spartan engineer
The Scientific Ecologically Open Minded Magazine
Member of the Engineering College Magazines Associated
MICHIGAN STATE UNIVERSITY
VOLUME 25
NUMBER 2
DEC./JAN., 1972

# PLACEMENT BUREAU

## MICHIGAN STATE UNIVERSITY

TELEPHONE 355-9511 EAST LANSING, MICHIGAN 48823 STUDENT SERVICES BUILDING

PLEASE POST ON BULLETIN BOARD

The following employers will be interviewing from October 11 through October 15, 1971. December, March, and June graduates of all degree levels are eligible to interview unless otherwise indicated.

If you are interested in an organization please report to the Placement Bureau AT LEAST TWO SCHOOL DAYS in advance to sign up for an interview and to obtain additional information. Doctoral candidates in all fields may sign up for interviews by phone. Interviewing appointments can be made from 8:15 a.m. until 12:00 noon and from 1:00 p.m. until 4:30 p.m. starting October 4, 1971.

To give as many students as possible the opportunity to have access to interviewing employers, it is necessary to limit, until noon on Mondays, the number of sign-ups by each individual to three (3). After 12 noon, students may sign with as many organizations as schedules permit.

MILITARY OBLIGATIONS: Students are advised to interview with employers even though they have not completed their military service. Many employers have indicated an interest in interviewing the student who will be available after his duty with the Armed Forces.

CANCELLATIONS: Employers travel considerable distances to interview and cancellations result in inconvenience for everyone concerned. It is fully expected that all students will KEEP EVERY appointment they make.

EDUCATION CANDIDATES: Unless otherwise indicated, candidates for interviews with elementary and secondary [illegible] should be in the Education curriculum requested and [illegible] tion.

CITIZENSHIP: United States citizenship is required unless otherwise indicated.

DEGREE LEVEL: B = Bachelor's Degree M = Master's Degree D = Doctoral Degree

SAMPLE

EMPLOYERS NAME ADDRESS CITY STATE ZIP
REPRESENTATIVES NAME INTERVIEW DATE(S)
LOCATION: If different from employer's CITIZENSHIP

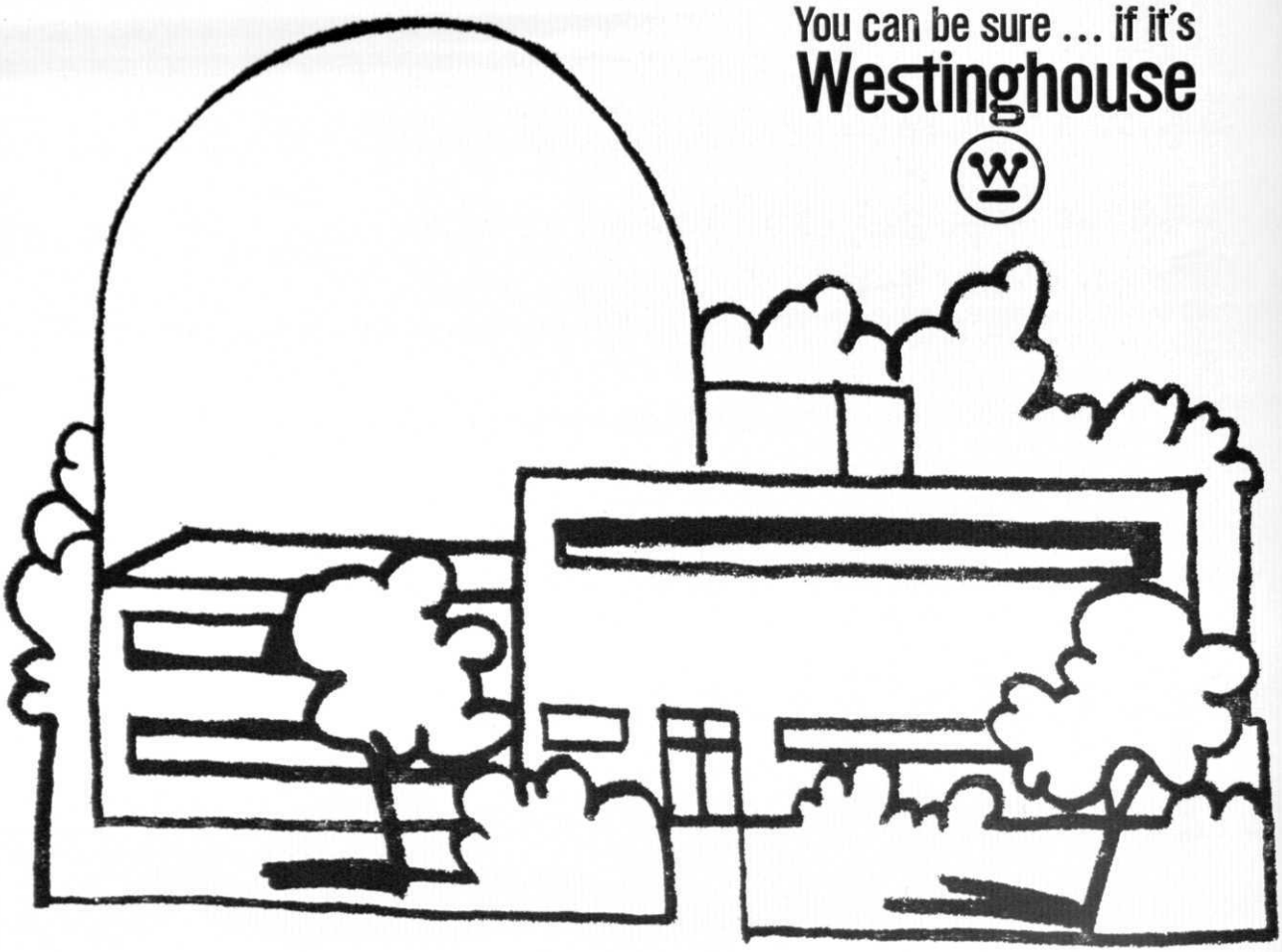
# Who's the No. 2 maker of nuclear powerplants?

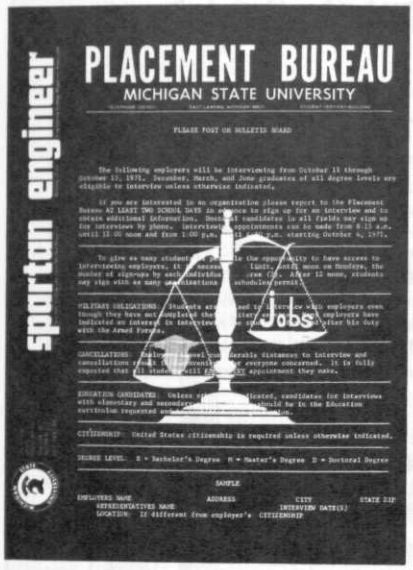
# It isn't Westinghouse.

# You bet we're hiring.

If you can't wait for the recruiter, write today to George Garvey, Westinghouse Education Center, Pittsburgh, Pa. 15221. An equal opportunity employer.

**You can be sure ... if it's Westinghouse**






This months cover by Milton Horst depicts the precarious situation many college graduates face attempting to find a job.

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*A statement of policy:*

The objective of the magazine is to communicate the exchange of ideas between: students and professors, professors and professors, departments, and colleges within the university. The Spartan Engineer believes that the engineering world can no longer neglect the social interactions of the outside world and is dedicated to initiating programs within its bounds that not only seek to relate the latest discoveries of pure science, but also show a genuine concern for the questions troubling our environment. The Spartan Engineer also identifies with the American ideal of free enterprise and its attempt to perfect the efforts of mankind in constructing a new world through human engineering.


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## FEATURES

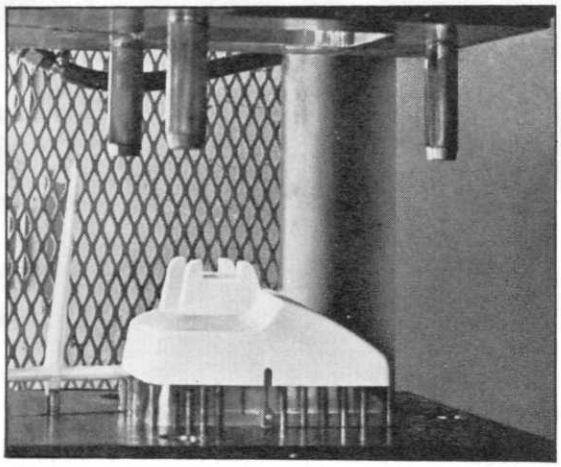


## DEPARTMENTS



## STAFF

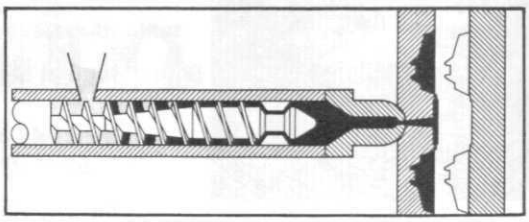
# WESTERN ELECTRIC REPORTS



**Molding by the millions.** Western Electric people produce some 8 million phones a year. Molded plastic is used for housings and many other parts. So there is a constant investigation into the most effective way to use these materials.

$$A^*(z,t) = A_e^*(z) - [(A_f^* - A_i^*)/(1 - e^{-\beta N t_r})]e^{-\beta N t}$$

**In developing the model** at Western Electric's Engineering Research Center, it was found that melting behavior can be described by this formula which includes terms for shear heating and conduction heating effects. Other models were developed for temperature and pressure profiles.



**End of molding cycle.** At this point, the screw is stationary and heat is conducted into the plastic on the screw. After the plastic solidifies, the mold is opened as shown. The parts can then be ejected.

## Solving the mysteries of molding with mathematics.

Even though plastics have been around for many years, there's still a lot to be learned about these versatile materials and their processing. So they are the subject for continuing studies by our engineers.

Some of their recent investigations have brought forth new and highly useful information about a relatively unexplored area: the melting behavior of plastics in the injection molding process.

One result of these studies is the mathematical formula, or model, above.

The model helps us predict melting behavior along the length of the injection screw molding machine used to mold telephone housings and other parts. Melting behavior is extremely important, because plastic pellets should be completely melted but not thermally decomposed before injection into the mold.

This information on melting is then used to investigate screw designs, operating conditions, machine sizes and plastic properties. All of which is aimed at obtaining optimum processing techniques.

Predictions obtained from the mathematical model have checked out closely with experimental observations. So the resulting screw designs are now undergoing evaluation by engineers at our plants in Indianapolis and Shreveport.

**Conclusion:** For new designs and materials, the model can help reduce the development cost for new molded parts and materials. For manufacturing current products, operating costs can be reduced.

Perhaps most significant is that we're getting information about molding temperatures not available experimentally. And many other types of information can be obtained without the use of costly, time-consuming experimental work.

The end result will be more efficient plastic molding and therefore a better product for the lowest possible cost.

**Western Electric**

We make things that bring people closer.

*EDITORIAL*

# Why Interview?

While talking with some of my peers last term I was shocked to hear: "Why interview. The job market is so poor no one will get a job anyway."

Well if that is what you believe, you're right, you won't get a job. Engineers are no longer receiving five or six offers of employment. When graduating Engineers were receiving such copious offers the United States had set a goal of 1970 to put a man on the Moon. The Aerospace industry was subsequently crying for Engineers. Well, as we all know that day has come and gone, and seeking employment in the space industry today is reaching for a nebulous goal.

Consumer industry seems to be the focal employment area today and in the future, especially if individuals like Ralph Nader keep demanding improvements on Consumer products. The only feasible solution for these improvements is better engineering, which will require more Engineers. Many narrow-minded individuals have said, "Everything to be done in engineering is done," but someone said the same thing after the automobile, airplane, jet, and submarine were developed. There are new fields in which employment opportunities for the Engineer are still untapped. Bio-Engineering, Ecology, and Oceanography are only a few of these new fields.

The opportunities lay before you, but you have to step forward and seek them out. This means stepping out on a brisk Monday Winter morning and ambling over to the Placement Bureau. If you won't put forth the effort that's your funeral, but ask your fellow Engineers where they are working after graduation; won't you be surprised when they say Ford, RCA, G.E., Proctor and Gamble, etc.

D. J. Willeman

| | | | |
|---|---|---|---|
| BS | Harry Diamond Labs | Electronic Engr | |
| BS | Owens Illinois | Elec Engineer | |
| BS | Prog Control Mach Sys | Control Design Engineer | |
| BS | Purdue University | Grad Teaching Assist | |
| BS | US Army Material Comm | Gen Eng | |
| BS | Western Electric Co | Engineer | |
| BS | Oldsmobile | Jr Plant Engineer | |
| BS | Consumers Power | Graduate Engineer | |
| BS | Dun Ruvin Country Club | Asst Greens Keeper | |
| BS | Delco Remy Div of GM | Product Engr | |
| BS | M | Grad Student | |
| BS | Motorola Inc | Electronics Engineer | |
| BS | Michigan State Univ | Laborer | |
| BS | Western Electric | Electrical Engineer | |
| BS | Michigan State Univ | Grad Student | |
| BS | Univ of Colorado | Grad Student | |
| BS | Lincoln Electric Co | Engineer Trainee | |
| BS | Kurtz Gravel Co | | |
| BS | Meijers Inc | Butcher | |
| BS | Newport News Shipyard | System | |
| BS | Westinghouse Corp | | |
| BS | US Air Force | | |
| BS | Michigan State Univ | | |
| BS | Ford Motor Co | | |
| BS | US Army | | |
| BS | Moto | | |
| BS | Sta | | |
| BS | Gene | | |
| BS | Consu | | |
| BS | Univ of | | |
| BS | Michigan | | |
| BS | Consumer | | |
| BS | Manpower | | |
| BS | Michigan Sta | | |
| BS | Michigan Stat | | |
| BS | US Air Force | | |
| BS | Naval Missile Sy | | |
| BS | Detroit Edison Co | | |
| BS | Michigan State Un | | |
| BS | US Army | | |
| BS | Motorola Inc | | |
| BS | US Army | | |
| BS | Eastman Kodak | | |
| BS | US Air Force | | |
| BS | Tracy Design Corp | | |
| BS | Consumer Power Co | | |
| MS | US Navy | | |
| MS | Lear Siegler Inc | | |
| MS | Michigan State Univ | | |
| MS | Mich State Univ | G | |
| MS | Mich State Bd of Comm | Sta | |
| MS | John Hopkins Univ | Assoc | |
| MS | IBM | Assoc | |
| MS | US Navy | Ensign | |
| MS | Essex International | Proj Eng | |
| MS | Michigan State Univ | Grad Stu | |
| Ph.D. | Bell Telephone Labs | Member T | |
| Ph.D. | Owens Illinois Inc | Electrical E | |

MATERIALS SCIENCE

| | | |
|---|---|---|
| BS | Humble Oil & Refining | Tech Analyst |
| BS | Stanford Univ | Grad Student |
| BS | Uniroyal Inc | Develop Engineer |

MECHANICAL ENGR

| | | |
|---|---|---|
| BS | Oldsmobile | Engineer |
| BS | Ford Motor Co | Eng Grad Trainee |
| BS | Caterpillar Tractor Co | Mech Engr |
| BS | Packard Elect Div GM | Product Eng |
| BS | US Navy | |
| BS | Allis Chalmers | Mechanical Engineer |
| BS | Chevrolet Div | Coll Graduate in Training |
| BS | Purdue Univ | Grad Student |
| BS | Consumers Power Co | Asst Engineer |
| BS | Bechtel Corp | Cost Engineer |
| BS | Ford Motor Co | Product Engineer |
| BS | Oldsmobile Div GMC | Engineering |
| BS | Chicago Pub Schls | Teacher |
| BS | US Air Force | Air Craft Maint Off |

| | | |
|---|---|---|
| BS | Michigan State Univ | Grad Student |
| BS | Rapistan Inc | Engineer Trainee |
| BS | Pontiac Motor Division | Product Engr Coll Grad in Trn |
| BS | Newport News Shipbldng | Design Eng |
| BS | Chrysler Corp | M Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | B L Const Co | Truck Driver |
| BS | Michigan State Univ | Grad Student |
| BS | Union Pump Comp | Test Engineer |
| BS | Univ of Michigan | Grad Student |
| BS | Michigan Cons Gas Co | Graduate Trainee |
| BS | Mare Island Naval Shipyrd | Asst Design Engineer |
| BS | Ford Motor Co | Prod Dev Engineer |
| | Ford Motor Co | Design Engr |
| | Foster Wheeler Corp | Service Engineer |
| | Foster Wheeler Inc | Service Engineer |
| | Saginaw Steering Gear | Associate Engineer |
| | W Smith & Son | Mechanic |
| | nsumers Power Co | Associate Engineer |
| | Steel | Maint Foreman |
| | quip | Mechanical Eng |
| | an State Univ | |
| | bile Div GMC | |
| | Univ | Grad Student |
| | State Univ | Grad Asst |
| | abco | Design Engineer |
| | e & Steering | Egr |
| | Co | Product Engineer |
| | s | Engineering Trainee |
| | | Pilot |
| | | MFG Engineer |
| | Co | Grad Engr |
| | | Draftsman |
| | | Clerk |
| | n | Corporate Engr |
| | | Mech Engineer |
| | | Test Engineer |
| | | Engineer |
| | | Grad Student |
| | | Design Engineer |
| | | Grad Student |
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| | | Gen Engr |
| | versity | Research Assistant |
| | | Systems Training |
| | d Northrup Co | |
| | Navy | Officer Lt |
| | Michigan State Univ | Grad Student |
| MS | US Navy | Officer |
| MS | US Navy | Electronic Engr |
| Ph.D. | Turkish Sugar Corp | Associate Researcher |
| Ph.D. | Michigan State Univ | Research Associate |

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**You'd be surprised at all the things we do.**

# Threshold of Ecological Disaster

G. Robert Hall is a freshman in Electrical Engineering. Mr. Hall entered the following essay in the Spartan Engineer Essay Contest, and was awarded first prize for his outstanding paper.

**G. Robert Hall**

As public utilities and government agencies such as the Atomic Energy Commission and the Federal Power Commission find viable means of producing the tremendous quantities of electrical energy being demanded by our affluent society, we find the topic of ecological disaster coming ever more in question. With the state of our technology as it exists today, there is nothing superior to nuclear power from an economic viewpoint. A recent study showed that one million BTU nuclear fuel cost is 17¢; whereas, the cost of coal is 33¢ and oil is 37¢. The "total life" cost of a nuclear facility, from construction start to plant retirement, is approximately 20% less than a comparable fossil-fueled plant. An additional benefit of nuclear power may be derived from the by-product formation of plutonium, itself a useable fuel element, from the fissioning of uranium. It would then appear there is but one choice if we have faith in American engineering ability. The problem is that this source of nuclear energy was born of war and is of a complex nature which has largely escaped the ability of the public to understand.

Public spirited citizens have formed into "action groups," such as the well-known Sierra Club, to act as interveners in the question of where power plants of all types are erected and the manner in which they are operated. This is not only desirable but, in fact, necessary to insure that the balance of our environmental needs is not upset.

There also exists, under this guise of public spiritedness, a serious attempt to undermine all efforts for advancing our infant atomic age. A prime area of concern is the possibility of radioactive emissions. Doctor John W. Gofman, for a number of years an active participant in the Atomic Energy Commission, has recently published two books, in co-authorship with Doctor Arthur R. Tamplin.

The first of these books is entitled "Radiation Induction Of Breast Cancer In The Rat: A Validation Of The Linear Hypothesis Of Radiation Carcinogenesis Over The Range Of 0-600 Rads."[1] This is a serious attempt to equate from a scientific and technical viewpoint that a radiation-induced cancer, achieved in an accelerated experiment, will naturally produce from a nuclear power plant the same results in man. The conclusions reached in this book by Doctors Gofman and Tamplin are wholly based on prior work done by Doctors V. P. Bond, E. P. Cronkite, S. W. Lippincott and C. J. Shellarbarger in their "Studies On Radiation Induced Mammary Gland Neoplasia In The Rat."[2] Yet, Doctors Bond, Cronkite and Shellarbarger, appearing before the Joint Congressional Committee On Atomic Energy, Hearings On The Environmental Effects Of Producing Electric Power, have testified that the empirical approach taken by Doctors Gofman and Tamplin has no bearing in practicality as relates to man.[3] For instance, the Gofman-Tamplin hypothesis fails to note the fact that the estrus cycle of rodents and the menstrual cycle of women provide different patterns of estrogen and progesterone secretions which alone makes extrapolation of the rat results to man invalid. Further, the only logical means of reaching their conclusions is by the doubling effect, or inverse square law of radioactivity. While this approach is true for high range point sources of radiation, it fails to take into account such inherent qualities of a nuclear plant as containment boundaries, physical location or exclusion areas.

The second book with the facetious title of "Population Control Through Nuclear Pollution"[4] was reviewed by Doctor Leonard Sagan, Associate Director of the Department of Environmental Health, Palo Alto Medical Clinic, for the Atomic Industrial Forum, Inc.[5] Doctor Sagan's summary is as follows:

> Suffice it to say, that this reviewer concludes that this book makes no contribution to the difficult and complex issues of U. S. energy usage, pollution, or indeed any other issue, but does indeed further generate that polarization and emotionalism which makes dis-

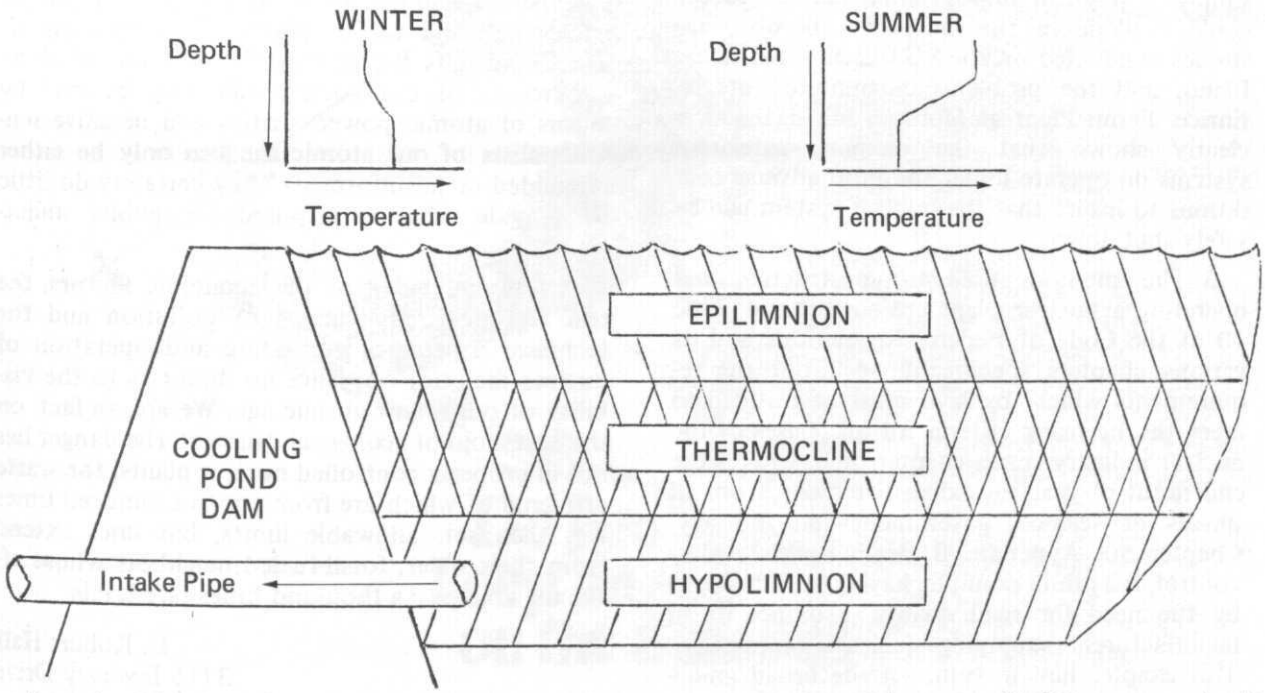
passionate solutions of problems ever more difficult.

A second area of major concern, which opponents of nuclear construction often point out, is thermal pollution. This area is a very real problem when one considers a 3400 MW (Th) plant will have an approximate unit heat rate of 9600 BTU/KWH which means an overall efficiency of 35% is the maximum that can be achieved. This figure is on a par with older and smaller fossil-fueled plants and probably worse than is produced by a large modern plant. It is obvious, then, that the waste heat being rejected to the environment is significantly greater per kilowatt-hour produced via nuclear power than a comparable amount generated by conventional means. The challenge of this problem is being met by those progressive utilities which engage in ecological homework prior to starting construction.

One solution, widely used, is the application of cooling towers to avoid upsetting the balance of aquatic life in local rivers and lakes. This however, only exchanges the area of concern and often results in problems of equal magnitude in the form of fog and a higher deterioration rate of surrounding equipment and structures.

A better solution to the problem of waste heat is offered by a review of limnology as shown in the following illustrations.

**COOLING POND TEMPERATURE PROFILES**




Aquatic life flourishes in the thermoclinetic region and it is this area that must be protected from thermal pollution. By withdrawing a plant's intake cooling water from the hypolimnetic region and discharging several thousand feet distant from the intake to the epilimnetic region, the actual temperature differential is held to an absolute minimum. The thermoclinetic region is not disturbed because of the low Delta T and the natural dispersion at the surface of the pond.[6] Thermal pollution is as real a problem for conventional plants as for nuclear. Thus, the attack on a specific energy source as the sole cause of the problem is irrational.

In recent months, certain quasi-political groups have lobbied to place a moratorium on all present and future construction of nuclear facilities. Their arguemnts include statements such as: Nuclear power is a new and dangerous medium of energy using untried methods and being regulated by the same governmental agency (AEC) as promotes its development. A careful examination of such inconclusive statements reveals an almost total lack of understanding and, in refutation, the following is offered:

1. Nuclear power is not new. In terms of time, our current interest dates to 1939 and the realization of the first controlled fission event. In 1946, the Manhattan District, a forerunner of the AEC, initiated a project known as the "Daniels Power Pile" which was aimed at the construction of a small, land based nuclear power plant. Shortly thereafter, the Navy requested a study of the application for a high pressure, water cooled reactor for submarines. This resulted in the commencement of construction on the Nautilus land-based prototype at Arco, Idaho, in 1950, and has led to what is now this nation's first line of defense.[7] Nuclear power is not new from an even more important

aspect than time, when one considers the technological advances science has made in the area of computers. The speed and memory of early units increased rapidly, progressing through such stages as the IBM-650 and the UNIVAC to modern CDC-6600 and IBM-360 computers.[8] The worth of these analytical systems, in terms of reactor physics research, far out-weighs the single aspect of time.

2. Nuclear power is not dangerous. It is true that there have been accidents, inevitable whenever there is a combination of men and machinery. Not a single accident, however, has resulted in the uncontrolled release of fission fragments to the biosphere. All reactor systems are so designed as to be inherently stable and it is simply a physical impossibility that a reactor could explode in the sense of a bomb. Case studies conducted on the SL 1 accident at Arco, Idaho, and the problems encountered at the Enrico Fermi Plant at Monroe, Michigan, have clearly shown that the designed safeguard systems do operate under the most adverse conditions to insure that the nuclear system can be safely shut down.

3. The methods used in constructing and operating a nuclear plant are not untried. Title 10 of the Code of Federal Regulations and its various chapters specifically spell out the requirements which, by law, must be fulfilled to meet the licensing criteria for all phases of the nuclear industry. Each chapter of 10 CFR is the end result of years of exhaustive study from all phases of science, government and industry. Chapter 50, Appendix B, dealing with quality control, is a prime example, having been fostered by the need for rigid quality assurance of all manufacturers supplying nuclear components. This chapter has, in turn, set the broad guidelines so that individual standards could be provided by the cognizant areas of industry. A list of these industrial standards has been compiled and published by the American National Standards Institute and is currently in its sixth edition.[9] Such facilities as Shippingport, Connecticut Yankee and the Naval Nuclear Power Units have a tremendous construction and operating history, using these so-called "untried" methods.

4. It is agreed that the Atomic Energy Commission both promotes and regulates the industry; so also do the Department of Transportation, the Federal Communication Commission and the Federal Aviation Administration in their assigned responsibilities. In fact, due to the complexity of their respective areas of expertise, it is foolish to ask or expect otherwise.

Experience in the Naval Nuclear Power Program, nuclear electric utility plants and numerous research facilities has proven that the electrical requirements of our society can only be met by means of atomic power. Critics and negative sensationalists of our atomic age can only be either misguided or misinformed. They certainly do little to provide what is required for public understanding.

A rational review of the economic factors, the real and imaginary threats of pollution and the technical aspects of regulating and operation of nuclear facilities can leave no doubt as to the viability of our infant atomic age. We are, in fact, on the threshold of ecological disaster! The danger lies not in properly controlled nuclear plants, the waste effluents of which are from ten to a hundred times less than set, allowable limits, but does extend from their older, fossil-fueled neighbors whose effluents are up to a thousand times safe levels.

E. Robert Hall
3715 Inverary Drive
Lansing, Michigan
Telephone: (517) 393-3267

**FOOTNOTES**

1. Dr. John W. Gofman and Dr. Arthur R. Tamplin, "Radiation Induction Of Breast Cancer In The Rat: A Validation Of The Linear Hypothesis Of Radiation Carcinogenesis Over The Range Of 0-600 Rads" (GT-112-70), mimeographed copy, p. 2.
2. "Environmental Effects Of Producing Electric Power, Hearings Before The Joint Committee On Atomic Energy," Congress of the United States, Ninety-First Congress, Part II, Vol. II (Washington, D.C., 1970) pp. 2145-2155.
3. Ibid.
4. Dr. John W. Gofman and Dr. Arthur R. Tamplin, "Population Control Through Nuclear Pollution," Nelson-Hall Co. (Chicago, Illinois, November 16, 1970).
5. Dr. Leonard Sagan, book review of "Population Control Through Nuclear Pollution," Background Info, (Public Affairs and Information Program), Atomic Industrial Forum, Inc. (New York, N.Y., November, 1970), p. 4.
6. C. A. Dewey, "Limnology And Thermal Effects Of Cooling Ponds," Duke Power Company, Nuclear Training Program, Charlotte, North Carolina, 1970).
7. The Naval Nuclear Power Training Program, Catalog of Information, U. S. Government Printing Office (Washington, D.C.), p. 6.
8. Jack Dhernick, "Status Of Reactor Physics Calculations For U. S. Power Reactors," Reactor Technology (Washington, D. C., 1971) p. 368.
9. J. Paul Blakely, "Compilation of U. S. Nuclear Standards," Nuclear Safety Information Center, American National Standards Institute, (Washington, D. C., 1969).

# Do you keep an eye on the time line?

**To gain the competitive edge, the experts in downhill slalom have this advice: "Watch the time line—the fastest course line."**

**"In the race against time, if a skier slips off and goes too low in the traverses, he'll lose precious seconds."**

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# notes & news

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## The big "E"—it's environment

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## R & D, the big challenge

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We operate one of the world's largest mining organizations, with 10,000 employees in wholly owned operations, domestic and foreign. Our professional managers and engineers represent a broad spectrum of technical and engineering disciplines.

## Study up

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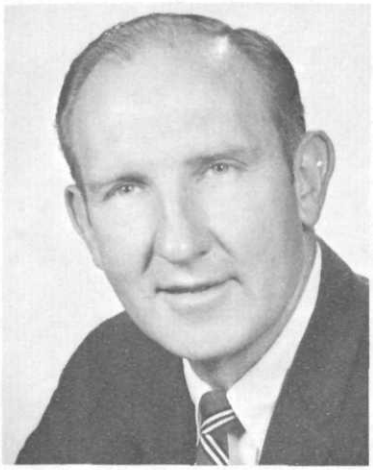

Jack Shingleton

# AN INTERVIEW WITH JACK SHINGLETON

by Bob Norby

**Bob:** Are there more people interviewing this year than last year?

**Jack:** Yes, definitely more people are interviewing because they recognize that jobs are scarce and they're working harder to get a job.

**Bob:** I talked to Mr. Fitzpatrick and he said that in the engineering field there didn't seem to be a shortage of jobs for MSU students.

**Jack:** Well, lets put it this way. The jobs will not be in the numbers that jobs were in 1969 and previous years although I think every student who works at it will get a job.

**Bob:** Which types of graduates are most in demand?

**Jack:** In terms of all disciplines in the university I'd say the technical people are in greater demand than the nontechnical. The engineers would be at the top of the heap. The ones that would be least in demand would be those in social science and education.

**Bob:** Are interviewers really intent on hiring employees or are they just here because its their job?

**Jack:** Interviewers are here because they want to hire people. There may be a few exceptions but for the most part anybody who comes on campus has jobs and is definitely looking to hire people. Now, most employers do not have as many jobs as they had in previous years and this plays an important part in the whole situation but its too expensive for employers to come to campus for an interview to just go through the motions. They come to the campus because they want to hire people.

**Bob:** Do you think winter term interviewing will be more promising than fall term?

**Jack:** Well, winter term interviewing is usually more promising than fall term because thats the term we have most employers; however, winter term this year will be about the same as winter term last year which was down substantially from the year before.

**Bob:** Do you have an estimate on how many of last years graduates are unemployed?

**Jack:** Yes, we not only have an estimate we have a pretty accurate figure. 7.3% of our last years class who participated in a study we made were unemployed as of October 1. This means 7.3% who are actively looking for jobs are unemployed . . . this is all majors, all disciplines. In engineering, to my knowledge, there are no engineers unemployed who are actively seeking jobs.

**Bob:** If employed are they employed in the fields of their abilities?

**Jack:** Most of them are, especially in engineering. We are finding a great many college graduates; however, who are what we call underemployed. That means working in fields not at the level to which they studied. This is not as true in engineering as in other fields.

**Bob:** Do you have any other comments you would like to make?

**Jack:** The only other comment I would make is this. Michigan State University engineering graduates are getting a first class education and they are highly marketable when they compete in the overall engineering employment market. Unless a student has unusual geographical restrictions or does not work at this business of looking for a job, I see no reason why all of our engineering graduates should not have jobs by graduation time. Many of the graduates will not have the selection their predecessors have had but if they demonstrate a willingness to work and seriously go about the matter of looking for a job they'll do all right.

One final word. Many of the engineers who are being let out of jobs today are people who have become obsolete in their profession through the years. It behooves all of the graduating students to recognize that their education does not end with the diploma, especially in their field. I urge them to constantly keep abreast of new developments in their respective fields and they can look forward to a good solid future.

**Bob:** OK, well thank you very much.

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Every week now, it replaces six or eight of its old c
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INTERNATIONAL NICKEL HELPS

Ed Fitzpatrick

# AN INTERVIEW WITH ED FITZPATRICK

by Bob Norby

**Bob:** Which types of people are most in demand in the technical and science oreinted graduates?

**Ed:** You've asked a question that isn't easy to resolve in a couple of words. There has been pretty strong interest shown in all majors in the College of Engineering. In talking of engineering specifically we had employer requests last year for interviews on campus with students which ranged from a low of 23 for the Sanitary Engineer to the highest demand area we saw which was for Mechanical Engineering with 293 employers. The numbers of employers seeking interviews has to be tempered by the numbers of people in the disciplines. The ratios, probably as a generalization, Bob, were about a two to one ratio of employers per student. In some areas it was higher. In Chemical Engineering we had the heaviest ratio of employers to students that being about 4 to 1. It was not what we had seen two years ago where we had such really wide open selectivity on the part of the individual graduate. Many seniors could very well identify what kind of engineering work they wanted to accept and in a great many cases where they wished to work. Most of the Engineering students who were out working at finding a job last year didn't have much difficulty. There were some who were looking for a specific kind of employment in a particular area or some who just simply didn't come across positively in an interview and who didn't come up with jobs. There were some who thought they were going on to grad school and then sometime in Spring decided to look for a job and then, had kind of an uphill fight. It wasn't a wide open year but it was a considerably better year for the technically oriented graduate than it was for the student in many of the Liberal Arts disciplines.

**Bob:** Do you think this year will be much better?

**Ed:** No, I don't think this year will be much better. I think it will be just about the same as last year. The bachelors candidates and many of the masters graduates didn't have many problems in finding jobs; some did, as I said. The bigger problems seem to come for the doctoral candidates. It was typically easier last year for the undergraduate to find work than for the doctoral candidate.

**Bob:** Thats a lot better than what I heard for the job opportunities.

**Ed:** Well, I was speaking with a man last night at a meeting who was talking about the job market and he said, he knows all kinds of engineers who have ten to fifteen years of experience who are laid off on the west coast. They have probably been out of school for 15 to 20 years. I agree with him. We've seen a number of alumni out of work. Speaking specifically of the new graduate market, however, it is better than the alumni market.

**Bob:** Are there any new areas an engineer might look into such as biomedical engineering?

**Ed:** Very definitely Bob, but a lot of these haven't translated from ideas into hard jobs at this time. The biomedical area is one and environmental engineering another, where the engineer would work as part of a coordinated team potentially including chemists, entomologists, fisheries and wildlife majors, forestry majors, biologists and a series of scientists. Very definitely things are coming but we have not seen these translated from a few pilot programs to the point where they're coming in interviewing seniors. I think it would be a little premature to say this is right around the corner but I certainly don't think its very far away. More and more has to be done before these fields reach the stage of campus interviews. There is a growing awareness on the part of government agencies particularly and a number of research oriented organizations towards the environmental area. I think this will represent considerable numbers of jobs in the future. There will be other applications in commercial fields stemming from a lot of things they've generated from real "blue sky" research situations. There will be applications in biochemical areas, obviously. The supplement

to the heart that the gentleman in the Detroit area received will just be one of a series of application in the biomedical electronics field. I don't think it would be exclusive to biomedical or environment but I think a very broad application in engineering. Those two I would suspect are probably going to receive a greater amount of attention and maybe priority than some of the others.

**Bob:** Are there any engineering areas or science areas that are in excess? Too many students? Too many graduates?

**Ed:** Possibly. In total the area which seems to be most critically affected, with which I have come in contact most this year, has been the doctoral candidates. I think this would go across disciplines. In the past they were the darlings of the recruiters' eye. Everyone was clamoring for the Ph.D. and the market has turned cold. There have been no engineering areas that have been critically over produced as far as Michigan State goes. Projections seemed to justify the number, but when we're talking in the science areas currently, the doctoral level is this overproduction problem. The "cooling" of the economy was a major factor. We haven't seen the problem that critically at the undergraduate level. Let me throw a couple of figures at you here that I suspect will validate my statement. We were talking about the numbers of employers in our office recruiting: 92 employers came last year looking for Chemistry majors, 16 for Geology, 83 for Mathematics, 17 for Microbiology and Public Health, 50 for Physics majors, 31 for Statistics . . . those are not bad figures. The thing to consider in this is that each of those employer numbers do not represent one employment opportunity but possibly multiple opportunities. Of course that can vary from about one opening to a hundred. In engineering the largest demand was 293 for Mechanical Engineers. So at MSU I wouldn't say that we were over produced. That may not be true at all though at a national or even a regional basis. At the doctoral level there is this problem. The employment market in Education, Business and Government has really withered.

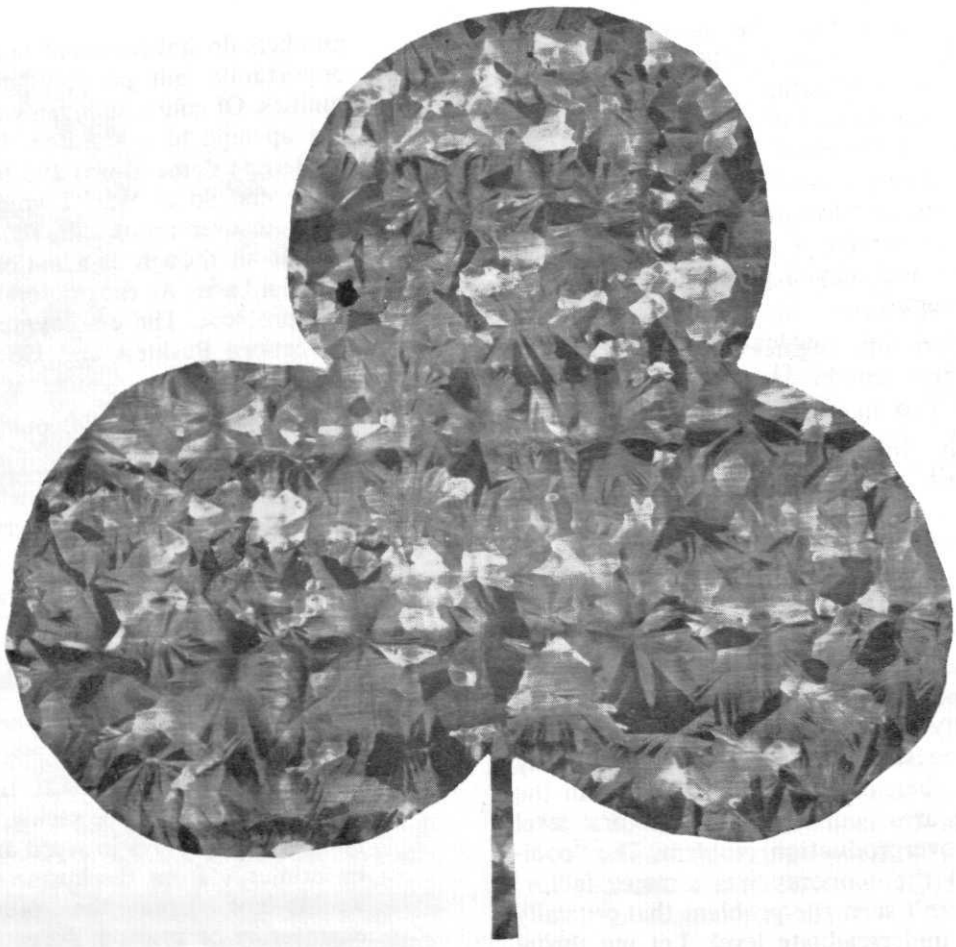
**Bob:** Is there anything you would like to add now?

**Ed:** Yes. Let me make a comment or two about recruiting at State: The recruiting season for the technically oriented individual in the Sciences or Engineering is during Fall or Winter Terms. Regretfully, I see a few students coming in about late April saying "Who will be coming in for the balance of the year?"

**Bob:** And its too late . . .

**Ed:** Yes, its too late. By that time the employers that we will be seeing, and we will be seeing employers in April and May, will be primarily from the business and school worlds—not from the production or engineering or research areas. Most of the students do pretty well if they work at looking for a job. The ones that try to follow a pattern that was effective even a few years ago, of being passive and waiting for the employer to somehow hear of them as being the shining star on the campus and coming directly to them will just wait a long time this year.

**Bob:** Thanks a lot Mr. Fitzpatrick.



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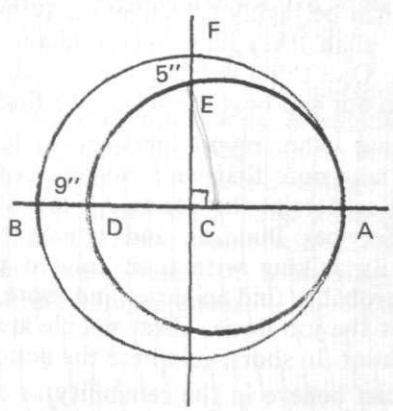
# Puzzle Page

A five dollar prize will be awarded to the first engineering student to turn in the correct solutions in Rm. 210 E.B.

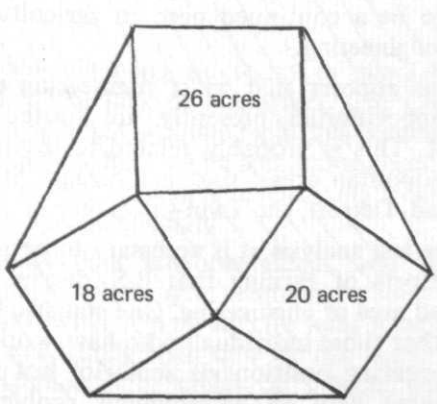
1. A rook and a bishop are placed at random on different squares of a chessboard. What is the probability that one piece threatens the other?

2. What is the missing number in the sequence? 10, 11, 12, 13, 14, 15, 16, 17, 20, 22, 24, ....., 100, 121, 10,000.

3. The crescent is formed by two circles, and C is the center of the larger circle. The width of the crescent between B and D is 9 inches, and between E and F 5 inches. What are the diameters of the two circles?




4. A farmer owned the three square fields as shown. In order to get a ring fence around his property he bought the four triangular fields. What is the total area of the farmer's land?



# The Engineering Job Market: Point of View

by Larry Barazsu and Dave Zolynsky

Believe it or not, there are real job opportunities for graduating engineering students. The situation may not be like the early 60's, when engineering graduates received an average of 3.73 job offers. Perhaps it should be noted that most of these offers (2.73) came from the space industry.

The prospective employee today must be skilled at "selling" himself, along with his ability and paper credentials. What this means is that he must be pleasant to work with, in addition to the self confidence and poise he exhibits. Like the man said: "If you don't like yourself, why should anyone else"?

The world of work, especially in metropolitan areas, usually require mobility and flexibility. So it is very important to decide where you prefer to work and what sort of responsibility you wish to shoulder. It apparently makes it easier to find a job if the prospective employer has more options at his disposal.

When talking to a prospective employer, he will make a mental note of your appearance—the length of your hair, your taste in clothes, that elusive air of professionalism.

You must also remember that in order to find a job, you have to go out and hunt for it. Today's employer can be highly selective; many have more applicants than they can accomodate even for interviews. One thing is fairly certain: they're not going to go out and beat the bushes to find you.

For those who might underestimate its importance, take note that we have one of the finest placement centers in the country. Stop over in the Student Services Building and check it out for yourself. By talking with their trained personnel you will probably find an easier and more effective way to get the job done. These people are there to help you hunt. In short, go where the action is!

If we can believe in the reliability of some employment information described in other student engineering magazines and the September 24, 1971 Engineers Joint Council Newsletter, some engineering areas have not been overly affected by the national economic slowdown. These areas include civil, petroleum, environmental, sanitary, and chemical engineering among others. There also seems to be a continued need in agricultural and mining engineering.

It also appears that most engineering employment opportunities presently are rooted in the Midwest. This is probably related to the presence of metropolitan areas, such as Chicago, St. Louis, Cleveland, Detroit, the Twin-Cities, etc.

In the last analysis, it is necessary to persevere in your efforts of earning that B.S. degree in your preferred area of engineering. One statistic I found, stated that those individuals who have worked into an engineering position via seniority but without any degree have an employment problem 44% higher than those with degrees.

Like they say: "It's one thing to find a job; it's quite another to be able to keep it."

## AN INTERVIEW

## WITH BILL MACLEOD

by Don Willemsen

**Don:** How many engineering students were employed through the Summer Job Program at MSU last summer?

**Bill:** The exact number we cannot be sure of. However, the number is fewer than in recent years. Generally "Business" employers who interview at the Placement Bureau for summer employment take a strong look at the technical fields.

**Don:** What type of students seem most in demand by the employers?

**Bill:** Vocationally oriented summer employment is becoming increasingly difficult to obtain during the summer months; although it can be an invaluable experience to both the student and employer. In most cases, we anticipate students will be employed during the summer in work such as in the camp and resort areas or labor positions. To find a summer opportunity in engineering, students generally need to have completed at least their Junior year in college. As the job market tightens, specific training and the student's grade point will strongly affect the possibilities of obtaining technical summer employment.

**Don:** Do you expect this year's summer job market to do better or worse than last year's?

**Bill:** We anticipate jobs for the summer definitely to drop from last year. I would urge engineering students interested in summer jobs to fill out a Summer Employment Application with the Student Employment Office of the Placement Bureau. These applications will be made available to employers at the Placement Bureau requesting summer job applicants. Students should also start watching the job opportunities listed in the Summer Job Catalogs at the Student Employment Office made available at the beginning of Winter Term. This information is very limited at this time; although we expect an increase in engineering jobs around February, March, and April. Students may also wish to take the summer Federal Civil Service Examination which will be administered on campus during the months of January, February, and March 1972.

**Don:** Do many summer jobs lead to full-time employment?

**Bill:** There is a definite advantage to obtaining a summer job experience. This not only gives employers a better knowledge of your interests and working ability; but more important, it will give you that same information.

# IDENTITY! worth $50

by Dr. John V. Polomsky

Yes, the big hang up today in many areas of America is the lack of "Identity." The College of Engineering is not immune from this contemporary malady. We propose to do something about it with the help of our students currently matriculating at Michigan State University.

We want your creations, ideas, and views on good, sharp, meaningful emblem, trademark, or logo, call it what you please. We want some snappy symbol to identify with that we can use as our official letterhead, for crests on jackets, pennants, stationery, to put on gavels, rostrums, etc. In other words we want something everyone can recognize as that of the College of Engineering at Michigan State University.

**Requirements for the contest**

There should be a freehand sketch submitted that is clear enough to be reproduced by an artist for graphic work or engraving. It should be at least 4" x 5" minimum, and not **more** than 6" x 8". You should color or at least color code your work so your ideas are conveyed to the judges. Try to be as original and creative as possible and try for more than one, there is no limit to the number of entries you may present. You can incorporate letters, symbols, and any shapes you desire. We want something snazzy, so let's get with it. Be sure to put your name and phone number on all entries. Turn your entries in to: Dr. John V. Polomsky
106 Engineering Building.

**The winner will receive a $50 cash prize.**

# How to call a stereo buff's bluff.

A buff will probably tell you you've got to drop a bundle to get a really great stereo system.

Nonsense.

Stereo is all in the ear. It's how it sounds, not how it costs, that makes a stereo system great.

So next time some buff hands you that old line call his bluff. See if he can figure out how much you paid for your Sylvania matched component stereo system. Just by listening.

Pick your favorite record. Put it on the BSR micro-mini turntable. (If tape's your thing, slip one into the 8-track cartridge playback.)

Then balance the bass and treble on the FM stereo FM/AM tuner and amplifier. And let him have it.

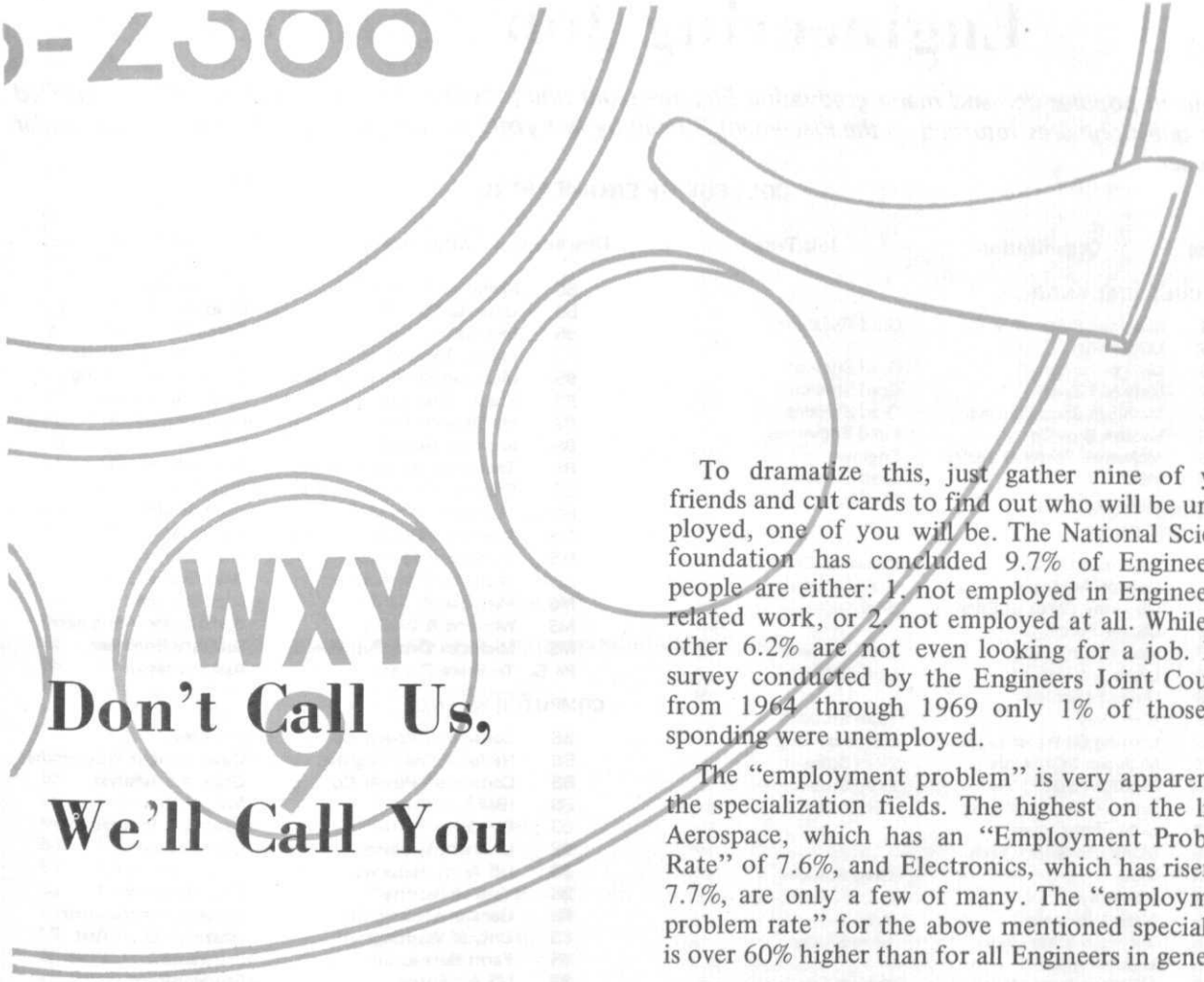
Make sure he digs those round low notes from the two six-inch woofers. And those high sweet ones from the two three-inch tweeters. They're all air-suspension speakers, so they sound as good as standard speakers two sizes larger.

Your buff won't have a chance. He'll stand there, surrounded by sound, completely bluffed. Trying like crazy to figure out how much you laid out for a stereo that sounds that great.

But don't tell him.

After all, you just want to call his bluff. Not destroy his ego.

GTE SYLVANIA




# Don't Call Us, We'll Call You

by Douglas Franz

The job market is not as bad as many people are implying. One can always drive a taxi or deliver a few of Domino's pizzas. But in the real money-making job market things are very stagnate.

In the mid 60's scholars and high school advisers were explaining the many advantages and job opportunities in the field of Engineering; so you went. Four years and 180 odd credits later even grad school looks good.

The real world is in quite a mess. "Phase One" is "dead and buried," while "Phase Two" has burst forth like a breath of spring after everything has been dead for two years. Unemployment among Engineers has steadily increased between March 1970 and June 1971 while the national unemployment has only risen 27 per cent in the same period. It comes down to the plain fact that the job market is at its worst since the early days of F. D. Roosevelt.

To dramatize this, just gather nine of your friends and cut cards to find out who will be unemployed, one of you will be. The National Science foundation has concluded 9.7% of Engineering people are either: 1. not employed in Engineering related work, or 2. not employed at all. While another 6.2% are not even looking for a job. In a survey conducted by the Engineers Joint Council from 1964 through 1969 only 1% of those responding were unemployed.

The "employment problem" is very apparent in the specialization fields. The highest on the lists: Aerospace, which has an "Employment Problem Rate" of 7.6%, and Electronics, which has risen to 7.7%, are only a few of many. The "employment problem rate" for the above mentioned specialties is over 60% higher than for all Engineers in general.

The real mind-boggler comes when you take a look at the main problem areas in engineering employment, which are in citizenship, age, and level of education. The unemployment among the age groups under 25 or over 55 has the highest rate of any age group. Ten percent of the people under 25 years in engineering are under-employed. Meaning they either don't have a job or they have a job, not by choice, outside of engineering. If you are not an American Citizen, you are 80 per cent more likely to have trouble getting a job, in comparison to an engineer who has U. S. Citizenship.

The "employment problem rate" is 44% higher for Engineers without a college degree than those with the papers.

The future shows no tangible signs of improvement except for the decrease in engineering, enrollment. one-fourth of all Scientists and Engineers working on defense projects are being phased out of work. The large scale areospace production will not revive itself unless something unforseeable arises. The only breath of hope lies in a consumer products race instead of an arms and space race between the manufacturing nations. When this happens attention will be placed on quality and a high demand for engineers will arise again.

# Engineering Job Statistics

*Due to popular demand many graduating Engineers did find jobs last year. Below are statistics compiled from questionnaires returned to the Placement Bureau by last years graduates. Engineers are just as popular this year.*

## COLLEGE OF ENGINEERING

| Degree | Organization | Job Title |
|---|---|---|
| **AGRICULTURAL ENGR** | | |
| BS | Michigan State Univ | Grad Assistant |
| BS | US Marines | |
| BS | Univ of Hawaii | Grad Student |
| BS | Univ of Hawaii | Grad Student |
| BS | Michigan State University | Grad Student |
| BS | Babson Bros Co | Field Engineer |
| BS | McNamee Porter & Seeley | Engineer |
| BS | MSU | Grad Student |
| BS | Century Farms | Manager |
| **CHEMICAL ENGR** | | |
| BS | American Oil Co | Chemical Engr |
| BS | Univ of Arkansas | Grad Student |
| BS | US Army Corps of Engr | Engr Aide |
| BS | US Air Force | |
| BS | Mass Inst of Tech | Grad Student |
| BS | Leeds & Northrup | Sales Engineer |
| BS | Univ of Michigan | |
| BS | Rice Univ | Grad Student |
| BS | Lansing Bd Water Light | Chemical Engr |
| BS | Michigan State Univ | Grad Student |
| BS | Michigan State Univ | Grad Student |
| BS | Union Oil of California | Comm Rep |
| BS | Univ of Michigan | |
| BS | Monsanto Salfex Tech | |
| BS | MSU | Grad Student |
| BS | US Army | |
| BS | Marine Reserve | Pvt |
| BS | Michigan State Univ | Grad Student |
| BS | Univ of Wisc | |
| BS | Michigan State Univ | Grad Student |
| BS | US Army | |
| BS | Univ of Texas | Grad Student |
| BS | Albert Einstein College | |
| MS | American Oil Co | Asst Chemical Engineer |
| **CIVIL ENGINEERING** | | |
| BS | City of Detroit | Junior Civil Engineer |
| BS | US Pub Health Service | Asst Sanitary Engr |
| BS | Florida State Trans Dept | Prof Eng Trainee |
| BS | Michigan State Univ | Grad Student |
| BS | US Navy | Project Engr |
| BS | ETC Inc | Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | Michigan State Univ | Grad Student |
| BS | Oldsmobile | Clerk |
| BS | US Air Force | 2nd Lieutenant |
| BS | Wisconsin Dept of Nat Res | Environ Eng I |
| BS | Mich Dept St Hwy | Civil Engr |
| BS | Univ of Illinois | |
| BS | Ohio Dept of Highways | Engineer in Training |
| BS | McNamee Porter & Seeley | Engineer |
| BS | Mich Dept of Hwys | Civil Eng |
| BS | McNamee Porter & Seeley | Design Engr |
| BS | M C S Engineers | Design Engr |
| BS | Eastman Kodak Company | Civil Engineer |
| BS | Spicer Engineering | Civil Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | John E Hiltz Assoc | Design Engineer |
| BS | EDCO Constr Inc | Engineer |
| BS | Prog Engr Consultants | Civil Engineer |
| BS | US Air Force | Civil Engineering Officer |
| BS | Prein & Newhoe | Civil Eng |
| BS | Dept of Natural Res | Sanitary Eng |
| BS | Army National Guard | |
| BS | McNamee Porter & Seeley | Civil Eng |
| BS | Michigan State Univ | Grad Student |
| BS | Univ No Carolina | Grad Student |
| BS | Michigan State Univ | Grad Student |
| BS | Fenske Excavations | Consultant Engineer |
| BS | Michigan State Hwy Dept | Engineer in Training |
| BS | Ebasco Services | Asst Engineer |
| BS | US Dept of Agri | Design Engineer |
| BS | National Guard | E 1 |
| BS | Tennessee Valley Author | Design Engineer |
| BS | Brighton Engineering Co | Civil Eng |
| MS | Michigan State Univ | Grad Student |
| MS | American Test & Engineer | Proj Engr |
| MS | Mich Dept St Highways | Traffic Engr |
| MS | Michigan State Univ | Grad Student |
| MS | Michigan State Univ | Grad Student |
| MS | Williams & Works | Construction Engineer |
| MS | Michigan Dept Pub Health | Sanitary Engineer |
| Ph.D. | Tri State College | Asst Professor |
| **COMPUTER SCIENCE** | | |
| BS | Consumers Power Co | Systems Analyst |
| BS | National Cash Register | Development Programmer |
| BS | Consumers Power Co | Graduate Analyst |
| BS | IBM | Mktg Rep |
| BS | Bendix | Associate Programmer |
| BS | Univ of Maryland | Grad Student |
| BS | US Army Reserves | |
| BS | Yale University | Grad Student |
| BS | General Electric Co | Systems Programmer |
| BS | Univ of Washington | Research Grad Asst |
| BS | Farm Bureau Ins | Programmer Trainee |
| BS | US Air Force | Student Pilot |
| BS | Merritt Enterprises | Programmer |
| BS | Control Data Corp | Programmer Analyst |
| BS | Aeroquip | Systems Programmer Trainee |
| BS | US Army | |
| BS | Burrcughs Corp | Sales Support Rep |
| BS | US Air Force | Comp Sys Programmer |
| BS | Michigan State Univ | Grad Student |
| BS | Texas A&M | Grad Student |
| BS | Adams Tool & Engineering | Machinist |
| BS | State Farm Mutual Ins | EDP Specialist III |
| BS | Michigan State Univ | Consultant |
| BS | US Army | |
| BS | Michigan State Univ | Computer Programmer |
| MS | Michigan State Univ | Grad Student |
| MS | Uniroyal Inc | Systems Analyst |
| MS | MSU Coll of Ed | Grad Student |
| Ph.D. | Sacramento State Coll | Asst Prof |
| **ELECTRICAL ENGR** | | |
| BS | Ford Motor Co | |
| BS | US Army | Electrical Engineer |
| BS | US Navy | |
| BS | General Electric Co | Engr Training Program |
| BS | Georgia Inst of Tech | Grad Student |
| BS | US Army | |
| BS | Detroit Edison Co | Assistant Engineer |
| BS | McDonnell Aircraft Co | Aerospace Grd Engr |
| BS | Dlcuhy Electric | Electrician |
| BS | Gen Tele of Mich | Engr Asst |
| BS | Mi chigan State Univ | Grad Student |
| BS | Johnson & Johnson | Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | Stanford Univ | Grad Student |
| BS | Consumers Power Co | Grad Engineer |

| | | |
|---|---|---|
| BS | Harry Diamond Labs | Electronic Engr |
| BS | Owens Illinois | Elec Engineer |
| BS | Programmed Mach Sys | Control Design Engineer |
| BS | Purdue University | Grad Teaching Assist |
| BS | US Army Material Comm | Gen Eng |
| BS | Western Electric Co | Engineer |
| BS | Oldsmobile | Jr Plant Engineer |
| BS | Consumers Power | Graduate Engineer |
| BS | Dun Ruvin Country Club | Asst Greens Keeper |
| BS | Delco Remy Div of GM | Product Engr |
| BS | MSU | Grad Student |
| BS | Motorola Inc | Electronics Engineer |
| BS | Michigan State Univ | Laborer |
| BS | Western Electric | Electrical Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | Univ of Colorado | Grad Student |
| BS | Lincoln Electric Co | Engineer Trainee |
| BS | Kurtz Gravel Co | |
| BS | Meijers Inc | Butcher |
| BS | Newport News Shipyard | Systems Engineer |
| BS | Westinghouse Corp | |
| BS | US Air Force | |
| BS | Michigan State Univ | |
| BS | Ford Motor Company | Product Design Engr |
| BS | US Army Material Comm | General Engineer |
| BS | Motorola | Elec Engineer |
| BS | Stanford Univ | Grad Student |
| BS | General Electric | Electrical Engr Trainee |
| BS | Consumers Power Co | Assoc Elec Eng |
| BS | Univ of So Cal | Grad Student |
| BS | Michigan State Univ | Grad Student |
| BS | Consumers Power Co | Associate Engineer |
| BS | Manpower Inc | General labor |
| BS | Michigan State Univ | Grad Student |
| BS | Michigan State Univ | TAB Operator |
| BS | US Air Force | Navigator |
| BS | Naval Missile Sys | Electronic Eng |
| BS | Detroit Edison Co | Assistant Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | US Army | |
| BS | Motorola Inc | Development Engr |
| BS | US Army | |
| BS | Eastman Kodak | Electrical Engineer |
| BS | US Air Force | |
| BS | Tracy Design Corp | |
| BS | Consumer Power Co | Grad Engineer |
| MS | US Navy | Lieutenant Junior Grade |
| MS | Lear Siegler Inc | System Engr |
| MS | Michigan State Univ | Grad Student |
| MS | Mich State Univ | Grad Student |
| MS | Mich State Bd of Comm | Staff Engineer |
| MS | John Hopkins Univ | Associate Engineer |
| MS | IBM | Assoc Engineer |
| MS | US Navy | Ensign |
| MS | Essex International | Proj Engineer |
| MS | Mi chigan State Univ | Grad Student |
| Ph.D. | Bell Telephone Labs | Member Technical Staff |
| Ph.D. | Owens Illinois Inc | Electrical Engineer |

MATERIALS SCIENCE

| | | |
|---|---|---|
| BS | Humble Oil & Refining | Tech Analyst |
| BS | Stanford Univ | Grad Student |
| BS | Uniroyal Inc | Develop Engineer |

MECHANICAL ENGR

| | | |
|---|---|---|
| BS | Oldsmobile | Engineer |
| BS | Ford Motor Co | Eng Grad Trainee |
| BS | Caterpillar Tractor Co | Mech Engr |
| BS | Packard Elect Div GM | Product Eng |
| BS | US Navy | |
| BS | Allis Chalmers | Mechanical Engineer |
| BS | Chevrolet Div | Coll Graduate in Training |
| BS | Purdue Univ | Grad Student |
| BS | Consumers Power Co | Asst Engineer |
| BS | Bechtel Corp | Cost Engineer |
| BS | Ford Motor Co | Product Engineer |
| BS | Oldsmobile Div GMC | Engineering |
| BS | Chicago Pub Schls | Teacher |
| BS | US Air Force | Air Craft Maint Off |
| BS | Michigan State Univ | Grad Student |
| BS | Rapistan Inc | Engineer Trainee |
| BS | Pontiac Motor Division | Product Engr Coll Grad in Trn |
| BS | Newport News Shipbldng | Design Eng |
| BS | Chrysler Corp | M Engineer |
| BS | Michigan State Univ | Grad Student |
| BS | B L Const Co | Truck Driver |
| BS | Michigan State Univ | Grad Student |
| BS | Union Pump Comp | Test Engineer |
| BS | Univ of Michigan | Grad Student |
| BS | Michigan Cons Gas Co | Graduate Trainee |
| BS | Mare Island Naval Shipyrd | Asst Design Engineer |
| BS | Ford Motor Co | Prod Dev Engineer |
| BS | Ford Motor Co | Design Engr |
| BS | Foster Wheeler Corp | Service Engineer |
| BS | Foster Wheeler Inc | Service Engineer |
| BS | Saginaw Steering Gear | Associate Engineer |
| BS | C W Smith & Son | Mechanic |
| BS | Consumers Power Co | Associate Engineer |
| BS | US Steel | Maint Foreman |
| BS | Aeroquip | Mechanical Eng |
| BS | Michigan State Univ | |
| BS | Oldsmobile Div GMC | |
| BS | Stanford Univ | Grad Student |
| BS | Michigan State Univ | Grad Asst |
| BS | Hartman Fabco | Design Engineer |
| BS | Bendix Brake & Steering | Egr |
| BS | Ford Motor Co | Product Engineer |
| BS | General Motors | Engineering Trainee |
| BS | US Air Force | Pilot |
| BS | Xerox Corp | MFG Engineer |
| BS | Consumers Power Co | Grad Engr |
| BS | Clark Equipment Co | Draftsman |
| BS | Seven Eleven Store | Clerk |
| BS | Aeroquip Corp Jackson | Corporate Engr |
| BS | Martin Marietta | Mech Engineer |
| BS | US Army | |
| BS | Board of Water & Light | Test Engineer |
| BS | Oldsmobile Div GMC | Engineer |
| BS | Michigan State Univ | Grad Student |
| MS | Eastman Kodak Co | Design Engineer |
| MS | Michigan State Univ | Grad Student |
| MS | Michigan State Univ | Grad Student |
| Ph.D. | NASA Lewis Res Center | Aerospace Engr |
| Ph.D. | General Motors Inst | Associate Professor |
| Ph.D. | US Army | |
| Ph.D. | Natl Aero Space Adm | |
| Ph.D. | General Motors Inst | Prof of Mech Engr |

MECHANICS

| | | |
|---|---|---|
| MS | University of Wisconsin | |
| MS | Olds Div | Project Engineer |
| MS | US Air Force | Student Pilot 2 Lt |
| Ph.D. | Ford Motor Co | Sr Res Sci |
| Ph.D. | Mich Dept of Highways | Physical Research Engineer 12 |
| Ph.D. | Wayne State Univ | Research Assistant |

METALLURGY

| | | |
|---|---|---|
| BS | US Army | |
| BS | Western Electric | Member of Research Staff |
| MS | Hayes Albion Corp | Metallurgist |
| MS | US Patent Office | Patent Examiner |
| MS | US Air Force | Pilot Officer |
| Ph.D. | General Motors | Senior Physicist |

SYSTEMS SCIENCE

| | | |
|---|---|---|
| BS | Bd of Water Light | Systems Engineer |
| BS | Dept of Navy | Gen Engr |
| BS | Air Force Inst of Tech | |
| BS | Michigan State University | Research Assistant |
| BS | J M Fields Inc | Systems Training |
| MS | Leeds and Northrup Co | |
| MS | US Navy | Officer Lt |
| MS | Michigan State Univ | Grad Student |
| MS | US Navy | Officer |
| MS | US Navy | Electronic Engr |
| Ph.D. | Turkish Sugar Corp | Associate Researcher |
| Ph.D. | Michigan State Univ | Research Associate |

# ENGRINEERS

"I shall now illustrate what I have on my mind," said the E.E. Prof. as he erased the board.

The first woman was called Eve because her arrival brought an end to Adam's perfect day.

"What you got?"

"Three eights and a pair of kings. Ah wins."

"No you don't, ah wins."

"Three sevens and a razor."

"So you does. How come you is so lucky?"

A medical-school class was asked to name five reasons why mother's milk is better for babies than cow's milk.

One student wrote:

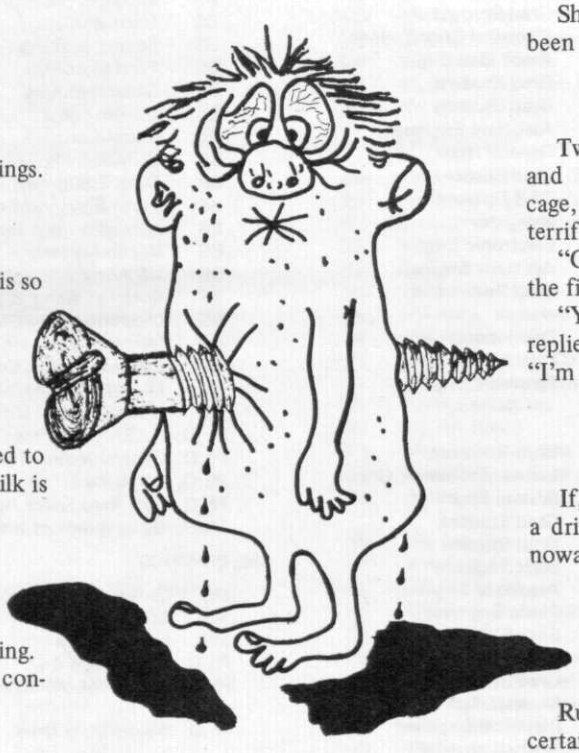
1. It's faster.
2. It's cleaner.
3. It's safer; the cat can't get it.
4. Easier to handle when traveling.
5. Comes in more attractive containers.

Confucius say: "A bosom companion sometimes turns out to be a false friend."

Typist: "But professor, isn't this the same exam you gave last year?"

Professor: "Yes, but I've changed the answers."

**WORK DILIGENTLY with INTEGRITY**



**YOU'LL ALWAYS GET YOUR REWARD!!**

The American business man is finding it harder than ever to get ahead. Every time he develops something new the Russians have already invented it and the Japanese are making it cheaper.

The boss was chasing his secretary as usual. He suggested, "Let's go up to my apartment tonight."

She answered, "I am very didactic and pithy in my refusal of your very derogatory, vituperative, and vitriolic proposition."

Stunned, he replied, "I don't get it."

She answered, "That's what I've been trying to tell you."

Two drunks wandered into a zoo and as they staggered past a lion's cage, the king of beasts let out a terrific roar.

"C'mon, let's get out of here," said the first."

"You go ahead if you want to," replied his more inebriated cohort, "I'm gonna stay for the movie!"

If, as the scientists say, sex is such a driving force, why is so much of it nowadays parked?

Rumor has it that manufacturers of certain feminine garments are currently making only three types: The Russian type, the Salvation Army type, and the American type. The Russian type uplifts the masses, the Salvation Army type restores the fallen, and the American type make a big thing out of nothing.

Girl: How did you get that scar across the bridge of your nose?

EE: From Glasses.

Girl: Why don't you get contact lenses?

EE: They don't hold enough beer.

The ad shown below has told the public about a Kodak product intended to save people from a life of mental retardation.

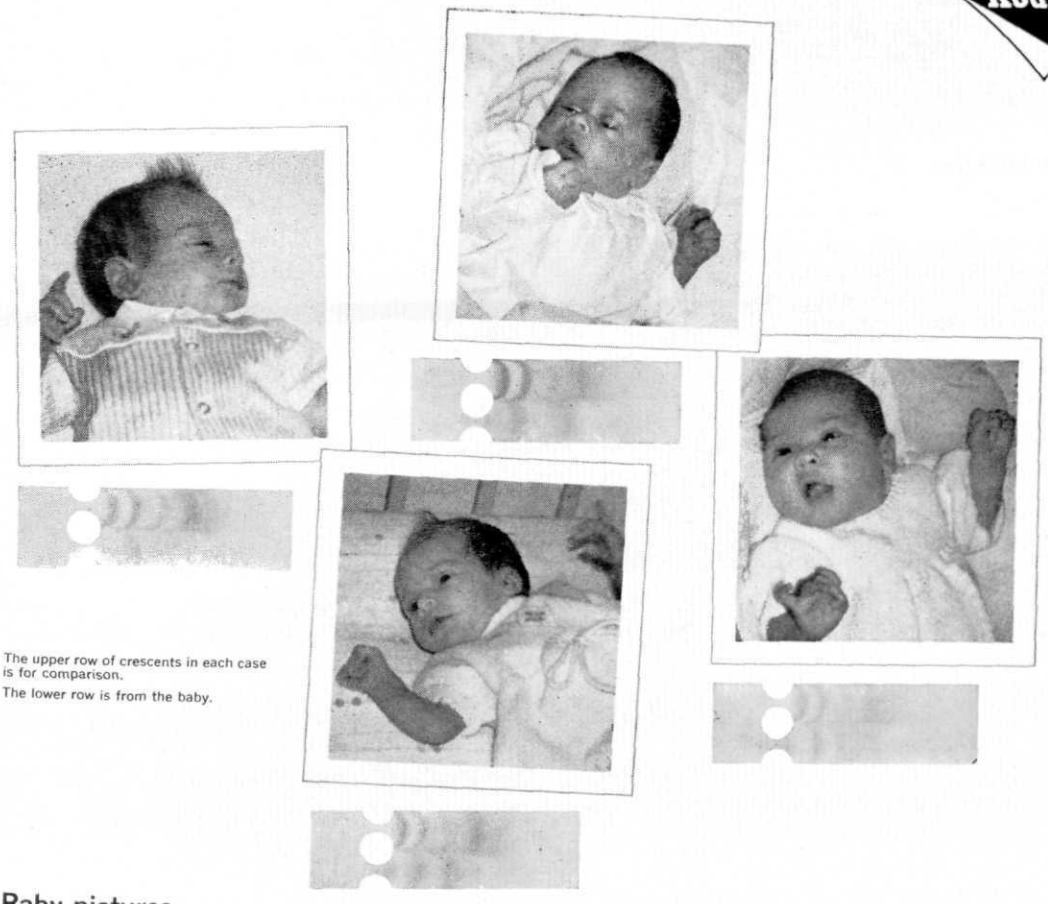
A young Kodak technical guy convinced us
we ought to market that product.

Convincing us was not easy.

*Nobody* who wants to do a little good in the world *ever*
has an easy time of it, *any place.*

EASTMAN KODAK COMPANY

Kodak



The upper row of crescents in each case is for comparison.

The lower row is from the baby.

## Baby pictures

Seen here as strips beneath the familiar kind of baby snapshots is a new kind, made from urine samples donated by these healthy new citizens. (A test of blood plasma is also desirable.) The strips tell about body chemistry. One out of many thousands of such patterns may turn up with a prominent crescent in the lower row at this particular point

Such is the hint that the infant's body is mishandling phenylalanine, a required substance that results from digestion of any natural protein food, like milk. If this continues, the child will probably suffer mental retardation.

Most states already require a test for this condition. If after the first weeks at home babies had an additional blood test with one of these snapshots, chances would increase of detecting other such metabolic defects. Unrecognized and untreated, many of these also lead to retardation and other severe impairments.

Treatment consists of precise regulation of diet.

Kodak, long known for simple snapshots, also makes the material on which these simple non-photographic ones are taken. (Thin-layer chromatograms, they're called.) No camera, only a few plastic accessories.

The physician's time and insight are required only for the infant whose test falls outside the common range of variation—to decide on more detailed confirmation of abnormality and, if confirmed, on remedial measures.

Cute baby pictures are both priceless and remarkably inexpensive. So is this less cute, biochemical kind. Who ought to pay for it is an interesting question in ethics, politics, and economics. Here is one place where industry's ambitions for efficient production may encounter little opposition.

# HOW CAN A MICROBE HELP TURN GARBAGE INTO FOOD?

The petri dish at the bottom of the page holds a special strain of thermophilic microbes. What does it have to do with garbage?

The microbes digest cellulose. And cellulose is what nearly two-thirds of all municipal garbage and farm refuse are made of.

So the microbes can digest your garbage. But that's not all they can do. They can convert it into a high-protein substance that livestock will accept as food.

This strain of microbes was first isolated in a General Electric research lab a few years back.

Today, our engineers are working to design a pilot plant to make the waste-conversion process work on a large scale.

It's a technological innovation with a good chance of solving one of the biggest problems facing the country today. But, then, that's hardly surprising. Technology is one of the surest ways of solving social problems.

That's why, at General Electric, we judge innovations more by the impact they'll have on people's lives than by their sheer technical wizardry.

Maybe that's a standard you should apply to the work you'll be doing. Whether or not you ever work at General Electric.

Because, as our engineers will tell you, it's not so much what you do that counts. It's what it means.

GENERAL ELECTRIC