“Diversity and Engineering, Past, Present, and Future: Perspectives on Change, Progress, and Challenge”

Amy Bix, Iowa State University

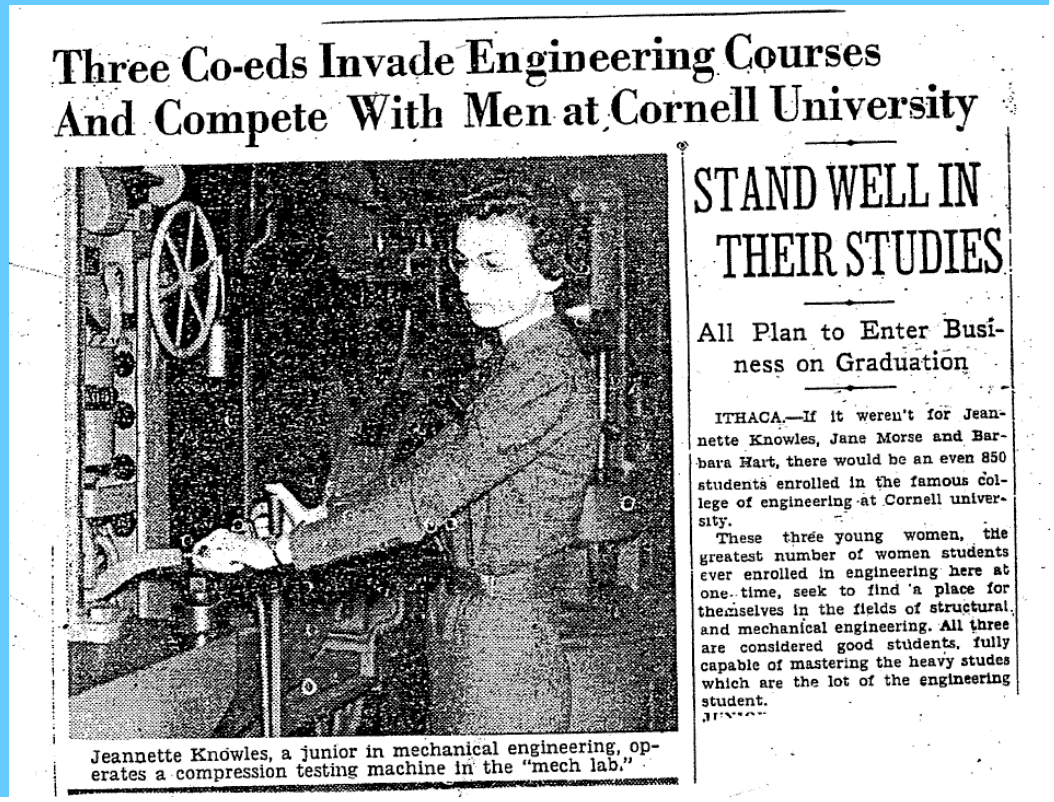
- **19thC little formal education 1800s – trained in field, machine shop, military.**
- **women in engineering stood out due to rarity (even more than in science).**

USMA cadets 1941

- **Technical traditions tied engineering to masculinity – romanticized heroes – “real-life engineers and their hair-raising adventures.”**
- **“boys’ toys” steer to engineering; link hands-on tinkering to masculinity;**

- Classroom, profession constructed on assumption engineering for men. Up to or beyond WWII, single-sex education (RPI, Georgia Tech, Caltech - ridicule idea of women engineers).
- 1892 Elmina Wilson
  C.E. Iowa State;
  1894 master's;
  1902 asst prof.
- 1893 Bertha Lamme
  M.E. Ohio State –
  Westinghouse

- Cornell 20 women engineering degrees by 1938 (others – Kate Gleason – family tool company Rochester – first woman elected full membership ASME 1914)
- As women, not typical engineers; as engineers, not typical women.
- Outsiders invading a man's world.



Three Co-eds Invade Engineering Courses And Compete With Men at Cornell University

STAND WELL IN THEIR STUDIES

All Plan to Enter Business on Graduation

ITHACA.—If it weren't for Jeannette Knowles, Jane Morse and Barbara Hart, there would be an even 850 students enrolled in the famous college of engineering at Cornell university.

These three young women, the greatest number of women students ever enrolled in engineering here at one time, seek to find a place for themselves in the fields of structural and mechanical engineering. All three are considered good students, fully capable of mastering the heavy studes which are the lot of the engineering student.

Jeannette Knowles, a junior in mechanical engineering, operates a compression testing machine in the "mech lab."

ESTHER KNUDSEN

Co-ed Engineers

Man's Domains are Again Invaded

By Harold C. E. Peterson

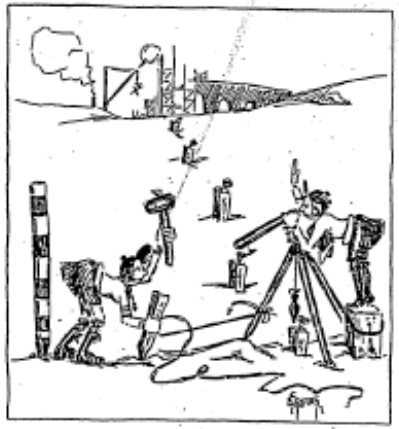
URSULLA QUINN

DURING the awful years of the war it became necessary for the patriotic woman of this country to don her manfolk's trousers and boots and stride forth to fill his place in industry as best she could. And she liked it. She enjoyed the new-found freedom of being able to kick up her heels, stick a cigarette in her mouth and walk into a barber-shop, saying, "A hair-cut, please, and make it snappy." For it was a chance to defy convention and laugh at grandmothers. And when the war was over, she refused to be displaced. Her freedom was not to be relinquished. And she had her way (witness any barber-shop) and continued to hold down her position as mechanic, street-car conductor, bookkeeper, bank president, senator, and whatnot. But certain fields were not open to her without years of preparation. She could not, at once, become an engineer. And investigating the possibilities, she found that first that awful ogre, the Calculus, must be overcome. She found that Descriptive Geometry must be mastered; that Analytical Geometry, Mechanics, Strength of Materials, and Hydraulics stood between her and such absorbing subjects as Bridge Design, Heat Engines and Statically Indeterminate Structures. And she hesitated. But not for long.

* * *

For in the 1921 a new sound echoed and re-echoed up and down the long halls of Main Engineering. Hurrying students paused to listen to the click-click of woman's heels upon the tiles of man's last retreat at the University. The less bashful, thinking to perform an act of chivalry, hastened to guide the two co-eds to the building they were seeking, for this was Main Engineering. And the would-be Sir Walters were non-plussed—astounded—sunk. For in reply to their inquiries the delicious bits of femininity replied, "Main Engineering? Of course! That's where our classes are. We're to be engineers."

Courageous? Of course, all pioneers are courageous. Determined? Yes!! For in spite of all the predictions of the sceptics—predictions that allowed the girls from one quarter to a year at the outside to change their minds and leave the Engineering School to men alone, the Misses Esther Knudsen and Ursulla Quinn have at last reached the zenith of their school life and are soon to be graduated, whereas most of the sceptics have dropped by the wayside. Even the prospect of six weeks in summer camp with the so-called "hard-boiled engineers" failed to deter them.



Prepared? Again, Yes! A comparison of their marks of even the Tau Betes of the college will show just how well prepared the girls are. Not only have they shown their ability in the more theoretical phases of engineering, but in the more practical laboratory courses, in surveying, and in designing, they have displayed a most unusual aptitude.

It will be mighty interesting to follow their careers after graduation. And it is safe to predict that through their efforts, and their success, succeeding classes of engineering will have larger and larger quotas of girl students in the ranks. And Man's sacred domains will be sacred no longer.

Coed Invades 'Man's World'; Finds Success In Engineering

By Pat Stenberg

If a girl has what it takes, she can succeed even in a man's world. The proof for this is found when one hears about Jeanne Chandler, a 1941 electrical engineering graduate of this University, being the only woman engineer on the staff of the Public Service Electric and Gas Company in Newark.

When asked why she chose to pursue a masculine career, Miss Chandler replied that she could not draw the side of a house that looked like the side of a house in freehand style; so she took a high school course in mechanical engineering. From then on it just seemed natural to her to study engineering at college.

Answers To "Chandler"

"Chandler," the only name to which she answers, says that she has encountered no jealousy or animosity on the part of the men who work with her. In fact, she thinks that they are swell and that they could not be nicer.

Someday she wants to be able to take engines apart and put them together again. As for now, "Chandler" contents herself with her desk work. The present problem on which she is working involves a study of heat reactions and turbines.

Still Feminine

Even though Miss Chandler is embarking on a man's profession, she is very interested in feminine activities. She helps her mother with house-cleaning, and she likes to knit her own sweaters. Someday she intends to get married and manage her own home.

If war comes to this country, "Chandler" is going to apply and ask the government to take her on as an oiler. When and if that day does come, "Chandler" will probably serve her country double duty, oiling tanks during the day and knitting kukahi sweaters at night!

Purdue Exponent Oct. 1941

Books, Plays, Engineers, Bells

Female Engineers Invade Chem Labs and Airplanes

Dr. James F. McCormick, whose first book, a biography of the Brownings was recently published, is working plans to continue his writing.

—Photo by Colwell

libraries in the eastern cards in Italy he found written to Italian friends to England for further ey Library, which was the death of its col- ts. This library has the Browning material in

Dr. McCormick returned ues teaching at Wayne the winter in putting "It was a lot of fun that," he said, "and a too." According to his like one night that he 30 class next day.

biography presented in in a new one. The book ues which is unusually by. Rather than present- a strictly factual man- excerpts from journals uick has emphasized a bout being any authenti-

s first book, McCormick he busy in his new role book has "educated his does to write more—but running.

Florence Springs comes d's poems and represents

Shop, physics and mathematics courses recently taken and black-listed by the so-called weaker sex are being braved by four courageous coeds in the College of Engineering this year.

Enrolling at Syracuse City Normal under protest "but upon mother's wish," Ruth Elizabeth Searle endured her teaching course a year before she was able to come to Wayne as the first woman student ever to take Aeronautical Engineering here. She was encouraged by her father who was a mechanical engineer at Williamsport, Pennsylvania where the year of the airplanes and plenty of aviation tradition in her family were were all she needed to make the "biggest decision of her twenty years."

Enlisted

Tiny Ruth, whose laughing eyes and slight appearance belie her big ambitions, proudly claims that Langley, the inventor of the first motor-driven airplane that would carry a man is her third or fourth cousin. "He was really the first," she said, "the Wright Brothers perfected what he started." She had already seen the plane on exhibit at the Smithsonian Institute in Washington. Ruth can also claim common heritage with Samuel F. B. Morse "because her great-grandmother's sister was his mother."

Sophomores

Starting at Wayne this summer Ruth took courses in ground school, shop, and engineering materials and is now classed as a sophomore. Since her field is not overcrowded Ruth has few worries about her place in this profession, although she has not yet decided her specialization.

Lillian Rhode Lee and Florence Mary Costello, both sophomores in chemical engineering, agree with Ruth that women do have a spot in this field. "We enjoy our courses in shop, physics and drafting as much as the fellows do," they said. Both girls are pals dating back to their senior year at Mackenzie High where they were in the same physics class together.

Betty Jane Quinlan, entering freshman in chemical engineering, boasted that her dad now comes to her for information and her brother who is still in high school "is envious." "I decided I wanted to be a chemist when I was so high and changed to a chemical engineer in high school," she said.

Campus Coeds Go Mannish In Trousers

Individualism after the fashion of Elizabeth Hawes became ruggedly noticeable last week when Sandra and Jean Goldslick started trotting to classes in the newest additions to their slack wardrobe.

Students gawked and rubber-necked after them, Sandra in her favorite covert cloth trousers and Jean wearing grey flannels. Instructors took one look, gasped audibly, and went on with the lecture.

Since High School

Says Sandra, "We've been wearing slacks ever since high school. They're comfortable, you don't have to worry about shrinking bills, and you're sure your slip isn't showing."

Denying that Marlene Dietrich had anything to do with it, Jean commented that although they've been wearing slacks for about two years, they're really disciples of Elizabeth Hawes, of *Fashion is Spinach* fame who predicts that by 1950 women will be wearing slacks all the time.

Favored

Man-tailored jackets and classic cotton shirts are favored to go with the outfit and of course oxfords are adhered to.

Both Sandra and Jean have about four pairs each and keep them well creased with a steam iron. Besides the covert cloth and flannels, they have pairs in beige and blue gabardine and green corduroy.

"The only real trouble comes when we wear skirts. Everyone keeps making such

Fire Drill Kicks The Gong Around

When we were in the process of being educated in the secondary manner, four bells used to mean fires, and we marched out on the lawn as a breather from a Latin class or something. But those days are gone. Four bells are just four bells to University students.

Last Friday afternoon, four bells rang out sharply and distinctly but students in the halls did not move. In fact the only response to this signal came from a member of the administration. Being of the old-school he naturally thought it was a fire. But students were unconcerned. We will

Purdue Exponent May 1943

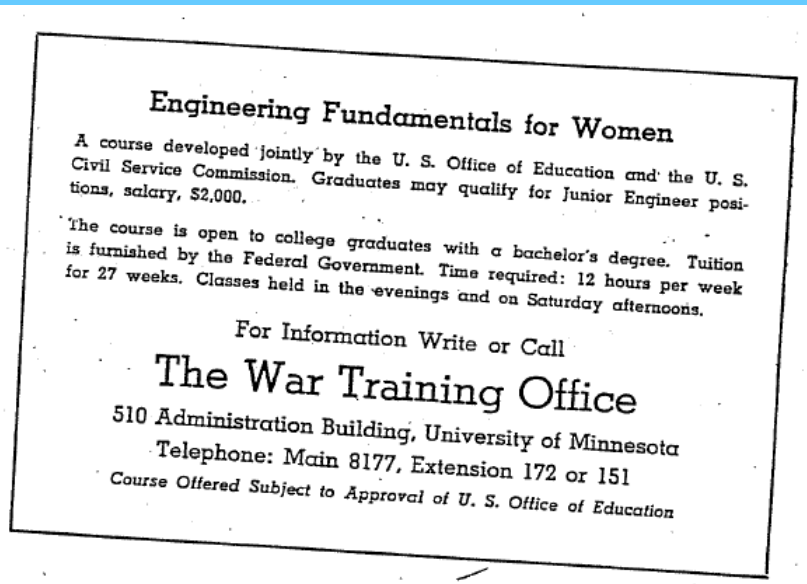
Girls Invade AIEE Meeting, Hear Hale Speak On Airfields

American Institute of Electrical Engineers held a meeting that contained some thing quite different from previous meetings. Fifty per cent of those attending were women—RCA Cadettes and Curtiss-Wright girls were there in a body. In fact only 22 of the 140 students attending were civilians, the others were men of the armed services and women in specialized training.

Art Peltosalo was in charge of the meeting and introduced the four speakers: Ensign Hale of the U. S. Naval Aviation Corps; Dr. Ewing, head of Electrical Engineering; Miss F. Talmadge, responsible for the RCA girls; and Mr. Pigage who is in charge of the Curtiss-Wright Cadettes.

Ensign Hale was the main speaker of the evening with his talk on the work being done in the Aleutians and Alaska. He described the airfields being built in Alaska and told of their importance to the war effort. In regard to the weather up and around Alaska, he said it was a bit better than that he had found here in Indiana.

- **WWII manpower shortage - “Rosie the Riveter” - window of opportunity to re-examine assumptions gender & technical expertise;**
- **“Engineering, Science & Management War Training” – 1943, 15 colleges** *“Engineering Fundamentals for Women”*



Engineering Fundamentals for Women

A course developed jointly by the U. S. Office of Education and the U. S. Civil Service Commission. Graduates may qualify for Junior Engineer positions, salary, $2,000.

The course is open to college graduates with a bachelor's degree. Tuition is furnished by the Federal Government. Time required: 12 hours per week for 27 weeks. Classes held in the evenings and on Saturday afternoons.

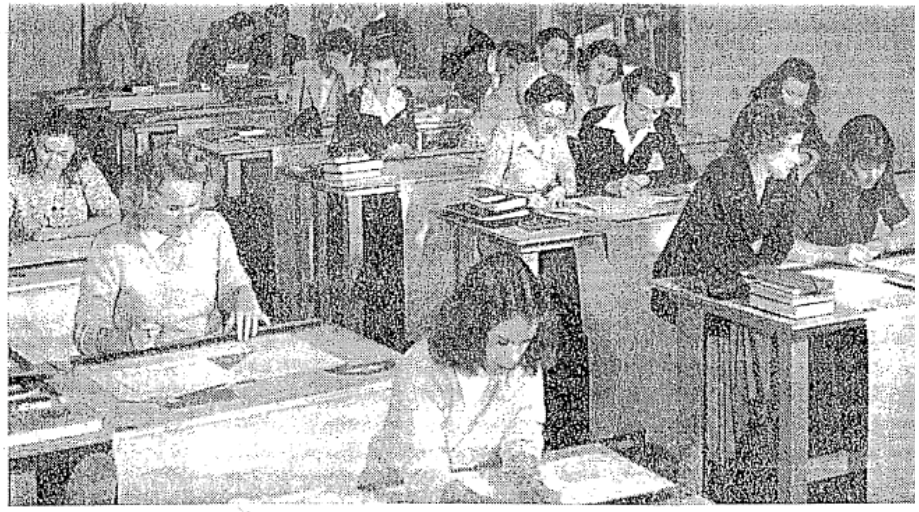
For Information Write or Call

The War Training Office

510 Administration Building, University of Minnesota

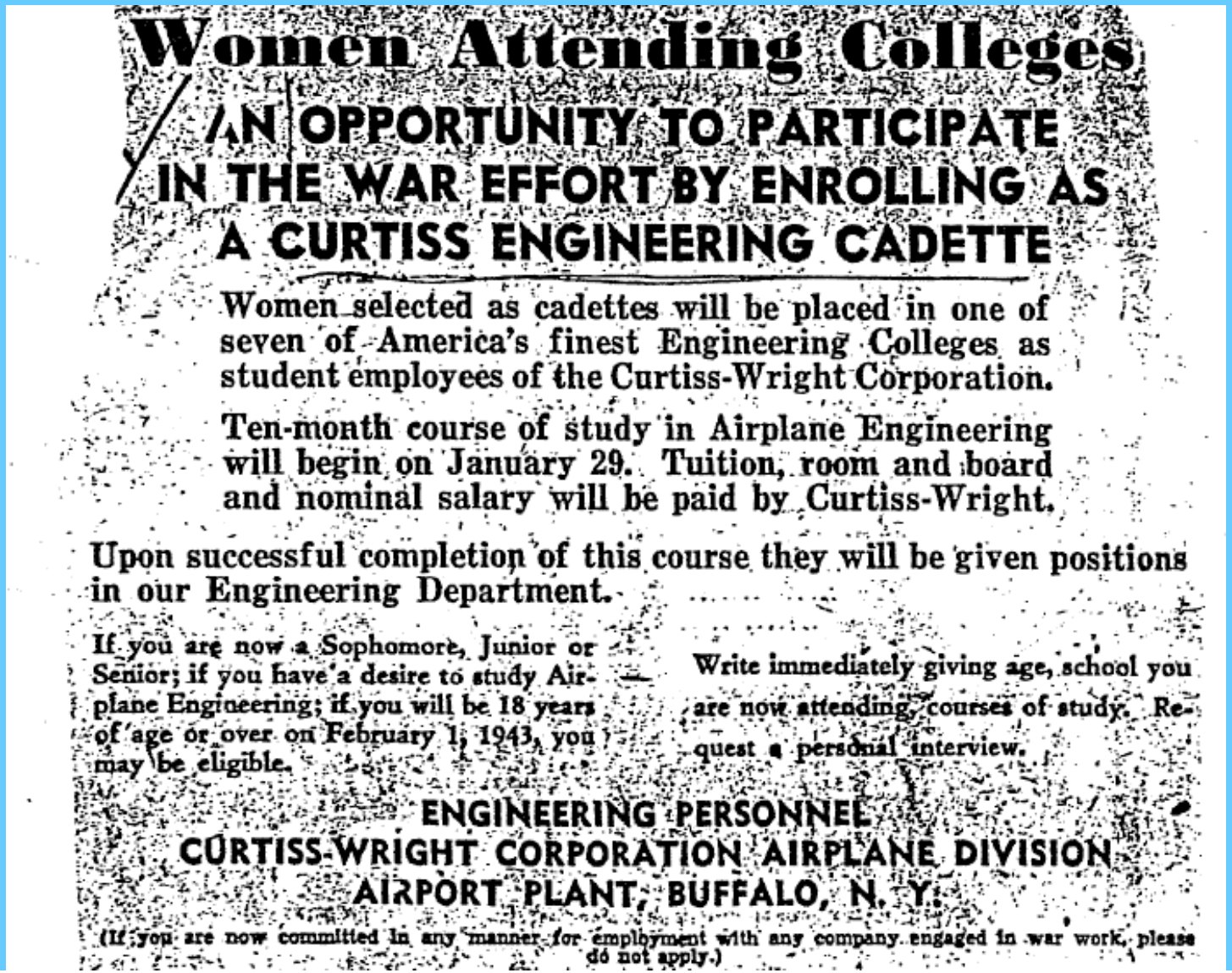
Telephone: Main 8177, Extension 172 or 151

Course Offered Subject to Approval of U. S. Office of Education



In this full-time University of California War Training drafting class, typical c scores held on the University's campuses and in many parts of California, men an women are quickly shown how to prepare plans for ships, planes, and other war need

- 1942 Curtiss-Wright airplane company



Women Attending Colleges

AN OPPORTUNITY TO PARTICIPATE IN THE WAR EFFORT BY ENROLLING AS A CURTISS ENGINEERING CADETTE

Women selected as cadettes will be placed in one of seven of America's finest Engineering Colleges as student employees of the Curtiss-Wright Corporation.

Ten-month course of study in Airplane Engineering will begin on January 29. Tuition, room and board and nominal salary will be paid by Curtiss-Wright.

Upon successful completion of this course they will be given positions in our Engineering Department.

If you are now a Sophomore, Junior or Senior; if you have a desire to study Airplane Engineering; if you will be 18 years of age or over on February 1, 1943, you may be eligible.

Write immediately giving age, school you are now attending, courses of study. Request a personal interview.

ENGINEERING PERSONNEL
CURTISS-WRIGHT CORPORATION AIRPLANE DIVISION
AIRPORT PLANT, BUFFALO, N. Y.

(If you are now committed in any manner for employment with any company engaged in war work, please do not apply.)

TABLE B

Distribution of Cadettes by Colleges

College	Desired	Number Guaranteed	Enrolled
Cornell	125	110	115
Penn State	125	110	107
Purdue	100	90	98
Minnesota	100	90	103
Iowa State	100	90	101
Texas	100	90	95
Rensellaer	100	100	100
Total	750	680	719

IOWA STATE

DAILY STUDENT

Z 195 IOWA STATE COLLEGE, AMES, IOWA, FRIDAY, DECEMBER 1, 1942 VOLUME 70, NUMBER 51

TRAIN WOMEN HERE

Lochner Stresses Recent Drop In German Morale

American Strength Must Keep Hitler On Defensive

EDITOR, BUSINESS MANAGER OF VETERINARY STUDENT

College Will Train Coeds For Work In Plane Engineering

Candidates Receive Training In Engineering Schools; Must Have Two Years Of College Mathematics For Eligibility

By Janet Russell

Starting the first week in February, Iowa State will participate in a program designed to train about 500 women in engineering work under the direction of the Curtiss-Wright Corporation, one of the largest aeronautical concerns in the country.

This was announced last night by Dean M. D. Heber, of the Junior College.

The plan for the training and employment of women to replace and aid engineers in wartime is the first of its kind to be

- **10-month immersion aeronautical eng.**

Curtiss-Wright Engineering Cadette Program

General Outline of Program

First Term—22 weeks Feb. 15–July 15, 1943		Second Term—22 weeks July 19–Dec. 14, 1943	
Subject	Hrs./ Wk.	Subject	Hrs./ Wk.
1a. Engineering Mathematics	6	1b. Engineering Mathematics	3
2. Job Terminology & Specifications	2	6. Theory of Flight	3
3. Elements of Aircraft Drawing and Standards	9	7. Aircraft Detail Design	12
4. Elementary Engineering Mechanics	6	8. Mechanics of Aircraft Structures Lecture and Rec.	6
5. Properties and Processing of Aircraft Materials	7	Laboratory	3
Physical Training	2	9. Aircraft Production Methods	3
Supervised Study	8	Physical Training	2
Total Hours Per Week	40	Supervised Study	8
		Total Hours Per Week	40

Aircraft Materials and Testing - 6 hours per week for 22 weeks

1. Materials Testing - 48 hours
   a. Tension testing
   b. Compression testing
   c. Shear testing
   d. Bending
   e. Buckling
   f. Torsion
   g. Buckling of columns
   h. Thin web beams
2. Airplane Parts and Assemblies - 48 hours
   a. Spars
   b. Control surfaces and mechanisms
   c. Loading and vibration
   d. Torsion
3. Wind Tunnel - 18 hours
   a. Demonstration
4. Production Engineering in Aircraft Industry - 18 hours
   a. Production methods, equipment, and operations
   b. Production planning
   c. Routing procedure
   d. Shop liaison

Bobby

- **Minnesota Cadettes' first class - prof suddenly burst out laughing -** *"he had never before faced 25 females wielding slide rules."*

Cadettes Invade Campus

Curtiss-Wright corporation assists the Purdue ratio by placing nearly a hundred women engineering students on the campus.

D. G. Frier
Chem. Eng. Senior

SATURDAY, FEBRUARY 13, was a memorable day on the Purdue campus for two reasons, the arrival of a post-season blizzard—and nearly a hundred Cadettes to reform the badly depleted ranks of the School of Aeronautical Engineering. There was precedent for the cold wave—but not for the large class of women engineering students sent by the Curtiss-Wright Corporation.

This large aircraft manufacturer had for some time felt the pinch of the shortage of technically trained personnel in its engineering and drafting departments. The need was not for replacements, since the Selective Service is not calling highly-trained men from any essential war industry; however, a large number of technicians in the jobs of layout, detailing, shop liaison, etc., were a constant requirement due to continual plant expansion.

It appeared that men who as yet possessed no special training or experience would be called to the armed forces before they could become sufficiently trained or experienced to be considered "essential." This circumstance indicated the necessity of recruiting and training workers from among women who had the necessary background of study in mathematics and physics. The natural supply of women versed in these engineering fundamentals was, of course, in the educational institutions of the territory east of the Rockies, the area from which Curtiss-Wright might logically draw its trainees without competition with the West Coast aircraft industry. Accordingly, company representatives visited nearly all the women's and co-educational colleges and universities in this territory.

At one of the new drawing boards Jane Allen attempts to solve one of the many problems which will be given her during her stay at Purdue.

Requirements for appointment as a Cadette were an elementary study of mathematics either in high school or college and one and a half years of college credit including college-level algebra or trigonometry. A few exceptions to these requirements were made in cases where girls demonstrated unusual aptitude and interest, but for the most part the Cadettes come to Purdue with the formal training prerequisite to engineering study. In fact, a few have already had several semesters of engineering or mathematics majors.

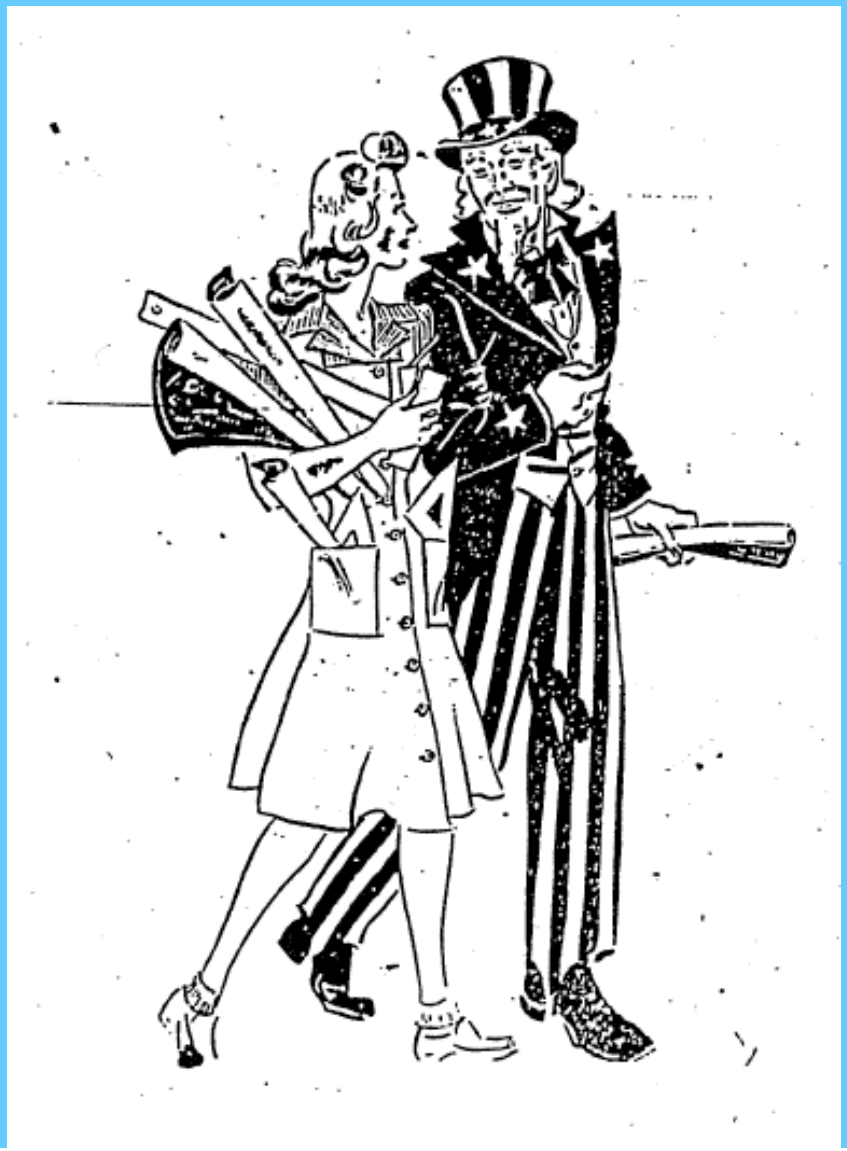
The training program of the seven hundred and fifty Cadettes is being carried out in seven universities: Cornell, Iowa State, Pennsylvania State College, Minnesota, Texas, Rensselaer Polytechnic Institute, and Purdue. Approximately one hundred girls have been placed in each school. The estimated total cost of the program will exceed a million dollars, and each graduating Cadette will represent a Curtiss-Wright investment of over $1,400.

The beginning of the program at Purdue was at a most opportune time when the rolls of classes in Aeronautical Engineering were being depleted by as much as fifty per cent by the Air Corps' call of its reservists. Thus the time of some of the University's most able instructors could be devoted fully to Cadette instruction. There are twenty-one regular University Staff members associated with the program and six of this number are doing full-time duty with the project. Professors K. D. Wood and E. F. Bruhn of the Aeronautical Engineering School co-ordinated Purdue's curriculum for Cadette instruction. It is a notable fact that two of the instructors, Professor Seibert Fairman of the Mechanics Department and Professor Neil Little of the Mathematics Department, have received the Sigma Delta Chi Best Teacher Award. Professor J. N. Arnold, formerly of the Mechanical Drawing Department and the slide rule specialist on the campus, is a full-time instructor.

The general course work was outlined by the Curtiss-Wright staff, and each of the selected schools submitted their detailed course outlines for approval and standardization. Purdue's course of 1760 hours is based on a forty hour week which is apportioned among the required subjects according to the following schedule:

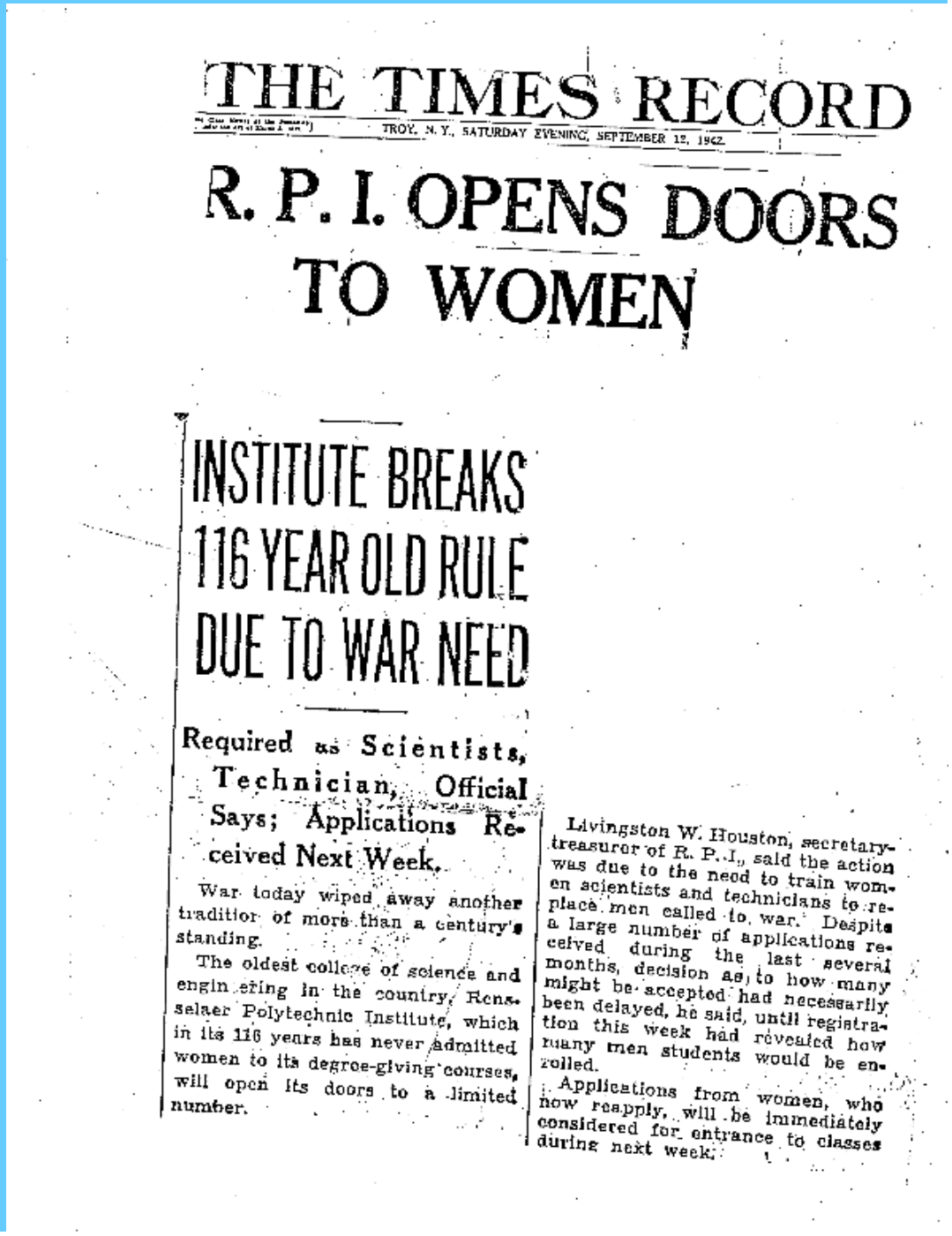
	1st Semester	2nd Semester
Engineering Mathematics	6	3
Job Terminology	3	
Theory of Flight		3
Elements of Drawing and Standards	9	
Aircraft Drawing and Design		12
Engineering Mechanics	6	
Strength of Materials and Aircraft Structural Analysis		6
Properties and Processing of Aircraft Materials	6	
Aircraft Materials Testing		6
Shop Work	8	8
Physical Education	2	2
Total	40	40

- **Patriotic justification**



Lola Stranz
University of Texas

- **Culture shock at previously all-male RPI**



THE TIMES RECORD

TROY, N. Y., SATURDAY EVENING, SEPTEMBER 15, 1962.

R. P. I. OPENS DOORS TO WOMEN

INSTITUTE BREAKS 116 YEAR OLD RULE DUE TO WAR NEED

Required as Scientists, Technician, Official Says; Applications Received Next Week.

War today wiped away another tradition of more than a century's standing.

The oldest college of science and engineering in the country, Rensselaer Polytechnic Institute, which in its 116 years has never admitted women to its degree-giving courses, will open its doors to a limited number.

Livingston W. Houston, secretary-treasurer of R. P. I., said the action was due to the need to train women scientists and technicians to replace men called to war. Despite a large number of applications received during the last several months, decision as to how many might be accepted had necessarily been delayed, he said, until registration this week had revealed how many men students would be enrolled.

Applications from women, who now reapply, will be immediately considered for entrance to classes during next week.

Curtiss Wright Women Enter Rensselaer To Begin Ten Month Aeronautics Course

Women Invade RPI Campus

The first all-woman class ever to occupy the study halls of Rensselaer Polytechnic Institute begin a year's intensive training. They number 100 students, all employees of Curtiss-Wright Corp.

Training Prepares Them For Engineering Aides

RPI's student bdoy was increased by 100 last Saturday when the Curtiss-Wright "Cadettes" arrived to begin work at the Institute. The girls' classes started yesterday morning and will continue for 44 weeks, two terms of 22 weeks each. Some of the members of the RPI faculty have been relieved of other duties, and will spend their time teaching the cadettes. All of the subjects the girls are taking are entirely new ones in Rensselaer's curriculum and will be taught only to the cadettes. They have been designed with the needs of the Curtiss-Wright Company in mind and were planned by company officials and by Dr. Hemke of the Department of Aeronautical Engineering after many conferences.

Courses

Included in the curricula are courses in Engineering Mechanics, Engineering Math, Materials of Engineering, Elements of Electricity, Machine Drawing and Standards, Stress Analysis, Vibrations, Elementary Aerodynamis, Shop Processes and Practice and Job Terminology and Orientation. After completing their work at the Institute, all of the girls will work as engineering aides in the propeller plants of the company. They will not replace regular engineers but will supplement them. In this way, Curtiss-Wright will try to alleviate the shortage of trained engineers. The idea is a new departure from traditional practice, and the Institute officials are proud that they are able to help by offering the facilities of the school.

- war-training women's presence reflected positively on growing number pursuing full engineering degree.

COED BECOMES ENGINEER

Photograph by Norman Fulmer

Ruth Best, C. E. So., one of five women enrolled in engineering this fall, joined the fun at a recent Civil Engineering roundup.

The men beside Miss Best, from left to right, are L. R. Heiple, of the Civil Engineering Department; and Irving Felton, C. E. Jr. In front, from left to right, are Buell Rockey, C. E. Sr., and Wayne McGinnis, C. E. Sr.

Five Women Are Now Enrolled In Iowa State's Engineering Division

Scorning the clatter of pots and pans, five coeds have enrolled in the Engineering Division this year.

Three freshmen and a transfer student have placed their names on the engineering book along with veteran architectural engineer, Marjorie Hook, now in her third year of drawing building[illegible] here.

Among the newcomers is Ruth [illegible] it's a suitable job for a woman. "The thought of working in South America fascinates me," she said.

Freshman registrants are Peggy Pauline Shultz, enrolled in general engineering; Mary Lou Protzman, architectural engineering, and Alys Elaine James, also in the architectural Engineering Department.

AUSTIN, TEXAS, TUESDAY, JANUARY 6, 1942

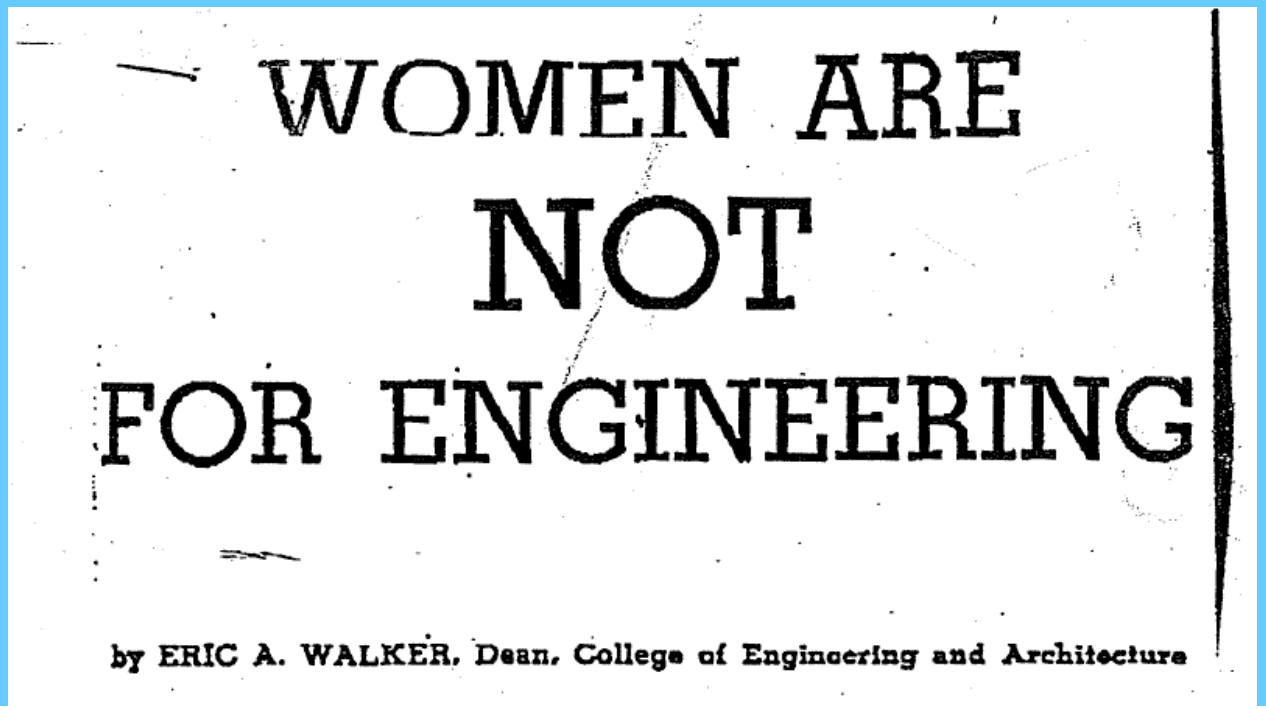
They'll Help Play 'Taps' for Japs

No knitting or other sissy stuff for these five girls—they're doing their bit for national defense in a manly way. The only female students in the College of Engineering, they are pictured being schooled by Dean W. R. Woolrich.

From left to rich, the girls are Orissa Stevenson of Houston; Anne Tally, Ke[illegible]; Mickie Jo Carleton, Austin; Anna Perry Wood, Austin; and Margaret Ann Magee, Waco.

- **Purdue – 1944, over 30 women in engineering; 1945, 75 women.** *"Now that lady engineers are not a novelty on this campus, people no longer stare at the sight of a girl clutching a slide rule."*
- **GI Bill limits postwar women's enrollment – reassertion conservative gender roles.**
- **1949 entire U.S.: 763 women enrolled in engineering; 1957: 1,783 women (still less than 1% of total in engineering)**

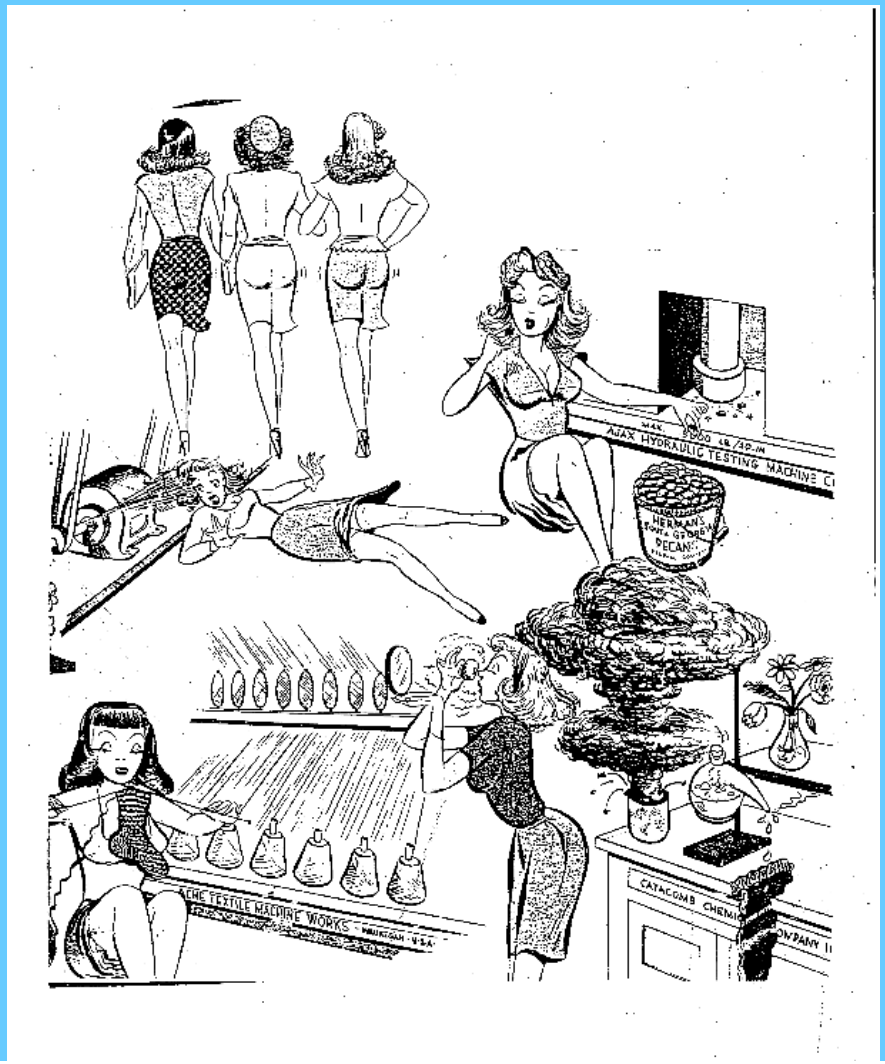
- **Penn St. Dean Eric Walker: lack** *"basic capabilities"- "The most evident ambition of many women is to get married and raise a family… [so] few companies are willing to risk $10,000 on a beautiful blonde engineer, no matter how good she may be at math."*

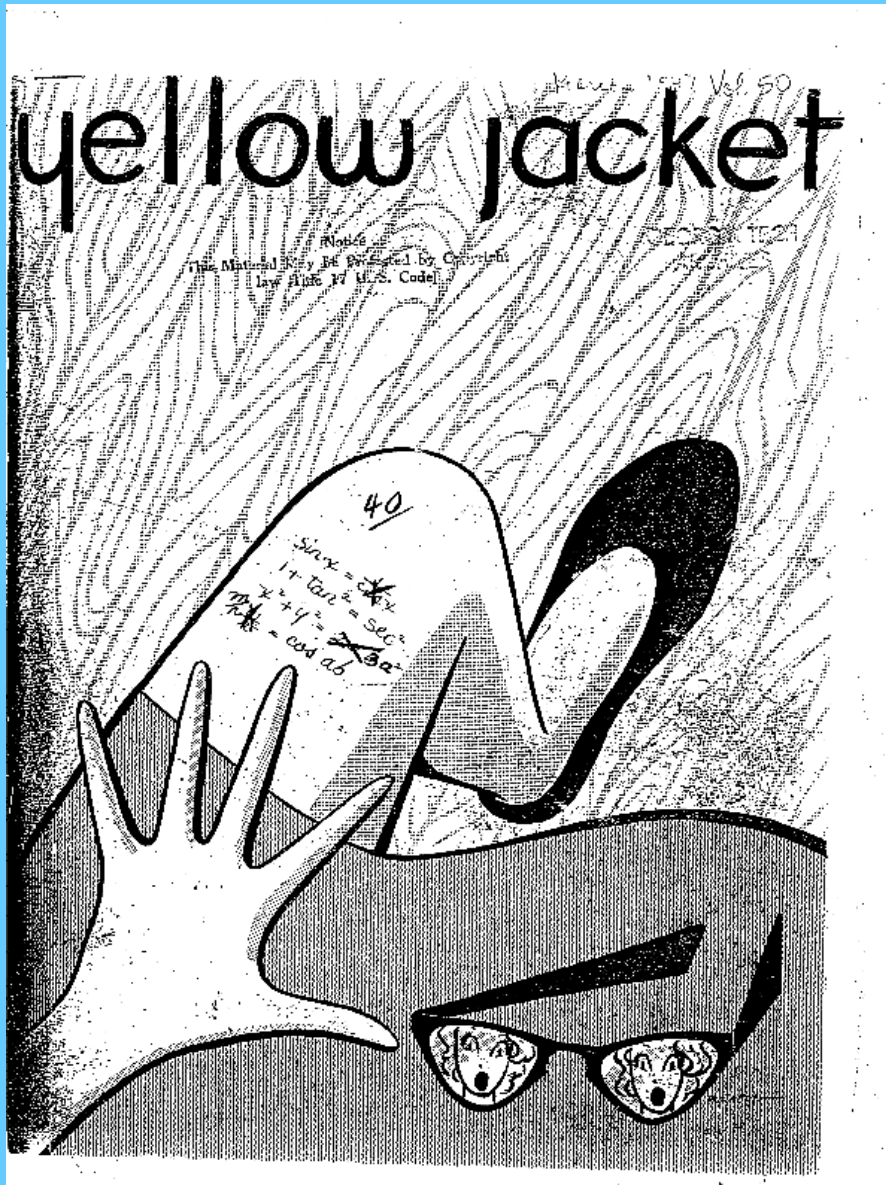


WOMEN ARE
NOT
FOR ENGINEERING

by ERIC A. WALKER, Dean, College of Engineering and Architecture

- **Georgia Tech ridicule idea women engineers**





- **1952 legal test case**

UTE OF TECHNOLOGY, ATLANTA, GEORGIA, TUESDAY AFTERNOON, FEB. 26, 1952 No. 35

NROLLMENT AT TECH?

Atlanta Women Petition For Femate Enrollment At Engineering Institution

By Fred Bennett

Sex barriers that have made Georgia Tech an all-male day school may be lowered in the near future.

The Technique is able to make this prediction on basis of information it considers reliable. Official confirmation must await action by the Board of Regents of the University System of Georgia.

Reasons for admitting women students have grown in recent years, while reasons for continuing to bar them from the regular student body have dwindled, according to a petition passed by the Women's Chamber of Commerce of Atlanta early this month. Copies of the petition were distributed to members of the Board of Regents. The Board referred the matt to President Van Leer with the request that he study the college's position and present it in the form of a report. The President's report is expected to be submitted to the Regents, about March 1, in order that each member of the Board may have ample time to study it before the March 18 meeting. At the present time the President has the petition under consideration, and is sounding out the attitudes of the faculty, alumni, other administrative officials and the student body before drawing up his recommendation for action by the Board.

The petition asserts that objections to admittance of female students because of lack of facilities are no longer valid, in view of the stepped-up building program; that efficiency apartments and other housing for women students are now available, and that each building on the Tech campus is now adequately equipped with separate lavatory and toilet facilities for female use. It charges "the continued policy on the part of the Board of Regents of the University of Georgia to bar fe. ile students . . . constitutes a gross discrimination to the females of Georgia in that it requires any female desiring to matriculate in the fields of engineering and/or architecture to seek facilities out of the state of Georgia for such study, resulting in additional expense." The petition also asserts that 2322 students are now enrolled at Tech, whereas the plant and facilities of the school are designed to accommodate approximately 5,000 students.

WHAT! WHAT! RAH! RAH! WOE! WOE!

-47 Co-ed Plan Takes Tech Aback

By ANNE WOOD

Tech students can't comprehend it. They think it's a joke. They just don't understand.

"Did I hear you right?" they inquired when told that the Board of Regents is considering making Georgia Tech co-educational. "Are you kidding?"

A cross-section of the student body polled Wednesday night, after recovering from the first shock, uttered varying opinions.

Said the president of the student body, Noel Turner: "It doesn't seem feasible to me to make Tech co-ed. However, it would probably be wholeheartedly welcomed by the student body."

Bobby Davis, captain of the football team, of the student body was held two months a the subject. To the question: "Do you fee you are missing a substantial part of colleg by attending a school that's not co-ed?" 58. cent answered "yes."

But to the second question: "Would you come co-education at Tech?" only 36.5 p answered "yes."

Other student opinions voiced in The C tution's roundup were:

Bill Burnett, of Greenwood, S. C.: "If w desire a technical education, I think they h right to attend Tech. However, it would be to study."

John R. Sherwood, of Creston, Iowa: "I

- **1952 divided board admits women to GA Tech under limited conditions;**

4-18-52
Journal & Con.

HAILS FROM ROOSEVELT

Petite Blonde Is First Tech Coed Candidate

By BOB McNATT

A petite blonde is the first woman to attempt invasion of the home of the "Ramblin' Wreck" since that male stronghold became coed last week.

She is golden-haired Mary Joan Coffee, a 17-year-old senior at Roosevelt High School who makes it plain that she is going to Tech strictly to study and not to look for boy friends.

Miss Coffee's application was received at Georgia Tech Saturday for admission to the school next autumn. She will be graduated from Roosevelt this spring.

TECH RAT CAP BECOMING TO FRESHMAN ELIZABETH HERNDON Son Ashley, "No Comment."—Staff Photo by Bill Warren

Mrs. Elizabeth Herndon Journal 7-28-52

ATLANTA MOTHER BECOMES GEORGIA TECH'S FIRST COED

By LOIS NORVELL

Blue-eyed Elizabeth Herndon has tried on a rat cap for size and likes the way it fits. She will go down in history as Georgia Tech's first feminine ramblin' wreck.

The brown-haired Atlantian spent a day at Tech getting registered for the fall term, visiting with officials and being photographed with fellow students in rat caps. The report is she successfully survived the whistles and sly comments from the upper classmen. "What kind of electricity is running through that wire?" demanded one of the Tech students when Elizabeth appeared . . . but it sounded more like a bid for an introduction than a snub to a woman freshman.

"I will probably enjoy all of their smart remarks," says Elizabeth, who finds fun, not embarrassment, in the collegiate sarcasm that accompanies her invasion of the male stronghold. And surely it will be a source of pride to her that such a corps of engineers should make their first surrender to her.

* * *

IF THE WEARERS of rat caps give her any trouble she can always call out her troop of Cub Scouts to protect their den mother. The center of Elizabeth's world is a 10-year-old Scout, her son Ashley, who is a fifth grader at Georgia Military Academy. Her husband, S/Sgt. Arch D. Herndon Jr., died eight years ago in World War II. Elizabeth delayed her entrance in college for a while hoping Congress would provide college benefits for widows of GIs, but since they did not, she is striking out now, and feels that son Ashley won't mind helping pinch pennies to send mama through college.

hood whim," says freshman Elizabeth. "I wanted to be so many different things at different times. When I made up my mind to go to college I decided it would be so much more to my advantage to study engineering than accounting, since the accounting field is overcrowded and there is a definite need for engineers."

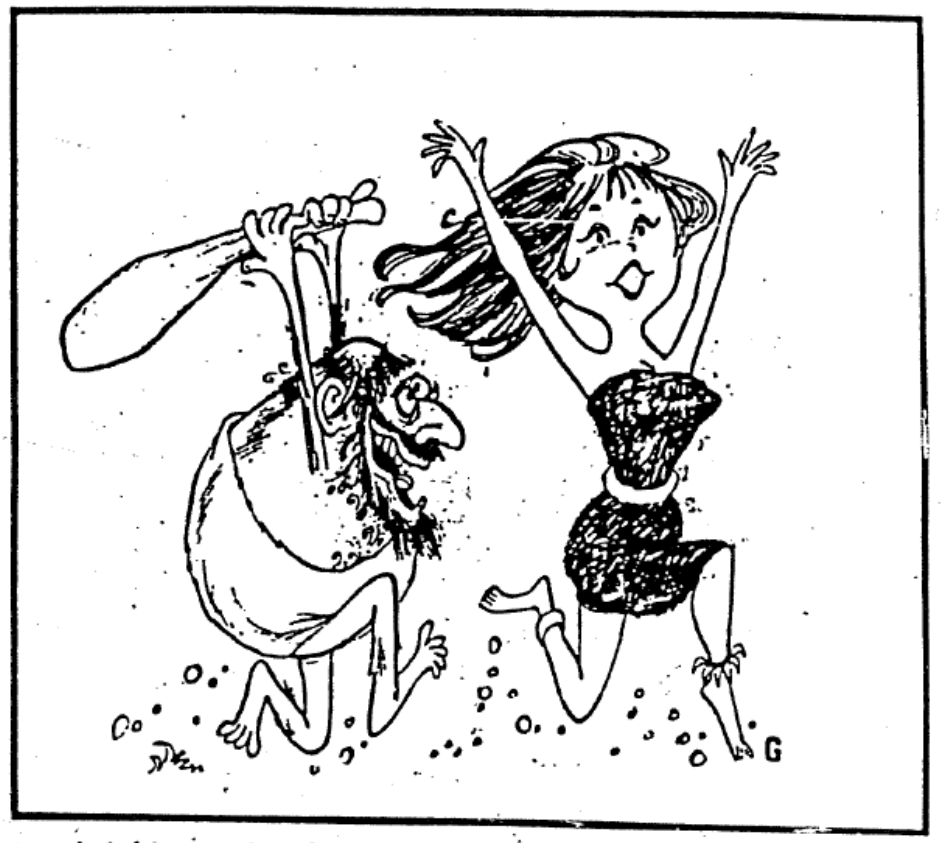
* * *

FRIENDS WHO KNOW Elizabeth's love for working with fabrics (she designs and makes her own clothes) urged her to choose textile engineering and designing. She did not agree, saying, "the people who know say electronics is the best field." She doesn't anticipate easy sailing. "I expect to study hard at Tech," she commented.

Her particular interest in electronics is radar, which seems a natural choice since it's the next best thing to a woman's intuition for showing what's going on beyond her line of vision.

What's the word from young Ashley about Mama heading to school to become a ramblin' wreck? He just will not commit himself. He just grins. However, he does admit he thinks it pretty funny that Mama will have to do homework and he's willing to help her along with any mathematical difficulties."

- **All-male Caltech 1960s:** *"Full-blooded American young men cannot be expected to live four years apart from girls."*
- **"Millikan's monastery"; "eunuchs of science"**



Artist's conception of typical cultural activities pursued by Teckers during visit to Scripps.

- **Undergrad campaign:** *"would feel much more at ease and willing to work if he were not frustrated by the lack of a full, rich social life. The presence of women would be a great civilizing factor. Presently, the Caltech male loafs around in sloppy clothes, unshaved. This would change for the better if an occasional female walked by…. So let's go coed."*
- *"Some faculty voiced the opinion that too much savoring of social intercourse may be antithetical to success as a research scientist or engineer. [After all,] most of the Caltech faculty spend relatively little time with their wives."*

Associated Students of the California Institute of Technology

Volume LXX — Pasadena, California, Thursday, November 7, 1968 — Number 7

GIRLS COMING TO TECH!

Coeds are sure to get a very warm welcome at Caltech. But will there be enough to go around. Don't fight boys!

Board of Trustees Vote Coeds For 1970

The Board of Trustees has now approved girls, in principle, President Lee A. DuBridge announced Monday the approval of a proposal to admit women to the undergraduate school, for fall 1970 at the earliest.

At a Board of Trustees meeting last weekend, a proposal voted by the faculty last year was finally approved, effective pending "a definitive plan for its administration and implementation," according to Dr. DuBridge. He estimated that not more than five per cent of the incoming freshman class would be female, a number about equal to the percentage of coeds in the M.I.T. undergraduate school.

Not More Than 5%

The women will be enrolled both as freshman and as upperclass transfers, on the same academic qualifications that apply to male students. There are still fairly few women interested in pursuing a course of study in science and engineering, Dr. DuBridge stated, but many are "extremely able and will easily compete with the men."

"The action of our trustees will open up opportunities to women of exceptional ability who can profit by a Caltech educational experience, and will encourage more women to seek careers in science and engineering.

"We feel that in this action Caltech is responding to a national trend toward coeducation at the college level," the educator continued. "Over the past year 18 American colleges that formerly were all male and 35 that formerly were all female have become coeducational."

Increasing Rate

This trend is due to the fact that women are playing an increasingly important role in business and industry, Dr. DuBridge pointed out, adding that broader educational opportunities should be made available to them so that they may better fit themselves for this role in what has become a coeducational society.

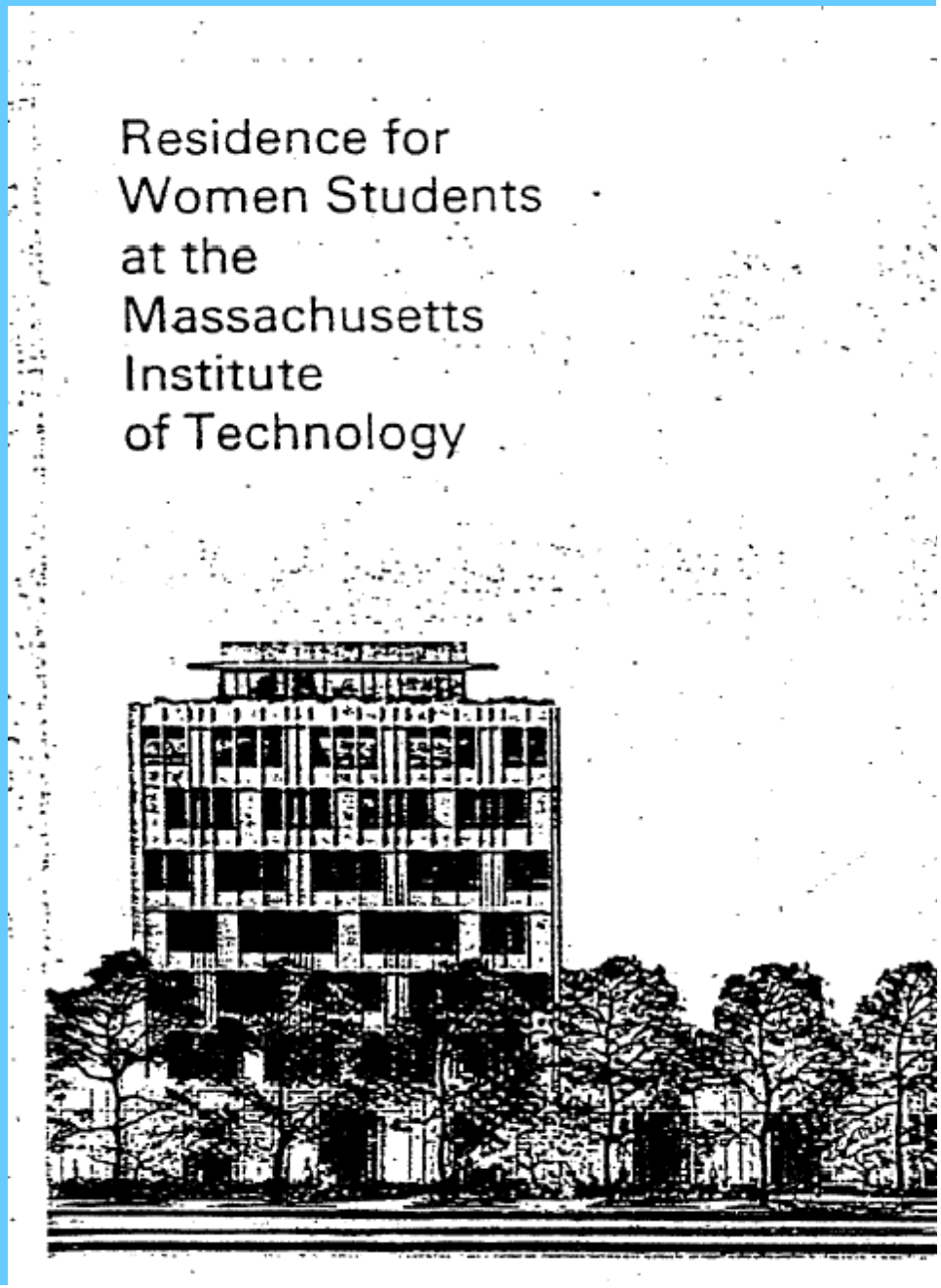
"The presence of women graduate students on campus since 1953," he noted, "has confirmed the expectation that women can add much to the intellectual life of Caltech. Forty-five of the 702 graduate students enrolled this year are women."

Action Unanimous

"The unanimous action of the trustees follows the recommendations of both the faculty and student body for Caltech to break from its tradition of being a monastic type of institution and to become coeducational," Dr. DuBridge said. "A recent Princeton University study shows that more than 80 per cent of the high school men who rank in the upper two-fifths scholastically feel that coeducation increases the attractiveness of a college.

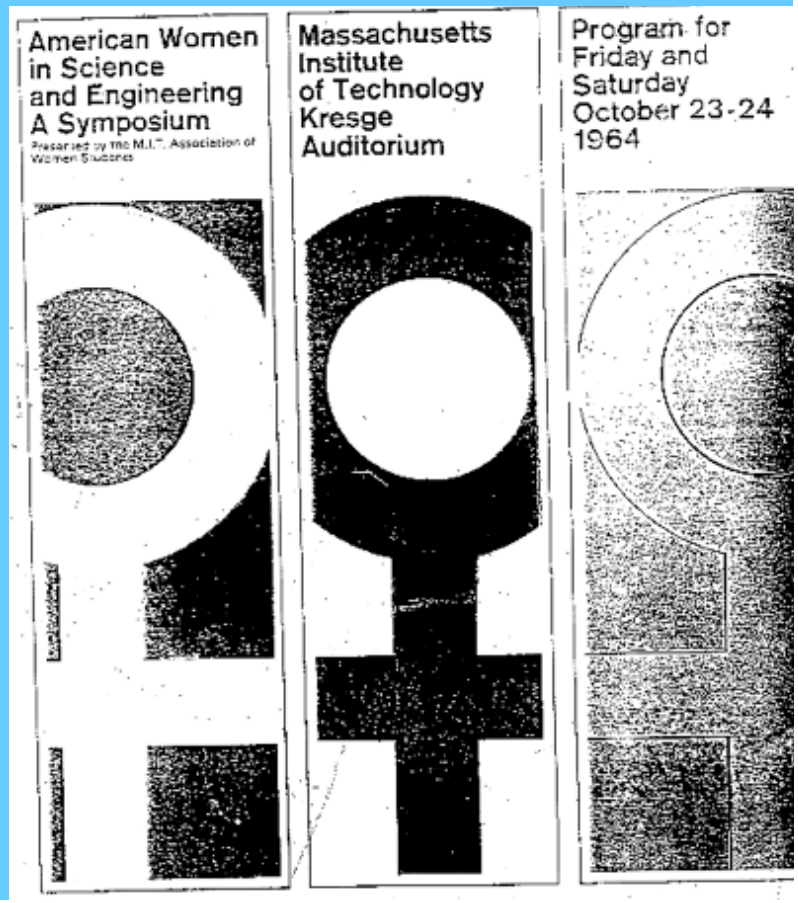
- **MIT pre-1940s: 65 women maximum any one time, out of 5000 students.**
- *"There's such a shortage of engineers, one wonders if we are justified taking positions away from male students for females."*
- *"Except for the rare individual woman, [MIT] is an unsuitable place."*
- **Medical director:** *"[Any] girls competing against high-grade intellects [of MIT men would] suffer a severe blow to their pride."*
- *"Before 1960, women entered MIT at their own risk. If they succeeded, fine; if they failed - well, no one had expected them to succeed."*

- 1963- McCormick Hall
- 1964 – women's applications to MIT jumped 50%.



- *"You have to walk a mile to find a ladies' room." "A conservative Wall Street attitude to women still runs through MIT… [treating women as] incompetent, unnatural intruders."*
- **Christina Jansen '63 EE:** *"I was very conscious of having to represent women in each class. If I did anything wrong, said anything stupid, it would be ammunition for all the men who didn't want us there in the first place."*
- *"Discriminatory events were so common that it didn't occur to us to object. Besides, other engineering schools weren't accepting women at all, so even though MIT was only accepting 20 a year, I felt MIT was doing us an enormous favor to have us there at all."*

- **1963-73, women at MIT tripled; late 1970s 17% of undergrads, 12% of engineering majors. Female professors as advocates.**
- **MIT Association of Women Students: numbers (*"critical mass"*)**



- *“rude jokes, derisive comments about women, being treated as a sex object only, assuming you are less intelligent because female, severe stereotypes into traditional female roles.”*
- **skewed gender ratio:**

“There is a large emotional burden attached with being a girl here. There is a feeling women have been brought to [Cal]Tech for the express purpose of pleasing the men.”

Girl of the Month

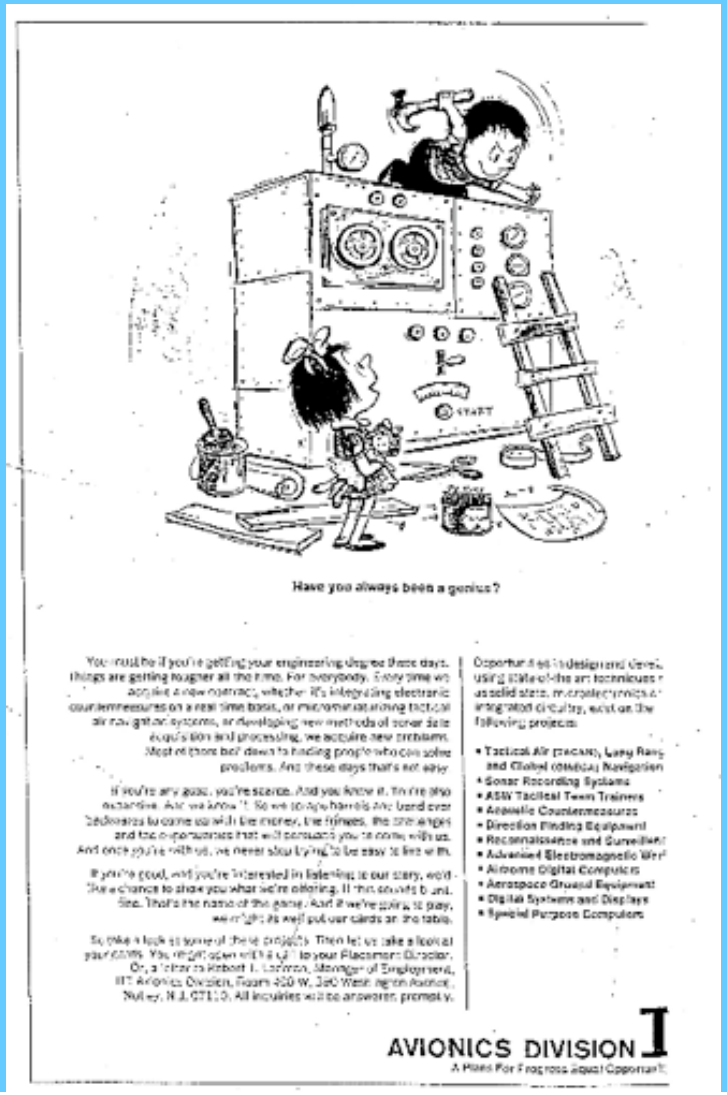
Our Little Engineer Girl this month is ANNETTE BAIR, sixth semester art education major. Her hobby, swimming, is suited to her streamlined 5 ft., 37-25-37 figure. Twenty-year-old Annette comes to Penn State from Seneca Falls, New York.

Penn State Engineer Photos by Forney Miller

March, 1950

21

- **Masculine culture of engineering: ads 1950s-1960s;**



Have you always been a genius?

You must be if you're getting your engineering degree these days. Things are getting tougher all the time. For everybody. Every time we acquire a new contract, whether it's integrating electronic countermeasures on a real time basis, or environmentalizing tactical air navigation systems, or developing new methods of sonar data acquisition and processing, we acquire new problems. Most of them boil down to finding people who can solve problems. And these days that's not easy.

If you're any good, you're special. And you know it. You're also selective. And we know it. So we've got a hard row to hoe to convince you that we're the company, the times, the challenges and the opportunities that will persuade you to come with us. And once you're with us, we never stop trying to be easy to live with.

If you're good, and you're interested in listening to our story, we'd like a chance to show you what we're offering. If that sounds fair, fine. That's the name of the game. And if we're going to play, we might as well put our cards on the table.

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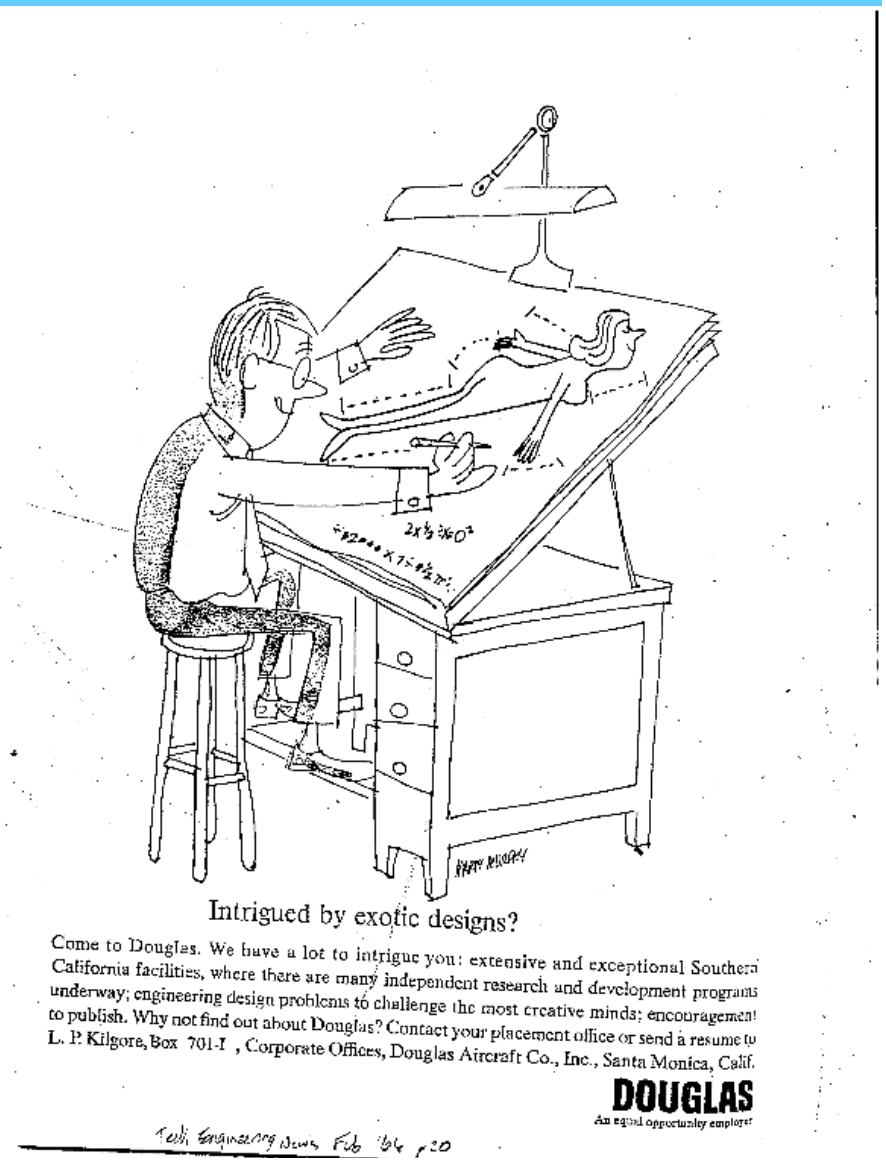
- Tactical Air (TACAN), Long Range and Global (OMEGA) Navigation
- Sonar Recording Systems
- ASW Tactical Team Trainers
- Acoustic Countermeasures
- Direction Finding Equipment
- Reconnaissance and Surveillance
- Advanced Electromagnetic War
- Airborne Digital Computers
- Aerospace Ground Equipment
- Digital Systems and Displays
- Special Purpose Computers

So take a look at some of these projects. Then let us take a look at your goals. You might open with a call to your Placement Director. Or, a letter to Robert L. Lawrence, Manager of Employment, IIT Avionics Division, Room 450 W, 320 West 15th Avenue, Nutley, N.J. 07110. All inquiries will be answered promptly.

AVIONICS DIVISION I

A Home For Progress Equal Opportunity



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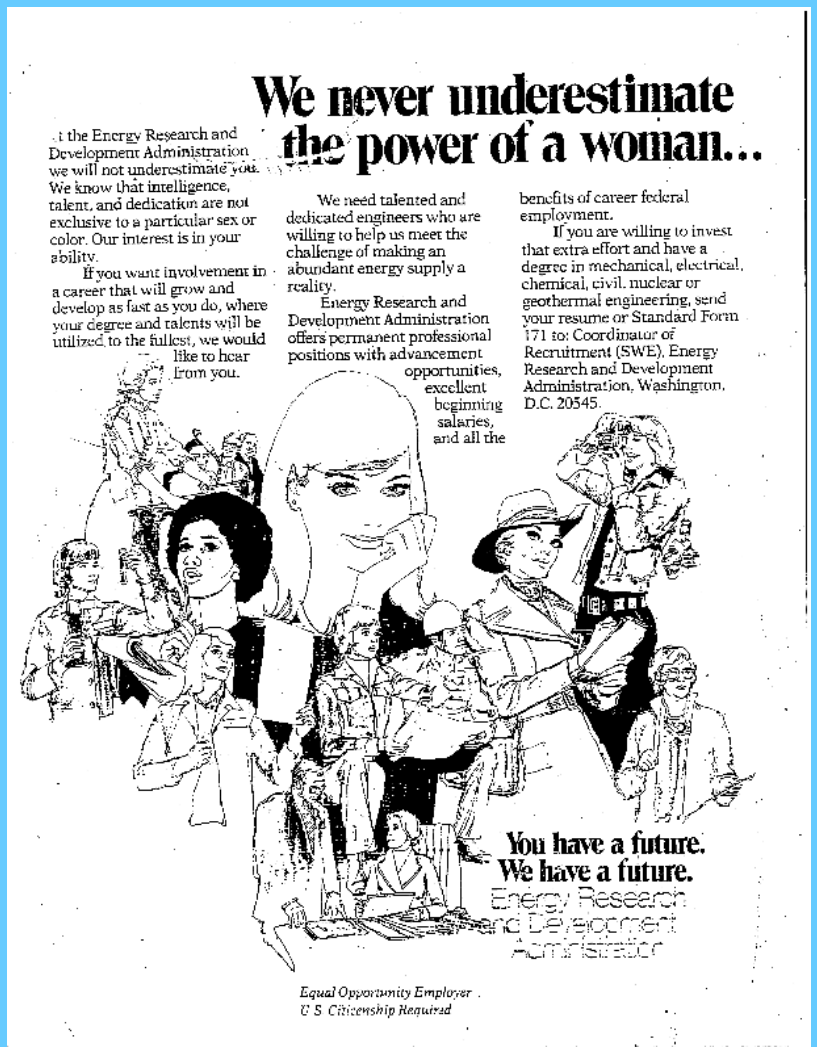
DOUGLAS

An equal opportunity employer

Tech. Engineering News Feb '64 p20

- **1970 civil rights/equal employment law**



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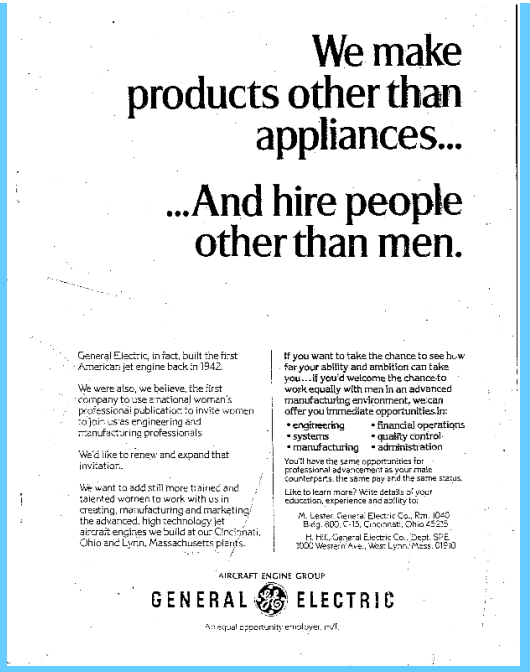

We make products other than appliances...

...And hire people other than men.

General Electric, in fact, built the first American jet engine back in 1942.

We were also, we believe, the first company to use a national women's professional publication to invite women to join us as engineering and manufacturing professionals.

We'd like to renew and expand that invitation.

We want to add still more trained and talented women to work with us in creating, manufacturing and marketing the advanced, high technology jet aircraft engines we build at our Cincinnati, Ohio and Lynn, Massachusetts plants.

If you want to take the chance to see how far your ability and ambition can take you... if you'd welcome the chance to work equally with men in an advanced manufacturing environment, we can offer you immediate opportunities in:

- engineering
- systems
- manufacturing
- financial operations
- quality control
- administration

You'll have the same opportunities for professional advancement as your male counterparts, the same pay and the same status.

Like to learn more? Write details of your education, experience and ability to:

M. Lester, General Electric Co., Rm. 1040 Bldg. 600, C-15, Cincinnati, Ohio 45215

H. Hill, General Electric Co., Dept. SHE 1000 Western Ave., West Lynn, Mass. 01910

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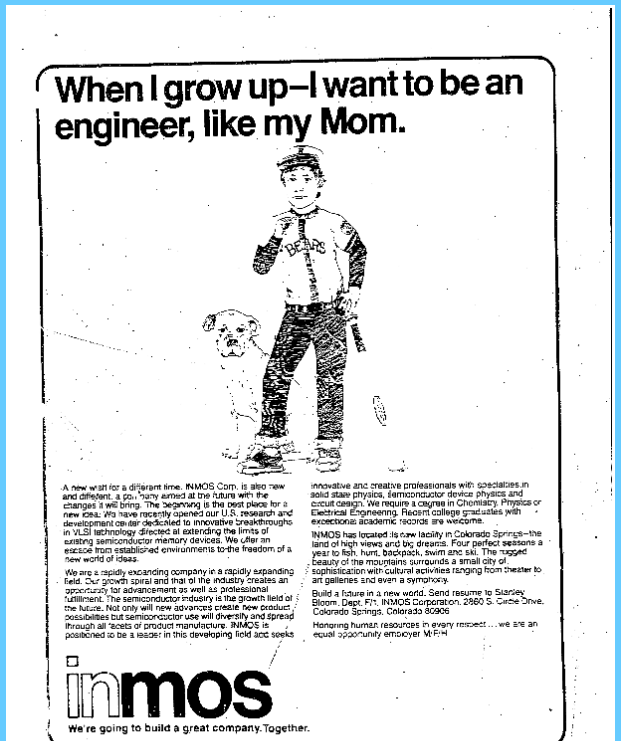

When I grow up—I want to be an engineer, like my Mom.

A new shift for a different time. INMOS Corp. is also new and different, a co...pany armed at the future with the changes it will bring. The beginning is the best place for a new idea. We have recently opened our U.S. research and development center dedicated to innovative breakthroughs in VLSI technology directed at extending the limits of existing semiconductor memory devices. We offer an escape from established environments to the freedom of a new world of ideas.

We are a rapidly expanding company in a rapidly expanding field. Our growth spiral and that of the industry creates an opportunity for advancement as well as professional fulfillment. The semiconductor industry is the growth field of the future. Not only will new advances create new product possibilities but semiconductor use will diversify and spread through all facets of product manufacture. INMOS is positioned to be a leader in this developing field and seeks innovative and creative professionals with specialties in solid state physics, semiconductor device physics and circuit design. We require a degree in Chemistry, Physics or Electrical Engineering. Recent college graduates with exceptional academic records are welcome.

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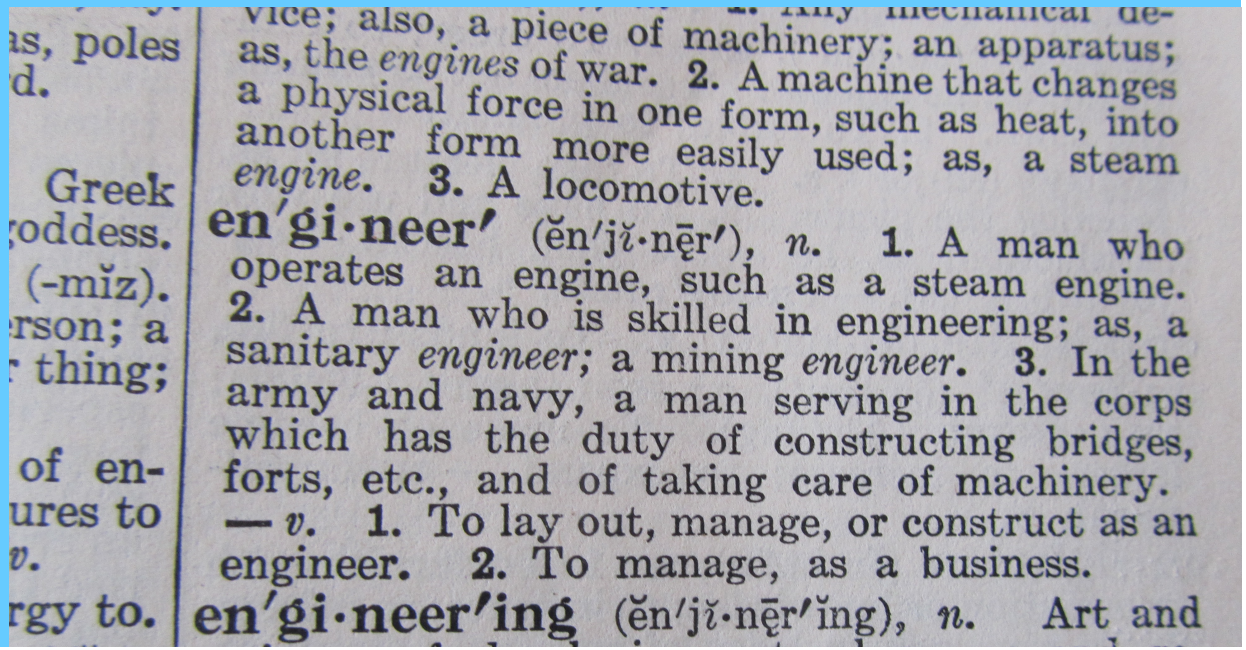
We're going to build a great company. Together.

- 1950s women less than 1% US engineering students; 2010 18.1%.
- 1951 Georgia Tech zero undergraduate women; 2011 almost 33% women – 24% all engineering majors
- 2011 Georgia Tech graduated nation's highest # female engineers;

- 1970 Caltech zero undergraduate women; 2011 women 39% undergrad enrollment
- Pre-1963 MIT under 2% female students; 2010 second only to Georgia Tech number female engineering bachelor's degrees, second only to Olin in percent of engineering degrees awarded to women

- **What made the battle so hard? Most dramatic transformation in modern STEM – widening notion of who can/should get involved – creation of today's advocacy movement to draw K-12 girls, other under-represented groups into STEM.**

- *1959 Webster's Elementary Dictionary*



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Greek
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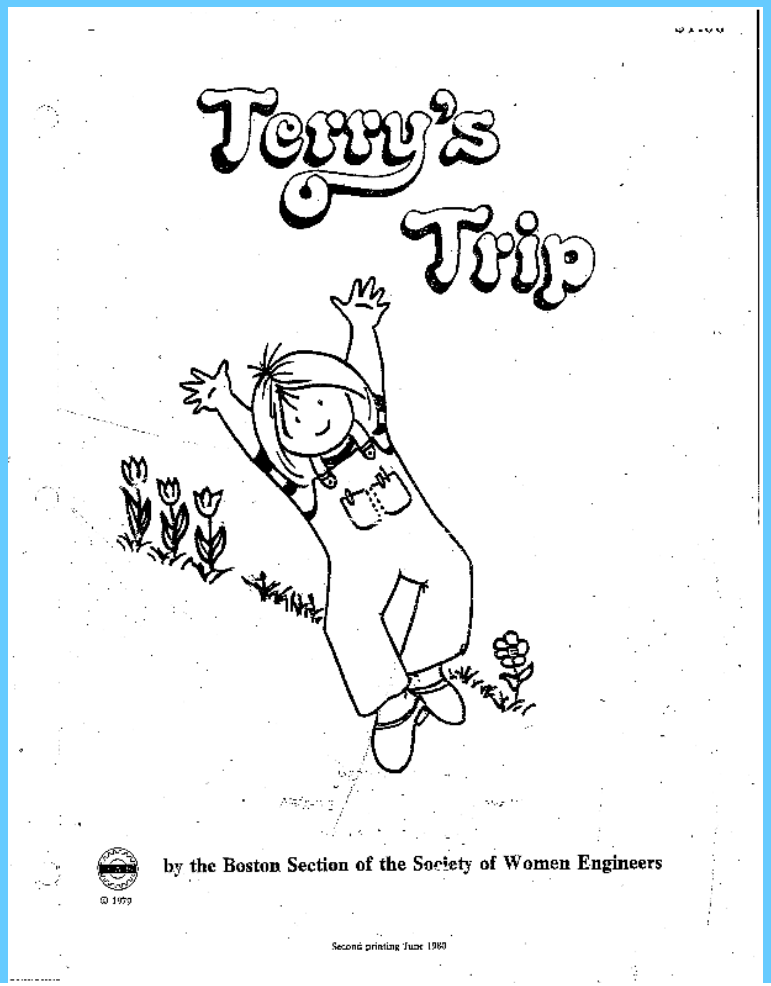
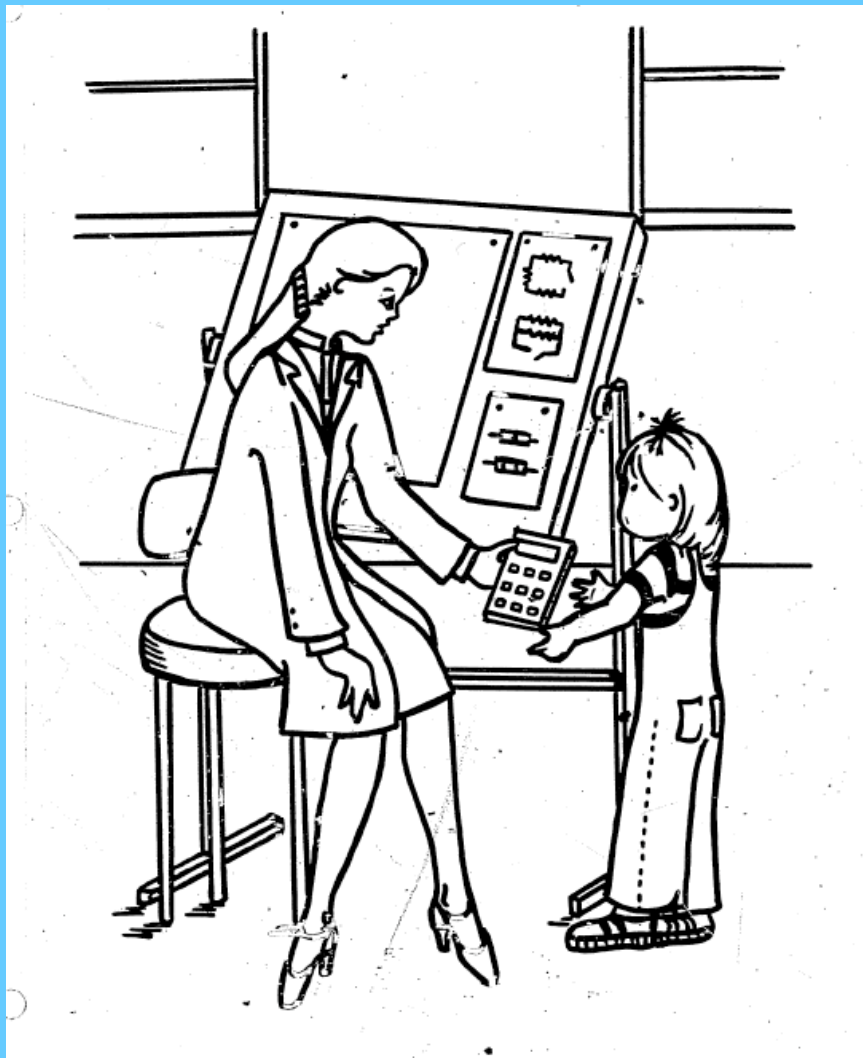
vice; also, a piece of machinery; an apparatus; as, the *engines* of war. **2.** A machine that changes a physical force in one form, such as heat, into another form more easily used; as, a steam *engine*. **3.** A locomotive.

en′gi·neer′ (ĕn′jĭ·nēr′), *n.* **1.** A man who operates an engine, such as a steam engine. **2.** A man who is skilled in engineering; as, a sanitary *engineer;* a mining *engineer*. **3.** In the army and navy, a man serving in the corps which has the duty of constructing bridges, forts, etc., and of taking care of machinery. — *v.* **1.** To lay out, manage, or construct as an engineer. **2.** To manage, as a business.

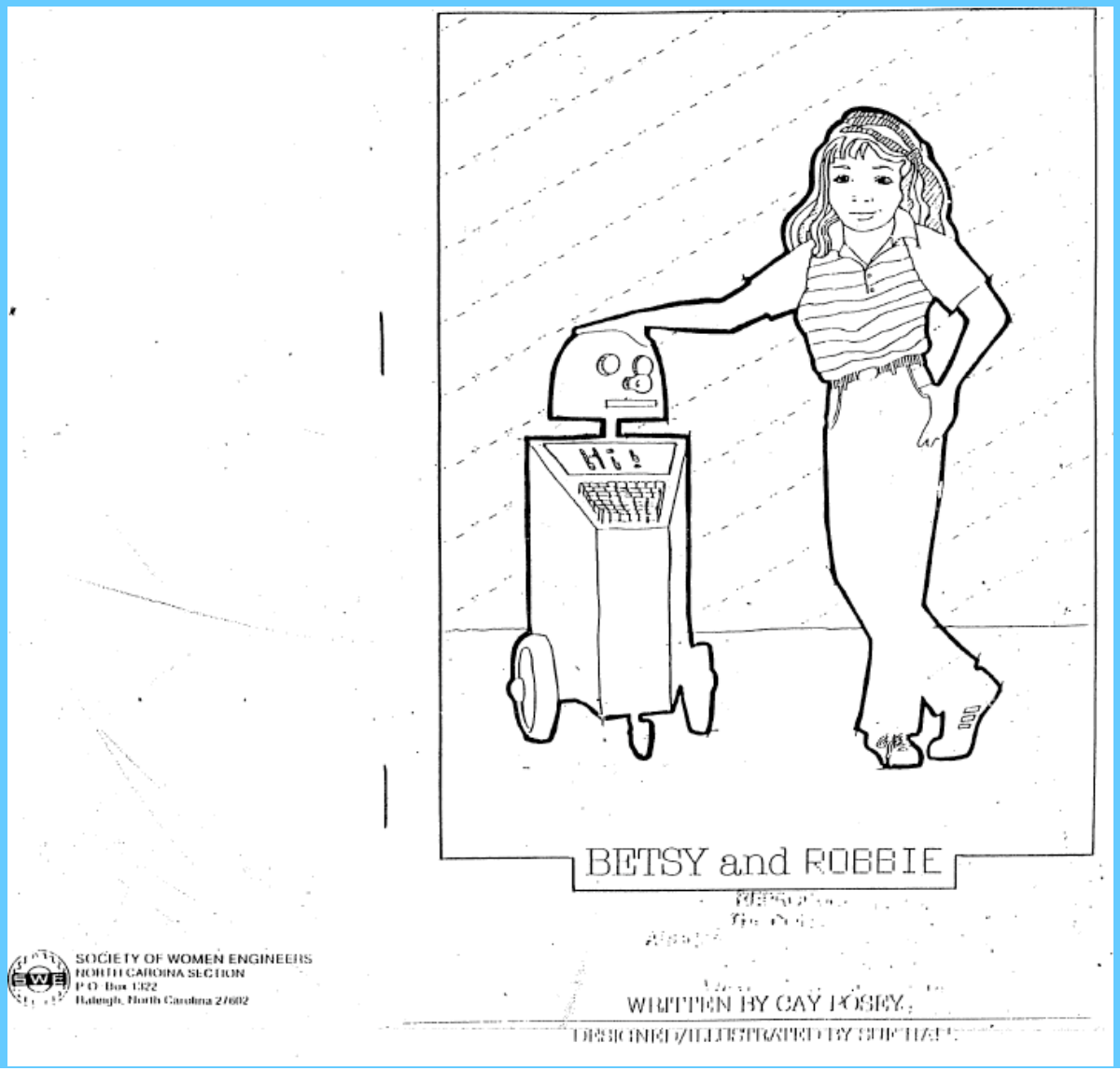
en′gi·neer′ing (ĕn′jĭ·nēr′ĭng), *n.* Art and

- **Society of Women Engineers - outreach to K-12 students:** *"Some day I'll be an engineer like Aunt Jennifer."*

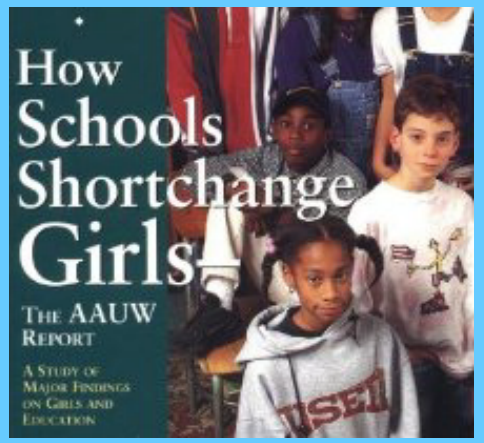


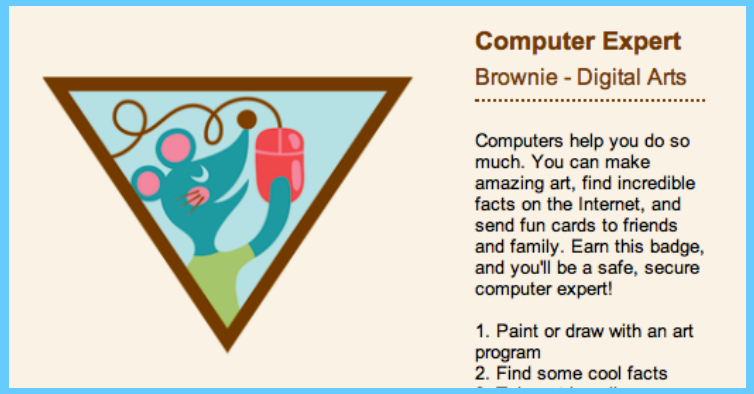


- **North Carolina SWE, 1983**



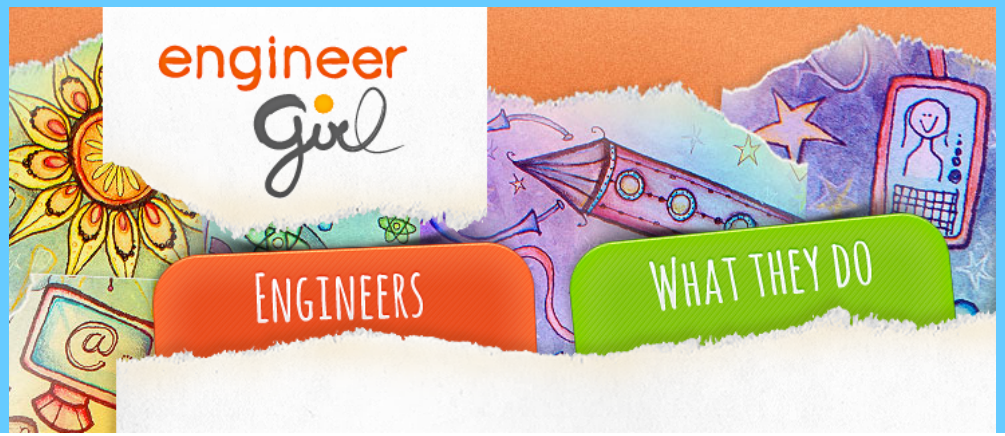
- 1960s on – feminist movement – Title IX; “Free to Be You and Me”; AAUW
- International/national/state/local - Girl Scouts (2 million girls), YWCA TechGyrls;





- Advocacy – 1971 women's caucus AAAS 1975 NSF Women in Science Program;
- Virtuous cycle: 1966- 2012 women's STEM undergrad, master's, doctoral degrees up almost every year. 2012, women just over 50% of all STEM bachelor's degrees.
- More female faculty/staff/ administrators; more mothers/fathers part of change – support/promote K-12 diversity outreach.

- **Re-shaped agenda national disciplinary societies, major STEM institutions. William Wulf, NAE president 1998:** *"We must celebrate the creativity of engineering to attract more, and more diverse, engineers."*
- **NAE website 2001: "***Become part of the movement transforming the way engineering is presented to girls."*

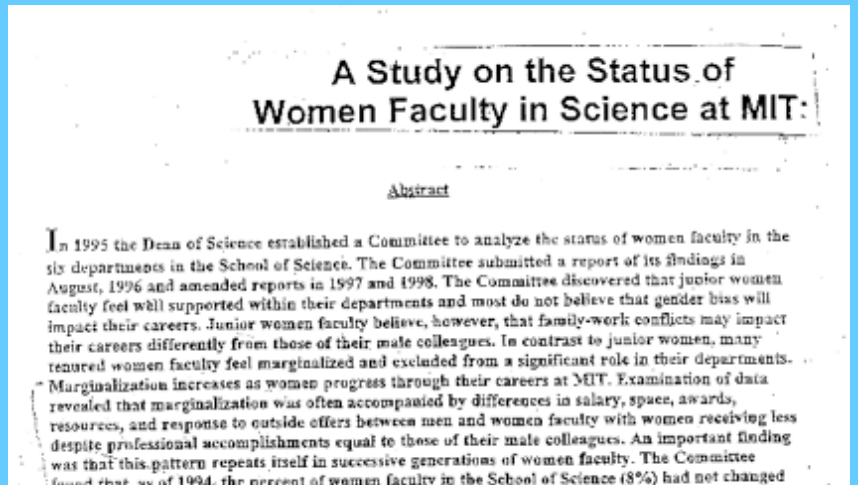


- **“engineering toys for girls” – books, TV shows, etc.**

- **Computer Engineer Barbie 2010 –** *"a national movement to inspire girls." "Barbie will broaden what feels accessible – being smart, confident, & tech-savvy, without sacrificing femininity & fun."*
- *"You can't rework a caricature of womanhood with impossibly long legs, pert breasts & glossy hair into some equal-opportunity role model by giving her a laptop, clothes with circuit board motifs and bright PINK glasses."*

- **“Girls Who Code.” White House Science Fair - Pres. Obama:** *“We don’t want to just increase the number of students in STEM. We want to make sure everybody is involved. We get the most out of all our nation’s talent, reaching out to boys and girls of all races and backgrounds. Science is for all of us. And we want our classrooms, labs, workplaces & media to reflect that.”*

- **High-profile corporate support - K-12 diversity outreach comfortable "sell" – non-partisan, non-controversial**
- *"leaky pipeline" "stereotype threat" "imposter problem" "hostile workplace" "chilly climate" "Silicon Valley bro culture" "Gamergate"*
- **Issues equity; retaining, promoting female workers;**



A Study on the Status of Women Faculty in Science at MIT:

Abstract

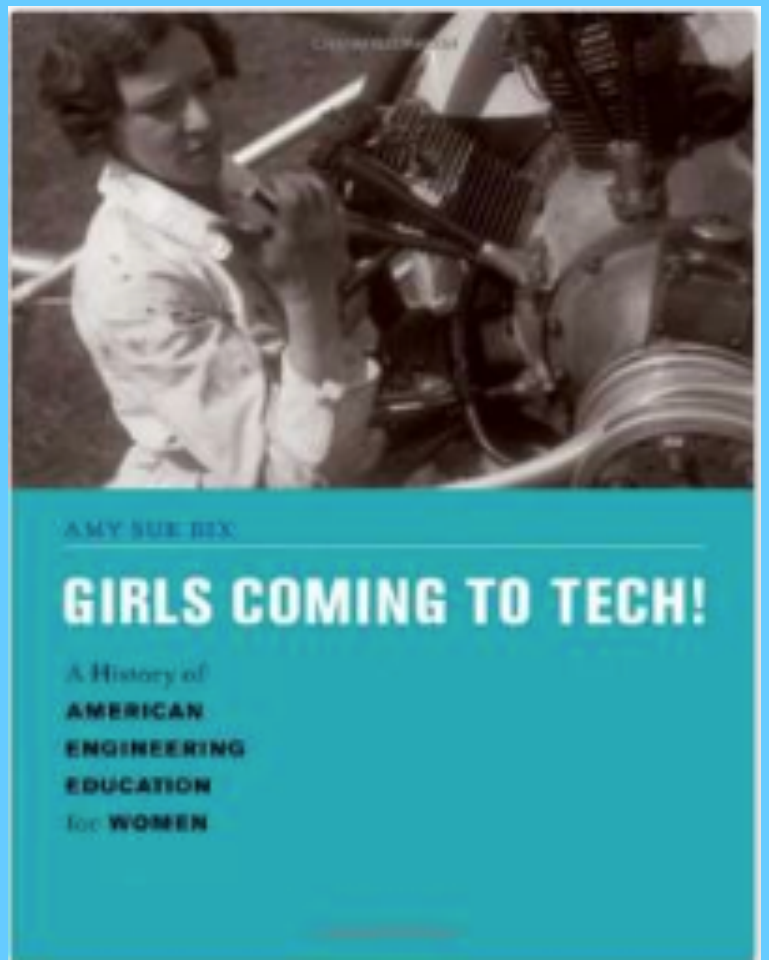
In 1995 the Dean of Science established a Committee to analyze the status of women faculty in the six departments in the School of Science. The Committee submitted a report of its findings in August, 1996 and amended reports in 1997 and 1998. The Committee discovered that junior women faculty feel well supported within their departments and most do not believe that gender bias will impact their careers. Junior women faculty believe, however, that family-work conflicts may impact their careers differently from those of their male colleagues. In contrast to junior women, many tenured women faculty feel marginalized and excluded from a significant role in their departments. Marginalization increases as women progress through their careers at MIT. Examination of data revealed that marginalization was often accompanied by differences in salary, space, awards, resources, and response to outside offers between men and women faculty with women receiving less despite professional accomplishments equal to those of their male colleagues. An important finding was that this pattern repeats itself in successive generations of women faculty. The Committee found that, as of 1994, the percent of women faculty in the School of Science (8%) had not changed

SCIENCE & IDEAS

The boys' club persists

MIT acknowledges it has a female problem: discrimination

- 1960s-today, K-12 girls' STEM advocacy command mainstream support for change, position STEM interests as appropriate, enjoyable, and rewarding for girls.
- Future – broaden culture of STEM diversity outreach, new mechanisms for support; reshaping ideas about nature of STEM itself;

Thank you for letting me talk about a subject I love !

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