



Mass-Lectures Praised in Recent Study

By ROBERT BOGURSKY

A recent experimental study conducted by Dean John White (School of Engineering and Architecture) has strengthened the position that the mass-lecture system of teaching will be part of an effective solution to the problem of increasing enrollment at the College.

The study was designed to determine the relative effectiveness of the teaching of engineering material of the mass-lecture technique as compared with small section sections. The courses involved in the three semester study were "Mechanics of Materials I" (CE 110) and "Engineering Fluid Mechanics I" (CE 120).



Dean White

Students were initially equated on the basis of four measurements: the American Council on Education psychological examination, high school average, composite score compiled by adding the high school average to the average of scores obtained on The

City College Entrance Examination in Science Comprehension, Science Vocabulary and Engineering Mathematics, and The City College average based on the student's average on the four basic pre-engineering course sequences, namely Chemistry, Drafting, Mathematics and Physics.

The comparison of the results of the method of instruction was based upon final examination scores and it was concluded in the report that "in terms of a student's ability to pass final examinations, there appeared to be no appreciable difference in the two teaching techniques used in this study."

At the conclusion of the experiment unsigned questionnaires were used to determine student and faculty reactions to the mass lecture method of instruction. Students gave the following as advantages of the mass-lecture method: an experienced lecturer to conduct mass-lectures; a uniform coverage of material; a rigid adherence to the course outline and greater aid in homework.

As disadvantages, students listed the tendency of lectures to become tiresome when given to a large group, too much adherence to material presented in the textbook, lack of opportunity to ask questions in a mass-lecture, and lack of direct contact between student and teacher, normally occurring in small sections.

(Continued on Page 2)

Summer Jobs

Opportunities for College Students as Engineering and Science Trainees during the summer vacation are available in Federal Agencies in New York, New Jersey and Washington, D.C. (\$77.20-86.00 per week, depending on amount of education.)

Last day to file for exams is February 18, 1965. Applications will be available in the Placement Office after November 16.

Blood Bank at All Time Low

The City College Blood Bank is at an all time low. To relieve this situation the annual blood drive is operating in high gear.

The Blood Bank is available to all students, faculty, staff, recent alumni and their immediate families, up to grandparents. As much blood as is needed is provided free by the bank. Normally the charge is \$35 per pint.

The benefits derived from being a donor are many. Donors will receive an excused absence from gym, a free bagel from Raymond and a blood pressure check.

Anyone between the ages of 18 and 59 may donate blood. Those under 21 need parental permission. Eligible donors may make appointments at the registration booths on North Campus opposite Knittle Lounge, and on South Campus opposite Room 152 Finley or in Cohen Library. Further information can be obtained from Dr. Harry Meisel of the Department of Student Life, AD 4-2000, or from the Blood Bank Information Director, Barry Shapiro, OR 3-5626.

Job Applicants Meet With Success

By FRANCINE COURNOUS

On-campus recruiters have been very impressed with the January engineering graduates. "The group is one of the best prepared and best directed we've seen at the College," one recruiter remarked. This is a typical reaction.

This semester many companies have expressed interest in a very large number of the students interviewed. According to Mr. Charles Meyer of the City College Placement Office, "The group, in general, is very promising, and is doing very well."

Not all companies are hiring with the same enthusiasm. Due to cutbacks in government spending



Mr. Charles Meyer

the aerospace companies, with a few notable exceptions, have been forced into a difficult position. Consequently new jobs are not always available. This is counterbalanced by the substantial increase in job opportunities afforded by commercial concerns. I.B.M. is about to embark on the largest recruiting campaign it has ever

undertaken. ESSO is looking for more personnel this year, across the board in technical areas, than it has for many years past. The RCA Sarnoff Laboratories have invited a great many of the students interviewed for plant trips. Representatives from the M.I.T. Instrumentation Labs say that their Apollo project as well as new projects received from the National Aeronautics and Space Administration (NASA) has been picking up some of the slack. This is just a sampling of the success on the part of both the students and the companies.

Mr. Meyer, however, has warned against over confidence. Some unfavorable reports have also been submitted. Among those qualities recruiters have found undesirable are the "Here I am — come and get me" attitude, the unrealistic approach regarding industry, lack of enthusiasm and preparation, nonchalance, lack of maturity and lack of direction. Mr. Meyer feels that those engineers who attended the workshops have less of a problem in this respect because they are well prepared for the interviews and understand these pitfalls.

Another difficulty encountered is the unwillingness of many engineers to leave the Metropolitan area. One recruiter remarked that some of the students he had interviewed would "rather sell hats in the City, than take an engineering job outside the New York area."

Faculty Profiles: E.E. Department

Among the new teachers in the Electrical Engineering Department this semester are ten lecturers, five laboratory assistants and one Assistant Professor.

The new Professor, Dr. Paul Karmel, came to City College because he feels that The College offers an excellent opportunity both teaching and research work. At present he is teaching courses in circuit theory and electromagnetic measurements. He will be doing research in microwave circuits and components. Professor Karmel received his doctorate at Columbia where he taught electromagnetics and EE courses for non-EE majors for 2½ years. He also worked in the Energy Conversion Lab which is similar to our Power Lab here at City College.

Having been at the College for a few weeks he feels it is too soon for him to form an impression of the school in general, but concerning the student body he

has nothing but praise. "The students at City College are very alert, keep up with their work and ask intelligent questions."

Professor Karmel did his undergraduate work at Cornell, received his master's degree from MIT in 1957 and his doctorate from Columbia last year.



Professor Karmel

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(Continued on Page 2)

Record Budget Requested

A capital budget of \$57,384,149 has been requested for The City University of New York for the year 1965-66 by Dr. Gustave G. Rosenberg, chairman of the Board of Higher Education, Dr. Albert H. Bowker, chancellor of the university, and the presidents of the university's colleges. The current 1964-65 budget is \$45,000,000, the largest in the city's history, and the board's chairman stressed the importance of maintaining the momentum gained.

Dr. Rosenberg asked that construction funds be provided in 1965-66 for five major projects for which plans are now being completed so that they may be opened in 1968 when the next big jump in high school graduates will occur. To accommodate these students Dr. Rosenberg said the University would have to spend an average of \$50,000,000 a year.

(Continued on Page 2)

Vector Review

By BRIAN COHEN

The modern engineer has widened his horizons by investigating many of the challenging questions that face humanity in all of the sciences. This expansion of interest is reflected in the forthcoming issue of Vector.

The feature articles present a testimonial to the expansive scope of interest of the latter-day engineer, but unfortunately only one of the three authors is himself an engineering major.

Martin Wachs, an upper senior in electrical engineering has written an excellent article entitled "A Muscular Control System." This paper is the result of an experiment performed by the author in which he harnessed and studied minute electrical currents sent from the human brain to stimulate the muscles to actuate mechanisms outside of the body. Mr. Wachs constructed an apparatus that picks up the signal currents and passes them to a series of relays and amplifiers that actuate servomotors capable of turning the wheels of a miniature car. The person to whom the apparatus is attached may direct the car to the left or right simply by tensing the muscles in his left or right arm. This well written and simply presented article will be of interest to any reader.

Victor Greenhut's article on "Crystal Defect Structures" is presented in a very professional manner that is indicative of the author's familiarity with the subject. The level of presentation is sophisticated, but not formidably so. Unfortunately, digression to the details of the experimental procedure in the middle of the article may prevent the more casual reader from continuing to

(Continued on Page 2)

Profiles... Lectures...

(Continued from Page 1)
Professor Karmel also has experience in research. He spent two years at the MIT Instrumentational Lab where he worked in the field of inertial guidance. He lives in New York City with his wife and child. His wife is an attorney for the Securities and Exchange Commission.

Mr. Stephen Kleinman earned his B.E.E. at Rensselaer Polytechnic Institute and his M.E.E. at Columbia University. He enjoys teaching at City College and plans to study for his doctorate. Mr. Kleinman might be considered somewhat novel. At least



Mr. Kleinman

that's the impression many students receive as the eligible young man approaches the College on a motorcycle, his daily mode of transportation.

Mr. Joseph Frank earned his B.E.E. at City College and his M.E.E. at Columbia. At present he is working toward his doctorate. Mr. Frank enjoys the academic atmosphere at City College because it affords him much time for study. Before coming to City



Mr. Frank

College Mr. Frank was employed in industry. He is married and has three children — and, one might add, a garden of tomatoes, which he grows in his spare time.

Mr. G. Papadopoulos earned his B.E.E. at City College and his M.E.E. at M.I.T. He enjoys the personal contact with students



Mr. Papadopoulos

that is involved in teaching. Next year Mr. Papadopoulos will return to M.I.T. for his Doctorate work. He is not married.

Mr. Joseph Nadan received
(Continued on Page 8)

(Continued from Page 1)
curing in small lecture sections. Professor Henry Semat (Physics Department) points out that this shortcoming in student-teacher relations need not be present. Most instructors have regular office hours devoted to student conferences. "The problem," according to Professor Semat, "is that too few students come."

Faculty reactions were similar to that of the students, but they added that under the mass-lecture system there was greater development of student initiative and, by means of observation, added assistance in the training of new instructor. Another disadvantage is lack of teacher incentive.

This study accepted as criteria for the adoption of the mass-lecture type of instruction "the ability to handle an ever increasing enrollment in engineering with a possible saving in teacher hours without sacrificing course content and student understanding of subject matter."

Commenting on student and faculty opinions of the mass-lecture system at City College, which is being used by more departments and in more courses each term, Dr. Louis E. Long, Chairman of the Department of Student Services, said "the discontent is not greater in the new system than in the old." As an extension of the mass-lecture system, he also points to new developments with closed circuit television and programmed learning as possible innovations in regular college teaching.

Vector...

(Continued from Page 1)
the end of the article where he would find some clever interpretation of crystallographic phenomena through such allegories as the "Dislocation Traffic Jam."

"Generalized Calculus" by Steve Hartman, a freshman math major, will appear to the engineering student as little more than an abstract of a calculus book. Mr. Hartman has failed to relate his semi-rigorous proof of the half derivative to any phase of the real world of engineering. The author might have been better off saving his paper for presentation in the mathematical journal which he hopes to inaugurate, rather than present it to a generally unreceptive audience.

The feature articles, supplemented by several sketches of new developments of modern engineering investigations as well as the traditional presentation of Vector Volts, the crossword puzzle and faculty profiles, make this issue of Vector worth reading.

Budget...

(Continued from Page 1)
"We are up against a stone wall as far as expansion is concerned until these buildings are occupied," Dr. Rosenberg said. "As you know, we opened no new buildings on our existing campuses this year, and the increases were made possible through the use of rented space and the truly heroic measures taken by the faculty to serve more students by extending the school day, extending the week, using large lecture classes, and other means of instruction where that was educationally sound. We look ahead to the need to expand again next fall because another large increase in high school graduates will occur."

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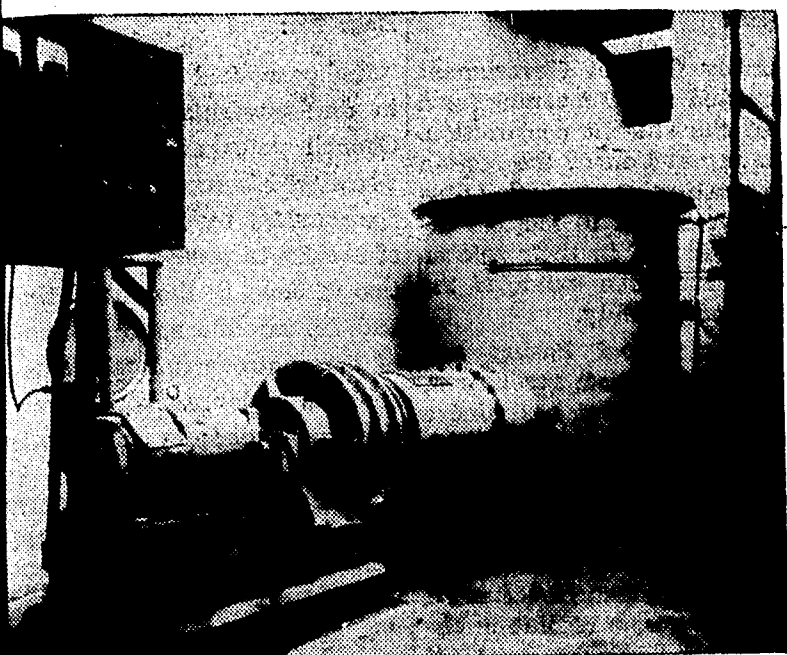
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AXIAL FLOW COMPRESSOR. Drive motor and motor speed control are at left. Note flow meters at extreme right.

By **SHELDON ZAKLOW**

Since its move to Steinman Hall in 1962, the Mechanical Engineering Department has purchased a great deal of new laboratory equipment in a continuing effort to keep its laboratories supplied with the most modern of available equipment.

Over \$90,000 has been spent on laboratory equipment by the Mechanical Engineering department since the School of Engineering moved into Steinman Hall in September, 1962.

Along with a new building, the M.E. department got a new curriculum, one stressing a more "experimental" approach to laboratory work. In the "Theory of Experimentation" course (M.E. 110), students are taught how to plan experiments, predict and randomize errors, analyze experimental results statistically, etc.

Much new equipment was needed so that students would be able to plan and run experiments of their own design, and so that instructors would be able to adequately demonstrate certain engineering principles. Following are descriptions, provided by Professor A. L. Steinhäuser of the Mechanical Engineering Department, of some of the M.E. department's major purchases since the move to Steinman.

An Axial Flow Compressor and a Supersonic Wind Tunnel Unit, costing approximately \$10,000, and a Supersonic Demonstrator, with a Schlieren system, costing about \$7500, have been purchased for the Fluid Dynamics Laboratory. The axial flow compressor is being used to conduct experiments on compressor performance and flow through various nozzles, including temperature, and static and dynamic pressure measurements.

Plans are now being made to conduct a demonstration of shock waves in the department's "Fluid Dynamics" sequence. The equipment will permit from mach 1.5 to mach 3.5 in supersonic velocities and allows pressure measurements along the nozzle throat. The Schlieren system will permit visual observation of the shock waves and density gradients. Models of various shapes may be introduced in the nozzle throat section.

At present the unit is operated on an intermittent run, using blow-down from nitrogen tanks. The department intends to increase the length of the run by conversion to larger compressed air supply systems or use of a compressor.

The department's heat transfer laboratory has added a Mercedes high speed diesel engine costing \$1750, a York One Ton Ice Plant costing \$7,000 and a Centrifugal Pump costing approximately \$4,000.

The Mercedes Engine is a high speed unit rated at 94 hp at 2600 rpm. It is being used in the M.E. 205 Energy Conversion Laboratory for measurements of performance characteristics.

The Ice Plant consists of a Freon Gas Compressor, Condenser Coils and Brine Tank; instrumented for measurement of flow rates and temperature of compressor gas, brine solution, etc. The unit is used for experiments on the refrigeration cycle in the M.E. 205 course. Recently it was also used by a group of students, under the direction of Professor S. Menkes, in the conduction of

suction water temperature by means of a temperature control heat exchanger.

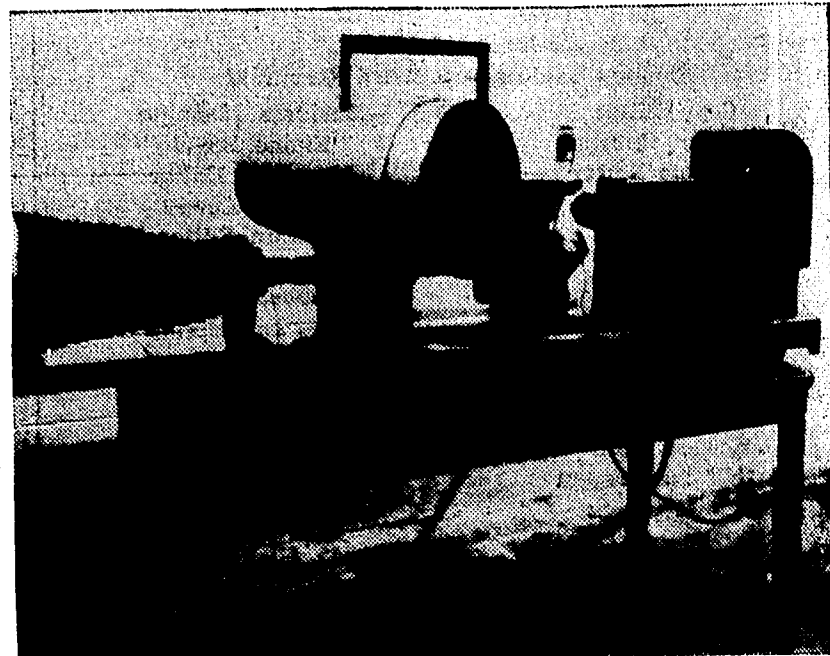
During the summer, the department's laboratory technicians constructed a heat transfer experiment, to which the department has added a 24 Channel Multi-point Recorder, capable of automatically recorded up to 24 temperature points. The Recorder is

An Instron Testing Machine costing approximately \$18,000 a Bausch and Lomb Metallograph, costing approximately \$6,000 and a Leitz Metallograph costing \$9500 have been added to the department's metallurgy laboratory.

The Instron unit will be used as a compression-tension testing machine correlating physical properties to structural variations in the M.E. 113 course. It will also serve as a valuable unit in the graduate area. It is capable of load ranges from 2 grams to 10,000 pounds; automatic recording of force-deflection; cycling of loads, including reversals; load speed variations, controlled by electronic weighing systems and servo-drive loading mechanisms.

The Bausch and Lomb Metallograph is now being used by students as a supplementary high magnification unit in the M.E. 113 course. It can be classified as a semi-research type capable of bright field, dark field, and polarized light with magnification up to 2,000 diameters.

The Leitz metallograph is now being as a demonstration unit by



LEITZ METALLOGRAPH. Note 23 in. viewing screen.

low temperature experiments. This effort was supported by an NSF grant.

The Worthington Pump is being used in the M.E. 205 and the M.E. 111 courses. Its complete instrumentation permits pump performance tests to be made with the possibility of changing

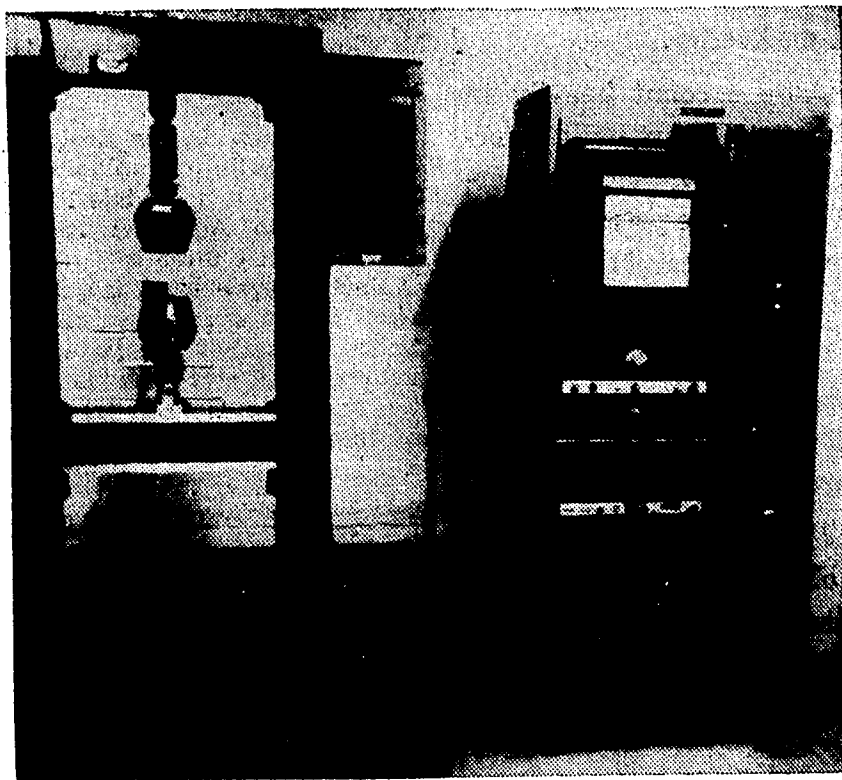
also being at present on experiments like "Temperature Distribution on a Fin or Rods of Different Materials." These units are extremely flexible in application and can be used both on undergraduate and graduate levels in the field of temperature measurement.

The department's production laboratory has purchased a \$20,000 Monarch Machinability Lathe and a High Frequency Induction Melting and Heating Unit costing \$5000.

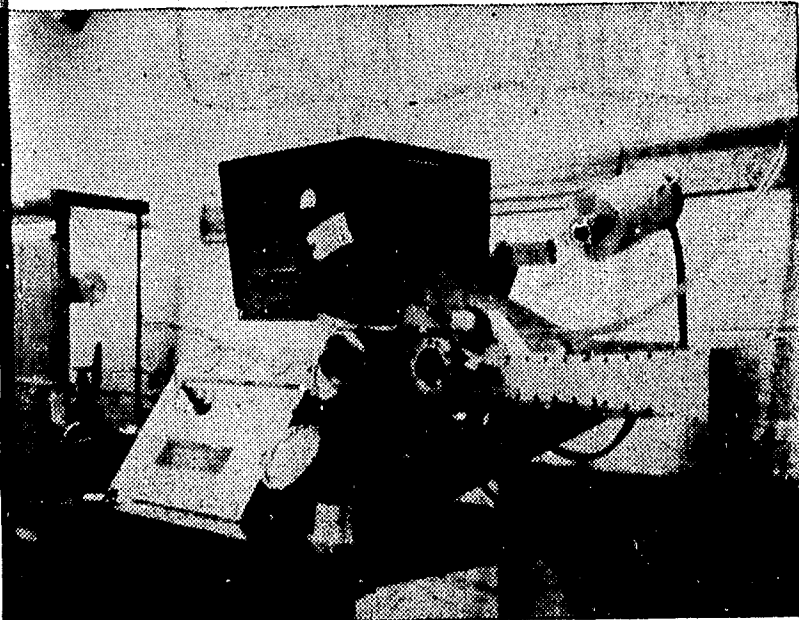
The Monarch Lathe is fully instrumented and at present is being used in an experiment showing the variation of cutting forces with changes in speed, feed, and depth of cut. A Strain Gage Dynamometer and Universal Amplifiers permit the recording of cutting and feed forces. The experiment will be expanded to include material variations and allow temperature measurements along with measurements of tool life, all such problems being a part of the continuing investigation of the problem of machinability.

The Induction device is a spark gap converter which can be used with a melting pot or an induction heating coil. It is used for extensive melting of ferrous and non-ferrous metals in the preparation on M.E. 113 laboratory specimens and will also be used to demonstrate foundry procedures in the M.E. 108 course.

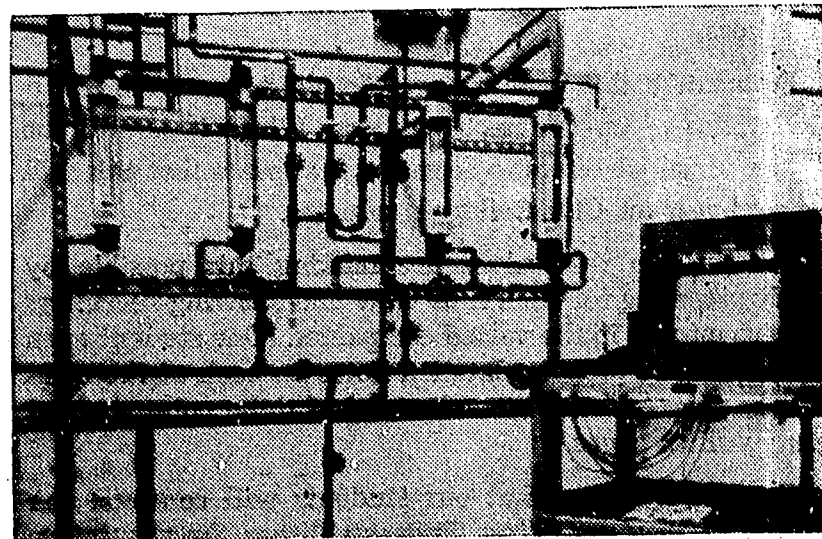
The department has also purchased Optical Pyrometers, Spectroscopes, Oscilloscopes, Amplifiers, Recorders, Impact Testing Machine, Surface Finish Measuring Unit, Potentiometers and various precise dimensional measurement equipment as accessories in its various laboratories.



INSTRON TESTING MACHINE AND CONTROLS.



SUPERSONIC WIND TUNNEL: from left to right: pressure measuring devices, nitrogen tanks, flow controls, Schlieren system, tunnel exhaust.



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That Certain Something

Job interviews are uppermost in the minds of the majority of engineering seniors. These confrontations with industry representatives mark the culmination of five years of back-breaking work, and are the key to what may be paths of glory or the well-travelled road of mediocrity.

Marks, experience, recommendations count heavily in influencing interviewers, and for the most part, will determine the outcome of any hiring gambit. Yet, there are certain intangibles; factors which lead experience personnel men to lean one way or the other on borderline decisions. Factors such as poise, self-assurance, attitude, ability to articulate and appearance.

Once recorded, marks cannot be changed, and most students do not vary greatly in the level of their performance over the length of their college careers. But the intangibles can be acquired rapidly, and with relative ease.

Dress is the most important of the subtle factors. Although superficial, appearance indicates many things about an individual. A well-dressed person is more likely to be up to date in his thinking, more socially aware and more careful in his personal habits, or so he appears. Well dressed does not mean only a clean shirt, tie and jacket, but involves a certain minimum of taste. Consulting any of the better magazines (New Yorker, Esquire, etc.) will enable an uninformed student to live up to expected standards of dress.

The other intangibles follow from a smart appearance. Confidence in one area carries over to others. When one is not self-conscious about his appearance he can concentrate on how and what he is saying. Poise is the most elusive quality to define and to acquire, but it is inspired by a knowledge of what is required of you. An informed, well-dressed student will have the edge on his less ambitious fellow graduate. That edge may make an important difference when jobs are handed out.

Fortunately, this year we are pleased to note the favorable reaction of on-campus recruiters. While it is still too early for actual job offers to be made, it appears that this will be a good year for City College graduates.

The students themselves are making this possible by actively preparing for each interview and showing recruiters a genuine interest in the varied companies. (One student even went so far as to prepare detailed notes on each of the companies he plans to interview. The total of these notes covered seventy written pages.)

We sincerely hope that our students will continue the excellent job they are doing. This establishes the reputation of City College as a source of fine quality engineers and scientists — a reputation which we want to continue and grow.

Inquiring Technographer

By PHIL BURTON

QUESTION: Do you think a system of unlimited cuts should be used at City College?

PLACE ASKED: Finley Hall.

Lois Lerner, Upper Freshman, English. As long as a student can demonstrate adequate ability on exams, essays and other written measurements of ability (since we don't mark on a classwork basis and discussion is severely limited by the large number of students in a class), the number of cuts which a student can afford should be left to a student's discretion.



Lerner

Pfeiffer

Joseph Pfeiffer, Lower Soph, Classics. I think it's a wonderful system. A certain large institution to the south has a system whereby a student with a B— average in any one subject is allowed unlimited cuts in that subject. The system doesn't seem to have impaired attendance in any classes. This allows a student who is good in one subject to study subjects which he is not good in.

Nina Holstein, Lower Senior, Philosophy. I believe in unlimited cuts because class hours interfere with going to Aqueduct Race Track. Now that there is a new post time at Aqueduct, it is quite difficult to get there unless class attendance is not mandatory. Moreover, excessive attendance leaves one too disciplined for the good things (which are free) in life.



Holstein

Halaksin

Gail Halaksin, Lower Senior, Elem. Education. I don't think that there should be unlimited cuts allowed because many students would take advantage of this privilege. This is because many students have not accepted the responsibilities along with the privileges.

Larry Marshall, Upper Junior, EE. Cuts should be unlimited in most courses except courses such as Freshman English, Speech, etc. The College assumes the student to be mature. Therefore, the decision to attend class should be his or hers to make — only he or she can best decide how to get the most value from school hours.



Marshall

Montrose

Louis Montrose, Lower Soph, History. This system has no honor at all. You come when you want and you don't come when

MAIL DEPT.

LETTERS...

Dear Sir:

Recently Student Government has adopted a new meaning for a part of the student constitution. The interpretation of the section of the constitution restricting Student Government to matters affecting students, in their role as students, has been extended far beyond acceptability.

In their school busing and Soviet anti-Semitism resolutions, Student Government has gone a great distance from campus affairs. These issues have only the most tenuous and doubtful connection with City College. Using the aforementioned resolutions as precedents, Student Government could easily pass a resolution endorsing a candidate for President of the United States.

We feel that students, as people living in an uneasy world, should have and express opinions. However, we believe that Student Government, as a body representing City College, should be restricted to the problems of college students as such. Our student officers were elected to handle college situations, not international issues. If these representatives desire to work on such issues let them run for public office.

Student Government must not be allowed to waste valuable time legislating about problems which it has no right even discussing. There are many pertinent problems facing the College which Student Government should handle. However, these problems are kicked aside while our representatives adventure on tangents.

As a group which represents a large section of the student body, we demand that Student Government stop wasting time on extraneous issues and start doing the job it was elected to do.

Sincerely yours,
TECH COUNCIL

you don't want to. However, I think it's a fine system. The basis of your mark is tests, reports and the like. If you don't depend on class attendance in determining marks, there is no reason to require your physical presence in class if you perform well on tests.

Dear Sir:

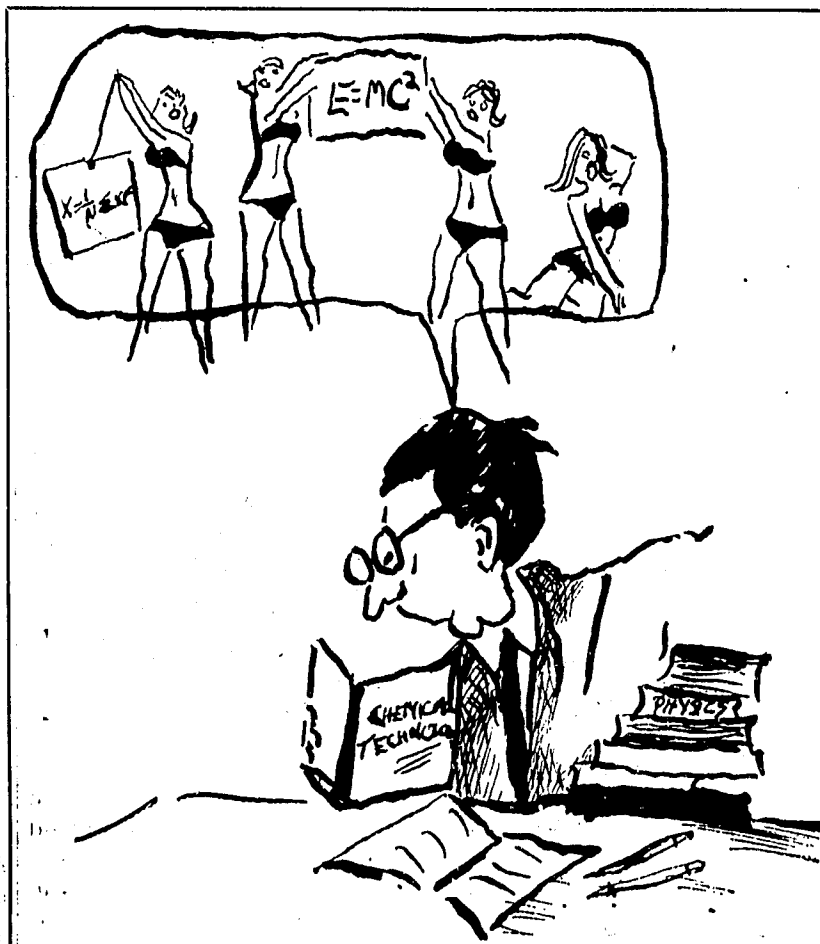
Today we find ourselves indeed in dire straights when Student Council votes on the "constitutionality" of a motion pledging sponsorship, by S.G. and Hillel of a rally to protest the persecution of Jews in the Soviet Union and the satellite nations, because of the controversial "students as students" clause. We have to hang our heads in shame when we read the editorials in the "Campus" and "TECH NEWS" lauding merely a strict interpretation of the "students as students" clause.

It seems to me that people on our campus, my own fellow students, find it necessary to separate human concern for other human beings, who are less fortunate than ourselves as constituting something apart and of the realm of our role as students. The City College has been called "an institution of high learning," but as such, unfortunately students cannot learn to have and use human understanding and merited action for the fellow men, because it is "unconstitutional," if I am allowed to use a little poetic license.

How 'high' is this learning then? What higher principles are there to learning than to "love thy neighbor as thyself," the golden rule, an emphatic yes to the old querie, "Am I my brother's keeper?"

If college is a place where we only learn about great men and ideas without instituting them, if college is just a place where the petty, semi-political, and not thinking association of student dehumanized to the point of unconcern or where they are able to write denunciations against positive actions of our fellow men by responsible groups and individuals, without thinking of the implications; if this is true, what our college life has taught us; then I literally am disgusted with what I see on our campus and I do not want to be associated with such a dreadful place.

Morris Kaufman, Class of '65



Demand For Engineers Strong Despite Cutbacks In Defense Spending

By MARTIN GOLD

Last year Defense Secretary Robert S. McNamara announced that he wanted to cut costs on government defense projects by almost four billion dollars a year by 1967. This great cut-back, it was felt, would decrease the amount of jobs available for our nation's new engineers.

According to a recent survey taken by the City College Placement Office, the government cut-back has brought an increase in stability of the engineering field and that talented young people used much more intelligently. Until recently when the cost-plus government contracts were given out engineers were hired as "warm bodies." Cost-plus guaranteed a company a commission based on the number of "warm bodies" they hired. These contracts permitted the hiring of engineers at very large salaries. Many engineers fell into this category and did nothing more than elementary drafting or clerical work. With the ending of the era of cost-plus contracts, engineers are being hired solely to do engineering work.

With the cutback in defense projects, there is large demand for engineers in such fields as education, state and federal agencies and our national research and development laboratories.

The National Science Foundation recently predicted that fewer than 765,000 newly trained engineers and scientists will become available during the next decade to fill more than one million engineering openings. More than half of these openings will be due to the growing technical man-power requirements of our expanding and technologically-based economy. More than 150,000 will be due to replacement needs for the engineers who retire, die, or transfer to other fields. The number of new entrants into the engineering profession, including engineering graduates, other college graduates and non-degree personnel, is projected at about 450,000 persons. This is 50,000 less than the projected demand. Over the coming decade, demand for engineers is expected to average about 72,000 a year, compared with a projected available supply of about 45,000 a year.

If man-power requirements in engineering are not met, projects will have to be postponed or even cancelled. Some projects may be carried out with difficulty and less efficiently and others may have to be stretched over a longer period of time than anticipated. This result in a great loss to our nation's economy. General unemployment can also increase since a great number of jobs are created in an engineering project no matter what its nature.

The National Science Foundation reports that nearly 40,000 engineers and scientists will be needed by state agencies throughout the country during the coming decade. These positions can be grouped into three categories — highway and public works, health, welfare, and agriculture and conservation. The majority of the engineers needed by the state agencies will be civil and chemical engineers with electrical and mechanical engineers also in demand. The civil engineers are needed by the highway and public works departments for planning, designing, and supervising the construction of new roads. Others will be concerned with the maintenance of roads or with public works projects such as the design and construction of public housing. A substantial number of electrical and mechanical engineers will be needed in the state public utilities and public service departments.

Chemical engineers and chemists will be needed in the laboratories of the state health and agriculture departments, where they will be concerned with the enforcement of food, drug, and cosmetic laws and the design, inspection, and testing of fertilizers, seeds, and pesticides. In highway and public works departments, chemical engineers will test soils and materials used on roads and other constructions.

There is an amazing need for our new engineers in the areas of research and development, manufacturing, marketing and production control of commercial products and systems.

In the area of research, engineers are needed to search for new knowledge, theories, and techniques with the hope that new products and processes will result that will better our daily lives.

Private industry is now looking for research and development engineers to develop new means of transportation. One such project on to start is the supersonic transport jetliners which will be able to carry over one hundred-fifty passengers across the Atlantic and exceed twice the speed of sound. The most important aspect of this project is that the efforts of these engineers will create an estimated 40,000 to 60,000 new jobs, many of them skilled, in airplane engine manufacturing companies plus thousands more in allied industries. It is estimated that this project will bring in, by the mid-70's, between 3 and 4.5 billion dollars in foreign exchange.

Another new means of transportation on our engineers' drawing boards is the A.M.F. monorail system. This modern means of transportation, operating above existing traffic, can be the solution to city congestion. The proposed plan calls for a system which will consist of variable speed closed loop monorails used for intra-city and intra-city, and high speed monorails for city to airport interurban use.

Research and development engineers and scientists are forever designing new means of communication to better the world of tomorrow.

Such projects which will require the creativity of our new engineers include an artificial larynx which will offer a great boon to people who have lost the use of their vocal cords, and the maser and laser. The maser is a device which amplifies electric currents or generates an intense, concentrated beam of light. This device, using the principles of modern physics, will be of application in radio, astron-

(Continued on Page 8)

Civil Service

Applications are now being accepted for the 1965 Federal Service Entrance Examination, the U.S. Civil Service Commission has announced. This examination, open to college seniors and graduates regardless of major study, as well as to persons who have had equivalent experience, offers the opportunity to begin a career in the Federal service in one of over 200 kinds of positions. These positions are located in various Federal agencies both in Washington, D.C. and throughout the United States. A few overseas positions will also be filled.

Depending on the qualifications of the candidates, starting salaries for persons appointed from this examination will be \$5,000 and \$6,050 a year. A written test is required, except for those candidates who have attained a sufficiently high score on the Graduate Record Examination Aptitude Test. Applicants who file by September 17, 1964 will be scheduled for the first written test on October 17, 1964. Six additional tests have been scheduled. The closing date is April 15, 1965.

A limited number of Management Internships with starting salaries of \$6,050 and \$7,220 a year will also be filled from this examination. An additional written test is required and additional education or experience is required for the positions paying \$7,220 a year. Applicants for these positions must file by January 21, 1965.

Details concerning the requirements, further information about the positions to be filled, and instructions on how to apply are given in Civil Service Announcement No. 333. The announcement may be obtained from many post offices throughout the country, college placement offices, Civil Service Regional Offices, or from the U.S. Civil Service Commission, Washington, D. C. 20415.

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Wednesday, December 16
Thursday, December 17

MUNRO

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Thursday, December 17

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INDUSTRY TODAY

The first practical system to apply television techniques to the electron microscope, a development that can boost the instrument's visible magnification power ten-fold to 2,000,000 times, was announced today by the Radio Corporation of America.

C. H. Colledge, Division Vice President and General Manager, Broadcast and Communications Products Division, described the system as "the most important single advance in microscope design since the perfection of the microscope itself."

"The new television system, with image intensification, extends the electron microscope's already tremendous capability by making it possible for the eye to see images never before revealed," Mr. Colledge explained.

"These images heretofore have been too dim to observe at high magnifications, or the specimens themselves have been destroyed or altered when exposed to the instrument's strong electron beam," he said.

"With the removal of these limitations, the overall sensitivity of the microscope system has been increased by at least ten times."

The TV system intensifies and displays on standard TV monitors the images formed when specimens are examined in the microscope. It was demonstrated for science writers today at RCA's engineering laboratories in Camden, N. J.

The conventional electron microscope is capable of direct magnification of 200,000 times, enabling scientists to observe objects 1,000,000 times thinner than the human hair. The addition of television increases the instrument's direct magnifying potential ten-fold to 2,000,000 times. At this magnification, the average one-inch paper clip would be 32 miles long and a man's foot some 400 miles long.

Mr. Colledge noted, however, that most observations in electron microscopy are made at magnifications well below theoretical limits.

He cited these major advantages for the system:

1. Radiation-sensitive plastics and other materials, which until now were destroyed or altered by the instrument's electron beam, can be examined for the first time. This is done by directing a relatively weak beam at the specimen and by electronically intensifying the correspondingly weak image until it is visible.
2. Scientists frequently are interested in how the appearance of specimens change as their temperature is raised or lowered, as the specimen is stretched, or as a magnetic field is applied. These changes now can be viewed and simultaneously recorded on television tape for playback immediately or at any future time. Thus television techniques permit study of what microscopists term "transient phenomena," events that happen only once or whose exact time of occurrence cannot be predicted. These techniques include, for example, TV tape recording of such experiments as stretching a fiber until it snaps.
3. With image intensification, still photographs now can be snapped in a fraction of a second. Since the conventional method of exposing photographic film directly to the electron image requires several seconds per picture, it has been impossible to make quick sequences of photographs showing changing phenomena in the specimen. The television system provides for a more continuous pictorial record.
4. Television display, using multiple viewing monitors, greatly enhances the electron microscope's use as a teaching tool. Classrooms of students can share the microscopist's view of the specimen, and case histories can be recorded on TV tape for classroom showings.

Mr. Colledge pointed out that the practical application of television to the electron microscope — which itself uses the TV picture tube principle of firing electrons at a fluorescent screen — came 24 years after RCA delivered its first microscope.

Since then nearly 1,200 of the powerful RCA instruments have been produced and are at work around the world in virtually every field of research. The space program and the fight against cancer are two of many areas where the electron microscope is contributing substantially to man's knowledge.

Mr. Colledge noted that the TV system enhances the usefulness of the microscopic image by providing a greater degree of picture contrast. Specimens that are inherently difficult to distinguish because of poor contrast can be made to project "good pictures" that are meaningful to the microscopist.

Another typical advantage television brings to microscopy, the RCA official said, is its ability to invert images. Some specimens, because of the nature of their preparation, appear on the viewing screen as a photographic negative with a flick of a switch, the image can be made positive, and quickly becomes understandable.

Addition of television, Mr. Colledge pointed out, was the result of a painstaking engineering effort to extend the microscope's capability without impairing any of its basic functions.

The engineers' problem has been to integrate image intensifying and TV pickup units with the basic microscope which itself combines some 4,300 individual parts and 80 miles of wiring in a closely-packed structure. This had to be done without creating any interaction between the magnetic fields and the high-voltage equipment of the two basic electronic systems — television and microscope.

The TV system demonstrated today uses an all-transistorized TV camera with a 3-inch image orthicon for pickup. Camera control equipment and viewing monitor are contained in a four-foot rack that is placed adjacent to the microscope.

The system makes use of image intensification techniques originally developed by RCA for military observation at night as well as a thin film semiconductor target pickup tube of extremely high sensitivity.

ARCHITECTURE

By ENOCH LIPSON

Unlike our own, almost barren New York, Boston still contains many prerevolutionary structures in usable condition. The Longfellow house, in the suburb of Cambridge, was built in 1759 by Major John Cassall, a wealthy Tory. During the Revolution, the house was first a rebel hospital and later the command post of General Washington. After the war, it was bought by Nathaniel Tracy. Mr. Tracy, emboldened perhaps by the quality of his home, spent somewhat more than he should have. Financial pressure then forced him to sell to Mr. Andrew Craigie, who was later seen to have a similar weakness. It was that gentleman's widow who sold it, as a slightly used boarding house, to Mr. Henry Wadsworth Longfellow. Mr. Longfellow proceeded to disprove the disparaging remarks made of poets' financial inclinations, for his descendants live there yet.

The house is a colonial version of Georgian architecture (referring to the current Kings of England) executed in wood which was cut and finished to resemble stone. This style, even now in use, is a provincial variation of late English Renaissance building. Although derived ultimately from classical Greece, the forms established by an Italian Renaissance architect and scholar, Andrea Palladio, are responsible for its popularity. The major strength of this style rests in its monumental applications, such as the White House. Attempts were (and still are) made to adapt it to less presumptuous structures.

King's Chapel, in Boston, is another such building. In the 1740's the first important Anglican congregation in New England asked Mr. Peter Harrison of Newport to design a church for them. They required that the final structure be 65 by 100 ft. with rough stone serving as the pri-

mary building material. The result was a simple exterior of Quincy granite, a hip roof, and two tiers of arched windows. Exterior Georgian touches are the 25 foot Ionic columns on the front porch and the missing spire which was to have been supported on the massive stone tower. The interior compensates for the grimness of the facades with showy white, coupled, fluted Corinthian columns.

Mr. Harrison was perhaps the colonies' first architect. An amateur, in its first and best sense, he adopted formal English Palladian architecture and applied it in the design of several churches, a synagogue, and a library. Mr. Harrison, who was born an English Quaker, was a ship's captain by the age of twenty-three and later a wealthy ship owner and merchant. During the French and Indian Wars, he was imprisoned by the French. While under confinement, he studied the prison town and later drew up the plans which led to its capture by the British. Mr. Harrison was not a jack of all trades, but rather a master of many.

In contrast, Charles Bullfinch

was the first great professional. His national fame lies in his completion of the Federal Capitol, which he managed to draw into a cohesive whole. Boston is fortunate in having several buildings which are completely his. The largest is the Massachusetts State House (1795-98), a fine example of early Republican (Federal or Adamesque) architecture. The Federal style is a derivative of the Georgian, generally lighter with less interplay of masses and with flatter facades. The State House, a graceful red brick structure, seems to have been directly inspired by the late English Renaissance buildings of London, such as Somerset House. Its treatment is lighter, lacking the gloominess which covers so many government buildings in Washington and New York. Unhappily, although the general style

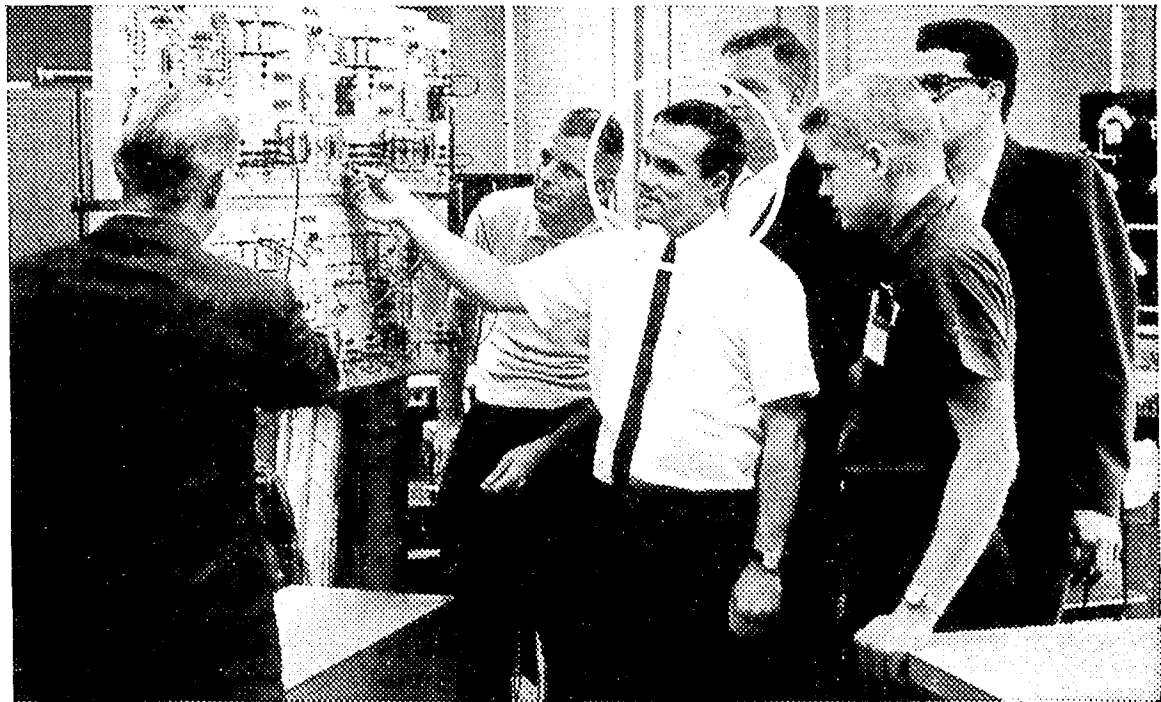
facades, but rather on the masterful manipulation of interior space. The eclectic use of Romanesque detail in an essentially eastern (Byzantine) design is a superficial characteristic. However, because of Mr. Richardson's skill, these details became so popular that we may now identify many later buildings as Richardsonian Romanesque. St. Luke's Church, due North of Steinman Hall, is a local example by Robert Henderson Robertson.

What had been a starting point for Richardson became a goal of his students. Trinity Church itself has suffered from this lack of understanding. The front porch was added in the 1890's after his death, in order to dress up the entrance. The contrast between this new direct copy of part of a twelfth century Romanesque Cathedral in Salamanca, Spain, and the original entrance shields shows how much more Richardson than Romanesque are the buildings that bear his name.

In 1878, Mr. Richardson began the first of his Harvard Buildings. Sever Hall is a simple three-story brick structure which shows the origin of its design only in the placing of the towers and in the deeply recessed multi-arched entrance. The building is one side of the Harvard Yard. Since it is unobtrusive, attention is directed in toward the yard space, rather than out, toward the perimeter. Reading motives into designs can be as incorrect in architecture as it is in literature; however, both author and architect are creators of environments, not just of characters or structures within them. The concept that an exterior space might be of more importance than the structures is well illustrated by three familiar New York City groupings. The Garden of the Museum of Modern Art and the Plaza in Rockefeller Center are enhanced by the buildings around them. On the other



Graduation was only the beginning of Jim Brown's education



Because he joined Western Electric

Jim Brown, Northwestern University, '62, came with Western Electric because he had heard about the Company's concern for the continued development of its engineers after college graduation.

Jim has his degree in industrial engineering and is continuing to learn and grow in professional stature through Western Electric's Graduate Engineering Training Program. The objectives and educational philosophy of this Program are in the best of academic traditions, designed for both experienced and new engineers.

Like other Western Electric engineers, Jim started out in this Program with a six-week course to help in the transition from the classroom to industry. Since then, Jim Brown has continued to take courses that will help him keep up with the newest engineering techniques in communications.

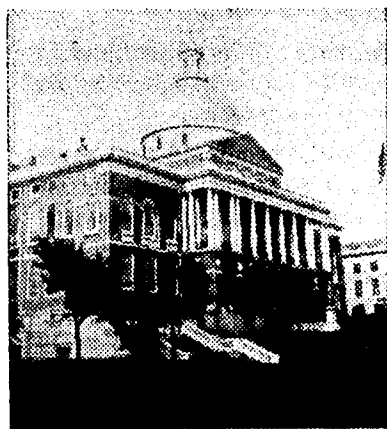
This training, together with formal college engineering studies, has given Jim the ability to develop his talents to the fullest extent. His present responsibilities include the solution of engineering problems in the manufacture of moly-permalloy core rings, a component used to improve the quality of voice transmission.

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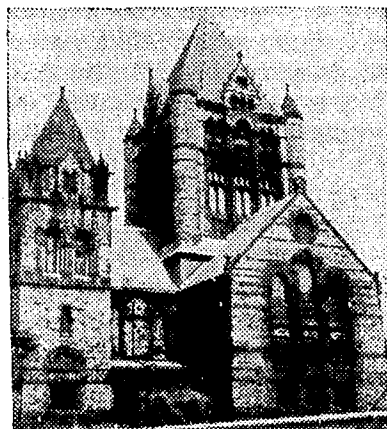
State House

and plan, from monumental stairs to dome, were copied all over the country, the imitators, confusing dignity with weight, often projected an image of overbearing bureaucracy rather than of easy strength.

Boston and the surrounding area are fortunate in their public buildings. Even the city of Cambridge has a delightful Romanesque City Hall dating from the Civil War area. Perhaps Henry Hobson Richardson was influenced by it as he attended Harvard.

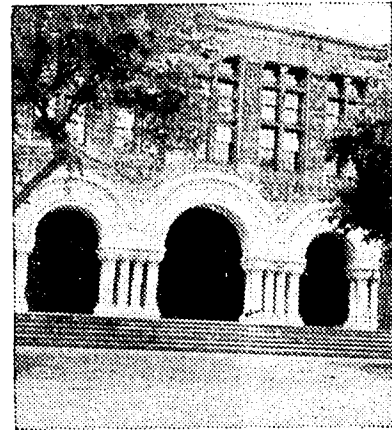
Mr. Richardson, born in the South, was intellectually attached to the Boston area. Although he left Harvard for the Beaux Arts in Paris and then architectural practice in New York he returned to settle permanently in Boston.

Beaux Arts graduates were trained in academic versions of Renaissance and Classical styles, yet in 1871 Richardson chose to do his first major structure, Boston's Trinity Church, in his own variation of Romanesque design. The original building was a study in masses with the structure



Trinity Church

clearly portraying the flow of forces into the earth. The details were simple and strengthened the smooth ashlar brownstone walls. The church has a powerful emotional effect which depends not on graceful Renaissance proportions of exterior



Entrance to Austin Hall

hand, the rather barren and weak space of the Seagrams' Plaza used somewhat presumptuously to set off the building. This has been done at the expense of the larger environment in which exists, Park Avenue.

The setting of Austin Hall (1885—Harvard Law School) did not demand the serenity of Sever Hall. This building has more of the easy power that characterized Richardson's smaller libraries. A tower bulges out of the front, like a music being flexed. Even the three massive entrance porches seem to strain under the weight from above.

Richardson was a reactionary in his use of structures and materials. Although his building help form the foundation of modern American architecture, copied would not be valid today. The Harvard of Richardson was part of old Cambridge and of old Boston. Mr. Richardson built important monuments of his time, but they can only assist in finding the solutions of our own age.

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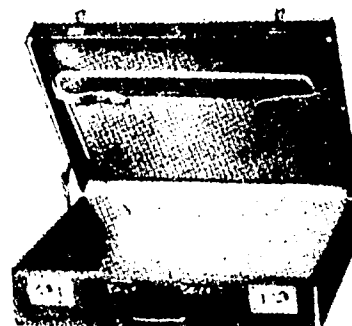
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Dean's List

A total of 147 City College students have been named to the Dean's List for second year honors, Dr. Buell G. Gallagher, president of the college, has announced.

The complete list:

BRONX

Marilyn R. Bell, Marvin Bishop, Ellen L. Block, Eileen W. Chale, Don Chodrow, Barbara Cohen, Gerald J. Cordani, John H. Denes, Irma V. V. Fishman, Helene S. Friedman, Abby M. Fuchs, Mark I. Felfand, Mark Gerhardt, Richard B. Goodman, Jordon H. Goodstein, Wallace R. Goodstein, Mona M. Green, Elizabeth Greifer, Guttman, Charles Herschkowitz, Kenneth S. Kamlet, Janet M. Kaplan, Kenneth Karger, Barry isloff, Steven Klansko, Barbara I. Kuksky, Rosalyn Kutcher, Steven F. Lawson, Joel T. Lester, Alan Levine, Robert Levine, Alan B. Lewis, Warren S. Liebesman, Roselyn S. Lowenbach, Judith Lynn, Martin Margulies, Brenda L. Marino, Norman Markowitz, Natalie J. Meltzer, Laura D. Millman, Albert Mizrahi, Craig M. Morris, Adam Naaman, Jerry A. Nathanson, Ann F. Novick, Leonard Oppenheimer, Heywood I. Paul, Alfred J. Pennisi, Stuart Rabinowitz, Alan I. Rapoport, Marlene, Richland, Phyllis R. Rosenblum, Richard J. Rosenbluth, Joan Rosenthal, Miriam Rotnemer, Melvin L. Sadownick, Barry M. Scher, David M. Schonfeld, Allan A. Schwartz, Lawrence M. Schwartz, Lloyd I. Sederer, Daniel Sheinbein, Robert C. Sohr, Edward E. Spiteri, Richard A. Strier, Arlene F. Targum, Evelyn R. Tepper, Miles M. Tepper, Michael L. Ticktin, Ramon Velez, Howard K. Welsh, Olivia Wilks, Barry Youngerman.

BROOKLYN

Susanne R. Augenfild, Joel Ettinger, Jerome Henkin, Gerald

Kaden, Paul Karoly, Abraham Kasdan, Jack Koplowitz, Amaranth F. Pavis, John E. Reiche, Harold S. Resnick, Steven H. Richman, Leo Rubin, Lawrence A. Ruth.

MANHATTAN

David M. Anchel, Samuel Z. Bavli, Stephanie Chanas, David Chmielnicki, Dennis A. Ehrich, Paul Elitzik, Lucy Elkes, Barry Freeman, Catherine Froloff, Debra Goldstein, Gale Griner, Miriam Hausman, *John I. Hochman, James B. Israel, Peter A. Jarvis, Mark L. Landis, Florence I. Ledwitz, George S. Leibson, Nora Levenstein, Randolph I. Marcus, Vicki L. Margulies, James F. McKillop, Rodger W. Nadelman, Maria T. Pallares, Ronald Mark Platzer, Vivian A. Plaut, Susan J. Rayfield, Sara Reguer, Caryl B. Reines, Iris A. Rifkin, Solomon Rosenberg, Marsha G. Rosenthal, Eileen Serlen, Judy C. Siegel, Elizabeth Simms, Sally J. Suskind, Susan F. Weisz, Donald Wexler, William J. Zide, Vicki M. Ziegler, *Solomon Honig.

QUEENS

Gerald Bergstrom, Robert Breiden, Ronald Cairo, Dennis J. Cirrone, Anthony D'Aquila, Lawrence Ernst, Victor Glasberg, Marilyn A. Kessler, Joel R. Klepper, Carole R. Klinger, Elizabeth A. Marecek, Elizabeth A. Marecek, Stanley L. Markowitz, Ethan S. Nebelkopf, Beatrice Perez, Roger Rearden, Louis Simchowicz, David J. Spiegel, Ronald P. Taylor.

STATEN ISLAND

Toll M. Daley, Lucien Dimino

Profiles...

(Continued from Page 2)

both his B.E.E. and M.E.E. from City College and is now studying for his doctorate. Mr. Nadan was a very active student during his undergraduate years at City College, holding the positions of Editor-in-Chief of TECH NEWS and President of IRE. Mr. Nadan finds both teaching and studying a challenge. He has worked as a research assistant but at present is not engaged in research work. However, not long ago he was engaged — and if you ask him, he may tell you about the charming young lady he married just five months ago.

Mr. Robert Smith earned his B.E.E. at City College and his M.E.E. at NYU. He plans to work toward a doctorate. He enjoys the academic atmosphere at City



Mr. Smith

College. Mr. Smith has worked in industry for two years. During his undergraduate years he was a member of Phi Epsilon Pi, Eta Kappa Nu, and Tau Beta Pi. He is single.

According to Professor Clemens, Chairman of the Electrical Engineering Department, the additions to the staff represent the normal increase for the beginning of a new school year. All but three of the new teachers are City College graduates.

Engineering Jobs...

(Continued from Page 5)

omy and satellite communication. A similar device, the laser, has several research, medical, and industrial applications.

Another field in which private industry is seeking engineers is technical writing. Technical writing can be classified as the writing of proposals, reports, design data, company and product brochures, sales literature, industrial advertising copy, trade publications, and handbooks and manuals.

Technical writing is unique in that the engineer prepares literature to describe equipment or present theory and concepts of systems whether they be in the concept state or the operational state. In contrast to the usual engineering work, the technical writer is not involved in design work and is therefore free of much engineering detail which is often tedious to the state of boredom. He is usually more active in conducting liaison and in meeting and dealing with other engineering and management personnel.

The cut in government defense projects could be advantageous to our new engineers. Jobs taken now can be expected to last quite a few years without the constant fear of a layoff which in the past resulted when large military contracts were suddenly cancelled.

With the change from military to commercial work, the engineering industry may finally be putting its feet on solid ground.

ELECTRICAL ENGINEERS

PHYSICISTS

MATHEMATICIANS

Technical representatives
of The MITRE Corporation
will be conducting interviews
on campus

November 23

MITRE is chief technical advisor and systems engineer to the Air Force Electronic Systems Division of the Air Force Systems Command. In this capacity, we design and develop such global, computer-based systems as the NORAD Combat Operations Center, Back-Up Interceptor Control System, and the Nuclear Detonation Detection and Reporting System. Other commitments: development of a future air traffic control system and supporting the Defense Communications Agency in the development of the National Military Command System.

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Requirements: M.S., or Ph.D. in these disciplines — electronics, physics, mathematics. MITRE is located in pleasant, suburban Boston and also has facilities in Washington, D. C. and Colorado Springs. If an interview will be inconvenient, inquiries may be directed in confidence to Vice President — Technical Operations, The MITRE Corporation, Box 208, Dept. TN, Bedford, Mass.

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