We managed to get back where we started from.)

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If a man tries to kiss a woman and gets away with it, he's a hero. If he tries and doesn't get away with it, he's a brute; if he doesn't try but would get away with it had he tried, he's a coward. And if he doesn't try to kiss her and wouldn't get away with it if he did—he's a wise man.

(And doesn't go to this University!)

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An egomaniac of note was the G.I. who was returning to the U. S. from foreign duty and remarked as he passed the Statue of Liberty:

"Put down your torch, honey, I'm home."