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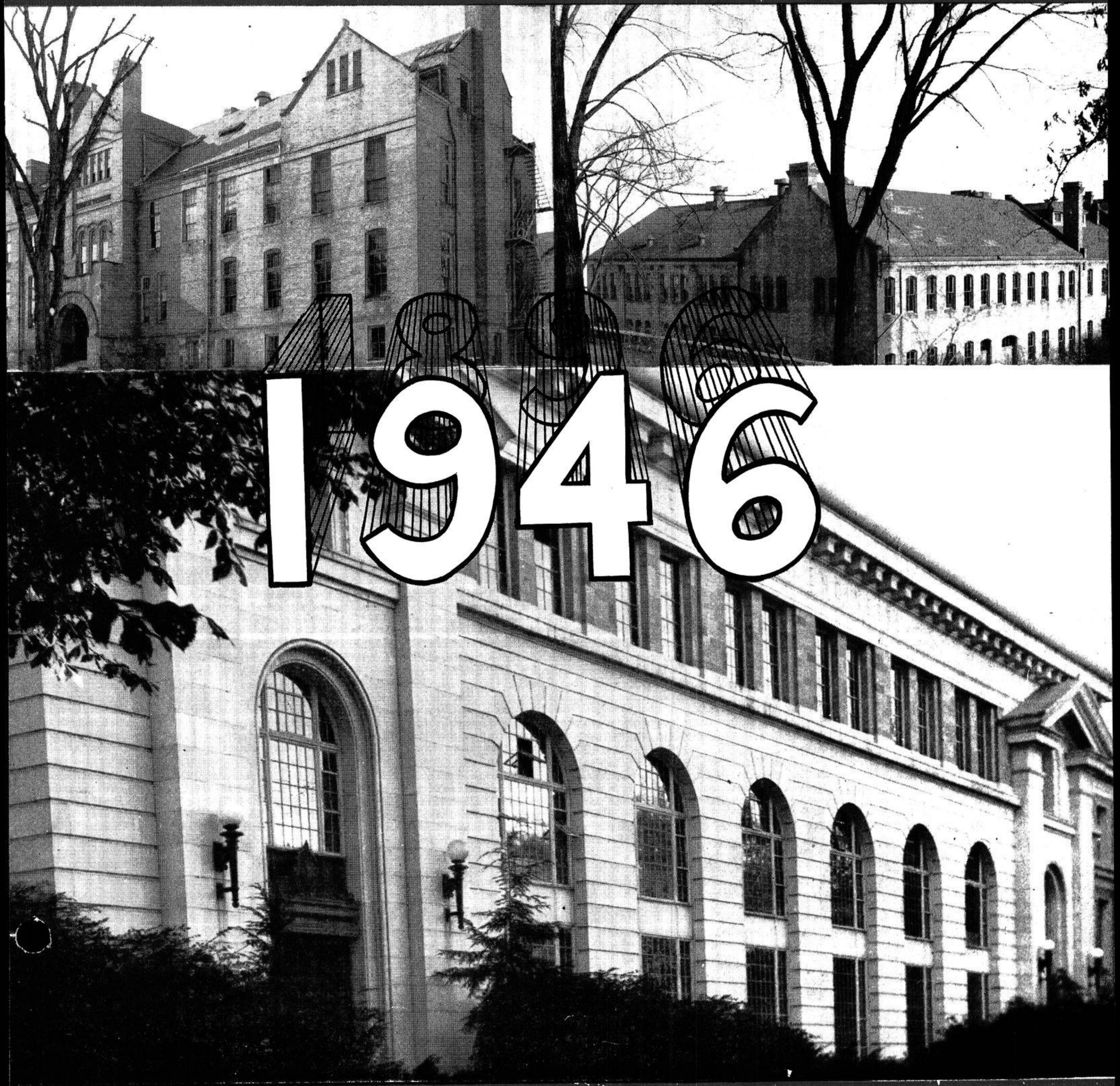
WISCONSIN ENGINEER

December, 1946



MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

WISCONSIN ENGINEER

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Volume 51 DECEMBER, 1946 *Number 3*

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

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In This Issue . . .

COVER:

For fifty years the WISCONSIN ENGINEER *has represented the Engineering College. During this time it has seen six engineering buildings completed and outgrown. Today, even these are inadequate and we await our new Engineering Building.*

From the Editor's Pen--

A MERRY CHRISTMAS AND A HAPPY NEW YEAR! Just a couple of little words that we so often repeat the last few weeks each year, but why limit these thoughts to the Christmas season?

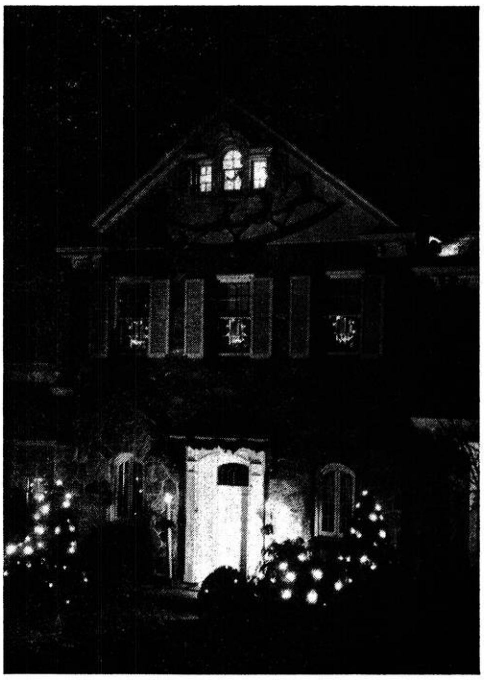
It was only a few years ago that most of us sat in our history class studying the causes and effects of World War I, the war to end wars, only to go to a current events class the next hour to review the latest events of the Chinese-Japanese war, the Ethiopian war, or the Nazi threat in Europe. No, it hardly made sense to us at the time.

Today we are just returning from the worst war in history, another war to end wars. Are we going to make that statement come true this time?

A year and a half ago the Allied nations were still fighting against a common enemy in the Pacific, when they started arguing over occupation in Europe. The surrender terms aboard the Battle Ship Missouri had hardly been signed in the Pacific when the Chinese civil war broke out. Is this the way we are to work together to "END WAR"?

Perhaps we are working from the wrong view point, or perhaps we have been raised with the wrong spirit. Remember a few years ago when you waited anxiously for Christmas Eve and Santa Claus to bring those presents? Those last few weeks before Christmas you were often cautioned to be good, don't fight, etc., or Santa might leave an empty stocking? Yes, we followed this advice and were exceptionally good, but oh my, the day after Christmas did we tear loose; a whole year before we had to be good again. Yes, a few weeks of kindness each year and then it's all forgotten. Even in war we saw the same idea, a one day, "cease firing", for Christmas, and then hard at it again. As I write this article the soft coal workers are all sitting idle while our industries are shutting down, and we are turning off lights and lowering the temperature of our rooms. Oh, it will probably be settled by Christmas, or at any rate they will call a one day truce in the argument so that everybody can exchange good wishes and presents or gather around to eat a good meal for Christmas, but the next day all will be back to the old, an eye for an eye, routine.

Thus it would seem that we all recognize Christmas as a day of great love and charity, but why must we limit



this spirit to a few weeks each season? The BABE born in Bethlehem on Christmas day didn't limit his works to a few weeks each year, yet too many of us today are inclined to remember Him and His neighbor but one day per year.

You and I, the college student of today, will be the Engineer, Business Man, Politician, or what have you, of tomorrow. We will be looked upon as the leaders of this grand country of ours, but are we going to be worthy of that position? Are we going to be the narrow minded individualist who takes all obtainable in his path through life, letting the remains fall where they may, or are we going to carry a little of the Christmas spirit of love and charity for our fellow man with us daily, so that our children may live in a world built upon the principle of, "Peace on Earth, Good Will Toward Men".

The Engineer; - - Yesterday and Today

by Emil Kasum e'48

VARIOUS articles in this issue depict the gradual development of the Engineer through fifty years of continuous publication. Beginning as a small obscure quarterly, the magazine has evolved as an internationally distributed monthly. In accord with such progressive changes the entire College of Engineering has expanded from a single building on the lower campus until now it occupies six buildings.

During these fifty years the Engineer has been an integral part of student activities. By expounding new technical advancements, reporting activities, and leading campaigns it has helped bring due recognition of the College on the Campus. In keeping pace with technical improvements, the important factor of increasing prominence of the engineering profession has not been overlooked. From the classification of college-trained mechanics, the vocation has become a recognized body of leaders who are responsible to society for present and future progress. This rise in eminence is probably the greatest single development throughout the years of the Engineer's publication.

The present large influx of students, the greatest in the history of the College, affords great opportunities not only to the students as future engineers but to the whole engineering field. The broader viewpoint of the present more mature student body causes it to realize the importance of the fact that no matter how important one's vocation seems it should not exclude everything else. By contact with lower classes, trends in thought and outlook common now can become traditional behavior in generations of classes to come. "Arsenals of Democracy", a phrase coined to describe the vital role of American Industry during the last war, could very well be affixed to our classrooms, laboratories and meeting places. The phrase should be analyzed for besides the obvious meaning, the stocking of the world's larder with more and better comforts of life, there is the demand for proper direction and organization of that larder.

Responsibility, the price of eminence, must be assumed by engineers rather than to expect their efforts to be automatically utilized for the greatest benefits to mankind. The present and future world calls for engineers not only highly proficient in the use of slide rules and drafting boards, but those that will be men and will take their rightful place as leaders. Engineers must be able to understand the needs of those about him and be able to direct their special talents towards the highest possible state of satisfaction of those needs. In so doing the engineering profession will merit the mantle of leadership and responsibility bestowed upon it.

The next fifty years of the Wisconsin Engineer will undoubtedly witness great strides in technical advances—and matching strides in engineering social consciousness.

The Second Twenty-five Years

by Prof. L. F. Van Hagen

THIS is a brief and, admittedly, an inadequate review of the events of the second twenty-five years in the history of the WISCONSIN ENGINEER. A review of the first twenty-five years appeared in the issue of the magazine for May, 1921, at the close of Volume 25. The present review picks up the story beginning with Volume 26, in the years 1921-22.

The second twenty-five years began in the Roaring Twenties, carried on through the Depression Thirties, and ended in the decade of the Warring Forties. It has been a rough quarter of a century.

At the beginning of the period, the College of Engineering was housed in the old Engineering building on the upper campus and was a compact group of faculty and engineering students, with a strong feeling of solidarity, which made the problems of getting subscriptions and delivering the magazine comparatively simple. During the Thirties, the college became scattered widely over the campus, a fact which has made the problems of circulation difficult to solve.

In the year 1922-23, the college had an enrollment of 1163 students. In that year, the paid subscriptions were as follows:

Faculty	70
Alumni	314
Students	586
Libraries	23
Miscellaneous	39
Total	1032

Subscriptions were on a voluntary basis, and student subscriptions were comfortably over fifty per cent. Under present conditions, such a percentage seems beyond attainment.

Various devices have been tried in an effort to maintain a proper ratio of subscribers to student enrollment. The "Polygon Plan" was put into effect in the fall of 1934. Polygon is a co-ordinating body whose purpose has been to unite the efforts of all student groups in handling all-college activities such as dances, picnics, expositions, and parades. Each of the various engineering societies elects representatives to the Polygon Board. The Polygon Plan provided for a student fee which was divided between the student societies and the Wisconsin Engineer. The plan proved to be about 80 per cent effective and raised the ratio of subscriptions to enrollment far above what had been attained on the voluntary basis. This plan continued in effect for a number of years, until members of Polygon became imbued with the idea that they were doing all of the hard work, while the Wisconsin Engineer reaped all of the benefits. That put the Engineer back on the basis of voluntary subscriptions.

An effort was then made to follow a practice that is in effect in a number of engineering colleges, whereby each student pays an "activity" fee, along with his other registration fees; said fee to be allocated to the Wisconsin Engineer. In the spring of 1941 the student body voted approval of the plan, but the regents of the university, who were then planning to abolish all special fees, rejected the plan.

Later the regents agreed to pay the cost of sending the magazine to all of the public high schools in the state, and this plan went into effect in the fall of 1945.

One of the most colorful events of the period was the feud between the Wisconsin Engineer and the Badger, the student year book. A growing resentment against the policies of the Badger Board came to a head in December, 1931, when the Engineer published an editorial denouncing the Badger policies. Bob Van Hagan, editor, and Jack Strand, manager, for the Engineer led the embattled engineers in a revolt against the Badger, with the result that the engineering societies refused to take space in the Badger of that year. Instead, the societies took space in the "First Annual Year Book Supplement", which was published in the May, 1932, number of the Wisconsin Engineer. The feud continued for four years, and the Year Book Supplements appeared in the May numbers for 1933, 1934, and 1935. In 1936, the Badger surrendered, and an arrangement was made whereby the engineering societies took space in the Badger, which in turn supplied the Wisconsin Engineer with reprints of the Badger pages that appeared in the May numbers for 1936 and 1937. The Year Book Supplement did not appear after 1937, but in May, 1942, there was a reappearance of similar material bearing the title, "The Professional and Social Organizations in the College of Engineering." It was a sporadic effort and has not been repeated.

The first appearance of color in the magazine was in October, 1925, when the cover was a color job. C. E.

Johnson was manager, and Harry C. Wolfe was editor. Every cover throughout that year was in color. The first modernistic cover appeared in January, 1931, under the editorship of Ted Perry. J. H. Lacher was manager.

The first double-page color spread appeared in the issue for January, 1944, and showed "Dive Bombers on the Deck of Carrier X." Donald E. Niles was editor and Don Caldwell, manager.

In spite of the turbulent decades through which it has come, the Wisconsin Engineer has not had financial worries since it climbed out of its debt thirty years or so ago. Business was good in the Twenties. As a member of Engineering College Magazines Associated, the magazine had access to national advertising. In addition, it cultivated the business of local advertisers successfully. The magazine not only built up a comfortable surplus; it felt so secure that it deposited $1,000 with the regents as a Wisconsin Engineer Loan Fund for engineering students.

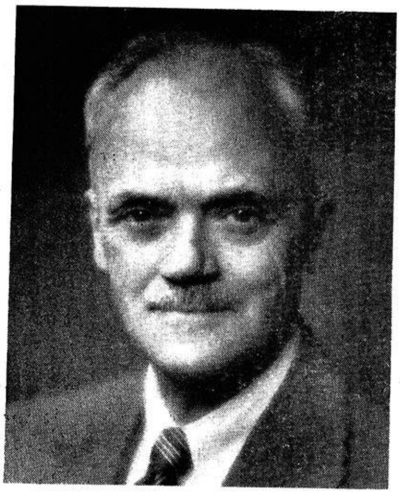
The Depression Thirties were another matter. For ten years or more, the magazine lived on its accumulation of financial fat. Each year it operated in the red. Fortunately its surplus, accumulated through the good years, was sufficient to carry it through to the easy money of the war years.

There was serious argument over the proposal to discontinue publication during World War II. Fortunately, the decision was to continue publication. By May, 1939, national advertising had dropped to a low of 2¼ pages per issue, but it picked up rapidly from that low. By May, 1940, it was 5¼ pages; by May, 1941, it was 6 1/8 pages, and by May, 1942, it was 10½ pages. The tax laws of the country were so framed that industry was stimulated to spend a good deal of its war income for advertising, and college magazines profited by the policy. The Wisconsin Engineer was able to build up its reserve in readiness for whatever the future might bring.

Although the war period was profitable for the magazine, it did bring some worries. The problem of staffing the magazine was acute, and the turnover was so great that the wonder is that the magazine appeared at all. The most unorthodox situation arose in August, 1944, when the editor was a woman student, June Hartnell, and the manager was an American Japanese, Toru Iura! Toru did not last long; the draft got him soon after his appointment as manager, but June stayed until she was graduated in 1946 and established the record of being editor for five semesters. Her unselfish and effective efforts should keep her memory fresh among the friends of the Wisconsin Engineer for a long time.

The draft was no respecter of printers, and that caused trouble at the shop where the Wisconsin Engineer is printed. Shortages of printers and of paper disrupted the schedules for the appearance of the magazine. It was not uncommon for the January number to appear sometime in February or March, or the October number to appear in December.

At the moment of writing, the shooting is over, but officially the war has not ended. Neither have the troubles of a publisher ended. The Third Twenty-five Years is off to a rough start.



Prof. L. F. Van Hagen

Prof. Van Hagen became faculty advisor to the Wisconsin Engineer shortly after the beginning of the first World War and has held that position ever since. During this period of time he has served as chairman of Engineering College Magazines Association, while in his undergraduate days he served as Art Editor of the Sphinx (predecessor of the Octopus).

The Engineering School *and* Campus Expansion

by Dean M. O. Withey

The essential features as given at the Milwaukee meeting of A.S.C.E.

THE main function of the College of Engineering is to furnish high-grade instruction to the interested youth of the State in the arts and sciences of the principal Engineering professions. Through its instructional function the College has long been established among the leading engineering colleges of the country. Its enrollment has rapidly increased from 400 in 1900, to 1600 in 1942, and this fall the enrollment has overtaxed our facilities with about 3400 students. In addition to the undergraduate and graduate instruction on the campus, there are nearly 1300 students receiving engineering instruction, mainly at the undergraduate level, in extension centers. Predictions from reliable sources indicate that the enrollment will remain at a much higher level than the war figures of the early forties.

A second function of the College is the prosecution of research both as a necessary part of the instructional program at the senior year and graduate levels and also to provide authentic knowledge for engineering design. Through its instructional program the college staff has published 86 bulletins and 124 reprints besides numerous technical papers embodying the results of researches. However, the industries of the State which are becoming more numerous and the major source of income are increasingly insistant that more aid be given them by the College in the solution of their many technical problems.

The inadequate laboratory and classroom facilities in the Electrical, Chemical, and Civil Engineering departments and the crowded conditions in other departments have frequently been publicized. To meet these needs $2,000,000 has recently been allocated, through the efforts of President Fred and the Board of Regents, for the construction of a new Engineering Building on the Camp Randall site. This building should be made large enough to house the three departments mentioned and the Drawing and Mechanics departments. By such procedure the overcrowded conditions on the "Hill" campus will be considerably relieved and the separated units of the College will be properly united. Owing to the steadily increasing cost of buildings, the sum granted is about half what is required to provide adequately for these five departments.

Construction of the proposed building can be accomplished without interference with existing classroom space. When completed as planned, it will provide:

1. Laboratory space sorely needed for instruction and research.
2. An auditorium seating 800, which would be available to other departments outside of the College.
3. Release of space on the "Hill" campus sufficient for 30 additional classrooms.
4. Fifty additional classrooms in the new building.

By the combination of items 3 and 4, other departments of the University would have available for their use about 50 classrooms, nearly half of the present number on the campus. Indeed, there is no single item in the proposed list of University capital expenditures which, in the writer's opinion, will bring relief from the present crowded conditions to as many persons as will the immediate construction of the proposed Engineering Building. Therefore it is highly desirable to push to a rapid completion the entire building even though prices are unduly high and an increased appropriation will be required.

To implement an expanded program of engineering research and to promote a closer tie with our industries, a request is being made in the University biennial budget that the Wisconsin Engineering Experiment Station be established with an appropriation for each year of the next biennium.

Whereas the Faculty of the College of Engineering are keenly aware of its primary responsibility to provide an excellent education in engineering for the youth of the State, it will welcome enlarged opportunities to cooperate with industries when personnel and facilities are available for that purpose.

Do You Know Your Slide Rule?

by Walter Graham, B.S., me'44

Editor's Note: Mr. Graham explains here the slide rule solution of problems of the type; $x^x=k$, $a^x=x^b$, tan x=kx and sin x=kx, so get out your slide rule and follow him.

THE purpose of this article is to present methods for solving equations of the above type by log log duplex slide rule operations.[1] These equations can not be solved by simple algebraic methods whereas rapid solutions to ordinary slide rule accuracy are found as outlined below. The methods are analogous to slide rule solutions of quadratic and cubic equations.[2]

Consider first the equation $x^x = k$. Let us solve for $k = 81.4$. Place the right hand index of the C scale over 81.4 on the LL3. Now note the relationship between numbers on the LL3 scale and the C scale. (eg. place the hairline over 5.8 on LL3. The 4.0 on the C scale shows that $(5.8)^{1/0.4} = 81.4$. This is analogous to ordinary division on the C and D scales. Note the reading on the CI scale of 2.5, the reciprocal of 0.4 on C. This shows that $(5.8)^{1/0.4} = (5.8)^{2.5} = 81.4$ but the latter exponential is of the form $x^y = k$.) This suggests that if we find the same number on the LL3 and CI scales we will have the solution $x^x = k$. This is found rapidly to be 3.505 ± 0.005. It should be noted that a mental approximation or a sketch will greatly facilitate the solution and avoid erroneous results. eg. $3^3 = 27$, $4^4 = 256$ so our solution must lie between 3 and 4. The erroneous result that $15.9^{1.59} = 81.4$ is avoided by making the approximation since the CI scale does not indicate the fact that the decimal is at 1.59 and not 15.9. Another example of this type . . . $x^x = 1.77$: This is solved on the LL2 and CI scales to give $x = 1.472$. This method fails if $k > 22{,}000$. If $0.692 < k < 1$ it is necessary to put the slide in upside-down making a BI scale of the B scale. Then solve using the red LL scales and the BI scale. eg. $x^x = 0.71$: We find two roots $x = 0.507$ and $x = 0.241$. There is no real solution if $0 < k < 0.692$.

Consider next the equation $x^a = b^x$ where "a" and "b" are given constants. This can be written as $(x)^{1/x} = (b)^{1/a}$ (by taking logs of both sides, dividing by ax and rewriting as an exponential). The $(b)^{1/a}$ is readily evaluated on the LL scales. We observed in the previous case that "x", a number taken on an LL scale, was raised to the 1/y power where "y" was the number appearing above "x" on the C scale. eg. $(5.8)^{1/0.4} = 81.4$. $(5.8)^{1/4.0} = 1.552$. $(5.8)^{1/40} = 1.0450$, the result being taken on the LL scale determined by the decimal of the "y" taken on the C scale. It is seen then that if we find a $y = x$ we are raising $x^{1/x}$ and solving our problem. (Note that moving along the hairline from one black LL scale to the next raises or lowers the number by a tenth power. eg. $(81.4)^{1/10} = 1.552$ $1.0450^{100} = 81.4$. On the red LL scales this factor is 100. eg. $0.98^{100} = 0.132$.

Let us solve $x^{16} = 2^x$ (see Fig. 1). Write as $(x)^{1/x} = (2)^{1/16} = 1.0443$. First note that the positive root must be some number greater than 1.0443 since a number greater than 1.0 to a power equal to its reciprocal will be a number less than itself. Place left hand index of C under 1.0443 on LL1. (It normally would be there from raising $(2)^{1/16}$). Find some number near 1.0 (see Fig. 1), but greater than 1.0443, on both the LL1 and C scales. This gives $x = 1.0464$, one solution. The other root is seen from the sketch to be a negative number just more positive than $^{-}1.0$. Examination of the given equation shows that the x^{16} will have the same value for positive and negative "x". 2^x, however, must be evaluated on a slide rule as $1/2^x$ ("x" now taken as positive) for negative values

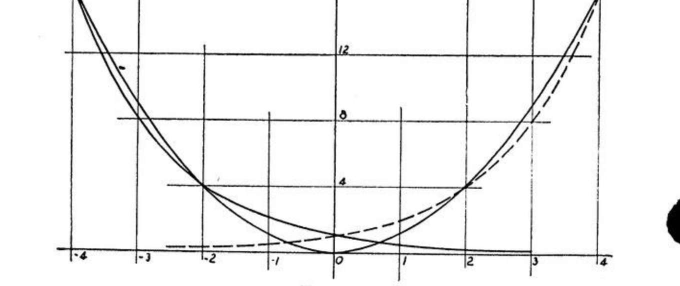


Fig. I

of "x". Therefore solve $x^{16} = 1/2^x$ and take negative of solution. $(x)^{1/x} = 1/1.0443 = 0.9576$ (the latter value is somewhat critical and should be found by long division). Using the LLO and B scales $x = {}^{-}0.9592$, the other root.

Solve $2^{-x} = x^2 = (x)^{1/x} = 2^{-1/2} = 1/2^{1/2} = 0.707$ (see Fig. 2). Reason here that the positive root will be somewhat greater than 0.707 but less than 1.0. Using LLOO and B scales we find $x = 0.767$. To find the negative roots (which in this case are evident by inspection), note that we can solve $2^x = x^2$ and take negatives of solutions owing to the symmetry of x^2 and 2^{-x} about the Y axis. This argument is equivalent to the argument of signs used in finding the negative root in the above example. Solving $(x)^{1/x} = 2^{1/2}$ we get $x = 2$ and $x = 4$. The solutions to the given problem are then $x = 0.767$, $x = -2$ and $x = -4$. The importance of the sketch (Fig. 2), which indicates that there are three roots, is apparent.

Solution of $e^x = -x$ is illustrated in Fig. 3. Here we solve $e^{-x} = x$ and take negative of solution. e^{-x} is read directly from the A scale to the red LL scales. eg. $e^{-1} = 0.367$ $e^{-0.02} = 0.9802$ $e^{-0.2} = 0.8187$. We can read $e^{-0.567} = 0.567$. Therefore $x = -0.567$.

In practice equations of the trignometric type are more common.[3] These are slightly more difficult to solve owing to the limitation of the trig scales to 0 to 90 degrees.

Consider $\cos x = ax$. Solve where $a = 0.21$. See Fig. 4. First we write $\cos x/x = 0.21\pi/180 = 0.003665$ where we read x in degrees. Place the 0.003665 of C scale over left index of D scale. Read 74.2° on cos scale and 74.2 on D scale This is one solution. (Note that the cos 74.2° appears as 0.272 on the other side of the slide on the C scale, the ratio $\cos x/x$ appearing on the C and D scales without our computing the value of the cosine). The cos x at "m" equals the sin y which is an angle 90° smaller. If we take a number on the sin scale, add 90 to it, and find that sum on the D scale we will have the second solution. It is well to estimate the root from the sketch to approximately orient the hairline. (Estimate –120°). Adding 90 to 24.85° on sin scale we find 114.85 on D scale, giving the second root, $x = -114.85°$. The interesting fact that the readability attainable by these methods is the better of the two

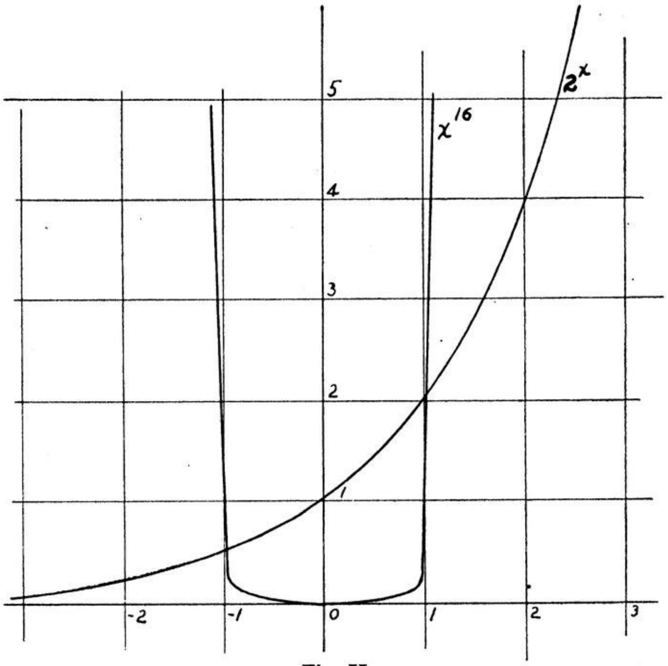


Fig. II

scales involved is particularly apparent here. The "coarser" scale is something of a vernier for the "finer" one. For the third root, at "n", we take cos z (see Fig. 4) and add 180 for identity on D scale. This gives $x = -217.3°$.

To solve $\sin x = x/4$, write $\sin x/x = \pi/(4)(180) = 0.00437$ where x is in degrees. Place 0.00437 of C scale over left index of D scale. Read $\cos z = \sin x$ (see Fig. 5) on cos scale, add 90° to "z" which must give "x" on D scale. Estimate answer from sketch at 145°, solve for $x = \pm 141.8°$, the negative root from the symmetry of the problem. $x = 0°$ is also a root.

A problem involving the tangent is illustrated in Fig. 6. We have $\tan x = x/2$ or $\tan x/x = 0.008725$ where "x" is in degrees. We can read the angle "z" of the tangent scale and must add 180 to it for "x". It is clear from Fig. 6 that "z" is between 45° and 90° and the tangent will appear on the CI scale instead of the C scale. Therefore we must use the CI and DI scales. Place 0.008725 of CI over left index of DI. Read $z = 64.95$ or tan plus 180 gives 244.95 on DI. The next root equals "y" plus 360 and will be close

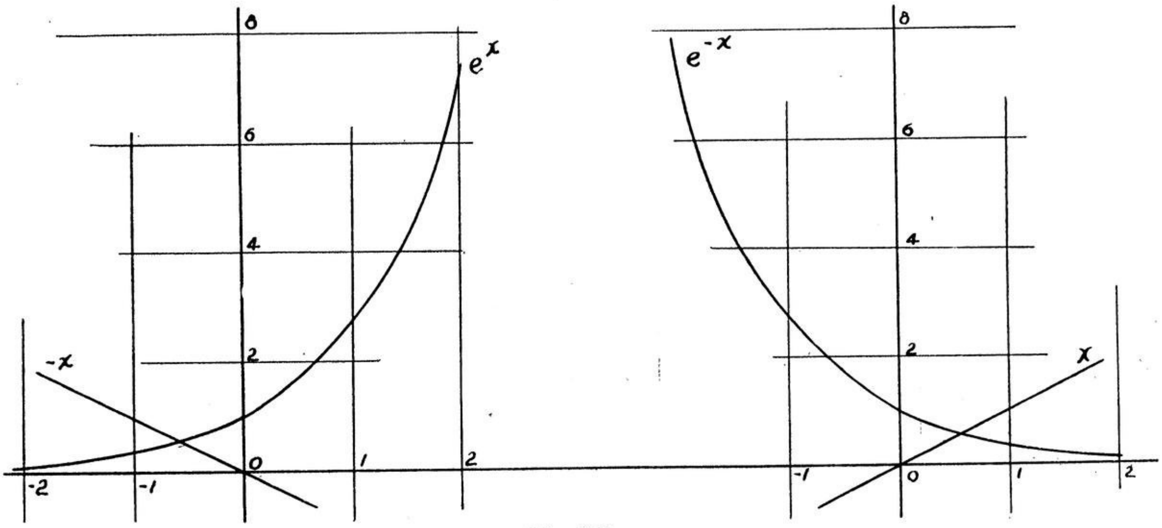


Fig. III

to, but less than 450°. We get x = 435.3°. The next root is 619.51° ± 0.02. For roots greater than 84.3° + 180 n (where n is a positive integer) it is necessary to use the ST scale and read 4° as 86°, 5° as 85° etc. eg. for root at intersection of curve through 6π we solve w + 6 . 180 = w + 1080 = x and "x" will be just less than 1170. Reading 84.36° on ST scale and 1164.36° on DI we have a root that really looks remarkable for a slide rule. x = 1886.52° is the intersection of x/2 with the tangent curve through 10π. Fig. 6 shows that x = 0° is a root as well as the negative of each of the positive roots.

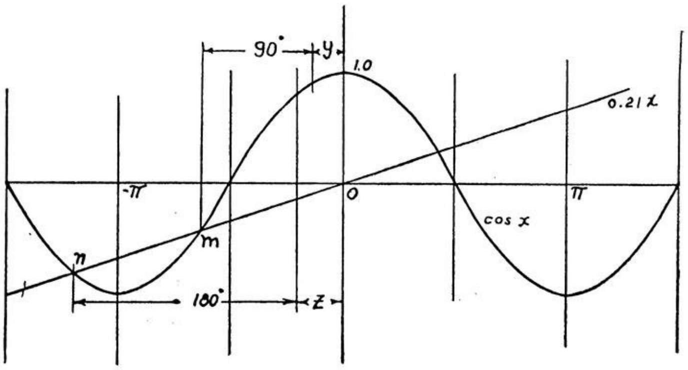


Fig. IV

Lastly consider an inverse function, csc x = 1.5 x which we write as csc x/x = 0.0262. To read the csc at the point "m" (see Fig. 7) we treat the sin scale as a csc scale but remember that the value appears on the CI scale. eg. csc 30°, placing hairline on sin 30°, and reading on CI gives 2.0. To solve then we proceed as in the case of tan x between 45° and 90° by taking our ratio on the CI and DI scales. Setting 0.0262 of CI over left index of DI we read 49.9° on sin scale and 49.9 on DI scale. For the root at point "n" we will work with the cos scale and add 90° as in previous problems in this quadrant. Note from Fig. 7 that this root will be near 180° and it will be necessary to move the 0.0262 over the right index of the DI. Reading 76.78 on cos scale and 166.78 = x on the DI we find the second root. For the third root we read on the sin scale but must add 360°. x = 365.99°. We expect the next root very close

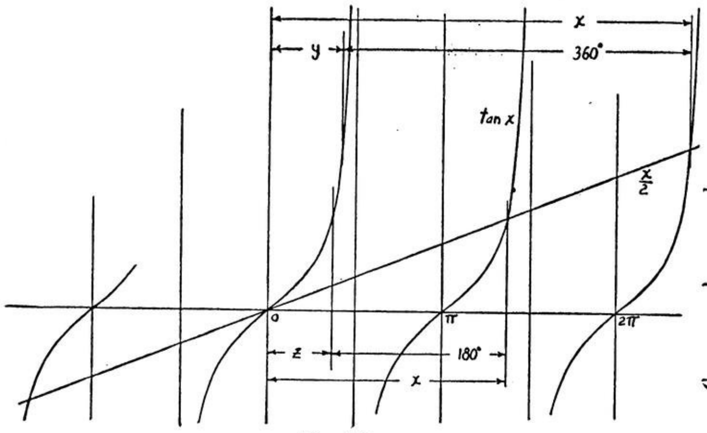


Fig. VI

to 540°. We would add 450° to the cos scale but the cos scale ends at 84.25° which gives a maximum "x" of 534.25°. The fact that the root is between 534.25° and 540° becomes apparent when we try to solve as we did for "m". Therefore we observe that the sin of an angle between 90° and 180° equals the sin of 180 minus that angle. We take sin (180 – z + 360) = sin (540 – z) see Fig. 7, where "z" will appear on TS scale. Solving x = 540 – 4.08

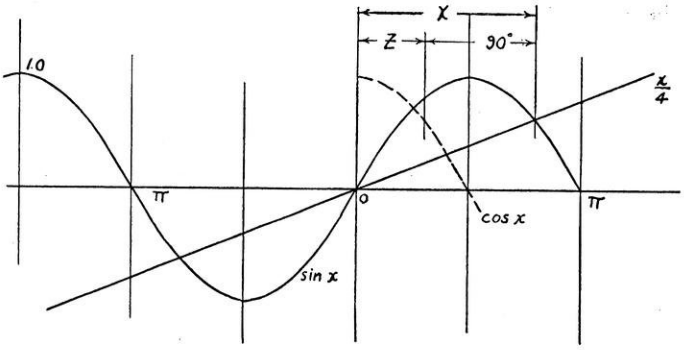


Fig. V

= 535.92°. There is a negative root of the numerical value of each positive root. Any of the six trignometric functions equal to ± kx or ± 1/kx can be solved by analogous procedure.

The use of two slide rules or one slide rule and a table will extend this principle to more complicated equations but the solution is less direct.

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1. The reader who is not familiar with the use of the log log, inverse, and trignometric scales is referred to the Keuffel and Esser slide rule manual.

2. see Graphical and Mechanical Computation by Lipke.

3. see Cauchy, Memoire Sur La Theorie Des Ondes Oeuvres S 1 V 1 p 204-212.

see R Ruedy "Vibration of Power Lines in a Steady Wind". Can Journal Research V 16A 1938 p 147.

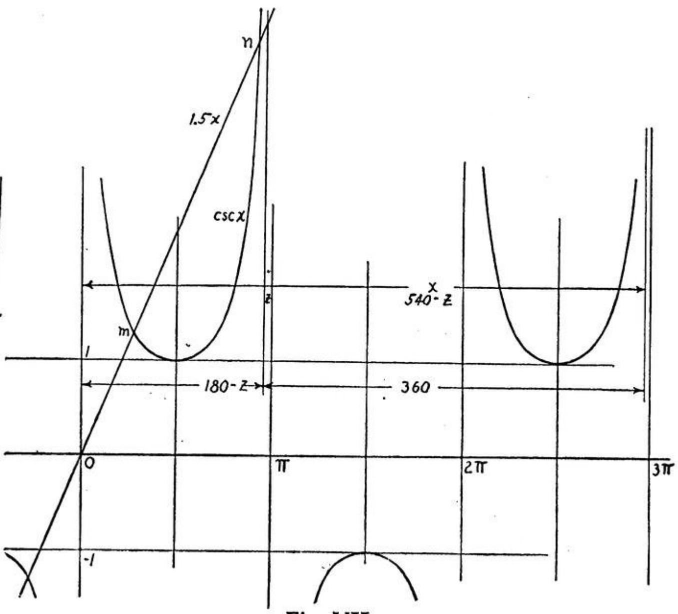


Fig. VII

The Engineers' Ball

by John Tanghe e'47

IF you looked carefully at the large slide-rule mounted above and behind the orchestra you probably noticed that the numbers under the indicator weren't those normally found on the C, D, and K scales. In place of the usual digits found there, a very practical-minded decorations committee had substituted co-ed phone numbers—Peg, EW 4136, Jane, F. 3204, and Mary, B. 4423, were the pleasant digits.

This huge slide-rule, mounted before a silver curtain and played on by an array of soft red and blue spotlights, formed the focal point of the decorations at the Engineers' Ball, semi-formal dance sponsored by Polygon Board and held in Tripp Commons at the Union on Saturday evening, November 23. This dance, first big social event of the semester for the Engineering School, brought together 125-rhythm-minded engineers and their dates who danced from 9 to 12 to the music of Eddie Lawrence's band.

During the intermission, midway through the evening, Harlan Skatrud, president of Polygon Board, introduced Master of Ceremonies L. C. Rall of the Economics Department, who in turn introduced Dean M. O. Withey, Dean of the College of Engineering, and Prof. C. H. Sorum of the Chemical Engineering Department, honor guests of the evening. After a few jokes full of "digs" against the lawyers, Mr. Rall opened the contest to choose the "Slide-Rule Queen" from the girls attending the dance.

Six girls selected by Polygon Board members from the dancing couples were lined up and exposed to the keen and sparkling eyes of Messrs. Rall, Withey, and Sorum, who acted as judges. The six girls in this preliminary judging were: Dorothy Milbrandt, Virginia DeGolier, Mrs. Doris Stueber, Margaret O'Brien, Charlotte Dance, and Jean D. Wells.

The judges then narrowed the contestants down to three (Misses Wells and Dance, and Mrs. Stueber), and from these the audience selected, by clapping, Mrs. Stueber as "Slide-Rule Queen". Mrs. Stueber, wife of H. C. Stueber, M.E. graduate of 1944 but now attending Law School (tsk, tsk!), was presented with a Sterling Silver compact as token of her regal position as beauteous "Slide-Rule Queen."

This all-engineering dance was arranged and put on entirely through the efforts of Polygon Board, the 10-man board composed of two members from each of the five engineering societies on campus. Ed Ansell was general chairman, Norm Stickney was in charge of tickets, John Krehbial handled publicity, and finances and arrangements were directed by Ed Hillery. Harley Skatrud is president of the Board.

Modern Logging Practice

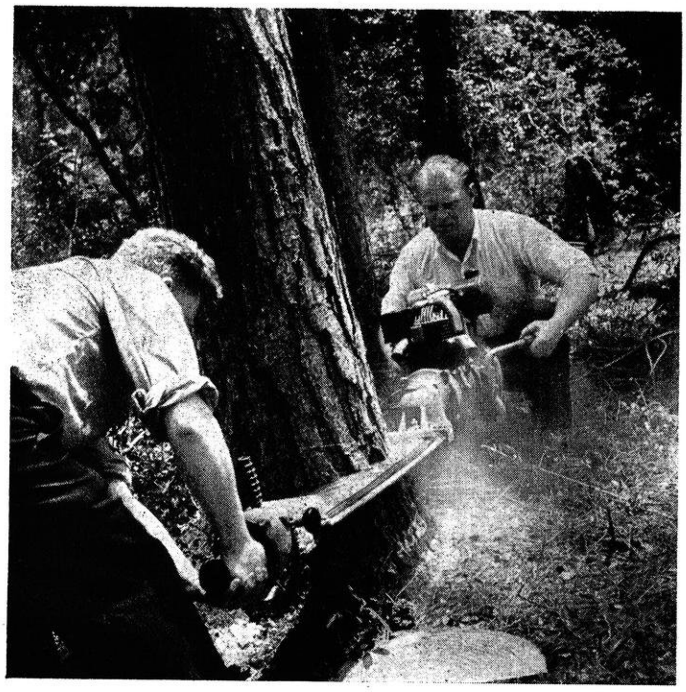
by Robert J. Mitchell m'48

This is the first of two articles on logging and lumbering. The second will follow the operations in a modern mill.

FEW men have more or knottier problems to solve than our lumbermen in the forests — the loggers. Few groups of men have had more numerous and unbelievable tales erected about them. The stories about our old-time loggers have grown largely from the tasks that they have undertaken and performed.

A good example of logging legend is that of Paul Bunyan and his big blue ox, Babe. Paul, tiring of the conventional ways of logging, hitched Babe up to forty acres one day, hauled it into the mill, and felled it practically into the mill pond.

The present day logger must be satisfied with something short of Paul's technique, however, due largely to the fact that animal husbandry apparently has gone backward rather than forward, since his time. The problems before the loggers are still the same, however: Get the timber down, out to the roads, and to the mills—cheaply.



Chain Type Power Saw
—Courtesy U. S. Forest Products Lab., Madison

Felling:

Felling the timber is the simpler of the three stages in most cases. More care in the cutting has complicated this process beyond that of a very few years ago. The realization that our timber reserves were not unlimited has forced selective cutting, careful directing of the fall, and narrower access lanes upon the lumbermen.

The progress of cutting equipment has taken place in three major steps: The axe, crosscut saw, and the power saw. The latter is a very recent development which was precipitated from isolated use and experimentation into general use by the wartime labor shortage. Essentially, the power saw is either a chain-type or circular saw which is driven by a lightweight gasoline or electric power unit.

The chain-type saw, driven by a light, air cooled gas engine, is the most widely used. The saw itself consists of a number of flat links which are made into an endless chain. Each link embodies one or more teeth which extend outward in the plane of the link. This endless tooth-chain is sprocket-driven and is guided on its circuit by a flat steel blade, on whose periphery the well lubricated links travel. The engine was developed largely from designs used in outboard motors. Such saws are said to yield about five times the cut possible to the same two operators with a conventional cross-cut saw. The labor itself is actually lighter, leaving the men in better condition physically and mentally at the end of the day.

The circular felling saw is usually more cumbersome and is mounted on some sort of transporting equipment. Since portability is an essential feature of the power saw, such types are less desirable.

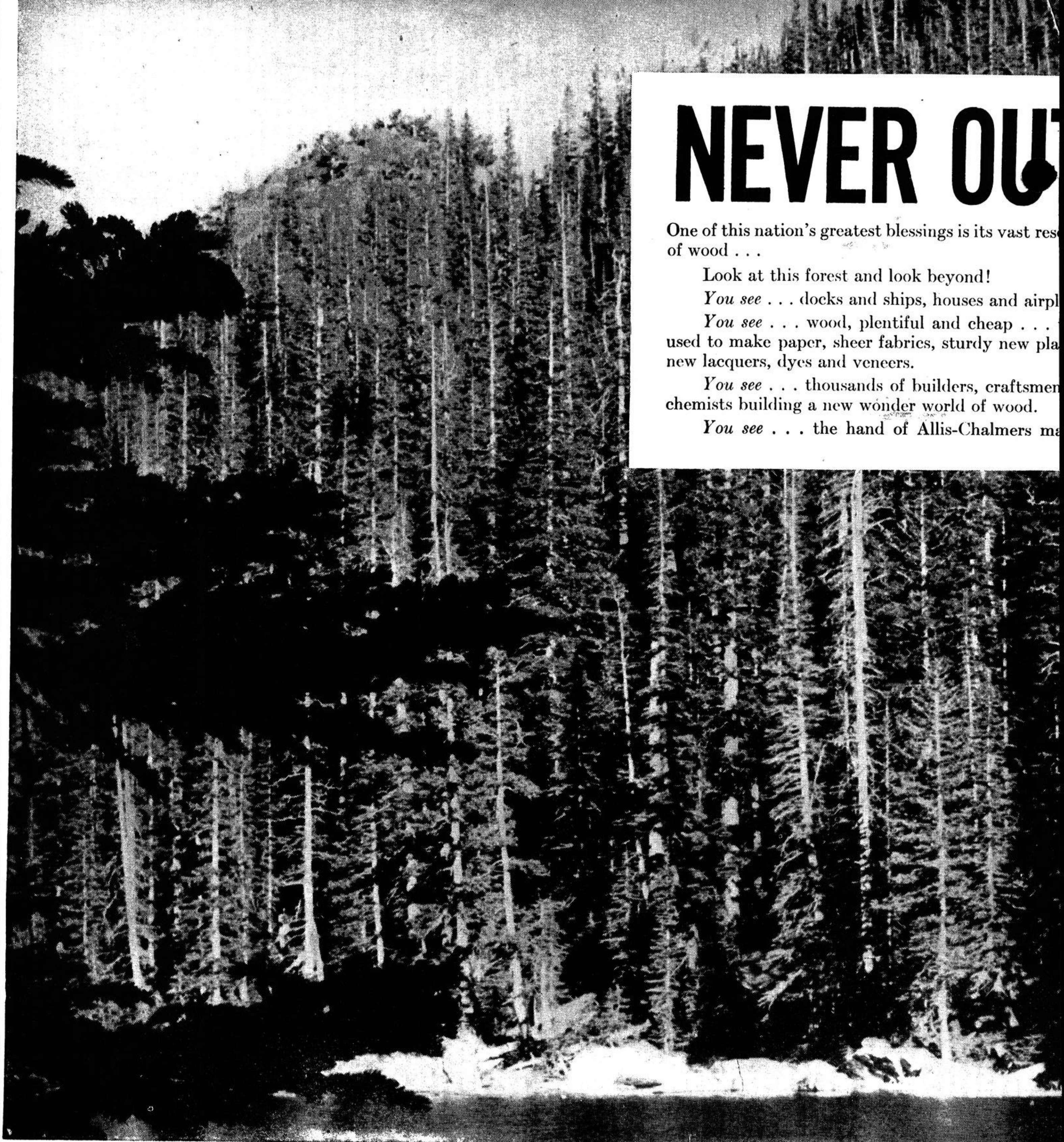
When a tree crashes to the ground, it usually crushes or badly scars all the young timber in its path. This single thing decreases the standing timber crop by a very large percentage each year. It can be only partially corrected, but by carefully directing the fall of the tree, (by wedging the butt and notching the opposite side), much of the waste of our young growth can be avoided.

Topping timber is another step in the same direction. This is probably the most hazardous of the many dangerous jobs in the log woods. To perform the job, the 'high-climber' ascends the tree to a point just below the lower limbs and secures himself to the tree. Supporting himself with his spiked boots and belt, he notches the trunk on the side toward which he wishes the top to fall and then saws through from the other side. Wedges will make the top fall away from him. The tree, once topped, can be felled with a minimum of damage to the surrounding timber.

Skidding and Skylining:

The logs, downed and "bucked" into lengths, have to be transported to the log roads, or the waterways. The most common equipment used in heavy timber now is the

(continued on page 18)



NEVER OU

One of this nation's greatest blessings is its vast res
of wood . . .

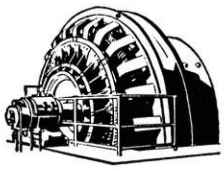
Look at this forest and look beyond!

You see . . . docks and ships, houses and airpl

You see . . . wood, plentiful and cheap . . .
used to make paper, sheer fabrics, sturdy new pla
new lacquers, dyes and veneers.

You see . . . thousands of builders, craftsmen
chemists building a new wonder world of wood.

You see . . . the hand of Allis-Chalmers ma



Whether your electric power requirements run to hydraulic or steam turbines . . . whether your needs are for generators, transformers, motors, control devices, or switchgear—expect from every Allis-Chalmers product advanced electrical engineering and design, thoroughly modern efficiencies. Specify Allis-Chalmers.

ALLIS-

One of the Big 3 in Electri

Biggest of All i

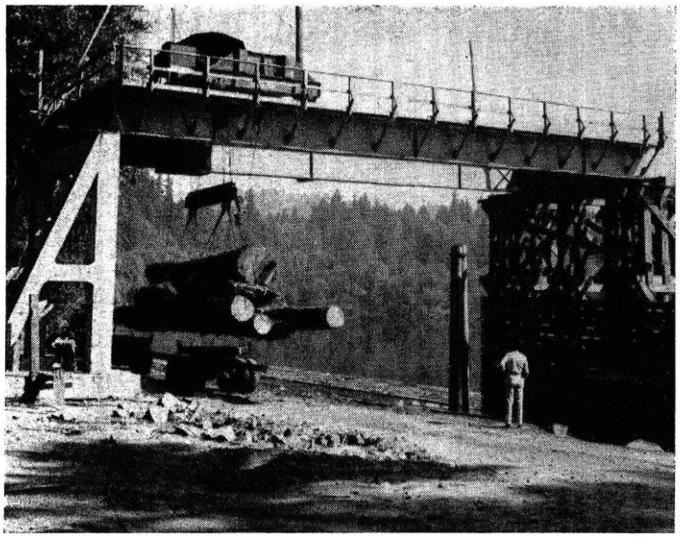
Modern Logging Practice

(continued)

skidding tractor with an "arch". The name amply describes the latter, for it is a steel bow under which the log-butts are suspended. The raising of the ends of the logs makes the skidding operation easier and faster.

Frequently, the "skyline" is used. The skyline is nothing more than a cable trolley strung between two trees, high off the ground, to move heavy logs for distances up to a quarter of a mile. The main cable is usually about two inches in diameter and is capable of supporting loads up to fifteen or twenty tons. The trolley itself is moved along the cable by other smaller lines. To make a lane for the skyline, it is necessary to clear the standing timber between the "tail" and "spar" trees. In the past, indiscriminate mowing of all surrounding timber left bad scars in the woods. In line with policy of selective cutting, we now cut a lane barely wide enough to permit the unrestricted passage of the load.

The most wasteful manner of skidding logs was practiced in Louisiana during the day of the longleaf pine. A central spar tree was well guyed, and a pulley was placed at the top. A single line was run out through the forest to the logs, attached, and reeled in. In a short time, all the logs in that area were piled around the foot of the spar tree—and all the young timber for nearly half a mile in all directions was flat. Needless to say, such a thing is definitely frowned upon today.



Modern Bridge Crane Unloading into a River
—Courtesy U. S. Forest Products Lab., Madison

Log Roads, Railroads, and Waterways:

Years ago, when loggers could choose their operation sites, the principle means of transporting logs to the mills was floating. In the rivers, they depended upon the current to move them along. When they were floated on the lakes, the logs were rafted together and pulled by tugboats. Most of the timber along such ideal thoroughfares has been logged off, more than once in most cases, but new developments in transportation opened up new tracts. Many companies have their own railroads specifically and solely engaged in hauling logs. The more recent development of the motor truck has been an even greater boon to lumbermen.

The Logger's Dream, a Truck Mounted Jammer
—Courtesy U. S. Forest Products Lab., Madison

Waterways had many advantages, but the most important of these were:

1. Mass movement.
2. A minimum of equipment necessary.
3. Power "Gratis".

All these add up to economy of movement. The disadvantages are perhaps more numerous, but sufferable for this economy. They are:

1. Log jams.
2. Uncertainty of the elements.
3. The tremendous storage space required for the logs of such a mass drive.
4. Shifting sand bars.

The log jams have been highly publicized as massive, immovable accumulations of cut timber that are held up by one key log. Accept the latter with skepticism, for in a large jam the rivermen must pry, dredge, and blast extensively to free them.

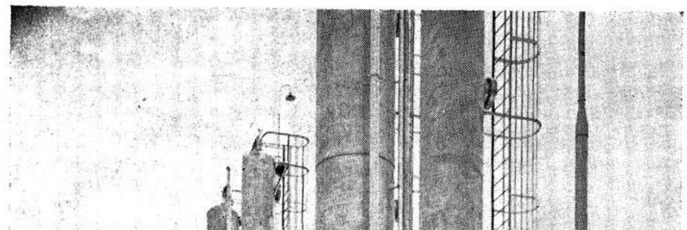
(continued on page 21)

Aviation Gasoline

by R. J. Meisekothen ch'47

CATALYTIC alkylation of hydrocarbons has assumed great industrial importance as it serves as a process for production of high-octane aviation fuel. For this purpose, branched chain paraffins are used, thus making it possible to utilize the highly volatile gaseous hydrocarbons, e.g., those containing three or four hydrocarbons, for making motor fuels which otherwise would not be suitable for use because of their high volatility.

Sulphuric acid has proved to be a commercially suitable catalyst for the alkylation of the lower paraffins. Experience has shown that this cheap catalyst provides for a process which can be handled in standard engineering equipment on a large scale, and by which a superior aviation fuel can be produced. The sulph-acid process was developed jointly by the Anglo-Iranian Oil Co. Ltd., Humble Oil and Refining Co., Shell Development Co., Standard Oil Development Co., and the Texas Co. research staffs.



A Modern Alkalation Plant
—Courtesy Shell Dev. Co.

Feed Stocks Used

Isobutane is the most widely used isoparaffin in alkylation, but because of its high volatility, it has restricted use in gasoline. A wide variety of olefins may be used but the best results are obtained with butylene. Isobutane is alkylated readily by most of the pure olefins with a low catalyst consumption. Unfortunately in the refinery, the olefins are present in mixtures along with dienes, aromatics, mercaptans, thiophenes and other substances. These may affect markedly the yield and acid consumption, since it has been proven in the laboratory that mercaptans, amines, dienes, aromatics and oxygenated compounds are absorbed by the acid, and reduce its activity rapidly. Each feed stock presents a separate problem in pretreatment depending on the amount and type of impurity present, and may require adjustment of the operating conditions over and above the adjustments necessary when operating with olefins of different impurity.

The Reactor

When aliphatic olefins are mixed with strong sulphuric acid at around room temperatures, the primary reaction is one of olefin absorption in the acid to form alkyl sulphates. This absorption is a rapidly exothermic reaction while the saturated paraffins remain virtually unabsorbed. The coupling reaction occurs in the acid phase through the formation of an olefin acid ester, which then reacts with the isobutane, the reaction in its simplest form, consists of two steps, however, it is more complicated than it will appear from the following scheme.

1. Absorption step:

$$CH_3{:}CH_2{:}CH{=}CH_2 + H_2SO_4 \rightarrow CH_3{:}CH_2{:}CH(HSO_4)\ CH_3$$

butylene-1 alkyl ester

2. Coupling step:

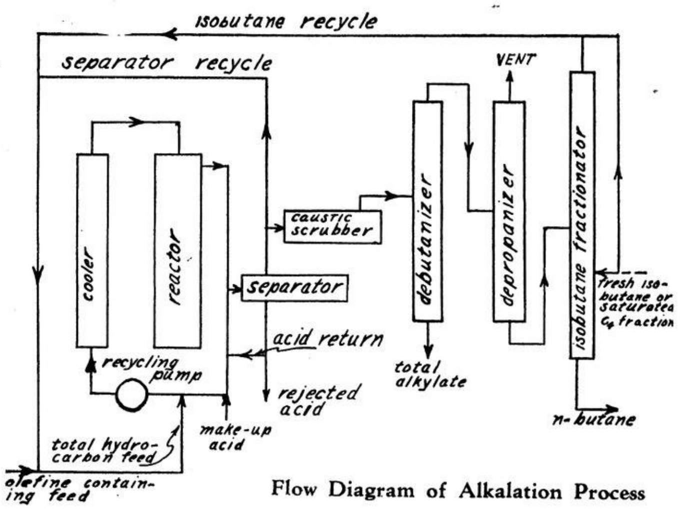
$$CH_3{:}CH_2\ CH(HSO_4)CH_3 + \begin{matrix} CH_3 \\ CH_3 \end{matrix} \rangle\ CH\ CH_3 \rightarrow$$

isobutane

$$\begin{array}{c} \quad\quad\quad CH_3\ CH_3 \\ \quad\quad\quad | \quad\ | \\ CH_3{:}CH_2{:}CH{:}C{:}CH_3 + H_2SO_4 \\ \quad\quad\quad\quad\ | \\ \quad\quad\quad\quad CH_3 \end{array}$$

iso-octane

The reaction is conveniently carried out in the liquid phase by adding the olefin over a definite period of time to the vigorously agitated isoparaffin and acid. Since the effective carrying out of the reaction is determined to a considerable extent by the intimacy of mixing achieved, conditions favorable for fine acid and isoparaffin emulsion are essential—i.e., a high acid-hydrocarbon ratio and efficient agitation. Insufficient mixing, whether due to poor agitation or too small acid-hydrocarbon ratios, results in polymerization rather than addition. Since the most convenient temperature for the reaction is about 35°F., means must be provided to remove the heat evolved because of the exothermic reaction. The pressure need only be high enough to keep the reactants in the liquid state.



Flow Diagram of Alkalation Process

The Separator

After a suitable average time of residence in the reactor (about 50 minutes), the reacted emulsion is withdrawn to a separator in which it is separated into a hydrocarbon phase and a catalyst phase, by gravity or centrifugation. The product containing hydrocarbon is drawn off in the top layer and removed from the system for the recovery of the alkylate, while the separated acid is returned to the reactor. A caustic wash of the hydrocarbon phase is provided to neutralize any traces of acid which might be carried over from the separator to the fractionation system.

The Fractionation System

In the debutanizer the hydrocarbon mixture is fractionated to separate the normal butane, the isobutane, and the lower boiling hydrocarbons from the alkylate which is removed as a bottoms stream.

This bottoms stream is passed into the alkylate fractionator wherein the gasoline boiling range constituents, (100-130°C), are separated from the heavier alkylate, which is removed from the system through the bottoms line. The alkylate gasoline fraction is removed in the overhead line for condensation in the condenser. A portion of the resulting condensate is returned to the tower to serve as reflux. The remainder of the condensate is withdrawn from the system and comprises the high anti-knock aviation grade gasoline product.

Conclusion

The sulphuric acid, liquid catalysis, alkylation of highly volatile gaseous hydrocarbons represents our simplest and most economical process of manufacturing high-octane aviation fuel. This process was developed during the recent war thus enabling us to supply the unprecedented quantities of fuel which our all-out air offensive required.

MODERN LOGGING . . .

(continued from page 18)

A look at the average log train will show the greatest advantage of the whole log-train system, mass movement. One glance at the source of the load will show a major disadvantage, and that is the extra handling necessary to bank out (store) the logs along the right-of-way. To construct the road itself necessitates such expenditures of time, money, and labor as to make isolated tracts of timber utterly impracticable to log. In block timber holdings, the economy of mass movement makes the railroad very desirable as a mover.

The flexibility that goes with trucking operations is the greatest single factor in the popularity of this relatively new type of hauling. By constructing a minimum number of inexpensive roads to connect with existing highways, a widespread logging system can be built up, to supply a mill that could not operate if it were dependent upon railroads. The small loads allowable on the trucks deprive them of the big element favorable to the waterways and railways. Long hauls are frequently necessary to avoid the construction of access roads through rough terrain. So as to aid in the production of lumber for homes for veterans, our government has allotted fifteen millions to the construction of access roads from Florida to Oregon. This makes possible the harvesting of timber reserves on our Indian Reservations and National Forests, and nearly all of the hauling will be done with motor trucks.

The ideal logging outfit of today would seem something like this at a glance:

A fleet of big, powerful motor trucks.

A group of caterpillar tractors with skidding arches.

Loading cranes.

Power saws.

Intelligent men who know what the limits of their equipment are.

The Engineering Department's New Placement Office

THE problem of contact between employer and the graduating engineer has been often discussed here at Wisconsin, but until the present time no satisfactory solution has been found. Too often the contact representative has found it necessary to schedule two or three different interviews, one for each of the departments in which his company is interested. If, on the other hand, he schedules an interview with only one department, those students in the other departments, although interested in the company, often feel that he is interested in only one branch of engineering at that time.

In order to be of greater service to both the graduating student and the many industries looking for these men, the College of Engineering has recently established a separate Placement Office. As yet this office is in its infancy, but under the able direction of Professor Mack, it is taking shape so that in the near future his work and efforts will be noticed by both the student and industry.

Since the new department is maintained specifically to establish contact between the graduating engineer and the various phases of industry, a much better source of information on the various companies will be maintained. A cross file is being set up, which will maintain information by companies and also by the various types of engineers they employ. With this organization comes another aid to the student in the form of contact with the smaller companies. Under the present system only the larger and better known companies send representatives to colleges to conduct interviews. Thus, a graduate who had a preference for a smaller industry or a particular field found himself, "on his own", so to speak, in tracking down his preferred position. With the broader file system and a greater emphasis placed on this phase of work, positions in a much broader field should be available to the graduate here at Wisconsin.

Prof. Mack is not satisfied with simply placing his men, but intends to maintain contact with, or at least keep track of, all men placed, and their advancement after leaving here. In order to do this a rather extensive alumni organization must be maintained. Thus the placement office will, in the future, be the Engineering alumni office, publishing an alumni directory and keeping a record of the progress of all men after leaving.

In this new department the Engineering School is certainly setting up a program which has long been needed and which will help Wisconsin's Engineers as individuals, and in the eyes of the industries.

David J. Mack, Assistant Professor, administrative, is not only a man of varied experiences in the engineering field, but he has a definite personal interest in bettering the chances of placing our Engineers.

Having graduated from Wisconsin with a B.S. in Ch. E. in 1931, he remained another year to obtain his M.S. in the same department. 1932, however, was one of those lean years and Mr. Mack reports that the number of graduating engineers employed that year could be counted on one hand, so he is now determined to do all he can to aid the placement of his brothers in the field.

Following graduation he was employed for a time at the Burgess Laboratory here in Madison before going to Milwaukee, with the Globe Mfg. Co. It was in 1934, while employed in Milwaukee that he joined the ranks of the married engineers, and the Macks now have two children adorning the household. From 1935 to '39 he returned to the "grind", but this time at Purdue University, where he received his Ph.D. in Metallurgy. The following years were spent at the University of Tennessee, where part of his time was required by the University, in research and teaching, while the remainder was spent with the T.V.A.

1945 marked his return to Wisconsin, where he was employed in the Technical Service Training Division, at the Forest Products Laboratory, here in Madison. In November, however, he returned to his Alma Mater as Assistant Professor of Drawing and Descriptive Geometry, and was taken from that department for this new office. Those of you who will have the pleasure of meeting Prof. Mack in the future will immediately notice his outstanding personality and keen interest in this new undertaking.

Campus Notes

by John Tanghe e'47

Dangerous Crossing?

(Campus Notes' Column has received several letters pertinent to student affairs. We print one of them here for your inspection and consideration.)

"To Campus Notes: I am one of the many engineers who find it necessary to cross University Avenue directly in front of the M.E. Building on my way to and from classes. The speed at which the cars sail by at that point makes crossing a very dangerous and often lengthy venture, especially during the heavy traffic hours.

"Couldn't the university or city traffic bureau provide some sort of safety protection, stop lights, or underpass to help the hundreds of students going to and from the M.E. Building? Must we wait for someone to be injured or killed before safety measures are taken?"

•

"Mars Calling!"

"Radio Noise from the Sun and Stars" was the topic discussed by Mr. Vincent C. Rideout at the November meeting of the Student Chapter of AIEE held in 116 Education-Engineering Building on Tuesday evening, November 12. Mr. Rideout, formerly of the Bell Telephone Laboratories, is now an instructor on the electrical engineering faculty. He discussed measurements of radio frequency noise from the sun and the Milky Way, and speculated on communications to Mars and the size of radio equipment that would be needed for inter-planetary communication.

Ed Ansell, student chairman, announced the National Convention of Student Chapters of AIEE to be held at Notre Dame on May 2. AIEE's quota of tickets for the Engineers' Ball of November 23rd were distributed.

The next meeting, scheduled for December 10th, will feature the discussion of "Theory and Application of Power Rectifiers and Inverters" by Mr. O. Marti, consulting engineer of the Rectifier Division of Allis Chalmers Manufacturing Co. in Milwaukee. Mr. Marti was formerly head of the Rectifier Division before his retirement.

•

Dean Withey Goes to Washington

Dean M. O. Withey, head of the College of Engineering, left Madison on Tuesday, December 3rd, for a two-day stay at the annual meeting of the Highway Research Board in Washington, D.C. He is a member of the Committee on Testing of Resistance of Concrete to Freezing and Thawing.

•

Alpha Chi Sigma

At the professional meeting of Alpha Chi Sigma held on Nov. 11, Dr. John D. Ferry of the U.W. chemistry department spoke on harmful marine organisms and paints used to combat them on marine structures and ship bottoms. According to Dr. Ferry a few weeks' growth of barnacles can reduce a ship's speed to 2/3 or ½ of normal.

On Nov. 25 Dr. J. Willard of the U.W. chemistry department spoke before the chapter on his experiences with the atomic bomb and some of the technical aspects of the Smythe Report.

A technicolor movie of the Bikini A-Bomb explosion was scheduled for Monday evening, December 9, in room 100 of the Chemistry Building.

•

KHK-Triangle Christmas Formal

Members of the local chapters of Triangle, all-engineering fraternity, and Kappa Eta Kappa, electrical-engineering fraternity, are planning a jointly-sponsored Christmas semi-formal dance at Nakoma Country Club on Friday evening, December 20. Preceding the dance, members of both fraternities and their dates plan to eat a banquet supper at the country club. Phil Wanzek, KHK, and Bob Miller, Triangle, are the social chairmen in charge of the arrangements. Will Harold and his orchestra will furnish the music for the affair.

•

New Engineering Fraternity

On October 29, 1946 a group of enterprising engineering students striving to promote a greater interest in the profession, organized "Gamma Mu Epsilon." Prospective members must be enrolled in some branch of engineering, must have a grade point of 1.5 or better, for the semester previous to pledging and must have at least a first semester sophomore standing. Since this is a professional fraternity, members may be affiliated with social fraternities.

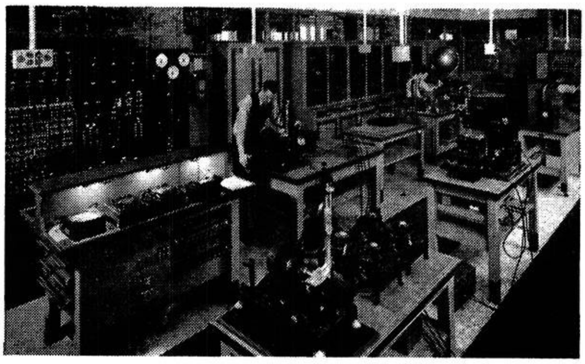
Officers elected at the first meeting include: J. N. Pike, president; N. Stickney, vice president; W. A. Hambley, Secretary, and W. Courson, Treasurer, with Mr. Keith E. Gilbert as faculty advisor.

The fraternity was officially recognized by the University on November 26. Good work men, and lots of luck.

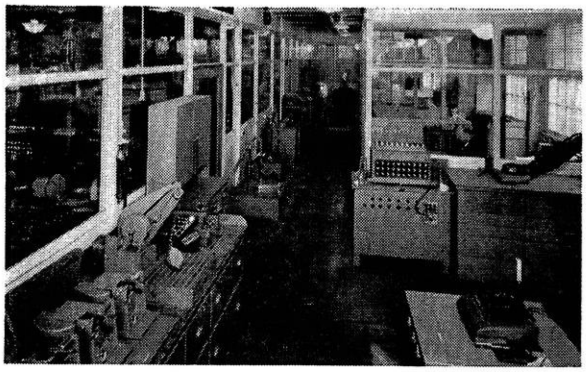
(continued on page 26)

Laboratory Facilities

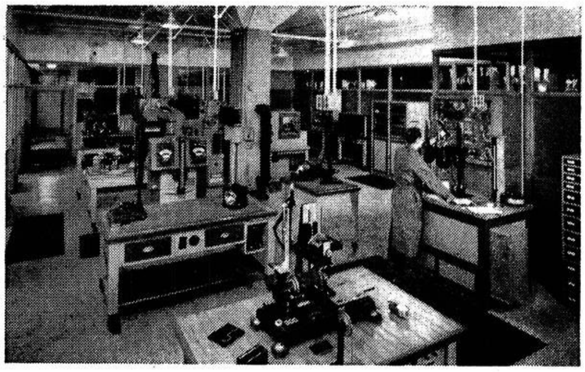
HOOVER ENGINEERING DEPARTMENT



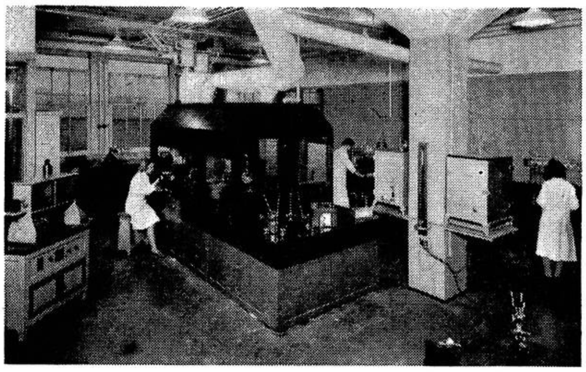
The Electrical Laboratory designs, tests and redesigns motors and component parts in developing power plants for Hoover Cleaners.



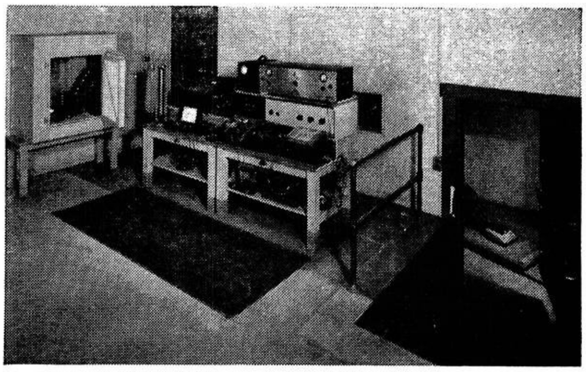
The Testing Laboratory maintains production control by acceptance tests on parts and materials. Test specifications and special test apparatus are developed here.



Filters, fans, materials, processes are tested in the Mechanical Laboratory; air flow and power problems, cleaners and cleaning methods are studied.



In this modern, fully equipped laboratory exhaustive chemical and metallurgical tests are conducted on metal, fabric, wood, paper and plastics.



A 50-ton room supported on numerous steel springs affords perfect acoustical isolation, insuring precision measurement on noise and vibration problems.

Building the world's largest-selling electric cleaner is big-time engineering, and many thousands of hours of design, tests, research and study go into constructing each new cleaner model.

The Hoover Engineering Department is recognized as a leader. Hoover engineering problems call for the full range of engineering skills—and the best in both equipment and personnel is necessary to handle them.

THE Hoover COMPANY
North Canton Ohio

CAMPUS NOTES . . .

(continued from page 24)

Aerial Photography and Lie Detectors

At the November 21st meeting of ASCE Professor E. C. Wagner of the Topographic Engineering Department spoke about his experiences in the Aerial Photography branch of the Army Engineers Corps. During his talk Prof. Wagner passed around some photographs and actual flight patterns used by the army. He also explained that the university surveying department may soon offer a course covering this type of work.

On Thursday, December 5, Dr. J. H. Mathews of the university Chemistry department and well-known criminal detection authority addressed the ASCE student chapter on the subject of criminal lie detection. Dr. Mathews explained that although there has been no perfect method of lie detection developed as yet, many methods have been tried. He explained that the first method tried which had any scientific basis probably was that used in India where a twitching of the toe was used to indicate emotional disturbances created when questions were asked. Under the Chinese "Rice Chewing Method" the suspect was compelled to chew rice for a period of time; if upon spitting it out the rice was moist he was considered innocent. If the rice was dry it meant the salivory gland had failed to function presumably because there had been an emotional disturbance.

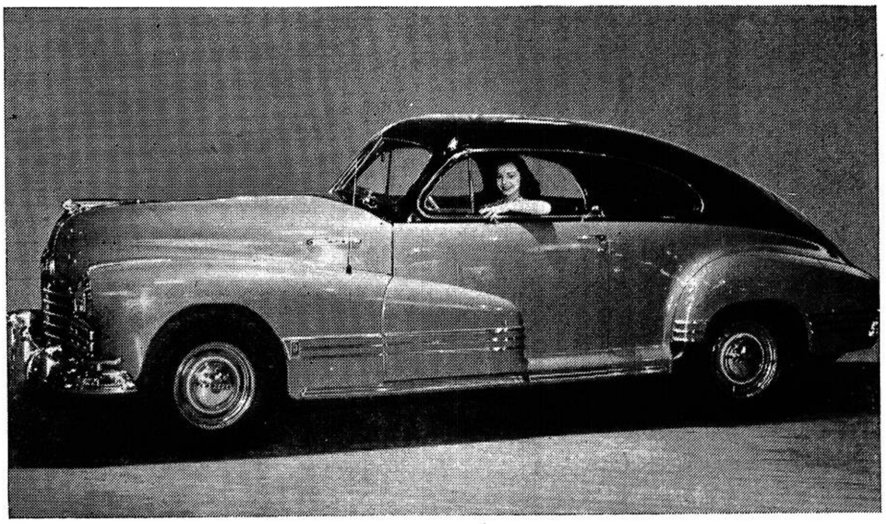
Dr. Mathews illustrated the use of the lie-detector by means of a sample demonstration on three volunteer members from the audience. The results obtained were not distinct, primarily because the questions asked and the surrounding conditions were not satisfactory for setting up the emotional reactions necessary to be detected by the machine.

(continued on page 32)

Du Pont Digest

Items of Interest to Students of Chemistry, Engineering, Physics, and Biology

Chemistry Provides New Colors for New Cars



In Detroit this spring, automotive engineers and designers were shown a dozen cars finished in glowing colors never before seen on any automobile—colors that diffused and reflected light back to the eye from within the finish instead of from the surface.

These new "Duco" Metalli-Chrome lacquers which attracted industry-wide attention are expected to give new beauty and durability to America's cars. The story behind their development is an interesting one.

New Techniques for Pigment Preparation

As many commercial pigments are now made, they are precipitated from chemical solutions in the form of fine particles, which are then dried, ground and reground with a liquid vehicle to produce the final paint, enamel or lacquer. The fineness of the particle-size largely determines the luster of the finish. Although mechanically ground pigment particles can be made extremely fine, they are not nearly as small as the particles originally precipitated.

A few years ago a program of research was started by Du Pont scientists to try to take advantage of the very fine particles formed by precipitation. They proposed to eliminate the drying and grinding processes entirely—to transfer the microscopically sized, precipitated, hydrated pigment particles directly from the mother solution to the lacquer vehicle.

Extended study by organic and colloid chemists, physicists and chemical engineers finally solved this problem. The procedure consists of mixing the wet pigment in a heavy-duty mill with water-wet nitrocellulose, dibutyl phthalate and castor oil. Dibutyl phthalate forms a colloidal solution with nitrocellulose. The colloid absorbs the castor oil and pigment, but eliminates the major portion of the water as a separate insoluble phase.

A New Range of Color Effects

After the method of transferring wet pigment particles had been established, the second development in this program was the practical utilization of precipitated ferric hydroxide. Although it had been used for a long time as an intermediate for the manufacture of dry ferric oxide pigment, ferric hydroxide in the wet form as a pigment had been applied only to a very limited extent and its true value had gone unrecognized. When used in conjunction with the new process, wet ferric hydroxide produced a lacquer of unusual brilliance and durability. In combination with other pigments, a whole new range of color effects became possible.

Because of their extremely small pigment particle-size, the Metalli-Chromes are somewhat translucent, having a distinctive, soft innerglow. This lustrous depth is further enhanced by introducing into the film aluminum particles which act like mirrors to reflect the light within the finish.

Not only are these new lacquer finishes more lustrous and more beautiful, but they are also more durable, as proved by four years of laboratory and road-testing. "Duco" Metalli-Chrome lacquer is a worthy newcomer to the ever-lengthening list of developments by men of Du Pont that have helped in the mass-production of automobiles and the creation of new industries, new markets, new jobs for millions of Americans.

Questions College Men ask about working with Du Pont

WILL I FIND COMPETITION DIFFICULT AT DU PONT?

It is to be expected that there will be competition in an organization where every effort is made to select the best trained and most promising graduates. However, such competition is not deliberate or is it on an elimination basis. New employees are given every opportunity to grow in the organization.

Technical undergraduates and graduate students will be interested in the new booklet, "The Du Pont Company and the College Graduate." Write to 2521 Nemours Building, Wilmington, Del.

More facts about Du Pont—**Listen to "Cavalcade of America," Mondays, 8 P.M. EST, on NBC**

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. DU PONT DE NEMOURS & CO. (INC.)
WILMINGTON 98, DELAWARE

Static

by Jim Woodburn m'48

and Jack Hinkley m'47

One firefly to another: "Put out that light! Don't you know that this is a blackout?"

"How can I help it? When you gotta glow, you gotta glow."

•

Arriving at a strange hotel, a fussy woman thought she'd better know where the fire escape was. So she started exploring. During her tour, she opened a door and found herself in a bathroom occupied by an elderly gentleman.

"Oh, I'm sorry," she twittered, "I was looking for the fire escape."

Continuing her search, presently she heard the pad of bare feet behind and a shout that made her turn. It was the elderly man, clad in a bath towel.

"Wait a minute!" he gasped. "Where's the fire?"

•

To kiss by phone, I must admit,
Is not most men's desire.
They say it lacks a certain warmth
And of it soon they'd tire.
But I am one who disagrees
A lover most uncouth.
My girl and I we manage fine—
When in the same phone booth!

•

The railway coach was crowded and a none--too-well dressed little boy had taken a seat alongside a very haughty and fashionably dressed woman. The boy was sniffling in a very annoying manner. Finally the woman turned to the boy and asked:

"Have you got a handkerchief?"

"Yes," replied the boy, "but I don't lend it to strangers."

•

A neurotic Chinese nicknamed Lucious
Fills his pipe with dried poppies and fuchsias.
He gets choked on the smoke,
Mumbles joke after joke,
And passes them off on Confucius.

•

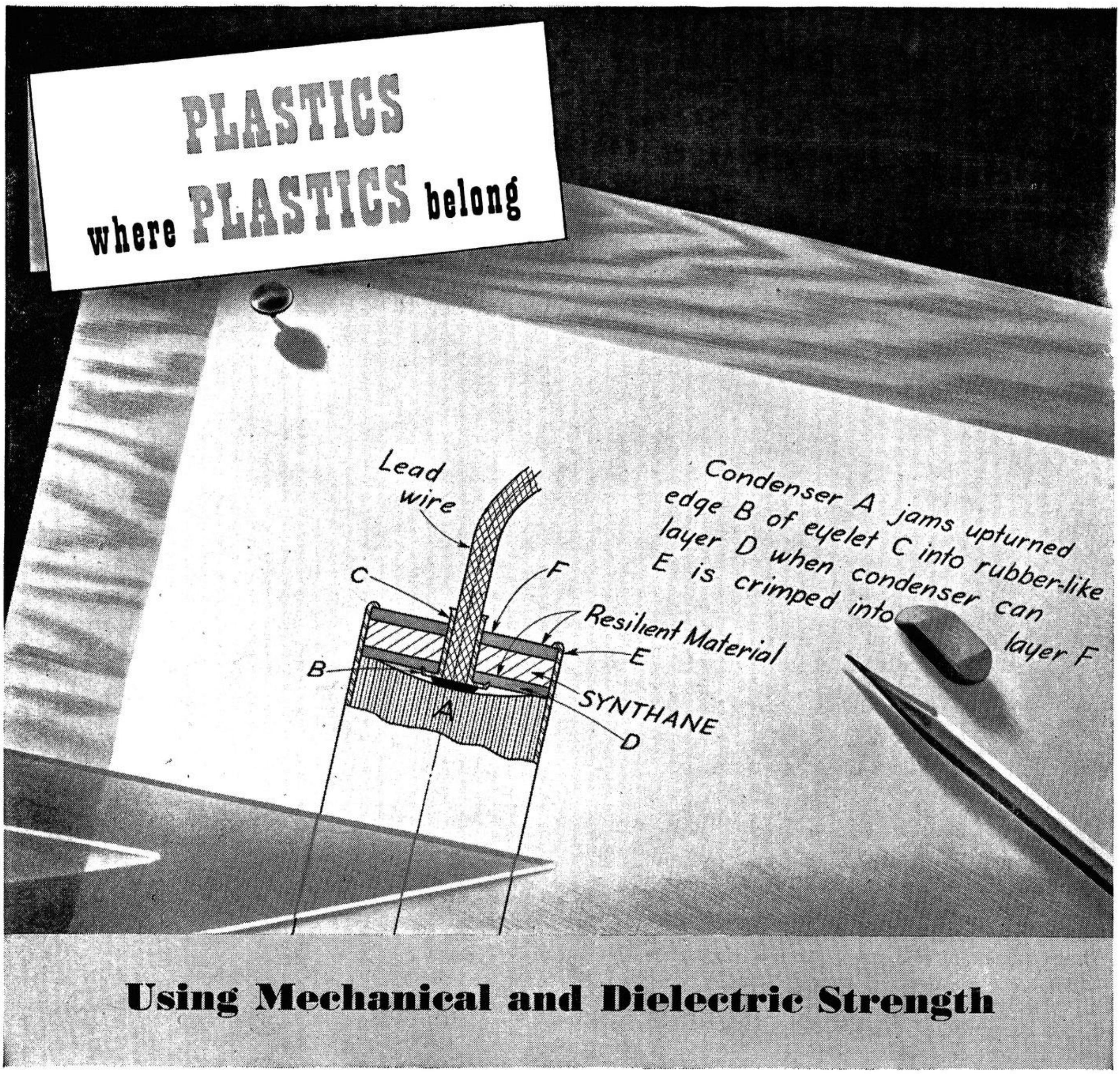
Dedicated to Pat: About the surest way to tell a five-cent cigar from a ten-center is by the price.

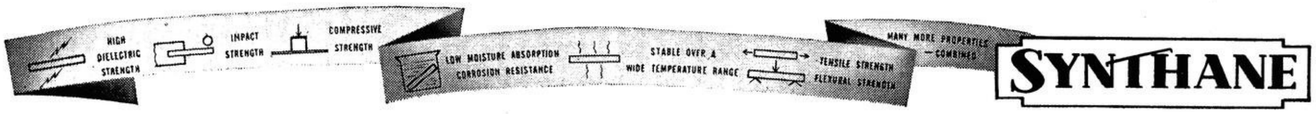
•

She—Oh, Jack, do excuse me for getting here so late. You poor fellow, you've had to wait an hour for me.

He—Oh, no, it's all right. I've only just come.

She—What! So that's the way you treat me, is it? If I'd come at the time agreed you'd have made me wait a whole hour.


PLASTICS
where PLASTICS belong
Lead wire
Condenser A jams upturned edge B of eyelet C into rubber-like layer D when condenser can E is crimped into layer F
C
F
Resilient Material
E
B
SYNTHANE
A
D
Using Mechanical and Dielectric Strength


HIGH DIELECTRIC STRENGTH
IMPACT STRENGTH
COMPRESSIVE STRENGTH
LOW MOISTURE ABSORPTION
CORROSION RESISTANCE
STABLE OVER A WIDE TEMPERATURE RANGE
TENSILE STRENGTH
FLEXURAL STRENGTH
MANY MORE PROPERTIES COMBINED
SYNTHANE

CAMPUS NOTES . . .

(continued from page 26)

Fifth Anniversary

The middle of January marks the fifth year as secretary to the Dean of Engineering School fo Mildred Bowar, one of the three fair lassies at the desks in Dean Withey's outer office.

•

Victory!

The curtain is down, the ballots are in—and the tally shows that Ed Brenner, ChE 4, was triumphant in the recent campus election for senior class president. Congratulations, prexy!

•

MESW Meeting

The regular meeting of M.E.S.W. was held on Tuesday, Dec. 3, at 7:30 P.M., acting president, Jim Woodburn, presiding.

A general discussion by Messrs. R. L. Daggett, R. J. Harker, D. J. Mack, and V. C. Rideout, viewed the advantages and disadvantages of various types of companies from the Engineers' standpoint. Mr. Rideout opened the discussion with a general introduction to the issue. The Engineers' position in a small company was discussed by Mr. Daggett, while Mr. Harker viewed the large company and Mr. Mack discussed a government position. Many advantages and disadvantages of either type of company were brought to light, and all present felt that the questions which had come to their minds when thinking of post graduation days were somewhat clearer after the discussion.

•

Scholarship Awards

Four engineering students were recently awarded $500 scholarships through the John Morse Memorial Foundation. John Slater, CE 3, R. Ray Weeks, EE 3, Daniel McDonald, ME 3, and Ed Brenner, ChE 4, all scholastic high-hono students, were the recipients of the award.