

Home Purchasing Incentives Needed

By ROBERT C. DIORIO
Staff Writer

An economist at the MIT-Harvard University Joint Center for Urban Studies has developed a home purchase incentive program which he says can produce 350,000 additional housing starts this year and generate thousands of work hours for the devastated construction industry—all for a one-time cost of under a billion dollars.

Dr. Kenneth Rosen's plan, based on his analysis of housing starts and the housing industry which was developed in his PhD thesis at

the Joint Center where he is currently a research associate, has been incorporated into a measure placed before the US Senate by Senator Edward W. Brooke, R-Mass., senior Republican on the housing subcommittee of the Senate Banking, Housing and Urban Affairs Committee.

The key to Dr. Rosen's proposal is the payment by the government of a \$1,000 incentive to the purchaser of an unsold, newly constructed house or to the purchaser of a new home started within the

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Patriots' Day

The Massachusetts Legislature last year passed an Act providing that—"Patriot's Day shall be celebrated as a legal holiday on April 19th, 20th and 21st in the year 1975."

John M. Wynne, vice president for administration and personnel has announced that Patriot's Day will be observed on Monday, April 21st for the purposes of Institute policies and collective bargaining provisions applying to holidays. Saturday, April 19th and Sunday, April 20th will not be recognized as holidays for these purposes.

NSF to Fund, Test Sewage Plant

Electron accelerators—first developed as tools to study the atom and later used in the treatment of cancer—may also turn out to be the most important new method of disinfecting municipal sewage developed in the last half century if scientific experiments planned at Boston's Deer Island succeed.

The Massachusetts Institute of Technology High Voltage Research Laboratory—a part of the MIT Department of Electrical Engineering and Computer Science—has just received a \$198,000 grant from the National Science Foundation's Research Applied to National Needs Program to build an experimental electron facility at the Metropolitan District Commission's Deer Island wastewater treatment plant near Winthrop in

Boston Harbor.

Using the facility, scientists from MIT will study the cost and effectiveness of rendering sewage sludge biologically safe, by irradiating it for a fraction of a second with high energy electrons—electrons accelerated almost to the speed of light.

Sludge is the solid matter that

makes up about one one-thousandth of the wastewater that flows through a sewage treatment plant. On an average dry day, about 300 million gallons of wastewater flow through the Deer Island plant, the largest of two sewage plants operated by the MDC. From this about 300,000

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Cell Biology is Topic At Center Dedication

By BARBARA BURKE
Staff Writer

A symposium on cell biology will mark the March 28 dedication of the Cell Culture Center at MIT.

The center, located in the recently-dedicated Seeley G. Mudd Building, 40 Ames St., was established and funded by the National Science Foundation to provide cells and viruses in mass quantities to researchers, primarily in New England.

Its official opening March 28 will be marked by a morning symposium and an afternoon open house. Interested scientists are welcome to attend.

The symposium, which will be held in Building 9, room 150, will highlight the goals of the National Science Foundation's Human Cell Biology Program. That program, under the direction of Dr. Herman Lewis, is a multidisciplinary effort to describe the structure and function of human cells.

The symposium will begin at 9am with welcoming remarks by Professor Walter A. Rosenblith, MIT Provost.

Dr. Theodore T. Puck, professor of biophysics and genetics and director of the Institute for Cancer Research at the University of Colorado, will speak on "Cells in Culture as a Research Tool."

Dr. Guido Guidotti, professor of biochemistry at Harvard University, will speak on "The Cell Surface."

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Services Planned For John Asinari

A funeral mass was to be held at 9am today (Wednesday) at St. James Church, Arlington, for John L. Asinari, 20, an MIT junior in biology and a resident of MacGregor House who died early Saturday at Boston City Hospital of injuries suffered when he and a companion were beaten, stabbed and shot by assailants in Boston.

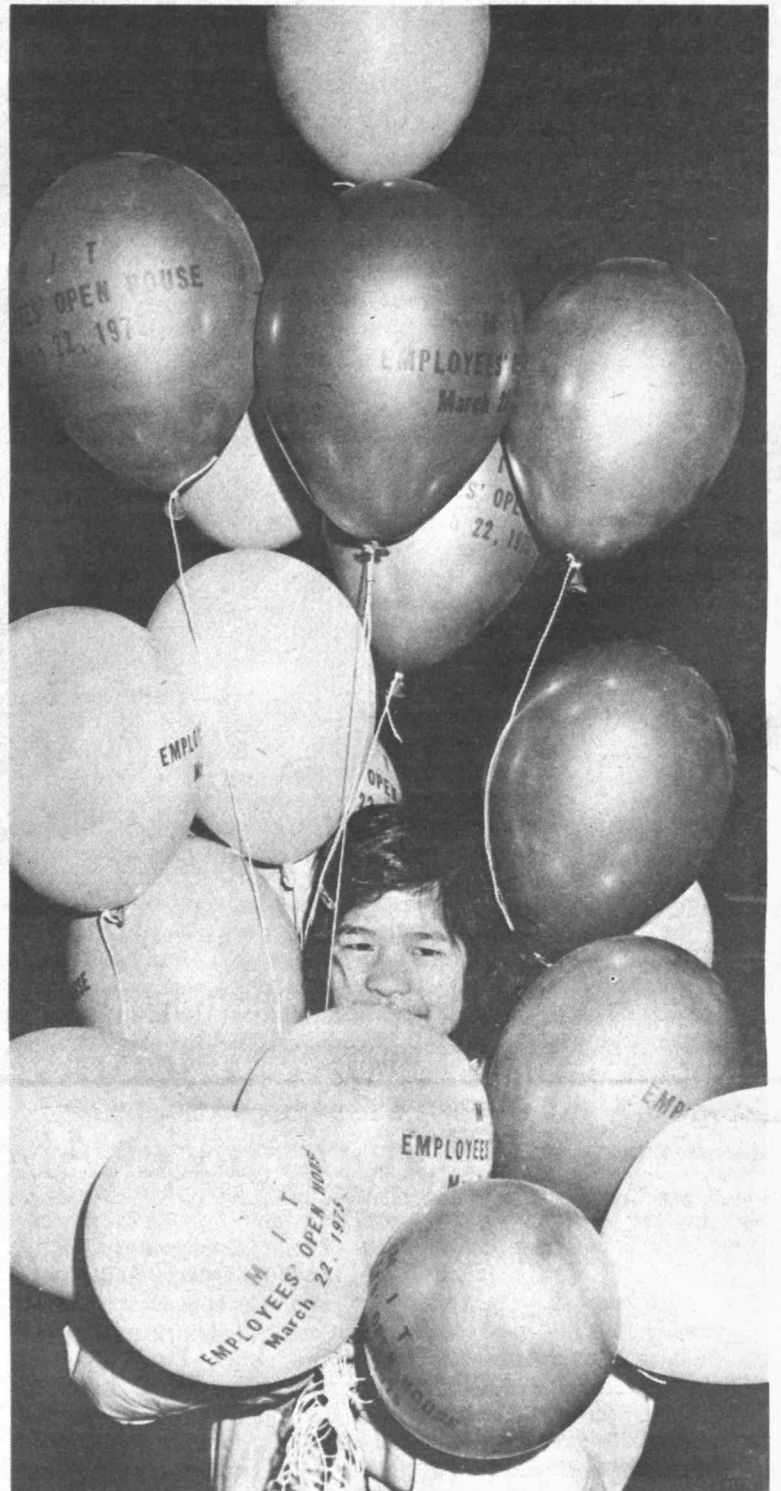
In addition, a memorial service will be held for Mr. Asinari at noon Wednesday, April 2, a week from today, in the MIT Chapel.

President Jerome B. Wiesner described the fatal attack as "a terrible tragedy, a senseless and

(Continued on page 8)

Special Faculty Meeting Apr. 2

A special meeting of the faculty will be held Wednesday, April 2, for a report and discussion of the master's degree program in nuclear engineering for Iranian students. The meeting will be held in Rm. 10-250 starting at 4:15 pm.



Patricia Eng, daughter of Dr. Richard Eng of Lincoln Group 82, captured the light-hearted spirit that pervaded MIT for its first Employees' Open House last Saturday, when thousands of faculty, staff and employees turned out with their families to explore the Institute. See story, other pictures on pages 4 and 5.

MIT Quarter Century Club To Induct 43 New Members

Some 40 veteran employees will be inducted into membership in the MIT Quarter Century Club at its annual spring banquet Wednesday, March 26 in Walker Memorial.

More than 350 working and retired members of the Club are ex-

pected at the dinner, which will be the first combined induction since the Silver Club merged with the Quarter Century Club last year.

Walter L. Milne, assistant to the Chairman of the Corporation and special assistant to the president

(Continued on page 3)

Colleges' Aid in Desegregation Plan Under Court Review

An unprecedented school desegregation plan calling for the involvement of MIT and 16 other colleges and universities in the education of Boston school children is under review this week in US District Court, Boston.

The comprehensive proposal, drafted by four court masters with the assistance of two deans from the Boston University School of Education, would require the City of Boston to enter into contracts with the colleges

and universities to achieve specific educational improvement goals.

For example, the masters suggest that MIT "would work intensively to redesign East Boston High School into the citywide East Boston Technical High School and with the Barnes Middle School, a new citywide magnet middle school."

MIT President Jerome B. Wiesner, who learned the substance of the masters' proposal

less than a week before the draft plan was filed with Judge W. Arthur Garrity, Jr., indicated in a letter to the masters MIT's desire to extend "vigorous cooperation." But he also informed the masters that there is need to establish "guidelines for developing constructive efforts and contractual relationships" that are mindful of "present capacities."

Dr. Wiesner, in a statement earlier this week, said no specific planning has as yet been started

at MIT pending the outcome of the court proceedings.

"If MIT eventually takes on contractual responsibility involving East Boston High School, or any other school, one of our first objectives will be to identify people within the faculty who may have, or wish to develop, professional interest in this area. At this point, however, there is not a great deal we can do, since the report of the masters is in draft form and has yet to be act-

ed upon by the court itself."

In his letter to the masters, which they made part of their draft report to the court, Dr. Wiesner wrote:

"MIT joins with the other institutions of higher education in the Boston area which have indicated their desire to be helpful in extending vigorous cooperation to assist the Boston Public Schools to improve the

(Continued on page 12)

Hayden to Host Tibetan Exhibit



"Hayagriva," a bronze sculpture 24 inches high from the Hartman Rare Art gallery, New York City, is among the objects to be shown in an exhibition entitled, "Visual Dharma: The Buddhist Art of Tibet," organized by the MIT Office of Exhibitions in collaboration with the Nalanda Foundation. The exhibition will be on view in Hayden Gallery April 5-May 7, 1975, with a public preview scheduled for 8-10pm April 4. Pre-publication copies of the exhibition catalogue, which will later be distributed by Random House, will be on sale in the gallery during the exhibition.

Guarneri to Perform under Abramowitz Aegis

The renowned Guarneri String Quartet, which has been called "the world's master of chamber music," will present a concert at 8pm Thursday, April 10, in Kresge Auditorium as the 1975 Abramowitz Memorial Lecture.

The quartet, which is marking its 10th anniversary season, will play a program of music by Mozart, Beethoven, and Mendelssohn. The concert will be free and no tickets are required.

The Abramowitz Lecture, sponsored by the Department of Humanities and made possible by a gift from William L. Abramowitz, '35, was established to bring distinguished leaders in the humanities to MIT.

For the concert, the Guarneri will play Mozart's Quartet No. 4 in C Major (K. 157), Beethoven's Quartet No. 12 in E Flat Major, and Mendelssohn's Quartet in A Minor. The MIT concert is one of more than 100 recitals scheduled by the quartet during the current season, including a tenth anniversary series of five concerts as part of the Great Performers Series of the Lincoln Center for the Performing Arts.

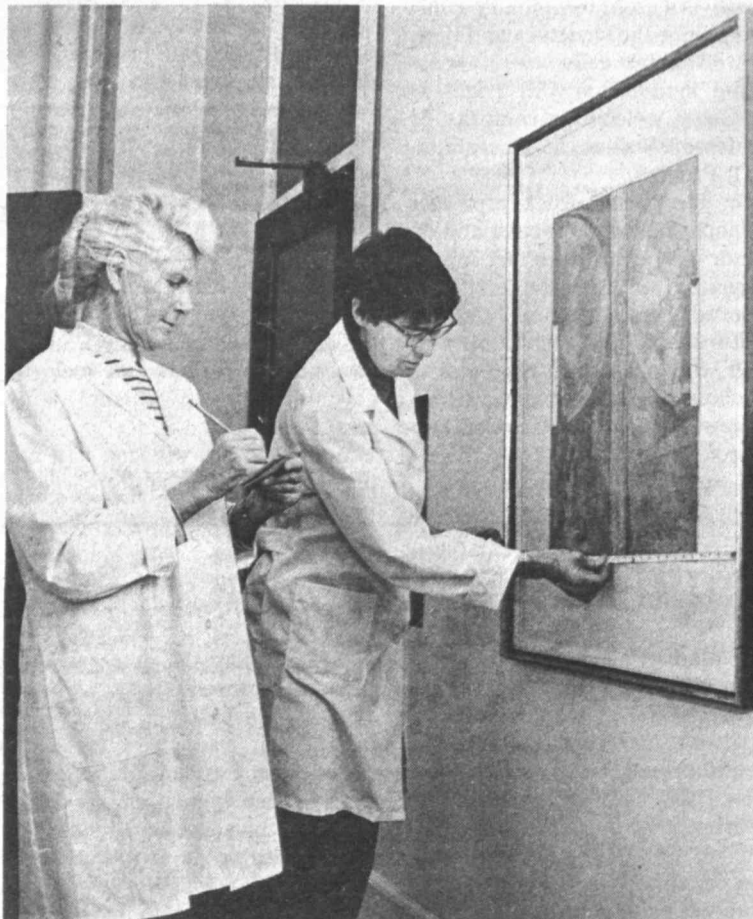
The Guarneri String Quartet was founded in 1965 at Vermont's Marlboro Music Festival by violinists Arnold Steinhardt and John Dalley, violist Michael Tree, and cellist David Soyer, who have remained together ever since.

Mr. Steinhardt was a winner of the Leventritt Competition and made his solo debut at the age of 14 with the Los Angeles Philharmonic. Mr. Dalley made his concert debut also at age 14, toured widely through Europe,

and later served on the faculty of the Oberlin Conservatory. Mr. Tree made a Carnegie Hall debut at 20 and solo appearances with major orchestras in Europe and America. Cellist David Soyer, after a solo debut at the age of 17 with the Philadelphia Orchestra, distinguished himself in chamber music with the Bach Aria Group

and other ensembles.

In a review of a Lincoln Center concert earlier this month, Charles Michener, writing in *Newsweek* magazine, called the Guarneri "possibly the most-listened-to string quartet in the world" and said "...as charismatic proponents of the cause, the Guarneri is peerless."



Mrs. Marianne Teuber, left, and Mrs. Lucy Martin are volunteers from the Office of Exhibitions who may be visiting you. They are part of a program to inventory and catalogue the MIT Art Collections. During the past quarter of a century, MIT has acquired more than 800 art objects which are distributed throughout the campus.

Team Plans Housing For Watershed Site

By SALLY M. HAMILTON
Staff Writer

Designs for construction of a low-density housing complex which would rely largely on solar-heating, are currently being developed by a team of MIT architects and students for a 70-acre site in the Pequannock watershed in rural New Jersey.

Located in a strategic water supply area, the Pequannock site is part of 35,000 acres in the watershed, owned by the city of Newark, 30 miles away, and constituting that city's major source of water.

The housing site is located in an area Newark leaders are also considering for recreational and conservation uses. The MIT team will work closely with the Newark Watershed Conservation and Development Corporation (NWDC) which administers the area and commissioned the project.

Funded by an Albert Farwell Bemis grant from the MIT Laboratory of Architecture and Planning, the project will also enhance curriculum development in the area of land planning and energy use.

"Climate-sensitive site planning" and "housing that works with nature" are two phrases the MIT team members use to describe their design approaches for preventing damage to the watershed's ecology and maximizing the use of solar energy.

According to Tunney Lee, associate professor of urban design and a team member, these methods resemble principles once used by farmers and primitive architects who would position their buildings in such a way that they could maximize heat from sunlight and at the same time deflect winds.

"Like those farmers, we have made careful site measurements collecting data on topography, vegetation, geology, climate, water-table, sun-position and prevailing winds," he said.

"These measurements were taken by students and faculty who visited the area in January during IAP. We have collated these factors to locate a building site within the lee of a mountain, with minimal wind chill force and optimum sunlight, and where we will have least effect on the area's ecology," according to Richard Britain, assistant professor of architecture and a project leader.

Professor Lee said, "As we proceed we will also determine a level at which solar technologies, such as solar collectors, would further complement our needs."

The project will also include a study for the NWDC of solar energy heating costs for the "life-cycle" of the building units. The study is expected to chart the contrasts between the initial high cost of construction with a multi-factor projection of long term savings the solar heated buildings will produce.

Design and planning for the building units, to house approximately 1,000 people, is being carried out by faculty members Richard Britain, Tunney Lee, R.T. Schnadelbach, visiting associate professor in urban planning, and Day Charoudhi, lecturer and research affiliate in the Department of Architecture's Solar Energy Laboratory. They are assisted by Lawrence L. Goldblatt, a former graduate student in urban studies, Lisa L. Hescong, a graduate student from Cambridge, and MIT undergraduates Charles E.

McGinn, a senior in architecture from Lafayette, La., Carol Mancke, a senior in urban studies from Bethlehem, Pa., and Wendy C. Irving, a sophomore in architecture from Eliot, Me.

"Designing safeguards for the area's water supply has been an over-riding consideration in this project. That means building countermeasures to the pollution from storm and surface water runoff," Professor Schnadelbach said.

"One approach to the problem may entail a system that would inject the run-off back into the soil for purification. Several other ideas such as banning cars in the housing vicinity, careful clearing of the site and strict street development controls, with paved surfaces kept to a minimum, would substantially reduce the amount of pollution," he said.

The team is currently drafting a map of these engineering alternatives and design factors to interpret their effects on the land's development. Later they will formulate construction models for testing in the watershed.

The team is expected to complete a design model by June, on which they will base a proposal for funding from the US Department of Housing and Urban Development and the Environmental Protection Agency for a pilot development project in the watershed.

Echoes

March 23-29

50 Years Ago

In a controversial ruling, the Institute Committee voted to replace "The Stein Song" with "The Courts of MIT" as Technology's Alma Mater.

The Aeronautical Society announced plans to build a light plane to enter in the national races in Dayton, Ohio.

40 Years Ago

Prof. Harold L. Hazen, Electrical Engineering, was awarded the Levy gold medal by the Franklin Institute for his work in servomechanisms.

W. Starling Burgess, designer of the Enterprise and Rainbow, both successful defenders of America's cup, spoke on sailing yacht design.

25 Years Ago

Technology Review reported techniques for detecting cancer cells by searching body fluids (developed by Dr. Bert L. Vallee of MIT and Don W. Fawcett of Harvard).

Leslie R. Groves, '17, discussed "Military Aspects of Atomic Energy" at a Newark, N.J. Atomic Energy Week program.

(Prepared by Ethel Newell of the MIT Historical Collections, x4444)

TECH TALK

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MIT Quarter Century Club To Induct 43 New Members

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for urban relations, will be master of ceremonies. Participating in the induction ceremony will be Jeri Whitman of Draper, president of the Club, Robert C. Radocchia of Walker, chairman of the Club's board, and John M. Wynne, MIT vice president for administration and personnel.

Following the induction, there will be a special presentation to Howard W. Johnson, chairman of the MIT Corporation, making him an honorary member of the Club.

The new members are:

Hugo R. Barra of Quincy, machinist in the Department of Mechanical Engineering.

Edgar H. Bartlett of West Medway, animal caretaker in the Environmental Medical Service.

John K. Bergerson of Marblehead, accounting clerk in the Comptroller's Payroll Office.

Philip N. Bowditch of Cohasset, lecturer in the Department of Aeronautics and Astronautics.

Dorothy L. Bowe of Arlington, associate director of the Student Financial Aid Office.

William F. Brace of Cambridge, Professor of Political Science.

Ciriaco A. Dattoli of Winthrop, a member of Lincoln Laboratory Group 12.

Stephen H. Dodd, Jr., of Reading, Division 3 head at Lincoln Laboratory.

Kenneth Fertig of Sudbury, Draper Laboratory Chief scientist.

Richard G. Haltmaier of North Andover, a member of the analog electronics group at the Draper Laboratory.

Clair S. Hendryx of Lynnfield, senior electronic technician in the Department of Earth and Planetary Sciences.

Forrest E. Houston of Westwood, a member of the Navy staff at the Draper Laboratory.

Nancy J. Hutchison of Cambridge, technical assistant in the Department of Biology.

Ernest P. Johnson of Wollaston, engineering assistant in the Draper Laboratory Mechanical Design and Fabrication Division.

Leon R. Jones, Jr., of Reading, technician in the Department of Materials Science and Engineering.

Janis A. Kalnajs of Newton Centre, research physical chemist in the Department of Electrical Engineering.

Richard V. Keyes, Jr., of Newton Lower Falls, DSR staff member in the Research Laboratory of Electronics.

George F. Koster of Brookline, Professor of Physics.

William Krag of Lexington, member of Lincoln Laboratory Group 96.

Mathias J. Leupold of Wayland, DSR staff member at the Francis Bitter National Magnet Laboratory.

Joseph F. Lynch of Mattapan, assistant director of Campus Housing Management.

James W. Mar of Lincoln, Professor of Aeronautics and Astronautics.

Frank A. McClintock of Concord, Professor of Mechanical Engineering.

Winifred T. McDonough of Cambridge, assistant recording secretary in the Office of the Treasurer.

Edward J. Medeiros of Arlington, Draper Laboratory Physical Plant Office.

Stanley Mitchell of South Boston, technical instructor in the Department of Chemical Engineering.

Alice E. Moriarty of Chestnut Hill, secretary to the Dean of the Sloan School of Management.

Mary L. Morrissey of Cambridge, director of the Information Center.

James H. Peers of Malden, a member of Lincoln Laboratory Group 51.

Dean A. Powers of Concord, facilities officer for the Department of Electrical Engineering.

Wilfred H. Powers, Jr., of Bedford, a member of Lincoln Laboratory Group 72.

George W. Pratt, Jr., of Wayland, Professor

of Electrical Engineering.

Joseph A. Principe of Jamaica Plain, supervisor of Walker Memorial Dining Service.

Edward D. Ralowicz of Chelmsford, a member of Lincoln Laboratory Group 76.

Frederick Sanders of Marblehead, Professor of Meteorology.

Joseph Sheff of Dorchester, photographer at Graphic Arts.

Eugene Skolnikoff of Lexington, Professor of Political Science and director of the Center for International Studies.

Clare F. Smith of Abington, secretary in the Research Laboratory of Electronics.

William A. Stameris of Needham, a member of the Draper Laboratory Programs staff.

Matthew H. Sullivan of Lexington, a member of Lincoln Laboratory Group 12.

Kenneth L. Thompson of Bedford, drafting supervisor in Physical Plant.

Felix M. H. Villars of Belmont, Professor of Physics.

Lydia E. White of Waltham, assistant administrative officer in the Center for Materials Science and Engineering.

Cell Center Dedication

(Continued from page 1)

Joel A. Huberman, associate professor of biology, will speak on "Chromosome Structure and Function," while Dr. Harvey F. Lodish, also associate professor of biology, will speak on "Cell Regulation."

An open house will be held in the Cell Culture Center from 3 to 5pm. Refreshments will be served.

The Cell Culture Center, which operates under the direction of Dr. P.W. Robbins, Department Head, and Mr. Donald J. Giard, Director, was established in 1974. Its primary function is to provide cells and viruses in large quantities to researchers whose laboratories lack the expensive equipment necessary to produce hundreds of grams—even several kilograms—of cells and viruses.

Cells and viruses are now produced at the Center in several ways. Cells that grow as monolayers on a surface are grown in roller bottles and other vessels in large walk-in incubators. Cells that grow in suspension are grown in spinner culture flasks. Large quantities of virus, propagated in a variety of cell lines, are concentrated and purified by continuous flow centrifugation. Researchers at the Center are working to improve these methods, and to develop new ones.

Applications for cells and viruses are screened by a committee of professors from MIT and other universities. Special consideration is given to requests from young investigators with limited resources. At present there is no charge for the service. Among the groups that have used it is the MIT Center for Cancer Research, which is also located in the Seeley G. Mudd Building.

The Winner!



Heidi Hoekzema, a secretary in the Medical Department jumps for joy upon learning she was the winner of THE TRIP, the lottery run by the Quarter Century Club to benefit the Community Service Fund. Ms. Hoekzema and her husband plan to visit Japan. Second lottery winner was Helen Beers, a secretary in biology, who will be off to Spain in May. THE TRIP raised \$1,828 for the Community Service Fund, which will realize nearly \$1,750 after state lottery taxes are paid. Meanwhile, John Ribiero of Graphic Arts submitted the winning phrase in the Community Service Fund motto contest. His winning entry was: "By caring, through sharing, the Community Service Fund provides living proof that something can be done."

Attended Bike Parking Opens

Attended bicycle parking will begin for the spring at 7:45am, Monday, March 31, at the bicycle shelter between Buildings 11 and 13, the Campus Patrol has announced.

An attendant will be on duty at the shelter Monday through Friday from 7:45am to 5:45pm. Bicycles will be tagged with numbers and the owners given a matching number which must be presented in order to reclaim the bike.

The shelter is open year-round, but is attended only during periods of high bicycle use. According to Campus Patrol, the facility is one of the safest places on campus to park bicycles.

Dr. Phyllis Wallace Joins Sloan

Dr. Phyllis A. Wallace, an economist noted for her research and teaching in the field of manpower and equal employment policies has been appointed to the rank of professor at MIT's Sloan School of Management.

She is the first woman to hold that faculty position at the Sloan School. The appointment was announced by Dr. William F. Pounds, Dean of the Sloan School.

Dr. Wallace, who has been a visiting professor at the Sloan School since 1973 had previously served as Deputy Director of Research for the US Equal Employment Opportunity Commission during 1966-69 and as Vice President for Research at the Metropolitan Applied Research Center in New York, 1969-1972.

Prior to that time she was a senior economist with the US government specializing in international economic affairs. Professor Wallace has also taught at City College of New York and Atlanta University in Atlanta, Ga.

Dr. Wallace received her BA degree magna cum laude from New York University and her MA and PhD in economics from Yale University. She is a member of Phi Beta Kappa.

At the present time, Dr. Wallace is a member of the National Manpower Policy Task Force, the American Economic Association's Committee on the Status of Women in the Economic Profession, and a board member of the Manpower Demonstration Research Corporation in New York City. She also serves on advisory committees of the National Bureau of Economic Research, the US Bureau of the Census, and the



Professor Wallace

National Academy of Sciences. In addition she has been a consultant to industry.

From 1971 to 1973 Dr. Wallace chaired the Advisory Panel to the Equal Employment Opportunity Commission in connection with its investigation of employment practices of the American Telephone and Telegraph Co. In 1974 Professor Wallace received a grant from the National Science Foundation to conduct three research workshops at MIT.

Her publications include: "Sex Discrimination: Some Societal Constraints on Upward Mobility for Women Executives" (John Hopkins University Press, 1973); *Pathways To Work: Unemployment Among Black Teenage Females* (Lexington Books, D.C. Heath, 1974); "Educational Change: Implications for Measurement" (Educational Testing Service, 1972); "Testing of Minority Applicants for Employment" (US Government Printing Office, 1970) and *New Perspectives On Equal Employment Opportunity* (MIT Press, 1975).

Dr. Wallace lives in Boston.

Mime Troupe To Perform

The National Mime Theatre is funded in part by the Massachusetts Council on the Arts and Humanities and its performances at MIT are sponsored by the MIT Department of Humanities.

Tickets for the concerts are \$4 for general admission and \$3 for students with identification.

A series of three performances by Kenyon Martin and the National Mime Theatre of Boston will take place in Kresge's Little Theatre at 8pm, Friday, Saturday and Sunday, March 28-30.

The company will present a two-part program featuring "Beyond Words"—an hour of classical mime vignettes, written and performed by Mr. Martin, followed by "Unnatural Acts, a clown show," a

series of tragi-comic situations based on the character of the clown.

Organized in 1966, the National Mime Theatre is well known in and around the Boston area and gained notice last summer for its performing series at Lesley College.

Ensemble members include Trent Arterberry, Cindy Benson, Stephan Driscoll, Drucilla Markle and Kenyon Martin, the company's artistic director.

Martin, a well-known figure in American mime, has studied mime under the European masters Le Coq and Marcel Marceau. He has performed widely in the US and in Europe and taught at various Boston area colleges.

Five Are Appointed as Visiting Professors Here

Three full professors and two associate professors have recently been appointed to MIT's visiting faculty.

Mervyn S. Paterson, Reader in the Research School of Earth Sciences at the Australian National University in Canberra, has been appointed visiting professor of earth and planetary sciences. A graduate of Adelaide University (SB '45) and Cambridge University (PhD '49, ScD '68), Professor Paterson is credited with leading the way in research on simultaneous high pressure-high temperature apparatus to study the deformation of rocks.

He is a former Angas Engineering Scholar and Overseas Fellow at Churchill College in Cambridge. From 1945-53 he worked as an assistant research officer at Aeronautical Research Labs in Melbourne. He began his affiliation with the Australian National University as senior research fellow in 1953 and went on to become

Reader in what was then the Department of Geophysics in 1956.

A pioneer in research on quasi-plastic and quasi-brittle deformation of rocks, Professor Paterson is devoting much of his stay at MIT to writing a monograph on the subject. Professor Paterson, who will be joined here by his wife shortly, is the father of a college-age son, and a daughter, Elizabeth, who is visiting several courses at MIT during his father's stay.

Karl G. Jugenfelt of the Stockholm School of Economics, where he has been a professor since 1971, has been appointed visiting professor in the Department of Economics. From 1966-71 he was a member of the faculty at the University of Stockholm and prior to that, worked for the Industrial Institute for Economic Research in Stockholm.

Professor Jugenfelt holds a master of social science degree ('56) and a PhD ('61) from the University of Uppsala, as well as a

Swedish doctor's degree in economics ('66). At present, he sits on two public committees in Sweden as a consultant on forestry policy and structure and change in the printing industry. While at MIT his main field of research is changes in productivity and profits over the lifespan of technology.

James M. Douglas, on leave from the University of Massachusetts, has been appointed visiting professor of chemical engineering at MIT. A native of Aurora, Ill., Professor Douglas has also been a member of the chemical engineering faculties at the University of Delaware and the University of Rochester.

He graduated from Johns Hopkins University with a BE degree in 1954 and from the University of Delaware, where he received a PhD in 1960. His postdoctoral research at the Imperial College of Science and Technology in London encompassed the fields of process dynamics and control, reactor design, and optimization. Professor

Douglas is married, with two children.

Appointed to the rank of visiting associate professor are Ian Lerche in the Department of Physics, and William W. Roberts, Jr., in the Department of Mathematics.

Professor Lerche, an associate professor at the University of Chicago since 1968, is a graduate of the University of Manchester (Bsc, '62; PhD '65). He joined the teaching staff of the University of Chicago in 1965 as research associate and was appointed assistant professor in 1966. From 1968-70 he was an Alfred P. Sloan Research Fellow.

Professor Lerche is a Fellow of the Royal Astronomical Society and a member of the American Astronomical Society and American Geophysical Union. He and his wife Kathleen are the parents of four daughters.

Professor Roberts has returned temporarily to MIT after a six-year affiliation with the faculty of

the University of Virginia, where he has been associate professor for the past year. His stay at MIT represents the completion of a sabbatical that took him to the Kapteyn Astronomical Institute in the Netherlands, where he was visiting scientist, the Institut des Hautes Etudes Scientifiques in Paris, and Stockholm's Observatory, where his title was NORDITA visiting professor.

A native of Huntington, West Virginia, Professor Roberts received the SB and PhD degrees from MIT in 1964 and 1969 respectively. He lists among his current research interests fluid mechanics, shock waves, the structure and dynamics of galaxies, star formation and mathematical applications to the societal problems of population growth and environment. Professor Roberts is married and has two children.



The Office of the Dean for Student Affairs was well represented at employees' open house by Assistant Dean Ken Browning, his wife Jane, and Jennifer and Craig, who came in from Winchester "primarily for the MIT Model Railroad." After refreshments in the Sala, they finished off the day with a visit to Dad's office in 7-133.

1975 Employees' Open House



Jeff Murley, 10, who accompanied his father Melvin, a member of the administrative staff at the Draper Lab, rides a "mini-miser" electric cart, used by night machine operators Hank Sherman and Joseph Clark to remove rubbish from MIT's main corridors and transport it to a compacter in Building 12. Mr. Sherman was last year's winner of the Community Service Fund's trip to Brazil.



Wally Wedlock, son of Dr. Bruce D. Wedlock, director of the Lowell Institute School, smooths the sand mold from which he later cast an Abraham Lincoln's head plaque in the MIT foundry exhibit. He

was given instruction by Wellesley student Elaine Lewis and Dave Sieverding, a senior in mechanical engineering, who gave up their first day of spring vacation to help out at Employees' Open House.

Are MIT employees interested in MIT? The answer is a resounding yes, if attendance at the first Employees' Open House is any indication.

More than 5,000 people braved a grey and sprinkly Saturday to come to the Institute and explore what goes on here.

Among them was George F. Dalrymple of the Sensory Aids Center in mechanical engineering, who brought his family. It was a very special occasion for him because his son, David S., had just received acceptance to MIT and became the first member of the

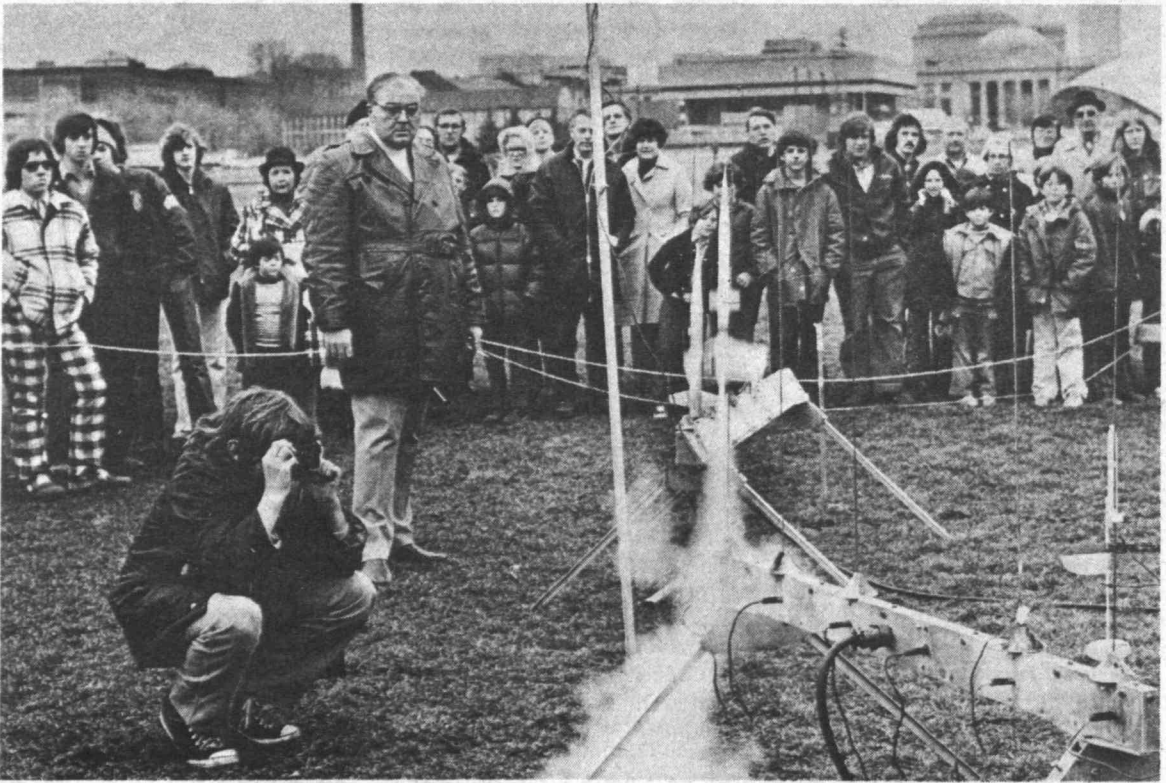
Class of 1979 to sign up.

Another father-and-son team that contributed to the success of the day was Edwin Backman, foreman in the Department of Materials Science and Engineering with more than 20 years' service at MIT, and Danny Backman of Cambridge, who will receive his doctorate in that department this June. They supervised the casting of more than 400 souvenir medallions, face masks, and Abraham Lincoln plaques in MIT's foundry shop in 8-404.

Professor Mark S. Wrighton, assailed by crowds that over-

flowed Room 9-150, was forced to give a second performance of his "Ultimate Magic Show—Chemistry in Action" for those who were turned away from the 12:30 scheduled display. Capacity audiences of 250-300 persons made both shows two of the most popular exhibits of the day.

At the demonstration of "Invisible Forces in Nature" in 26-100, eminent MIT Professor Victor F. Weisskopf chided his audience for "bringing too much moisture into the room" when an attempt to create static electricity faltered slightly before more than 550



Waiting, as if for some Jovian figure to descend from above, MIT Employees' Day visitors are actually anticipating the launching of the MIT Rocket Soci-

ety's fleet of Saturn rockets and radio-controlled gliders in Briggs Field.





They wrung their hands in frantic anticipation as Professor Mark Wrighton carried his "Ultimate Magic Show" to extraordinary lengths in Rm. 9-150. But when he withdrew his head from the plastic bag

and began to talk "like Donald Duck," in the words of one pint-size future scientist, everyone grew more comfortable with the experiment to illustrate the effects of helium and oxygen on human vocal cords.

Photos by Calvin Campbell

politely perspiring MIT employees.

Professor Weisskopf shared the podium with Professor Michael Feld, whose sons Jonathan and David demonstrated extraordinary courage by stepping into a transparent non-conducting cage and touching the sides as their father tried to "charge" them with a Van de Graaf generator.

First-hand participation was never far beyond the reach of MIT children who wanted to pilot a simulated Concorde, or conduct a train at the MIT Model Railroad, or record their voice on tapes pro-

vided by WTBS, MIT's student-run radio station.

Remembering the experiments they had seen during the day, MIT sons and daughters competed for parental attention on the way home. The feeling, in the words of one father, "was one I'd like to try to re-create every Saturday."

The success of the day, in the estimation of one Employees' Day Committee member was "indisputable." Two thousand balloons, 500 dozen cookies, 125 dozen ice cream novelties, and 50 gallons of fruit punch later, everyone agreed that being there was twice the fun.



After all that technical brainstorming at MIT Computer Facilities and the laser holography exhibit, Karen White, 9, concentrates freely on her swimming with her father Thomas J. White, Jr., a technical instructor at MIT.



Dr. Richard diFilippi, SM '59, ScD '62, seen here observing the double drop "hydraulic happiness machine" in Dr. Harold E. Edgerton's stroboscopic photography lab, learned about MIT Employees' Day from his son Christopher (far right), who got the word from Professor Michael Modell of the

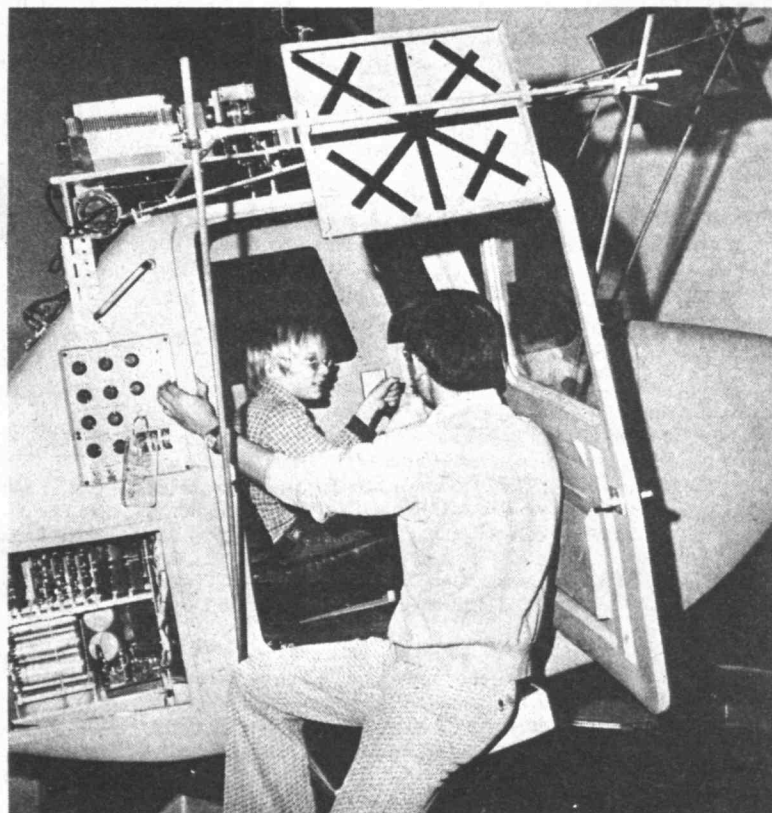
Department of Chemical Engineering—Chris's private teacher of FORTRAN. "It's something he always wanted to learn," said his father, a staff member at Arthur D. Little. Mrs. diFilippi and Roland, 10, are in the foreground.



"It's not every day that you can see a demonstration of electricity by MIT Institute Professor Emeritus Victor F. Weisskopf," thought Chris Morrison, 13, of Maynard, Mass., when he excused himself from his regular Saturday morning High School Studies Program class at MIT and became a participant in this demonstration of a dry-cell battery motor.



In the car on the way home to Newton, Lisa Weiss couldn't stop talking about "The Invisible Forces of Nature" exhibit to her father, Professor Thomas F. Weiss of the Department of Electrical Engineering. She saw Professors Weisskopf and Feld create electricity with everything from pieces of silk and glass tubing to a volt Van de Graaf generator.



Brad Goodwin, 12, makes technology perform for him in the cockpit of MIT's Concorde simulator. When he said good-bye to the MIT grad student who had invited him to Employees' Day, he was heard to say, "Maybe I'll be in the Tech Talk next week."

THE INSTITUTE CALENDAR

March 26
through
April 6

Events of Special Interest

Transportable Solar Laboratory* - Sponsored by the Energy Research & Development Administration and Honeywell, Inc. The exhibit will be in the back of Kresge parking lot Sat, Mar 22-Mon, Apr 21. Hours: 11am-2pm, Mon-Fri; 11am-4pm, weekends.

Quarter Century Club Annual Banquet - Members and their guests are invited to the banquet, at which new and honorary members, including Corporation Chairman Howard W. Johnson, will be inducted. **Walter Milne**, Assistant to the Chairman of the Corporation and Special Assistant to the President and Chancellor for Urban Relations and **John Wynne**, Vice President for Administration and Personnel, will take part in the program. Wed, Mar 26, 5:30pm, Walker Memorial Morss Hall.

Cell Culture Center Symposium* - Marking the official opening of the Center and highlighting the goals of the NSF's Human Biology Program. Fri, Mar 28, Rm 9-150. Opening remarks by Provost **Walter A. Rosenblith**, 9am; Cells in Culture as a Research Tool - **Theodore T. Puck**, University of Colorado, 9:15am; The Cell Surface - **Guido Guidotti**, Harvard, 9:45am; Chromosome Structure and Function - **Joel A. Huberman**, biology, 10:45am; Cell Regulation - **Harvey F. Lodish**, biology, 11:30am. Open House in Cell Culture Center, Bldg E17, 3-5pm. Refreshments.

Corporation Joint Advisory Committee (CJAC)* - Meeting to discuss student housing with Vice President Kenneth R. Wadleigh. Mon, Mar 31, 7:30pm, Rm 10-105.

Seminars and Lectures

Friday, March 28

Non-Linear Landau Damping of Broadband Spectrum of Electron Plasma Waves* - G. Matthieusent, University of Paris. Francis Bitter National Magnet Lab & RLE Plasma Dynamics Seminar. 4pm, Rm 36-261. Refreshments.

Monday, March 31

Energy Requirements of Materials Production* - John G. Myers, The Conference Board, New York City. Materials Science & Engineering and Center for Policy Alternatives, Materials Policy Seminar. 4pm, Rm 9-150.

The Mathematical Approaches Towards Measuring the Effects of Pollution on Aquatic Communities* - Ruth Patrick, chief curator of limnology, Academy of Natural Sciences, Phila, Pa. Civil Engineering & Parsons Laboratory, Water Resources & Hydrodynamics Seminar. 4pm, Rm 6-120. Coffee 3:45pm, Rm 48-410.

A Sequential Model for A Clinical Trial* - A. John Petkau, mathematics. Applied Mathematics Seminar. 4pm, Rm 2-338. Coffee 3:30pm, Rm 2-349.

Moving Loads on Elastic Beams and Strips with One-Sided Constraints* - George G. Adams, University of California at Berkeley. Applied Mechanics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

A Krohn-Rhodes Theory for Differentiable Systems* - Arthur J. Krener, mathematics, University of California at Davis; currently Division of Engineering & Applied Physics, Harvard. Electrical Engineering & Computer Sciences, Decision & Control Group Seminar. 4pm, Rm 39-500.

Tuesday, April 1

A System for the Selection and Review of Research Projects with a Large Corporation** - R. Grekila, Westinghouse Research & Development. Materials Science & Engineering, Ceramic and Glass Seminar. 9am, Rm 16-310.

Why the Arts at MIT?*** - Roy Lamson, Class of 1922 Professor of Literature, Emeritus; Special Assistant to the President for the Arts. Technology Matrons Seminar. 10am, Rm 10-105. Lunch (members only) 12n, Rm 10-340; cost \$2.25. Info, x3-3656.

Aero/Astro General Seminar* - Speaker to be announced. 4pm, Rm 35-225. Coffee 3:30pm, Rm 33-222.

Fourth Session on the Problems of New Technologies of the Special Series on How the Federal Policy and Regulation Process Works* - Henry Goldberg, general counsel, Office of Telecommunication Policy; Roland S. Homet, Chief Office of Studies & Analysis, OTP; Bowman Cutter, executive director, Cable Television Information Center. Communications Policy Seminar Series. 4pm, Rm 9-450.

The Myths of Power* - Lewis Mumford, Charles Abrams Visiting Professor of Urban Studies. Technology & Culture Seminar. 4pm, Rm 9-150.

Some Challenging Problems in Production Planning/Inventory Control* - Edward A. Silver, management sciences, University of Waterloo, Ontario, Canada. Operations Research Center Seminar. 4pm, Rm 24-121. Refreshments following, Rm 24-223.

A Continuously Variable Transmission and its Effect on Automobile Performance - Peter Huntley, vice president, Orshansky Transmission Company. Mechanical Engineering Seminar. 4pm, Rm 3-343.

Evolution of Impact-Produced Regoliths in the Solar System* - John B. Adams, earth & planetary sciences; West Indies Laboratory, Fairleigh Dickinson University. Earth & Planetary Sciences

Colloquium. 4pm, Rm 54-100. Tea 3:30pm, Rm 54-923.

Studies on Ribonucleoprotein - Dr. Thoru Pederson, Worcester Foundation for Experimental Biology. Biology Colloquium. 4:30pm, Rm 6-120. Coffee 4pm, Bldg 56, 5th fl vestibule.

The Luther Puzzle* - William Johnson, Brandeis. Humanities Crossroads Lecture. 4:30pm, Rm 4-145.

Wednesday, April 2

Externally Induced Strong Turbulence* - Ady Hershcovitch, G. Nuclear Engineering Doctoral Seminar. 3pm, Rm 38-136.

Analysis of Xe Oscillation Problem Using Synthesis* - Antonio Barroso, G. Nuclear Engineering Doctoral Seminar. 3pm, Rm NW12-222.

Greece* - Dirk J. Struik, mathematics, emeritus. Concourse Forum and Department of Mathematics, History of Mathematics Lecture. 3:30-5pm, Rm 10-105.

The Middle East at the Crossroads* - Nadav Safran, Harvard Center for Middle Eastern Studies. MIT-Harvard Arms Control Seminar. 4-6pm, Faculty Club Penthouse.

The Crystal: A Solvent* - Hermann Schmalzried, Technical University, Clausthal, Germany. Materials Science & Engineering, Robert S. William Lecture. 4pm, Rm 26-100.

Fuel Integrity Aspects of Fuel Management* - S. Schultz, G. Nuclear Engineering Doctoral Seminar. 4pm, Rm NW12-222.

Principles of Strobe Photography* - Harold E. Edgerton, Institute Professor and Professor of Electrical Measurements, Emeritus. Student Art Association, Photography Section Seminar. 7:30pm, Rm 4-402.

Thursday, April 3

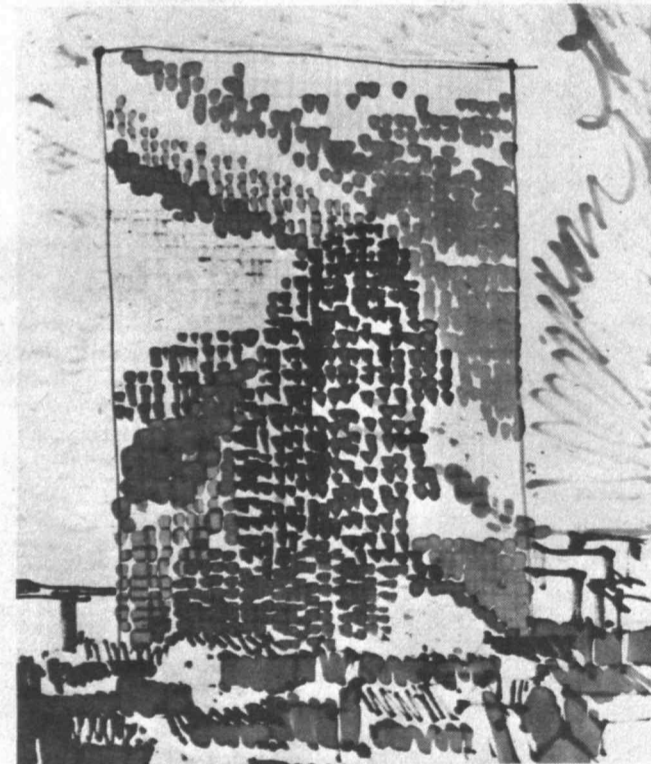
The Crystal: A Reaction Medium* - Hermann Schmalzried, Technical University, Clausthal, Germany. Materials Science & Engineering, Robert S. Williams Lecture. 4pm, Rm 9-150.

Effects of Stratification and Flow Round Obstacles on Turbulent Diffusions* - J.C.R. Hunt, mathematics & theoretical physics, Cambridge University, England. Civil Engineering & Parsons Laboratory, Water Resources & Hydrodynamics Seminar. 4pm, Rm 48-316. Coffee 3:45pm, Rm 48-410.

Hearing and the Proposed Federal Regulations on Noise Exposure* - Alan Cudworth, Liberty Mutual Insurance Co. Mechanical Engineering Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Bacterial Toxins* - Charles S. Duncan, bacteriology, Food Research Institute of the Department of Bacteriology, University of Wisconsin, Madison. Nutrition & Food Science Seminar. 4:15pm, Rm 54-100. Coffee 4pm.

The 3rd Cosmic Radiation* - Dirk Muehlner, physics. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments 3:45pm, Rm 26-110.



An Indian appears silhouetted in Otto Piene's proposal drawing "Reflections on John Hancock," included in Institute of Contemporary Art's current exhibition of work by members of the Center for Advanced Visual Study. The exhibition, "Boston Celebrations Part I," will remain on view through April 29 at the ICA in Boston.

Friday, April 4

Part I: The Molecular Thermodynamics of Chemical Reactions; Part II: The Structure and Properties of Reaction Transition States from High Pressure Kinetics* - C.A. Eckert, visiting professor from University of Illinois. Chemical Engineering Seminars. Part I: 9am, Rm 12-142. Part II: 11am, Rm 12-182.

Cell Free Synthesis of Adenosine Triphosphate (ATP)* - G. Adelsteinsson, G. Chemical Engineering Doctoral Seminar. 2pm, Rm 10-105.

Heparinizing Polymeric Surfaces as Non-Thrombogenic Biomaterials* - A. Dincer, G. Chemical Engineering Doctoral Seminar. 3pm, Rm 10-105.

A Review of Recent Passenger Car Gas Turbine Progress at Chrysler Corporation* - George J. Heubner, Jr, director of research, Chrysler Corporation. 3pm, Rm 3-133. Coffee, 4pm, Rm 1-114.

Nuclear Ventriculography* - Nathaniel M. Alpert, MD, physics research laboratory, MGH. Nuclear Engineering Biomedical Applications of Radiation Seminar. 3:45pm, Rm NW12-222. Coffee 3:30pm.

Localizing States in Liquid Helium* - Marvin N. Silver, physics,

University of North Carolina. Materials Science Colloquium. 4pm, Rm 9-150. Refreshments 3:30pm.

Alfven Wave Damping in the Magnetosphere - Theodore R. Madden, earth & planetary sciences. Plasma Dynamics Seminar. 4pm, Rm 36-261. Refreshments earlier.

Community Meetings

Cambridge Forum Video Series - Edited versions will be shown via Harvard-MIT cable system in Bldg 7 Lobby, 8pm. Sun, Mar 30: Radio, TV and the Citizen - Including an interview with recent FCC Commissioner Nicholas Johnson.

Women's Forum** - Meetings Mon, 12n, Rm 10-105. (Tues in case of Mon holiday). Mon, Mar 31: Ms. Bobby Clark, Harvard Business School DBA program; assistant to the dean at BU, will discuss women in business.

Men's (People?) Consciousness Group* - Sponsored by MIT SACC. Discussion of men's relations with others as people. Tues, 5pm, Rm 50-361.

The Wives' Discussion Group** - Wed, 2:15-4pm, Stu Ctr West Lge. Babysitting in Stu Ctr Rm 473.

Social Events

Singles Wine and Cheese Party* - Sponsored by Ad Hoc Over 30's Singles Chowder and Marching Society. Wed, Apr 2, 5:30-8pm, Rm 10-105. Admission \$1. New, prospective members welcome.

Evening of Waltz* - Sponsored by MIT-Wellesley Ballroom Dancing Club and Wellesley German Club. Sat, Apr 5, 8-12pm, Alumnae Ballroom, Wellesley. Expertise not necessary! Refreshments available. Info: Trudi Berlin, 235-7150.

24 Hour Coffeehouse* - Enjoy relaxing conversation, piano playing, games, inexpensive food, candy & drinks. Open 24 hours per day, 7 days per week, Stu Ctr 2nd fl lge. Note: Coffeehouse will re-open after vacation Sun, Mar 30, 8pm.

Ad-Hoc Over 30's Singles Chowder and Marching Society - Lunchtime meeting in Stu Ctr East Lge (small dining room off Lobdell), Fri, 12:30-1:30pm. New members always invited. Look for the table with the red balloon. Suzanne, x3-3131 or Marty x8-1206 Draper.

Movies

To Trap a Spy** - LSC. Fri, Mar 28, 7 & 9pm, Rm 26-100. Admission \$.50, ID required.

Oz Fuzis (The Guns) - Film Society. Fri, Mar 28, 7:30 & 9:40pm, Rm 6-120. Admission \$1.

The Andromeda Strain** - LSC. Sat, Mar 29, 7 & 10pm, Rm 26-100. Admission \$.50, ID required.

A Day at the Races** - LSC. Sun, Mar 30, 6:30 & 9pm, Rm 26-100. Admission \$.50, ID required.

Vorticity - Fluid Mechanics Film. Mon, Mar 31, 4pm, Rm 33-319. Free.

Triumph of the Will* - Humanities Film. Mon, Mar 31, 7:30pm, Rm 14N-0615. Free.

Nanook of the North; Plough that Broke the Plains* - Film Section. Tues, Apr 1, 7pm, Rm E21-010. Free.

Harvest of Shame; The River* - Film Section. Wed, Apr 2, 7pm, Rm E21-010. Free.

Rules of the Game* - Humanities Film. Wed, Apr 2, 8pm, Rm 26-100. Free.

Vorticity - Fluid Mechanics Film. Thurs, Apr 3, 4pm, Rm 33-319. Free.

Ulysses* - Humanities Film. Thurs, Apr 3, 7pm, Rm 10-250. Free.

Doctor Zhivago** - LSC. Fri, Apr 4, 6 & 10pm, Rm 26-100. Admission \$.50, ID required.

Raven's End (Bo Widerberg) - Film Society. Fri, Apr 4, 7:30 & 9:30pm, Rm 6-120. Admission \$1.

Humphrey Bogart Film Festival - SCC MidNite Movie. Fri, Apr 4, 12m, Sala. Free with college ID.

The Friends of Eddie Coyle** - LSC. Sat, Apr 5, 7 & 9:30pm, Rm 26-100. Admission \$.50, ID required.

Trimurthi* - Sangam Indian film with English subtitles. Sun, Apr 6, 2:30pm, Rm 26-100. Admission \$.50 with ID.

Rebecca** - LSC. Sun, Apr 6, 6:30 & 9pm, Rm 26-100. Admission \$.50, ID required.

Lobby 7 Events

MIT Gospel Choir* - Wed, Apr 2, 12n. Free.

Music

Noon Hour Concert* - Betelheimer String Quartet. Thurs, Apr 3, 12n, Chapel. Free.

MIT Chamber Music Society Concert* - Wed, 5:15pm, Music Library. Free.

Theatre and Shows

Beyond Words and Unnatural Acts* - Kenyon Martin and the National Mime Theatre Company. Sponsored by Mass Council on the Arts and Humanities & Humanities Department. Fri, Mar 28-Sun, Mar 30, 8pm, Kresge Little Theatre. Tickets: \$4, \$3 with student ID. Info: 353-1440.

Shakespeare Ensemble* - Scenes from *The Merchant of Venice*, *Romeo and Juliet*, *Twelfth Night*, *Much Ado About Nothing*. Thurs, Apr 3, 12n, Stu Ctr Mezzanine Lge. Free.

1776* - MIT Musical Theatre Guild production. Fri & Sat, Apr 4 &

THE M.I.T. ALUMNI SURVEY: A BRIEF REPORT



Analytical Studies and Planning Group
Office of the President and the Chancellor
March 1975

THE M.I.T. ALUMNI SURVEY: A BRIEF REPORT

This digest of the Alumni Survey Report was prepared with the assistance of John Mattill, editor of *Technology Review*, and it will appear in the March/April issue of the *Review*. Those who would like to discuss the findings or who would like a copy of the full report should contact the Analytical Studies and Planning Group, Room 4-237, x3-1701.

Kathryn W. Lombardi
Analytical Studies and Planning Group
M.I.T.

David S. Wiley, '61
Analytical Studies and Planning Group
M.I.T.

Constantine B. Simonides
Vice President, M.I.T.

This report is an account of an extraordinary experience — that of visiting, by telephone, with a representative sample of several hundred M.I.T. alumni across the country. Each visit — always by appointment and lasting an average of 53 minutes — was an adventure in evoking and listening to attitudes, opinions, suggestions, and criticisms about the Institute.

The alumni survey which we describe on the following pages was a natural outgrowth of a project started early in 1973 to study the effectiveness of M.I.T.'s efforts to communicate information about its programs and activities to groups outside the immediate Institute community. Obviously, alumni were a key audience in developing this picture. Through discussions with many alumni and people at M.I.T., we came gradually to a plan for a survey based on meaningful dialogue with a representative group of the Institute's graduates.

We concluded that a discussion format was needed, in which alumni would have an opportunity to express their views in their own words and to clarify their opinions. We needed not only the "pro" and "con" positions of alumni on various issues; we needed to understand, if we could, the reasons behind their attitudes. These considerations ruled out a conventional questionnaire which asked for "yes/no" or "agree/disagree" responses. Our planning therefore proceeded on the premise that the survey would be conducted using personal interviews.

The purpose of the survey was to listen to and learn from alumni, so that we might gain a better understanding not only of alumni feelings and perceptions, but, in a way, of the Institute itself — for M.I.T. surely can be measured by the contributions it has made to the lives of those who studied and worked here.

Our main sample included 489 alumni residing in the continental U.S. and Canada, selected randomly from files maintained by the Alumni Association; it was proportionally stratified in terms of year of graduation, and whether the alumnus had been an undergraduate student or had attended M.I.T. only as a graduate student. In addition, because of their relatively small proportion in the total alumni population (and therefore in our main sample), we randomly selected special samples from some special groups within the total alumni population — women, recent black alumni, and the alumni leadership groups. This brought the number of respondents to 738. This report will be on the main sample of 489 only, representing the overall views of the alumni population. We are still studying the additional special samples.

A Series of "Engaging" Conversations

Alumni in the sample first received a letter from President Wiesner explaining the nature of the survey and asking for their participation. This was followed by a telephone call from a member of the Alumni Survey Study Group to schedule an appointment. If the alumnus or alumna agreed to an interview (and most did), a time was set. (If we were unable to schedule an interview, we replaced that alumnus with another from the same subgroup population, so that the representativeness of the sample was maintained.) Then at the appointed hour the respondent was called by one of 30 specially-trained interviewers; five of these were alumni volunteers. The interviewers used a written interview guide which defined some general areas of discussion and provided some value-neutral questions with which to open each area. We felt that if we opened a general area, and then listened, we could learn more than if we proceeded quickly to a series of specific questions.

The interviewer wrote down on the interview report the respondent's exact words, with no paraphrasing, and noted in the margin if a particular response was given with a higher-than-usual intensity of feeling. Once a general area had been opened, the interviewer was responsible for probing further for clarity and understanding, using such neutral questions as "Do you mind telling me why you feel that way?" or "I'm not sure I understand; can you give a specific example of that?"

The interviewer's primary responsibility was to listen in a "neutrally responsive" way, and to record faithfully what was being said. Respondents were not discouraged from initiating discussion in areas in which they were interested, irrespective of the order in which those subject areas might appear (if at all) in the interview guide. Therefore, the interviewer had to be prepared to follow the respondent's train of thought, wherever it went. Respondents were thus encouraged to raise whatever issues were on their minds and to tell us not only what they were thinking, but why.

"When I came here, I was impressed. When I arrived, I was impressed with myself. Shortly after, I was impressed with everyone else, and worried about myself."

Throughout the fieldwork for the survey, one of the recurrent questions had to do with how we would preserve the richness of alumni views in a useful and manageable way. As one alumnus said at the end of his interview, "You've done a good job of covering it all, and I hope my answers help. I imagine you'll just throw it all into the computer."

We have, in fact, relied on computer processing as one tool to help us organize the 650 hours of spontaneous and thoughtful discussion that were the heart of the survey. As noted above, however, the interviews were not succinct question-and-answer sessions and did not give us information in "byte-size" pieces. We were not trying to test a model of what we thought alumni views might be; rather we collected whole conversations and let that information suggest the clusters of opinion that emerged. What we report here are the patterns of opinion and viewpoint which were volunteered at many points throughout the interviews. The categories we report on were devised after the interviews, in order to distill and communicate what was said in an organized and representative manner. The statistical data presented here help to support and shape the profile of alumni views but do not by themselves capture the richness — the individuality, flavor, and shades of meaning — which came through the interviews and which we hope to convey in discussions of the findings.

Nothing resembling unanimity was found on any point in the survey. What did emerge from our study was a tapestry of opinions and views which sharpen our understanding of alumni and the Institute, a collection of insights that may help to forge a stronger relationship between the Institute and the men and women who once were its students.

"I'd just like to feel closer to M.I.T. and have the feeling that someone there cares that I still be a part of the community."

In candid and open discussions, we learned what alumni tend to think about, as well as the range of their opinions on various issues. In some ways, the enthusiastic and thoughtful participation of so many alumni told us as much about their attitudes toward M.I.T. as did the particular things they had to say during the interviews. The warmth, and depth, and engaging character of the conversations, as well as their comments on specific issues, point out the high regard and good will most alumni have for M.I.T. And whether they like or dislike the Institute, approve or disapprove of recent changes, they often make a point of saying that M.I.T. is unique, and has a special character found nowhere else.

An Outstanding Faculty, but Do Students Get the Full Benefit?

Positive and often extremely favorable comments were volunteered about the reputation of M.I.T. by two-thirds of the respondents; only 2 per cent offered mixed or negative comments. Graduate School alumni were more likely than undergraduate alumni to volunteer a high regard for M.I.T.'s reputation. Generally, older alumni tended to make this kind of comment more often than younger.

Factors seen as contributing to M.I.T.'s high reputation included technical and scientific excellence, a tradition of innovation, high scholarship and discipline, and a special ability to contribute to the solution of major problems of national or worldwide import. This general recognition of M.I.T.'s prominence was often coupled with an expectation that M.I.T. would continue to be one of the world's outstanding educational and research institutions.

Alumni referred to the Institute most frequently as a scientific-, engineering-, or research-oriented institution; rarely did they speak of it as a college or university. There was a substantial expectation (discussed later) that M.I.T. should broaden its mission to bring its strength to bear more on the problems of modern society.

Almost one-third of the sample volunteered comment on the outstanding professional reputation of M.I.T. faculty members, with graduate school alumni volunteering significantly more comments on this topic. These comments on faculty reputation referred most often to faculty members' professional prestige and excellence in research.

Regarding the quality of teaching and the nature of student-faculty interaction, however, the comments were more critical. Respondents did not always see students as the primary beneficiaries of the high caliber of the faculty talent. For example, more than one-quarter of the sample volunteered comment on faculty interest in students or on the quality of teaching, and here the mixed or negative comments were twice as frequent as positive ones. Some who made positive comments liked the fact that faculty involvement in research brought the excitement of current research into the classroom; others talked about individual faculty members who had been particularly inspiring as teachers. Some of the more unfavorable comments, on the other hand, referred to faculty members' inaccessibility, to a perceived emphasis on research at the expense of teaching, and to a lack of competence or caring as advisors. "The instructor was a genius but he just flew through the material and left us in the dust; too smart to be a good teacher," said one alumnus.

Over three-quarters of the respondents offered some comment on the quality or character of M.I.T. students — with twice as many giving positive or very favorable, as distinct from mixed or negative, assessments. Alumni views of M.I.T. students included their impressions of students currently or recently at M.I.T., as well as their reflections on their own student days. On the whole, attitudes expressed about recent or past students appeared to be about the same. On the positive side, M.I.T. students were typically viewed as extraordinarily intelligent, capable, serious, and well-prepared. Some alumni recalled the unsettling experience of entering M.I.T. as freshmen and finding themselves surrounded by what appeared to be nothing but geniuses and class valedictorians. One alumnus recalled, "When I arrived, I was impressed with myself. Shortly after, I was impressed with everyone else and worried about myself."

Those who made critical or negative comments often suggested that, while M.I.T. students were technically and professionally capable, they sometimes lacked qualities of breadth or leadership — including an interest in broader issues outside the laboratory or classroom. Whether this was seen primarily as a characteristic of the students themselves or of the Institute's educational program was not clear. There was, however, frequent comment on the hard work ethic prevailing among the student body — an orientation that tended to focus students' interests, time, and attention on the development of exceptional capability in a particular field, but which did not foster a great deal of speculative or introspective thought. In the words of one respondent: "Work dominated things and limited the exploration of relationships. I wondered how people felt about other people."

Pragmatic Assessments of the Value of an M.I.T. Education

In order to gain an understanding of what M.I.T. has meant to alumni, we asked two direct questions on this topic: — How important is it to you that you studied at M.I.T.?

— If you were of college age today, would you choose to come to M.I.T.?

The answers to these questions, as well as the comments volunteered throughout the interviews, portrayed dimensions of life at M.I.T. which are not planned into the curriculum or residential program, but which are significant forces in the education of M.I.T. students and powerful shapers of their lasting impressions.

For every alumnus who indicated that it was of little importance to have studied at M.I.T., there were about three who thought it was somewhat important, and eight who judged it very important that he or she had done so. The only alumni who seemed to show any significant deviation from this overall pattern were the undergraduate alumni who were here during the 1950s. Only about half of this group attached high importance to their having studied at M.I.T., as compared with an average of over two-thirds for the other groups of undergraduate alumni.

Most alumni tended to make quite pragmatic assessments of the value of an M.I.T. education; that is, they talked most often of its contribution to their professional careers and much less often of a general widening of intellectual horizons or a deeper understanding of self and of the world around them. "I like being associated with the school's reputation," said one respondent. "When you first get out, it is helpful in getting started. What I learned in terms of how to solve problems

The following table shows the size and stratification of the sample used in the survey of the interests and attitudes of M.I.T. alumni which is described in the accompanying article.

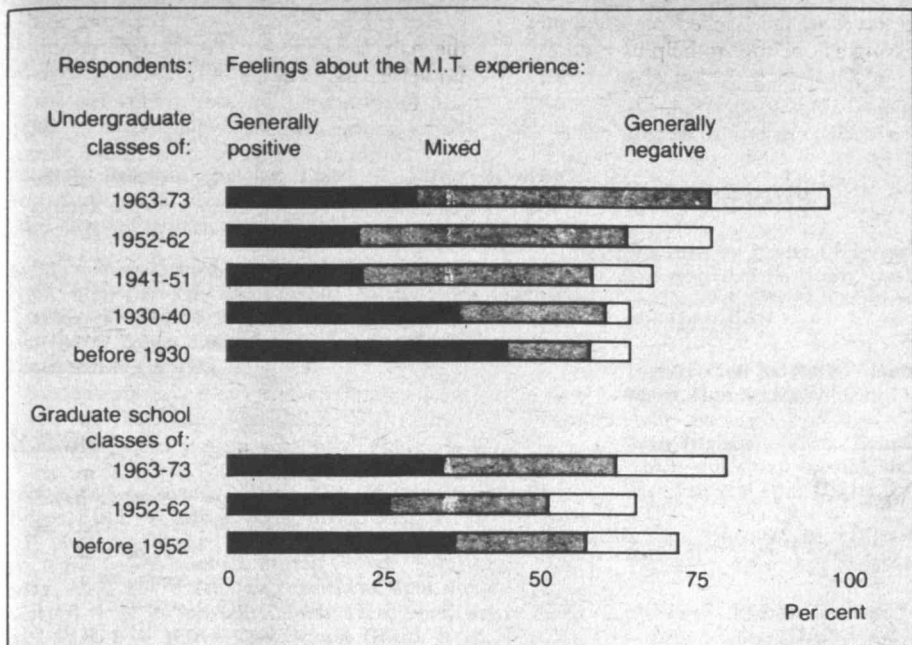
Undergraduate classes: *

| | |
|--------------|------------|
| 1963-73 | 75 |
| 1952-62 | 77 |
| 1941-51 | 74 |
| 1930-40 | 51 |
| Before 1930 | 49 |
| Total | 326 |

Graduate-School-only classes: *

| | |
|---------------------|------------|
| 1963-73 | 63 |
| 1952-62 | 50 |
| Before 1952 | 50 |
| Total | 163 |
| Total sample | 489 |

* Those designated as "undergraduate alumni" above — and throughout this report — include some who continued on at M.I.T. for graduate study. Those designated as "Graduate-School-only" alumni attended M.I.T. only as graduate students. The number of respondents in each of the subgroups is proportional to the representation of that group in the alumni population.



M.I.T. is more than a program of classes and laboratory work; it is a host of activities, situations, and relationships which alumni remember as a total experience. How positively do they recount that experience? This chart shows a compilation of respondents' comments volunteered throughout the interviews; it is not surprising that the most recent alumni are more likely to comment on their M.I.T. experiences, and it is interesting that the older alumni mention generally positive recollections more frequently than do their younger colleagues.

— in using rational analysis and the tools of mathematics — was also very helpful.” Another was less specific if no less pragmatic: “M.I.T. did give me something: the self-confidence to know that however hard or seemingly impossible the task, I can do it.”

Having solid confidence in the value and credibility of an M.I.T. education, almost three-quarters of the alumni we talked to would probably come to M.I.T. again. Said one respondent: “If I were of college age today? I'd just grit my teeth and do it again.”

Alumni who attended M.I.T. only as graduate students were significantly more likely than undergraduate alumni to say they would come again (81 per cent vs. 66 per cent). A substantial portion of the graduate school alumni specifically volunteered that they would come again as graduate students but not as undergraduates. For some, the proverbial drink from the firehose seemed too much to expect of undergraduates. Said one man: “The way undergraduates had the work piled on them, that seemed excessive. I told my children not to go. Despite that, my youngest daughter is there as a student, and is enjoying it immensely.”

As a rule, the high positive response to the questions on the importance of their M.I.T. education and on whether they would come to M.I.T. again was related to the quality and character of the academic and professional programs of the Institute. In fact, many alumni qualified their response by saying they would attend M.I.T. again if their career goals were the same.

Recalling the M.I.T. Experience

When feelings about the atmosphere and environment of the campus are considered, the picture becomes less favorable than that based on the academic program alone. To understand alumni feelings on the experience of being at M.I.T., we examined relevant comments volunteered throughout the interview. In addition, we made an overall assessment of the respondents' feelings about their experiences at M.I.T. based on a total reading of the entire interview. From these various indicators we found that we could characterize the kinds of feelings most people had about their experiences while they were students at M.I.T. Our analysis shows that about one-third had generally positive memories, another one-third expressed mixed feelings, and about one-eighth expressed generally negative feelings about various aspects of their years at M.I.T. Among undergraduate alumni, generally positive recollections were shared more often by those from the older classes, whereas the more recent undergraduate alumni were more likely to express mixed feelings. Those with more negative memories often referred to the impersonality and coldness of the atmosphere (voluntary comments on the impersonality and coldness of the M.I.T. environment were made by 12 per cent of

the sample) or to excessive competition and pressure (voluntary comments on the pressure at M.I.T. were made by one-quarter of the respondents); some referred to M.I.T.'s “factory” image.

The pressure and competition, while regarded as a necessary condition for their academic preparation by some, were more often seen as having an adverse effect on the overall environment.

These recollections illustrate a tension that was apparent in the attitudes of many alumni toward M.I.T.: satisfaction or pride in being associated with an outstanding educational institution, coupled with some negative feelings about the impact of M.I.T. on their personal lives while they were students here.

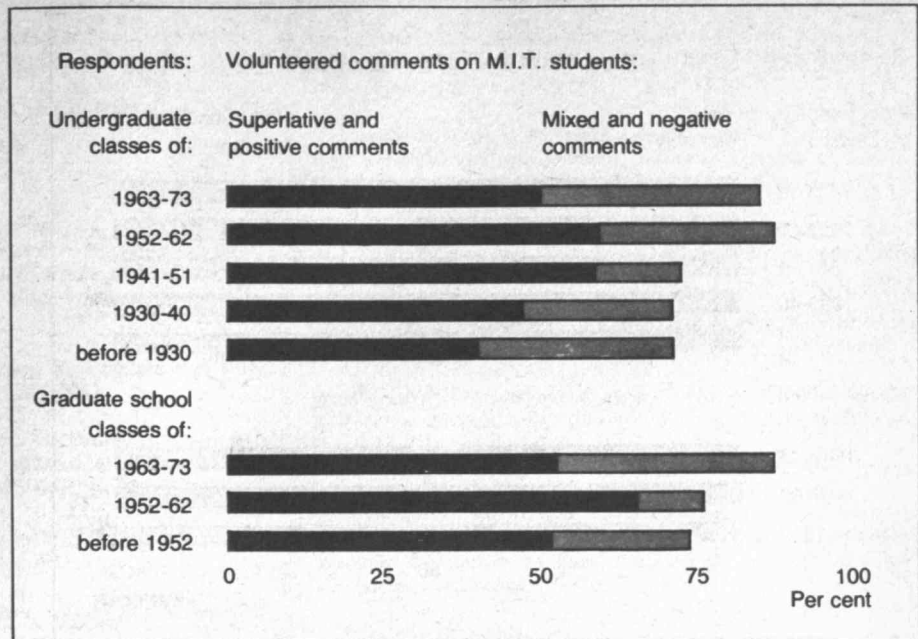
“M.I.T. did give me something: the self-confidence to know that however hard or seemingly impossible the task, I can do it.”

Changes at M.I.T.

In order to solicit comments on M.I.T. today, we asked alumni what they thought about recent developments at the Institute over the last few years. We did not ask about any trends specifically; rather the trends we mention below are those brought up by alumni on their own initiative at any point in the interview. For this reason, the responses — characterized by diversity — indicate not only alumni opinions but also what alumni tend to think about when they consider changes at the Institute.

The subjects of most frequent comment were admissions (37 per cent); the academic program (49 per cent, including the development of the humanities and social sciences [28 per cent]); and research policy in relation to defense (22 per cent).

Among those who volunteered comment on admissions, there was consistent interest in maintaining standards and quality. One-eighth of all respondents specifically mentioned the importance of preserving what they saw as M.I.T.'s traditional elitism, and one-tenth spoke of the need to broaden the admissions policies in order to achieve a better mix in terms of students' interests and backgrounds. Support of M.I.T.'s efforts to increase the number of women and minority students was volunteered by one-fifth of the respondents.



More than three-quarters of M.I.T. alumni surveyed offered some comment on the quality or character of M.I.T. students, and twice as many made positive or very favorable comments as gave mixed or negative assessments. The predominant theme was that M.I.T. students — present, recent, or past — are extraordinarily talented and bright, and that judgment varies little between older and younger alumni.

About half of the respondents commented on one or more trends in the academic program, most often the broadened curriculum (to address, for example, connections among science, technology, and social issues); expansion of humanities and social science offerings; increased flexibility or attention to individual interests (including such changes as the Undergraduate Research Opportunities Program, pass/fail grading, and the Independent Activities Period in January); development of interdisciplinary programs; and growth of cross-registration opportunities with other schools. Overall, alumni who volunteered comment favored these trends in the ratio of two to one. The mixed or negative comments most often reflected a concern that M.I.T. was moving away from its “original” or unique mission and standards; some conveyed a somewhat skeptical “wait and see” attitude. These people see M.I.T. as offering unique and outstanding opportunities which might be diluted if it were to expand its mission much beyond its central strengths in science and technology.

M.I.T.'s role in bringing the resources of science and technology to bear on the problems of society was a theme woven through many interviews. When we asked alumni to talk about what they thought were M.I.T.'s most important missions for the future, two-fifths said M.I.T. should take an active role in addressing such current social problems as energy, pollution, health care, poverty, and those created by technology itself. Some also mentioned M.I.T.'s responsibility to impart to students a greater social awareness and accountability. An additional one-eighth of the respondents felt that M.I.T. could best contribute to society through what they regard as the Institute's more traditional role of maintaining leadership in science and technology, of creating new technologies, and of addressing the lack of public understanding of science and technology.

One-fifth of the sample mentioned the divestment of the Draper Laboratory or what they viewed as a curtailment of certain kinds of defense-related work at M.I.T. The majority of those who brought up this subject argued that M.I.T. has developed much of its strength from its relationship with those sectors of society involved in national security and industrial development; in their view, such connections provide the university with important strengths, resources, and responsibilities. On the other side of the issue, some alumni felt that certain kinds of military research are not appropriate missions for a university, or that M.I.T.'s independence might be compromised if it relies too heavily on defense funding, or that today's priorities require a shift to social problems.

The political demonstrations in the late 1960s were mentioned by almost one-quarter of the alumni and by 40 per cent of those graduating before 1930. Many who volunteered comment in this area were unhappy that the demonstrations occurred, with a few wondering how this could have happened at M.I.T.; reactions on how M.I.T. handled the situation were mixed.

When we asked about perceptions of M.I.T.'s financial situation, about one-sixth responded that the Institute has a serious financial problem, one-half thought we had some problem, and the remaining one-third were equally divided between those who thought M.I.T. had no problem and those who had no idea. Direct knowledge of M.I.T.'s financial situation seemed to be very low, with many extrapolating from the general economic climate to estimate M.I.T.'s financial situation. One said, “It's obvious that M.I.T. is getting clobbered by the government and by inflation.”

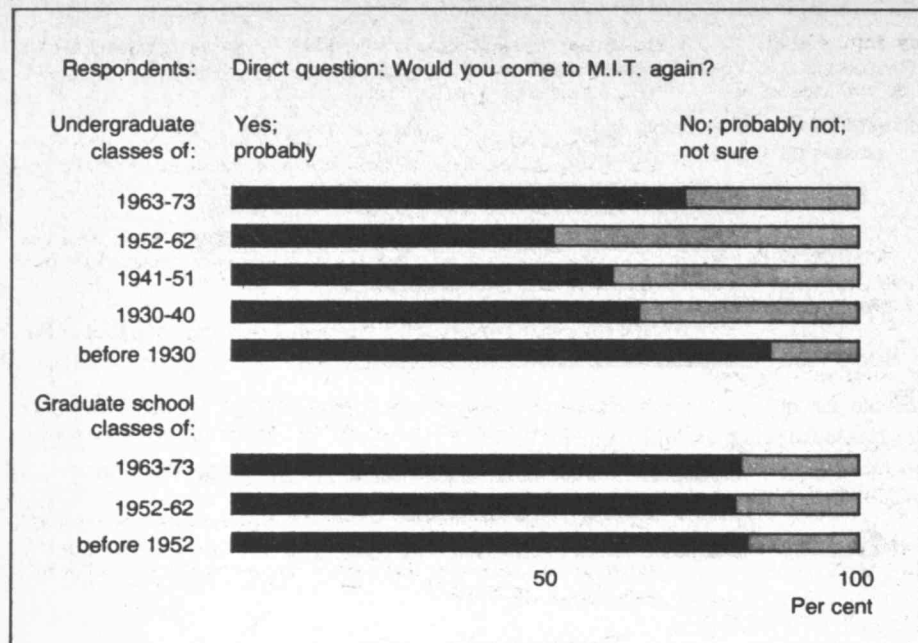
When asked about the importance of alumni support, slightly over one-third of the respondents thought it constituted an important or significant part of the Institute's total financial picture, and another one-third thought it played a small or insignificant part. Undergraduate alumni before 1941 attached higher significance to alumni support than did alumni from more recent classes, who were more likely to see alumni support as small compared with other sources such as government or industry.

The Responsibilities and Bonds Between Alumni and Alma Mater

To summarize alumni attitudes, it is fair to say that there is a solid foundation of positive attitudes toward the Institute. There is a substantial base of good will — though no unanimity of opinion — upon which new kinds of communications and activities with alumni can be built. One of the strongest messages that comes through in the survey is that alumni are individualistic, and that when they reach back — if they do — to connect with M.I.T., they connect in different ways, at different points in time, and for different reasons.

Graduates do not share a single, common bond to the campus. Not surprisingly, Graduate School alumni tend to think of their association with M.I.T. primarily in terms of their department or research group and less in terms of their Class or living group. Undergraduate alumni, on the other hand, think of their association with M.I.T. as much by living group as by Class, and even more by department. A good many of both graduate and undergraduate alumni think of M.I.T. in terms of specific people or activities. As one alumnus put it: “A place is people to me. When I lose touch with the people, I lose touch with the school.”

Some 60 per cent of our sample (representing as many as 30,000 alumni) had visited the campus within the last five years.



If you were of college age today, would you choose to come to M.I.T.? Among undergraduate alumni there are significant differences by age in the answers to that question; people from the more recent and from the oldest classes seem to be the most enthusiastic. Alumni who were at M.I.T. for Graduate School only were highly positive in response to the question, though one-third of those in the Classes from 1952 to 1973 volunteered that they would come again as graduate students — but *not* as undergraduates.

Their reasons for coming back provide another index of the diversity of alumni ties or interests in M.I.T. "Casual visits" — to see what has been going on since they were here, to show the school to their family or friends, to compare the M.I.T. they visited with the place and the people they knew as students, and, most importantly, to visit old friends — were as common as any reason for returning. These casual visits are intriguing, both because of their large number and because they are in a sense "hidden" from the more formal network of alumni relations. Professionally-related activities — such as professional meetings, consultation or collaboration with faculty, and attending a course or seminar — were another common reason for coming back to the campus.

About four-fifths of the alumni have had some type of contact with M.I.T. since they were students here. For those who were graduate students only, and for the more recent undergraduate alumni (1952 to 1973), the contacts have been predominantly informal, many for professionally-related purposes (for example, correspondence or visits with faculty members). More formally organized alumni activities were cited more frequently by undergraduate alumni who graduated prior to 1952.

Toward More Communication and a Closer Relationship

Based on comments throughout the interviews, only about two-fifths of the respondents indicated more than an incidental knowledge of what has been going on at M.I.T. Nevertheless, more often than not, the people we talked with were generally satisfied with communications from M.I.T. — although many made specific suggestions for improvement or commented on a particular topic on which they would like more information. Those who had a stronger interest in M.I.T. were more likely to make suggestions and criticisms or to indicate a wish for information. In response to a direct question, about one-third explicitly stated that the information they received did not completely meet their needs.

Technology Review, understandably, was a major focus for much of the discussion on communications. About 70 per cent of the sample acknowledged receiving *Technology Review* currently or recently, and most of them said they look at it frequently. Not surprisingly, the people most interested, knowledgeable, and involved in M.I.T. are most likely to receive *Technology Review* and to be its most faithful readers. Of all our respondents who receive the *Review*, about one-sixth read the magazine fairly thoroughly, about half read only those sections which are of interest (particularly the feature articles and class notes), and the remaining third tend to glance through it or to look at it only occasionally, if at all.

The many comments made about *Technology Review* covered a broad spectrum. The majority of those who receive the magazine made only positive comments or combined favorable comments with suggestions for improvement. Some alumni made only critical comments, and some offered suggestions without evaluative comment. Overall, about half of those receiving the *Review* made some suggestions regarding ways they felt the magazine could better serve their own needs.

After they commented on *Technology Review*, the respondents were asked if there were any particular information they would like to have from M.I.T. (beyond that provided by the *Review*); and over half mentioned one or more information needs. Allowing for multiple mentions, about one-quarter of the sample stated that they would like more Institute news; a calendar of campus activities was mentioned by about one-fifth of the Boston-area respondents; and about one-quarter of the sample (slightly higher for graduate school alumni) expressed an interest in more information on department- or research-related activities. Almost 5 per cent mentioned an interest in receiving an alumni register, or student or staff directories.

Given the diversity of expectations and needs among alumni in the area of communications, it is difficult to establish a single well-defined measure of how well M.I.T. is doing in this area. But given the substantial levels of interest in M.I.T. and the wishes for more or different kinds of information, there is clearly a potential for further creative effort.

Are there ways in which M.I.T. could have been more helpful to our respondents since they left the Institute? One-fifth of the alumni said yes. Job placement, either from the employee's or employer's viewpoint, was mentioned by 10 per cent — that is, by half of those who felt M.I.T. could have been more helpful. Needs for technical information or continuing education were cited by 7 per cent of the respondents.

Can there be new programs to bring the Institute and its alumni into a closer and more mutually satisfying relationship? To assess this potential for more active partnership, we examined three indicators of alumni involvement — or possible involvement — with M.I.T.: the degree of interest in the Institute, the level of recent activity with M.I.T., and the extent of knowledge about M.I.T. The survey tells us that in our sample there are about 15 per cent who are already closely involved with M.I.T.: These alumni are active, interested and knowledgeable. These people also are more likely to have been the

most vocal in expressing their opinions about M.I.T. in the survey; to be involved in a variety of activities and commitments outside their work and family; to have been on campus within the past five years; to live in the eastern half of the country; to receive *Technology Review*; and to feel that it was very important for them to have attended M.I.T. At the center of this core group are the alumni officers — the men and women who form a nucleus for the Institute's partnership with alumni.

Though it is difficult to characterize the potential for greater involvement beyond this core group, a general estimate supported by the survey data is that about three-fifths of the alumni population, including those already most closely involved, represent a good potential for becoming more closely engaged with the Institute. This overall estimate is supported by a number of indicators of alumni attitude toward M.I.T.: their good will toward the Institute (75 per cent of the sample); their interest in M.I.T. and its activities (60 per cent); their requests for more or different kinds of information and their suggestions on communications (60 per cent); their involvement with the Institute or in alumni programs during the last several years (60 per cent); and their visits to the campus within the last five years (60 per cent).

What about the alumni whose potential for involvement seems to us lower? Among this group are some who have strong negative feelings about M.I.T. or their experiences here. There are others who — either because of attitude or because of present circumstances — feel no real ties to or interest in M.I.T. at present. They may have stronger ties with other schools, they may not have ties with any schools, or they may have young children and may be busy building their careers. Some of these people may see closer involvement with M.I.T. as something to come — in later years. But for the moment their attitude is basically neutral.

To summarize our assessment: There is a core of alumni, about 15 per cent, who are already interested, knowledgeable, and actively connected with M.I.T. Many more beyond that seem to have reasonable potential for more active associations with M.I.T. We estimate that there are as many as 30,000 alumni (or 60 per cent of the alumni represented by our sample) whose interests and creative energies might find greater resonance with M.I.T. — if the Institute knew how to meet their interests and needs. These needs vary in intensity as well as in kind. To some alumni, greater involvement will come through services M.I.T. might provide to them now or in the future. Other alumni would like more opportunities to be of service to the Institute. Some alumni want both. In any event, it is clear that a closer association with M.I.T. should further the goals of or otherwise provide satisfactions for alumni on their own terms. The survey does not specify how this can be achieved, but it does show that there is a potential to be tapped, and points to some directions to explore.

The issues and questions raised by alumni in the survey present an exciting challenge: how to reach out and open up in ways that will make M.I.T. a more accessible, more vigorous, and stronger institution. Part of what has to be done rests with the Institute; part with the alumni. Most will be accomplished only by working together.

We urge all of you who read this digest of the survey report to join in the discussion of what needs to be done, how, and by whom. We look for your initiatives in listening, sharing, and caring about M.I.T. and about the people who make up our community on campus and beyond.

Constantine B. Simonides is Vice President of the Institute with responsibilities in the areas of organization and information. **Kathryn W. Lombardi** and **David S. Wiley** ('61) are Associates in the Analytical Studies and Planning Group in the Office of the President and the Chancellor. Mr. Simonides had overall responsibility for the planning and development of the survey; the day-to-day direction of the project was assigned to Ms. Lombardi and Dr. Wiley. They were assisted at various times by well over 100 people from the M.I.T. community in the planning, interviewing, coding, and analysis. Douglas Williams of Douglas Williams Associates, Inc., New York, was the principal consultant throughout the project in the design and implementation of the open-ended interview approach. Professor Lotte Bailyn of the Sloan School of Management was the academic advisor for the project. Osgood Nichols of Osgood Nichols Associates, Inc., New York, helped initiate the survey and served as consultant. The project was planned and conducted in close cooperation with Donald P. Severance and the resident staff members of the Alumni Association.

Dance

MIT-Wellesley Ballroom Dancing Club* - Tango & rumba workshop. Sun, Apr 6, 2:15-4:15pm, Stu Ctr Rm 491. Admission \$2.5. Info: Sharon Pastiriza, x8968 Dorm.

Folkdancing - International: Sun, 7:30-11pm, Sala. **Balkan:** Tues, 7:30-11pm, Stu Ctr Rm 491. **Israeli:** Thurs, 7:30-11pm Sala. **Evening-dancing:** Fri, 12n-1:30pm, Kresge Oval in good weather, otherwise Bldg 7 Lobby. Learn & practice more difficult dances Fri, 7:30-3 or 4pm, Stu Ctr 491.

Athletics

Home Schedule* - Sunday, March 30 - V Lacrosse. Rochester, 2pm, Briggs Field. V Sailing. Lark Invitational, 9:30am, Charles River. F Sailing. Dinghy Invitational, 9:30am, Charles River. Tuesday, April 1 - V Baseball. Boston College, 3pm, Briggs Field. Wednesday, April 2 - V Tennis. Connecticut, 4pm, duPont Courts. Friday, April 4 - V Baseball. Lowell Tech, 3pm, Briggs Field. Saturday, April 5 - Heavy Crew. Coast Guard, F 10:15am, JV 11am, V 11:30am, Charles River. V Sailing. Invitational, Charles River. V Lacrosse. Boston College, 2pm, Briggs Field. Sunday, April 6 - V Baseball, Boston State, 1:30pm, Briggs Field.

Rugby Football Club Practices** - Tues & Thurs, 7:30pm,

Rockwell Cage. Full medical insurance necessary. Info, x3-6221.

Women's Athletic Council* - Meetings 1st & 3rd Tues of each month, 7:30pm, duPont conference rm. Info: Mary Lou Sayles, director of women's athletics, x3-4910.

Exhibitions

Drawings by Abstract-Expressionist Painters* - Works by Willem de Kooning, Arshile Gorky, Jackson Pollack, Franz Kline and Philip Guston. Fri, Feb 21-Wed, Mar 26, daily 10am-4pm and Tues 6-9pm, Hayden Gallery.

Faculty Club Exhibit* - Metal and stained glass sculpture by Rose Miller. Mon-Fri March, 9am-11pm, 6th fl Bldg E52.

Joan Brigham - Steam Fountain Projects* - Drawings of a project which would tap existing underground steam lines in Boston. Mar, Mon-Fri, 9am-5pm, Center for Advanced Visual Studies (W31).

Creative Photography Exhibit* - Works by Wendy Snyder MacNeil. Thurs, Apr 3-Sat, Apr 22, 10am-6pm, Bldg W31. Free.

Drawings: Andrew Tavarelli* - Fri, Apr 4-Sun, May 4, Hayden Corridor Gallery. Open daily. Free.

Visual Dharma* - The Buddhist art of Tibet. Sponsored by the Committee on the Visual Arts. Fri, Apr 4-Wed, May 7; daily 10am-4pm, Tues 6-9pm; Hayden Gallery. Public Preview Fri, Apr 4, 8-10pm. Free. Gallery closed Apr 8 & 9.

Geo-Astral Formulations 1969-1972* - Lowry Burgess, CAVS fellow. Weekdays during April, 9am-5pm, Center for Advanced Visual Studies (Bldg W11), Free.

The Look of Music in the Middle Ages* - facsimiles of manuscripts and transcriptions into modern notation; pictures of life in the Middle Ages. Open daily, Music Library, Bldg 14E.

Hart Nautical Museum* - Permanent exhibit of rigged merchant and naval ship models, half models of yachts and engine models. Open daily in Bldg 5, 1st floor.

MIT Historical Collection* - Permanent exhibition, open Mon-Fri, 9am-5pm, Bldg N52, 2nd floor.

Photographs* - Showing the original 19th century MIT buildings in downtown Boston and step-by-step views of construction in Cambridge. Bldg 4 Corridor.

Freshmen are encouraged to attend departmental lectures and seminars. Even when these are highly technical they provide students one means to learn more about professional work in a department and field.

- *Open to the public
- **Open to the MIT community only
- ***Open to members only

Send notices for April 2 through April 13 to the Calendar Editor, Room 5-111, Ext, 3-3279, before noon Friday, March 28.

NSF to Fund Experimental Deer Island Sewage Plant

(Continued from page 1)

gallons of sludge are settled out in a series of sedimentation and thickening tanks.

This thickened sludge is held for 15 days or so in digester tanks where it is degraded by the action of bacteria. The decomposed sludge is then mixed with treated wastewater, which is chlorinated, and discharged into the harbor on outgoing tides. The methane gas produced by sludge digestion is used as fuel at the plant to produce electricity.

The process is at times unreliable, because the bacteria may die or be attacked by other bacteria. Moreover, new standards imposed by the federal Environmental Protection Agency in 1972 forbid the discharge of sludge into Boston

harbor.

The MIT researchers believe that high energy electron treatment is the most promising of the alternatives being investigated.

"If successful, the electron treatment of municipal sludge may prove to be the most important new treatment method that has emerged in the last half century," said Dr. John G. Trump, professor emeritus of electrical engineering, who will direct the research.

"Most important is the prospect that this form of ionizing energy applied to municipal sludge could convert a national problem into a national resource. It is expected that the treated sludge could be safely applied on land to improve soil fertility."

At Deer Island, the MIT researchers will work mainly with thickened raw sludge, which they will obtain from the MDC plant. They also plan to study the electron treatment of untreated wastewater, partially thickened sludge, and sludge that has already been treated by bacterial digestion.

The electron facility is expected to be in operation by the end of 1975. Although it is for investigative purposes, it will be capable of treating 100,000 gallons of sludge over a 24-hour day.

Dr. Trump and Kenneth A. Wright, co-directors of the High Voltage Research Laboratory, began research on the electron treatment of wastewater in 1973 with a small grant from MIT's Sea

Grant Program for studies on the inactivation of marine-related viruses.

In May of 1974 a grant from the RANN section of the National Science Foundation was awarded for in-house studies at MIT of municipal sludge treatment. The high energy electrons for this work came from the laboratory's three-million-volt Van De Graaff electron accelerator, which is also an important component of the electron cancer therapy program of the Lahey Clinic Foundation and MIT at the High Voltage Research Laboratory.

The research so far, Dr. Trump said, "has confirmed prior evidence that high energy electrons can adequately control the bacteria and viruses that might cause illness. The intense ionization introduced in the material (conversion of the material into electrically charged particles) also contributes to the breakdown of complex organic molecules and promotes their oxidation."

"This second NSF grant," he said, "will enable the studies to move up in scale to the high volume flow rates and actual plant conditions needed for sound radiobiologic and engineering feasibility evaluation."

The idea of using ionizing energy to disinfect sewage is far from new. It has been studied for the past three decades, usually on test-tube quantities of wastewater or sludge. The source of ionizing energy was most often penetrating gamma rays from radioactive materials such as Cobalt-60 or Cesium-137. In 1948 Professor Cecil Dunn at MIT published information on the wastewater disinfection capability of both energetic electrons and energetic photons such as x-rays and gamma rays. Information is also available from the use of ionizing particles and radiation for medical purposes such as the treatment of cancer and the sterilization of surgical materials.

Dr. Trump and his associates believe, however, that high energy electrons from modern accelerators are uniquely suitable for sewage disinfection because of their inherent safety, and the flexibility and economy with which they can be applied to small and large wastewater systems.

At the voltages required for sludge treatment, no radioactivity is produced in the sludge. In contrast to emissions from radioactive sources, the shielded machine accelerators can be instantly and totally inactivated by throwing a switch. Moreover, the method may eliminate the need for chlorination. Unlike chlorine, electrons are natural particles and an essential ingredient of all matter.

The method is economical in the speed of operation and in its efficient use of energy. Electron beam power can be produced from ordinary electric power by several types of accelerators, some with a conversion efficiency as high as 90 percent. The electron energy is also used efficiently, as indicated by the fact that energy lost is expected to be only enough to heat the treated sludge less than 2 degrees Centigrade.

A number of researchers and groups will work on the project. Professor Anthony Sinskey, microbiologist in the MIT Department of Nutrition and Food Science, will be responsible for determining the dosage required to inactivate a wide range of organisms, including pathogenic bacteria such as salmonella. Chemical analysis and methods are under the guidance of Professor Edward W. Merrill of the MIT Department of Chemical Engineering. Professor T.G. Metcalf of the Department of Virology at the University of New Hampshire is also preparing to work with MIT on virus inactivation by electrons.

The Metropolitan District Commission has strongly supported MIT's proposed investigation. The MDC's sewer division will assist in setting up and operating the research facility. The project is also receiving the support of the Commonwealth's Division of Water Pollution Control. It is being followed with growing interest by the regional representatives of the Environmental Protection Agency, and by the Army Corps of Engineers, which has supported a study of sewage treatment by gamma radiation in Florida.

The High Voltage Engineering Corporation, the leading developer of industrial and scientific particle accelerators, will lease to MIT a standard 50-kilowatt electron beam system with scanner, which will provide the high energy electrons for the Deer Island facility. The corporation will also provide engineering support for planning and operating the facility.

Jones Prefaces Book

Dr. Thomas F. Jones, visiting professor of engineering and education at MIT and former president of the University of South Carolina, has written the foreword and an essay entitled "Discovery Laboratories: An Alternative to 'Cookbook Labs'" for a new book, *Excellence in University Teaching*, to be released May 17 by the University of South Carolina Press.

R.H. Richards: Alumni Founder

"He grew up with the Massachusetts Institute of Technology from its very beginning, he stayed with it till he retired...Forty-nine years' association... Teacher, scientist, inventor, pioneer in the field of education." From the bookjacket of *An Autobiography*, Robert Hallowell Richards, *His Mark*.

Bobby Richards was what his colleagues and generations of students called this son of Maine, a member of MIT's first class, who became one of the country's most distinguished metallurgists and later won worldwide recognition for important developments in mining and metallurgy, particularly in the separation of ores.

An MIT press release, dated Aug. 26, 1944, the day on which Professor Richards celebrated his 100th birthday, referred to him as the oldest living graduate of the Institute, the last member of its first class, and a man whose philosophy of life was best expressed "by one of his oft repeated quotations: 'Thy candle burns none the less bright from having lighted the candle of thy neighbor.'"

One of the candles Bobby Richards helped light 100 years ago continues to burn, and its flame is constantly growing. It is the MIT Alumni Association.

He was its first president, a post he held for five years.

It was at the annual meeting of the Association of the Class of 1873, held at the Parker House Hotel on Tremont Street, Boston, on Jan. 23, 1874, that the formal proposal to organize an Alumni Association was made. The organization came into existence formally the next year and on Jan. 27, 1876, Professor Richards was elected president.

Today the flame kindled as the result of that 1873 meeting in the Parker House has grown into an association that comprises more than 60,000 former students, many of whom actively assist the Institute in a wide variety of volunteer positions.

These positions include the president of the Alum-

ni Association, positions on the association's Board of Directors, the Fund Board, and other national boards of the association. Each year more than 3,000 alumni are actively involved in supporting the Institute as club officers, class officers, course officers, and in various fund raising capacities. They include membership in the MIT Corporation, on the 24 departmental visiting committees and on other Institute advisory councils. Nearly 1,000 alumni also assist the Admissions Office in counselling prospective students.

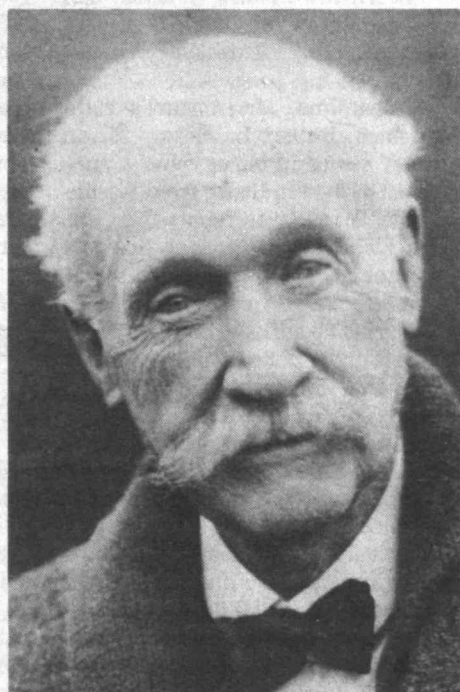
Robert Hallowell Richards was born in 1844 in Gardiner, Maine. At the age of 13 he was sent to school in England and later entered Wellington College in Surrey. He returned to the United States in 1862, studied under private tutors and then entered Exeter Academy for two years.

In 1865 his mother wrote him that William Barton Rogers, whose wife was a distant relative of Mrs. Richards, was starting a scientific school in Boston. Robert Richards, who was unhappy with the highly formal, classical style of education common in his day and longed to "learn by doing," promptly enrolled in the new school.

Before long he found himself in the school's first chemical lab where for a textbook students used proofsheets of the *Manual of Chemistry*, written by Professors Charles W. Eliot and Francis H. Storer shortly before Eliot became president of Harvard.

Professor Richards graduated in 1868, became an instructor at MIT, an assistant professor of analytical chemistry in 1870 and from 1873 to 1884 was professor of mining engineering. In 1872 he created the MIT mining and metallurgical laboratory, first of its kind in the world, and headed that department for 41 years.

His first wife was Ellen H. Swallow, MIT's first woman graduate, first woman on its teaching staff, and a pioneer in the fields of public health, home economics and food chemistry.



Personnel Officers Listed Again

School of Engineering
Jack Newcomb 3-4269
 (Carolyn Scheer, 3-6511, is currently substituting for Mr. Newcomb during his absence)
 Aero/Astro
 Center for Advanced Engineering Study
 Center for Policy Alternatives
 Chemical Engineering
 Civil Engineering
 Electrical Engineering & Computer Science
 Mechanical Engineering
 Materials Science & Engineering
 Nuclear Engineering
 Ocean Engineering
 Office of Dean—Keil

School of Science
Sally Hansen 3-4275
 Biology
 Chemistry
 Clinical Research Center
 Earth & Planetary Science
 Mathematics
 Meteorology
 Nutrition & Food Science
 Physics
 Office of Dean—Alberty

Vice President for Research
Philip Knight 3-4267
 Center for Space Research
 Center for Materials Science
 Energy Laboratory
 Laboratory for Nuclear Science
 National Magnet Laboratory
 Research Laboratory of Electronics
 UROP Office
 Office of Vice President—Hill

Sloan School, Humanities
 Libraries, Center for International Studies
Patricia Williams 3-1594
 Center for International Studies
 Libraries
 Economics
 Foreign Literatures & Linguistics
 Humanities
 Philosophy
 Political Science
 Psychology
 Office of Dean—Hanham
 Sloan School
 Operations Research Center
 Office of Dean—Pounds

Vice President—Operations
Michael Parr 3-4266
 Campus Patrol
 Endicott House
 Faculty Club
 Graphic Arts
 Housing & Food Services
 Physical Plant
 Safety Office
 Office of Vice President—Stoddard

Vice Presidents Financial/Fiscal and Treasurer
Virginia Bishop 3-1591
 Associate Treasurer/Recording Secretary
 Real Estate
 Treasurer's Office
 Purchasing
 Laboratory Supplies
 Vice President Fiscal Relations—Cusick
 Lincoln Fiscal Office
 Comptroller
 Accounting
 Audit Division
 Investment Administration
 Payroll Office
 Student Accounts
 Office of Sponsored Programs Administration
 Patent Administration
 Vice President Financial Operations—Cowen
 Credit Union

President, Chancellor & Vice President—Simonides
Richard Higham 3-4278
 Alumni Association
 Analytical Studies & Planning Group
 Chairman's Office

Dean for Student Affairs
 Athletics
 Technology Community Association
 Graduate School Office
 Institute Information Service
 Campus Information Center
 News Office
 Publications
 Information Processing Center
 Information Processing Services
 Special Assistant—Minority Affairs
 Special Assistant—Women & Work
 MIT Press
 Office of Administrative Information Systems
 Preprofessional Advisory
 President's House
 President's Office
 Chancellor's Office
 Office of Vice President—Simonides
 Registry of Guests

Provost (except Libraries & CIS)
***Kenneth Hewitt 3-6512**
 Artificial Intelligence Laboratory
 Cancer Research
 Cell Culture Facility
 Army ROTC
 Naval Science
 Aerospace Studies
 Haystack Observatory
 Summer Session
 Project MAC

***Carolyn Scheer 3-6511**
 Provost's Office
 Wellesley Exchange

Center for Advanced Visual Studies
 Education Division
 Health Science & Technology
 Neuroscience Research Program
 Sea Grant
 Commission on the Visual Arts
 Joint Center for Urban Studies
 Experimental Study Group
 Lowell Institute

*currently substituting for Claudia Liebesny

School of Architecture & Vice Presidents area

Evelyn Perez 3-2928
 Architecture
 Urban Studies and Planning
 Office of Dean—Porter
 Academic Staff Records Office
 Admissions
 Career Planning and Placement Office
 Personnel
 Planning Office
 Student Financial Aid
 Office of Vice President—Wynne
 Registrars' Office
 Medical Department
 Environmental Medical Service
 Arteriosclerosis Center
 Office of Vice President—Wadleigh
 Industrial Liaison Office
 MIT Associates Program
 Resource Planning
 Resource Development
 Institute Secretaries
 Office of Vice President—Lampert

Even Hurricanes Don't Stop ROTC Cadet Paratrooper



Col. R.A. Hyatt, commander 10th Special Forces Group at Fort Devens, Ma., pins paratrooper wings on MIT senior Thomas J. Feeney who completed his paratrooper training early this month at Fort Devens.

It takes more than hurricanes to stop Thomas J. Feeney, an MIT senior.

What mere hurricane could stop an MIT math major who is a qualified Army paratrooper and who, at last count, had been accepted to four law schools?

Feeney, who will be graduated and commissioned a second lieutenant in June, is the first person ever to qualify as a paratrooper at a place other than Fort Benning, Georgia, home of the Army's famous Airborne School. He won his chutist's badge at Fort Devens, Mass.

An army ROTC cadet, Feeney was sent to Fort Benning last September for three weeks—a period in which he expected to make the five jumps needed to qualify as a paratrooper. All the jumps were to occur in the final week.

"After we had gotten in three jumps, two hurricanes hit Georgia back to back," Feeney recalled. "That ended the jumping for the week. I had to get back to MIT for the start of the fall term and I thought I had missed out on qualifying this year."

Services Planned For John Asinari

(Continued from page 1)
 irrational act of wanton violence."

"All of us at MIT share with Mr. Asinari's parents, his family and his friends a sense of shock and deep sorrow at the loss of this young life," President Wiesner said.

Meantime, Mr. Asinari's companion, Robert L. Moses, 20, an MIT senior in biology and a resident of Burton House from Roslindale, Mass., was reported in fair and stable condition at Boston's Peter Bent Brigham Hospital where he is recovering from injuries he suffered in the attack. He is under police protection there pending the investigation.

Boston police said they had made one arrest, Robert Shaughnessy, 22, of South Boston, and were searching for three others. Police said the two MIT students spent Friday evening in Boston's Kenmore Square and were hitchhiking back to MIT along Massachusetts Ave. in Boston when they accepted a ride from four young men. Once in the car, police said the occupants demanded the students' wallets and at the same time began beating and stabbing them and later shot at them with a gun. Police said the students were pushed from the car on a South Boston street, then chased and again beaten. Residents called police and both students were taken to Boston City Hospital where Mr. Asinari died. The car, which police said had been stolen, was later found abandoned and burned.

Mr. Asinari, son of Mr. and Mrs. Louis Asinari of Arlington, was a

But he hadn't reckoned on the persistence of the Army ROTC contingent at MIT. To a man they are paratroopers and they set to work at once to convince the Army that Feeney should have a chance to get in his last two jumps before graduation. Finally they were successful.

Early on the morning of March 4 Feeney hit the silk 1,250 feet over the Turner Drop Zone at Fort Devens, jumping with members of the 10th Special Forces Group there.

Capt. Kevin M. Upton, a technical instructor with the Army ROTC unit at MIT, said the Special Forces troops "literally adopted Tom Feeney. They really made him feel welcome and gave him great support."

Feeney, son of Mr. and Mrs. Thomas J. Feeney of King of Prussia, Pa., is attending MIT on an Army ROTC scholarship and has been selected to attend law school under a highly selective Army law program. After law school he will serve in the Judge Advocate General's Corps as an attorney and plans to make the Army his career.

native of Arlington, was a member of the MIT lacrosse team and a former member of the crew. He was planning to complete four years, of undergraduate work at MIT in three years and was to continue at MIT next year working toward the master of science degree and eventually hoped to enter medical school. He had been working as a research assistant at the Veterans Administration Hospital in Jamaica Plain and at the Symmes-Arlington Hospital.

Obituaries

Sally E. Ross

Sally E. Ross, 60, of Cambridge, who had worked in the record room of the medical department since 1967, died on Saturday, March 15. Miss Ross is survived by a sister, Jeanette LaJoie of Brunswick, Me., a niece, Marilyn B. Alden of Ruston, Md., and a nephew, John F. Burns of Staten Island, N.Y.

Benjamin Sealy

Benjamin Sealy, 87, of Cambridge, who retired as a porter at the MIT dormitories in 1954, died Oct. 14 after a long illness. Mr. Sealy came to work at the Institute in 1930. He leaves four daughters: Sylvia Sealy and Muriel Fernandez of Cambridge, Elizabeth Askew of Avon and Rosemary Alston of Medford; eight grandchildren and 14 great-grandchildren.

Employment Q & A

In the February 26, 1975 issue of Tech Talk it was stated, "For the period July 1, 1973-June 30, 1974 97 employees were promoted to exempt and staff positions on campus." How many of the 97 were women?

Of the 97 persons promoted to Exempt and Staff during this period, 72 were women (74%) and 25 were men (26%).

Why can't an MIT employee collect unemployment compensation when on maternity leave?

A woman is not eligible for unemployment compensation while on maternity leave unless prevented from continuing work by the employment policies of the company for which she works. MIT does not have a policy which limits the time a woman can work during pregnancy and therefore Institute employees are ineligible for unemployment compensation while on maternity leave.

I have been employed on the biweekly payroll at MIT for 5 years as of March 10. Do I receive 3 weeks of vacation this July or next? When must I use the time in order to lose any part of it?

You will be credited with 3 weeks of vacation this July 1. Under normal circumstances, we would expect a person to use this time before June 30, 1976. After this date, any unused portion will be dropped from the payroll record.

Occasionally, unusual work requirements within a department prevent a person from using their vacation time within the specified period. In such a case, a letter of justification must be submitted by the supervisor for approval to the Personnel Officer for the area in order to retain the vacation time for an extended period. Under no circumstances can this extension go beyond another vacation year (in this example, June 30, 1977).

I am confused about who is eligible for a new employee review. What is its purpose? Does everyone receive a salary increase at that time?

The first six months of employment are considered a probationary period for all employees. In the second half of this period, an evaluation is made of the performance of each new employee. The level of difficulty and responsibility of the position is also reviewed at that time. Persons hired within six months of the annual review for their payroll are evaluated during the review process. For example, Biweekly employees who are hired between October 1 and the first Monday in January are reviewed in March.

Starting salaries are recommended by the Personnel Office and are set in conjunction with the individual who handles personnel matters for the department. The amount is determined by assessing the person's education, skills and experience in relation to the job to be performed. A review of this salary is made at the time of the New Employee Review. When the salary is determined to be low in relation to the job and performance level, an increase is recommended. It is not expected that this will be the case for each individual. No salary change implies that the original recommendation appears to be correct based on the review. This should not be inferred as a sign of unsatisfactory performance, unless specifically indicated in the evaluation.

Claudia Liebesny of the Office of Personnel Services would like to receive questions that are of general interest in writing at her office, E19-230. Questions and answers will be printed, as space allows, anonymously. Those not selected for printing will be answered individually when the name and room number of the person is enclosed.

Questions of a personal nature should continue to be referred to the Personnel Officer assigned to the department for which a person works.

CLASSIFIED ADS

Ads are limited to one per person per issue and may not be repeated in successive issues. All ads must be accompanied by full name and Institute extension. Only Institute extensions may be listed. Members of the community who have no extensions may submit ads by coming in person to the Tech Talk office, Room 5-111, and presenting Institute identification. Ads may be telephoned to Ext. 3-3270 or mailed to Room 5-105. Please submit all ads before noon, Friday, March 28.

For Sale, Etc.

Raleigh Sprite 27 5 spd m bike, exc cond, \$90; Roberts mdl 1725 tape rcrdr, combo reel & 8 trk, \$150 or best. Dave, x3-7779.

Camel-Hardtop pop up tent trlr, slpd 4, exc cond, towable by compact car, best. x8-3840 Draper.

Mini Minolta MGS-16, almost nw, \$50. Bob, 536-7780, x257.

Minicomputer kit, 1/2 blt, based on 8008-1 Microprocessor, incl 8008-1, 70 TTL IC's, board, plans, \$125. Call, 494-8786, evgs.

Bike, 5 spd; 29 gal aquarium w/std & access. x3-7902.

Olympus FTL fl.4 lens, tele lens Zuiko Auto f200, 2X auto conv, close up lens, flash fltr, hood, \$300. x3-3771.

'71 Vega GT wgn, less 20K, 4 snows & 4 wide oval tires, std 4 gear, radio, sell Blu Bk value (\$1,450); also 10 spd bike & access. John, x3-2105.

Elegant super bench, gd for sofa, xtra bed or reception rm, blk vinyl, s/stl, chrome w/bolsters & pillows, lk nw, \$330. Call, 899-5678, evgs & wknds.

Dbl bed, box spr & matt, cstm fitted wd frame, gd cond, \$30. Marilea, x3-3375.

Stu desk & chr, yr old, exc cond, \$20; girl Philips 3 spd Eng bike, lk nw, \$35. Cathy Doyle, x3-5803.

Dbl matt & box spr, \$15. x3-3132.

Rnd coctail tbl, Ital provincial, solid marble top & mrbl base, bargain at \$60. Ed Gross, x8-3371 Draper.

HP 45, 2 mos, all access, \$185. Charlie, x9468 Dorm.

Swim Master MR12 diving regulator, used once, \$65. x3-4177.

Port GE Mobilmaid dishwasher, gd cond, \$75. Kate, x3-2096.

Vt land, 2.3 acres nr Mt Snow & Stratton skiing, tennis & indoor pool avail, wl finance. Don, x3-3550.

Sony TC 352D, 3 hd tape deck, just overhauled w/nw motor, works fine, \$125 or best. Ken, 267-8460, beg 12n or aft 6 pm.

Pink embroidered silk street length dress, suitable for wedding, sz 6, nvr worn. Fran, x3-5907.

Lafayette stereo 25 amp, 20 W, Lafayette LT-670A amfm tuner, 2 Criterion 25A spkrs, \$100/all. Al, x149 Linc.

Snows w/rims & hubcaps, lk nw, less than 2K on them, \$35. x0316 Dorm.

Barbell set, 110 lb, gd cond, \$10. Jeff, x8665 Dorm, aft 8pm.

Refractor telescope, 60 mm objective lens, equatorial mint, 3 eye pces, sun screen, diag barlow lens, case, \$125. Dean or Jim, 782-4519.

Grn wool 14'x20' wool rug. Call, 262-2222.

Microtome, rotary, A/O speaker. x8454 Dorm.

Stereo amp, Sansui Au-505, \$135. x0341 Dorm.

Raleigh prof, 21 1/2" Reynolds 531 frame, Campagnolo equip thruout, nw cond, \$490. Cindy, x3-5687, morns.

Stereo power amp, 35 W/ch, +/- 1 db 20-20 KHz, noise 83 db down, IHD .306, 0.5 V in max. Bruce, x8761 Dorm.

Advent 101 dolby, unused, full wrnty, list \$160, ask \$120. Steve, x0646 Dorm, evgs.

Orig earthshoe "sandals," m sz 7, f sz 7, lk nw, only worn last sum, \$10/ea. Michele, x3-2316.

Miranda Sensorex 35 mm SLR w/50 mm fl.9 & 135 mm f2.8 Miranda lenses, var fltrs, etc, \$150. Les, x7675 Linc.

Brass bed, rails & spr incl, 44" W, exc cond. x8-4425 Draper.

Roto-tiller, Sears 5 hp, nds tune up, used 2 seas, nw \$256, \$100 firm. Wayne, x7227 Linc.

Refrig, \$40; Coors, 6 qts, best; couch; chrs; cheap. Ellen, 661-9117.

AC, 14,000 BTU, gd cond, \$100. John, x3-3312.

K sz bedspr, red & olive, perf for Med or Spanish decor, \$20. Mort, x7517 Linc.

Sears Lady Kenmore port washer & dryer, b nw, \$325 both, wl sell sep. Call, 646-2673.

Sm covered util trailer, \$35. Charlie, x7148 Linc.

F sz 9-10 Lama fur trim coat & hat, nw \$100, \$50; port radio, Nat'l Panasonic 4 band w/amfm, exc qual sound, \$25. Ed, x8-4373 Draper.

Buick & Opel parts, specs of parts on request. x498 Linc, aft 3:30pm.

Venetian blinds, 30" W, \$2/ea; 19" b&w TV, \$20. R. Strong, x8-1416 Draper.

GE 24" elec stove, 4 brnr, wht, \$20. Dick, x3-4643.

Technics SA5400X stereo/quad rcvr, nw w/wrnty, 4 Panasonic SB203 sprks, \$195 for all. Aldrich, x3-5360.

Singer sew mach, old mdl, exc cond, \$25. Mary, x3-7825.

Sofabed & old fshn chest drwr, free. Anne, x3-2029.

Mod 2 cshn couch, folds to dbl bed, b&w muted stripe, exc cond, ask \$150. Linda, x3-4737.

JVC integrated amp, 40 W rms/ch, blt in 7 band equalizer, cost \$360, \$200; pr Audioanalyst spkrs, 3 way 12" sys, cost \$276/pr, \$170/pr. Brian, 232-3867.

Piano, u move, \$50. Call, 861-8668.

Vehicles

'63 Chevy II wgn, 6 cyl, auto, \$175. Charlie, x7133 Linc.

'64 Ford cntry squire wgn, gd run cond, int & ext exc, ac, gd tires, \$350 or best. Concord: 1-369-5648.

'65 Corvair Corsa conv, turbocharged 180 hp, 4 spd, positraction, nw eng, top, paint, int, shocks, exc cond, best over \$1,000. Mike, 254-1743.

'65 VW sed, runs but nds work, intact or in parts, tires, doors, eng, etc. John, x8-4019 Draper.

'65 VW bus, gd run cond, \$300 or best. x3-1669.

'66 Mustang, \$300 or best. x8-2894 Draper.

'66 Ford Gal 500, 4 dr, auto, p st, radio, exc mech cond, 64K, \$295 or best. Hank, x3-7253.

'67 Saab 96, V4, 35K orig miles, nw tires, batt, exh. Bob, x3-7245.

'68 Volvo 122S, dark grn, 79 K, nw clutch, muff, brakes, perf run cond, \$1,000; port Olympia typwrtr, deluxe mdl, gd cond, ask \$30. Call, 876-0221.

'68 Pontiac, 4 dr, p st & br, nw exh, gd tires, nds valve job, \$150. Joe, x7124 Linc.

'70 AMC Hornet, 70 K, v gd cond, \$1,000 or best. x3-5547.

'70 GTO, 4 spd, ram air, tach, v cln, exc cond, 46 K, \$1,600 or best. Rich, x5845 Linc.

'70 Pontiac Cat 400 conv, p st & br, auto, gd tires, snows on rear, no rot, no dents, no rips in top, cln, yel/wht, \$1,095. Brad, x3-3688.

'71 Audi 100LS, grn, sunrf, radials, gd cond, \$2,800. x3-2955.

'72 Datsun 240Z, auto, sgl ownr, 30 K, exc cond. x3-4942.

Honda 90 cc commuter-scooter, totally reblt eng, 100 mpg, v gd cond, \$300. Patty, x3-1502, 9am-1pm.

Suzuki TS185 mtrcyc, lo miles, exc cond, \$495. Bob, x3-7856.

Housing

Bak Bay, 2 BR, K, LR, B, blk T, no sec dept or lse, avail 4/1, \$210 incl ht & hot wtr; want lg 2nd hand refrig, gd cond, up to \$50. Call, 536-2369.

Bos, studio w/alcove, avail 5/1, \$155. Jean, x3-6659.

Camb, Cent Sq area, attractive sgl rm, nicely furn, htd, on bus, nr T, 2nd fl. x3-7138.

Camb, Eastgate sub 5/1-8/31, lg BR crnr apt, \$210. Call, 494-8352, aft 5pm.

Camb, Harv Sq, sub BR apt, furn or un, decent cond, great loc, LR, K, B, \$200. Sam, x8-3686 Draper.

Som, Beac St nr Inman Sq, sub 6/1-8/31, 2 BR, ww, dw, ac, \$300 incl util; sell wool 15x13 carpet, exc cond, 2 yrs, ask \$75. Moshe, 547-3415.

Weston, sub hse June thru Aug, 4 BR, \$350. Vaughan, x3-5876.

Rangeley, Me, nw lux 3BR contemp on huge lake, superb view, mtn wilderness, swim, hike, fish, canoe incl w/rent. x8-2577 Draper.

Waterboro, Me, lakefront chalet, 2 hrs Bos, slps 8 conf, 2 lvls ea w/wd stove, full B, lg LR-DR w/sliders to deck facing water, port TV, lg rowboat, \$150/wk. Marilyn, x181-56-296 Haystack.

Animals

Affect, gentle spayed f puppy, free to gd home. Linda, 354-0036, evgs.

Lost and Found

Found: beaut pure wool scarf outside Hayden Lib. x3-2698.

Wanted

Elec guitar w/2 "pick-ups, amp, gd cond, reas. Call, 957-0219.

Upright piano in gd cond. Peter, x3-1738.

Fine Ital violin. David, x3-4157.

'73 MGB repair manual; timing light (strobe); tach & dwell meter; MGB tach. Call, 522-8685.

Gorilla costume to rent or borrow. Cindy, x3-4211.

Recorder lessons on soprano rcrdr, beg-intermed, Doris, x-3-3124.

Balance scale w/.5 gram sensitivity, 500 g or more capacity. Lambert, x7773 Linc.

All glass aquarium w/access, 40-50 gal. Lew, x8-3584 Draper.

Xtra charger for HP calculator, transformer not req'd. x3-6809.

Enterprising yng hacker to repair homemade Bose equalizer. Jack, 434-0708 days.

Used 10 spd bike in gd cond for short prsn (5' tall). Mona, x3-1491.

Used wht refrig, 12 cu ft, gd cond, reas. Robin, x8-4566 Draper.

Someone to repair refrig, wl pay well if you can do the job. Charlie, x3-6737.

Manual for '63 Studebaker. Paul, x8-3370 Draper.

Baby cripp for 6 mos old. x3-7398.

Textbook: 36 lectures in Bio, S.E. Luria. Call, 494-8888.

Tent-trlr, slps 4-5, buy or rent from about 7/20-8/30. Jochen, x3-7068.

Bike, m 5-10 spd. Neville, x3-2334.

Used piano in reas cond & reas priced, wl move. Cara, x3-4076.

Kitten, m or f, pref med-long hair, wl have gd home. Sue, x3-3270.

Roommates

BR avail now in Tang Hall 15E, \$123. Paul, x3-5095.

F rmmate, 25+, for 4 BR apt, Cldg Crnr, Bkline, own lg BR, \$85.25. Gay, x3-7170.

M or f, 1/2 of duplex apt, Cent Sq area, \$100 incl ht. Call, 661-8518.

F grad stu looking for furn apt to sub

or share nr MIT or T, 6/1-9/15. x3-1873.

F, 25+, non-smoker, share lg Camb apt w/f, 28, 2 dogs, own rm, opt furn, btwn Cent & Harv Sq, avail 5/1, \$105 + util. Dee, x3-7053.

F, share spac Bkline apt, own rm, LR, DR, K w/d&d, 2 mod B, avail 4/1, \$105. x3-2717.

Ride, Tweksbury-Linc Lab, off rt 38 & Shawsheen, hrs 8:30-5. Irene, x633 Linc.

Ride to Linc Lab daily, 5pm. x3-1863.

Miscellaneous

Nd a couple of dollars? Got an hr? If interested in being subject for psych exper for DSRE, call. Dave, 494-9833.

Xtra typing. Nancy, x3-6651.

Exp VW repair work, cheap! Eng rebld my specialty, gd work but slow srvc, make me an offer & save \$. Will, 247-8048.

Tech illustrating, mech & elec drafting. pc taping, etc. Mac, x3-7273.

Wd like to do gen hifi repair, 10 yrs exper, incl tape rcrdr biasing, tape duplicating, extensive testing lab. Cizek, 661-0761, 6pm-12m.

Typing: theses, manu, etc, tech/multi-lingual, IBM Correct Selec, reas. Greg, x3-6824.

Wl trade home-baked goods of your choice (cake, cookies, bread) for much-nded accordion lessons. Debbie, x3-6736.

Typing w/editing, anything, efficient MIT wife, \$.50/pg. Mike, x3-6275.

Want anyone who plays bagpipes & is interested in getting tog to play. Fred, 492-6983.

Exp typist wl type theses, reports, etc, in Eng, Grmn, Fr or Sp. x3-5822.

Typing on IBM Exec, manu, theses, papers, fast & accurate. Rita, x3-3408.

POSITIONS AVAILABLE

This list includes all non-academic jobs currently available on the MIT campus. Duplicate lists are posted each Tuesday preceding Tech Talk publication date on the women's kiosk in Building 7, outside the Office of Minority Affairs, 10-211, and in the personnel office, E19-239, on the day of Tech Talk publication. Personnel interviewers will refer any qualified applicants on all biweekly jobs Grades I-IV as soon as possible after their receipt in Personnel.

Persons who are not MIT employees should call the Personnel Office on extension 3-4251.

Employees at the Institute should continue to contact their Personnel Officers to apply for positions for which they feel they qualify.

Dick Higham 3-4278
Pat Williams 3-1594
(secretary - Dixie Chin)

Virginia Bishop 3-1591
Mike Parr 3-4266
Philip Knight 3-4267
(secretary - Joy Dukowitz)

Sally Hansen 3-4275
Jack Newcomb 3-4269
Evelyn Perez 3-2928
(secretary - Mary Ann Foti)

Ken Hewitt 3-6512
Carolyn Scheer 3-6511
(secretary - Ellen Schena)

Technical Asst., Acad. Staff, in Biology will maintain cell culture lines; prepare media, harvest plate and clone cells; provide general assistance with biochemical procedures involving RNA and protein synthesis on organisms including mammalian tissue culture cells, cellular slime molds, RNA viruses. BS or MS in Biology or Chemistry required. Cell culture experience preferred. Recent graduates, please submit list of relevant courses taken. C75-6 (3/26).

DSR Staff in Center for Space Research will participate in prepara-

tion, test and calibration of X-ray, astronomy satellite experiment (Focal Plane Crystal Spectrometer for High Energy Astronomy Observatory X-ray telescope); prepare data analysis system; participate in scientific planning of observing program; collect, analyze and publish data. Ph.D. in experimental physics, laboratory experience required. Familiarity with X-ray techniques, X-ray astronomy and experience with satellite experiments desirable. D75-58 (3/26).

DSR Staff, temporary, in Artificial Intelligence Lab will participate in the design of new learning environments for children and in development of learning theory; design and build equipment; write descriptive material, teach. EE or Physics degree, knowledge of electronics, computers, machine shop experience, ability to design and build prototype control and sensing circuits required. Temporary through 9/30/75. D75-56.

DSR Staff in Lab for Nuclear Science (Linear Accelerator Lab, Middleton, Ma.) will provide instrumentation development, operation and data handling support for research group in electron scattering and other programs. Strong EE or Physics background at BS level, or equivalent, minimum 5 yrs experience in nuclear instrumentation including Scintillation, Solid State and Multi-wire Proportional Counters, Nanosecond Digital and Analogue Electronics, CAMAC required. PDP 11/45 experience helpful. D75-55 (3/26).

DSR Staff, temporary, Systems Programmer in Lab for Nuclear Science (Linear Accelerator, Middleton, Ma.) will assist in maintaining and extending RT-11 and RSX 11-D real-time operating systems on PDP-11/45 computers with a variety of nonstandard peripherals: intersystem files compatibility on DEC, magnetic tapes, DEC pack and century discs; compatible graphics packages on Tektronix 4010, Gould 5000 and GT-40 graphics hardware. Thorough knowledge of DEC PDP-11 machine code and I/O handling, experience in mini computer graphics, real time systems and graphics hardware required. Temp. through 8/31/75. D75-57 (3/26).

Admin. Staff, Area Coordinator, Office of Administrative Information Systems, will analyze and resolve problems of an assigned area of operating business systems; develop modification specifications for present systems; schedule and control tasks to meet deadlines; direct and coordinate work systems analysts, programmers as required; oversee testing of changed programs; act as client liaison and as applications programmer as required. Applicants should have business and administrative experience, analytical ability and knowledge of programming. A75-15 (3/26)

Admin. Staff, District Officer, in Resource Development will coordinate volunteer solicitors in major geographic areas. Out of town travel necessary 50% of the time. Familiarity with MIT required for effective representation as well as poise and ease in dealing with people, demonstrated initiative and ability to work independently, good oral and written communication skill. A75-16 (3/26).

DSR Staff in Joint Center for Urban Studies will conduct research on real estate economics for study and model development of neighborhood evolution and decline. Ph.D., or equivalent, familiarity with operations of participants in real estate sector of economy (bankers, insurers, builders, etc.), computer programming ability (preferably FORTRAN IV), experience in data gathering and analysis of real estate sector, willingness to assume design and implementation of a component of the overall project required. Position will terminate December 31, 1976. D75-52 (3/12).

DSR Staff in Joint Center for Urban Studies will conduct regional economics research for study and model development of neighborhood evolution and decline. Ph.D., or equivalent, familiarity with regional economics, data sources of business activity locations in metropolitan areas, experience in computer programming and simulation (preferably FORTRAN IV), and willingness to assume design and implementation of a component of the overall project required. Position will terminate December 31, 1976. D75-53 (3/12).

DSR Staff, part-time, Tech. Asst, in Arteriosclerosis Center will process plasmas for cholesterol, triglyceride and lipoprotein quantitation procedures; run and maintain Technicon Auto Analyzer I; maintain patient records and run ultracentrifuge. Clinical chemistry and hematology background, ability to work with minimum supervision; previous lab experience desirable. 20 hrs/wk. D75-50 (3/12).

(Continued on page 10)

Positions Available

(Continued from page 9)

Admin. Staff, Sr. Staff Accountant, in Comptroller's Acctg. Office will supervise disbursement and system control functions of several payrolls; coordinate input from several sources into one cycle for delivery of checks, reports and documents; monitor all phases of system input by editing, updating, verifying; perform other reporting duties for outside agencies and other administrative offices. BS in Acctg. or equivalent education and experience, supervisory and communication skill required. Experience in university accounting and administrative computer systems desirable. A75-14 (3/5).

Admin. Staff, Director, Office of Administrative Information Systems/Assistant Director, Information Processing Services will have overall responsibility for operation of 70-employee office which provides information systems services to MIT administrative offices; oversee the delivery of timely, accurate reports to clients; interact with client offices on the development, implementation and design of new systems. Ability to identify and resolve problems in service environment, demonstrated skill in management of medium-sized organization required. Familiarity with MIT administrative environment and understanding of computer and information systems desirable. Please submit resume. A75-13 (3/5).

DSR Staff, Research Engineer, Civil Engineering, to work in area of transportation planning in developing countries. Experience in various phases of highway construction, familiarity with systems engineering, computer programming, highway networks and maintenance, implementation of program-developed software, particularly software analysis of rational pavement distress analysis required. SM, Civil Eng., and US citizenship required for foreign travel (approx. 3 mos/yr in E. African countries.) D75-46 (3/5).

DSR Staff in Energy Lab will develop computational models describing physics, fluid mechanics and heat transfer of energy converters (turbomachines, MHD generators, etc), particularly phenomena of electrode walls and other power take-off sections of MHD generators; develop and improve models of large advanced systems integrating such converters. Models include physical, engineering and economics of large systems. Ph.D. plus 5 years of experience in computational methods, plasma physics and fluid mechanics and 1-2 years experience in comp. methods of large engineering systems required. D75-45 (3/5).

DSR Staff, Economist/Econometrician in Energy Lab will participate in projects on development and application of models of domestic and international energy production and utilization; develop and apply econometric procedures to estimate parameters of simultaneous equation energy models; assist in model formulation and development of energy data and accounts in US and other industrialized countries, supervise junior staff and students, perform related duties as required. Ph.D. Economics, specifically mathematical economics and econometrics, experience in application of functional specifications, such as translog and generalized Leontief, familiarity with economic accounts of at least one foreign industrialized country required. D75-48 (3/5).

DSR Staff, temporary, in Project MAC Planner Group will write and implement programs in PLASMA and LISP. Experience in these languages required. Position runs June-August, 1975. S75-1 (2/26).

DSR Staff, Electrical Engineer, in National Magnet Lab, will perform daily operation of Low Field Lab; maintain sensitive magnetic detectors and display equipment, design and construct new equipment, perform human body measurements. Laboratory-oriented person with knowledge of low-frequency electronics, and experience with magnetics and cryogenics is desirable. Candidate should be able to work with hospital patients and to do occasional evening and weekend work. 40 hr/wk. D75-7 (1/22).

DSR Staff, Biophysicist, in National Magnet Lab will supervise day-to-day operation of Low Field Lab where magnetic fields produced by the human body are measured, perform specific lab measurements, design lab equipment. Experience with low-frequency electronics, magnetics, heart and lung physiology required. Must be available for occasional evening and weekend work. 40 hr/wk. D75-8 (1/22).

Admin. Staff, Sr. Consultant Trainer, in Office of Personnel Development will have responsibility for planning, design and follow-up services related to training workshops, organization development; perform professional,

management and support tasks as a participating team member. Must be knowledgeable and experienced in organization development, career development, adult education, process-oriented group work with adults, and applied social science survey research. Applicants will present 1-2 hour training activity, including written proposal and report, for staff evaluation. Report, proposal and process documentation writing skill, Master's degree in behavioral science plus facilitation experience required. Knowledge of MIT/academic institutions helpful. A75-1 (1/8).

DSR Staff, in Joint Center for Urban Studies will be principal researcher on development of computer-based manpower information system for construction industry, labor unions. MBA, 2 years experience in industrial labor relations, working knowledge of construction industry, and ability to supervise program development and operational system required. 74-1484-R (1/8).

DSR Staff in Energy Lab will be involved in developmental work with coal gasification projects. Prior experience in development and related technological processes of coal gasification: computer simulation, construction of pilot equipment with minimal technical assistance and financial resources, data gathering, work with students inexperienced in research activities, and ability to meet project deadlines required. Advanced degree in Chem. Eng. is also necessary. 74-1428-A (12/11).

Subcontract Administrator, Assistant Director in Office of Sponsored Programs will work with project personnel in negotiating complex subcontracts; prepare Requests for Bids; review quotations; arrange for preaudit of proposed costs and negotiation of terms and conditions. Will also monitor active awards. Bachelor's degree in Business Administration or equivalent combination of education and experience, subcontracting experience in government agency or university environment, knowledge of procurement regulations of government agencies required. 74-1403-R (11/27).

Administrative Staff-Director of the MIT Press: Full responsibility for publishing program and operations of large university press. Direction of acquisitions, editorial, design, production, marketing and business activities. Program includes over a hundred books and several journals. Annual sales, about \$2.5 million. Substantial and varied experience in scientific and technological publications. 74-1397-R (11/20).

DSR Staff in Artificial Intelligence Lab will be responsible for maintenance and repair of PDP 11/45 computer and its peripheral equipment, debug software problems, recognize and correct hardware faults. Some PDP 11/45 programming and equipment experience, the ability to work effectively with students required. 74-1306-A (10/23).

DSR Staff at the National Magnet Laboratory will work on the Alcatraz thermonuclear experiment. Conceive, design, and carry out plasma diagnostic experiments using neutron, X-ray, optical, electrical, magnetic and microanalysis and assessment of data. Ph.D. in plasma physics or related area required. Familiarity with tokamak devices desirable. 74-1512-A (1/8).

DSR Staff in the Energy Lab must have minimum of 5 yrs experience in defining, securing, organizing and supervising research in heat transfer related to energy production and utilization. Familiarity with MIT; experience in supervising student theses, research and staff; Ph.D. in Mechanical Engineering required. 74-359-A (5/1).

DSR Staff, Engineer, in the Energy Lab will do experimental research in stratified charge internal combustion engines: design, construct and maintain experimental facilities and conduct basic experiments and data analysis with single cylinder test engine and rapid compression machine. BS in Mechanical or Aeronautical Engineering, some practical experience with mechanical systems and workshop practice required. D75-30 (2/29).

DSR Staff, Scientific Programmer in Earth and Planetary Sciences will work on analysis of celestial mechanics data from Pioneer, Venus, Orbiter, VLBI and other space-related projects; design, write, modify and run programs which format, analyze and display data results. Position requires 1 year applicable professional experience, advanced knowledge of FORTRAN and its application to scientific computing in an IBM 360/370 environment; understanding of debugging techniques and program code and design practices available to large program. Bachelor's degree in Math, Physics or engineering; knowledge of IBM/360 JCL and assembler helpful. D75-40 (3/5).

DSR Staff, temporary, Nuclear Engineering, will assist in project on *in vivo* Neutron Activation Analysis utilizing Cockcroft Walton neutron generator. Experiments involve phantom targets

and animal subjects. Coordinate data collection with other research agencies; carry out data analysis on Ge(Li) detector gamma ray spectra; program new data analysis systems. BS degree, experience in biomedical radiation physics, dosimetry measurements, chemical analysis for phantom development. New graduates, please submit list of relevant course taken, 40 hr/wk. Position runs March 1-August 31, 1975. D75-24 (2/12).

DSR Staff, temporary in Joint Center for Urban Studies will work on study of inter-regional migration; review data sources on US migration patterns; develop model and computer program for analysis; prepare written report. Ph.D. or equivalent in urban planning, graduate level study in sociology, experience in development of computer-simulated models, advanced programming capability required. Job runs 3/1/75-1/31/76, D75-26 (2/12).

Admin. Staff, Business Officer, in Harvard-MIT Program in Health Sciences and Technology will manage budgetary and administrative affairs of interinstitutional aspects of Program; prepare, maintain and control budgets, prepare grant applications, progress, manpower and patent reports; execute principal investigator and Steering Committee directives, act as subcontractor liaison. Knowledge of Public Health Service and MIT grant and contract regulations, accounting skills, experience with research proposal preparation and administration required. A75-9 (2/12).

Admin. Staff, Asst. Programming Coordinator, Office of Administrative Information Systems will review program specifications, assist in control of program, schedules, develop program standards, assist in staff education relating to new concepts, act as technical liaison for new systems development; design and write programs; perform other related functions as required. Experience with PL/1, COBOL and BAL required. A75-7 (2/5).

DSR Staff, Programmer in Project MAC Automatic Programming Group to work on the construction of a system to convert English descriptions of management information systems into PL/1 programs; refine syntax for expressing intermediate levels of system description; implement software for translation; determine and implement criteria for optimizing PL/1 program output. Knowledge of LISP 1.5 language, mgt. inf. systems implementation techniques and mathematics related to optimizing configurations in a stochastic environment required. Position begins 6/1/75. D75-20 (2/5).

DSR Staff, Programmer in Clinical Decision Making Group, Project MAC will supervise construction and clinical testing of computer system to advise physicians regarding the administration of digitalis. Familiarity with pharmacokinetics of digitalis and its clinical administration, general medical knowledge including cardiovascular physiology, thorough knowledge of LISP 1.5 and ITS operating system required. D75-19 (2/5).

DSR Staff, temporary, Programmer, in Project MAC will design and implement multi-variate Laurent and pusieux series expansion system and combinatorial simplification routines. Several years of experience in programming of symbolic manipulation algorithms, LISP and ITS experience. BS and/or MS, Math, required. Temporary through August 31, 1975. D75-18 (2/5).

DSR Staff, temporary, part-time, in Joint Center for Urban Studies will develop and administer telephone interviews to explore status and social stratification; code and keypunch other questionnaire data. BA in sociology, some experience in design and administration of survey research instruments, knowledge of SPSS and other statistical instruments for programming required. Recent graduates, please submit list of relevant courses taken. 21 hrs/wk. Temporary through 6/30/75. D75-29 (2/19).

Technical Assistant, Acad. Staff, in Nutrition and Food Science will perform specialized and routine chemical analyses on body fluids; operate and maintain mass spectrometer, Beckman automated amino acid analyzer; assist in new methodology development; occasionally supervise other lab personnel. BS, chemistry, biology or medical technology and minimum 2 years experience in clinical chemistry required. C75-4 (2/5).

DSR Staff, Senior Research Engineer, Energy Lab, will perform research functions in Magnetohydrodynamics Test Facility including the design of high temperature electrode insular test modules; fabrication of ceramic compositions by sintering, melting, flame spraying; design diagnostic equipment for measurements in MHD test channel. Will assist graduate students with experiments; write technical progress reports. Ph.D. in Ceramics, 5 yrs. experience in high temperature materials test and characterization equipment (SEM, Microprobe, Instron, etc.) required. D75-15 (1/29).

Exempt, Asst. Account Representative, in Comptroller's Acctg. Office will act as Institute liaison with employees, students, organizations in matters of credit and collection through written correspondence and personal contact; prepare aging reports, payroll notices and other related material. 4-5 yrs. accounting experience, specifically in credit, collection required. Tact, good judgment also necessary. E75-8 (3/19).

In-patient Staff Nurse, Exempt, in Infirmary will do bedside nursing and may assist with emergency and first aid treatment. Mass. licensed RN with 2 yrs experience in medical/surgical nursing required. First-aid or emergency clinic experience desirable. Must be able to work all shifts and weekends on rotating basis. (40 hrs) E75-5 (3/5).

Clinic Nurse, Exempt, in Emergency Clinic will evaluate and treat patients, administer first aid and admit patients as necessary. Mass. licensed RN with 2 yrs. clinic experience, preferably in emergency room required. Must be able to work permanent evenings (4pm-12am) and rotate all weekend shifts. (40 hrs) E75-6 (3/5).

Administrative Assistant, Exempt in Civil Engineering Student Information Office will have responsibility for operation of office, including implementation of academic policy decisions, maintenance of student records and statistics, coordination and editing of catalog copy, counseling of students, recording secretary for departmental committees. Knowledge of MIT policies and procedures, ability to operate independently, organization and office management skills required. Bachelor's degree preferred. E75-1 (1/22).

Engineering Assistant, Exempt in the National Magnet Laboratory will set up experiments and take measurements of magnetic fields produced by humans and animals. Will work with hospital medical groups. Experience in biomedical research; strong experience in low frequency electronics; knowledge of magnetics and cryogenics required. Flexible schedule necessary for occasional evening or weekend work. 74-1033-R (8/28).

Tech. Asst. IV part-time, in Psychology Dept. neurophysiology lab will be involved in mammal motor control and coordination research. Primary duty is care, feeding and training of animals; will also manufacture testing equipment, assist in laboratory procedures, in data analysis and in general upkeep of lab. Familiarity with elementary electronics and digital logic helpful. High school graduate, or equivalent, required. 30 hr/wk. B75-79 (3/5).

Admin. Asst. V in Lab for Nuclear Science will handle secretarial and administrative duties for 40-member research group; type technical material; reports; arrange travel; maintain files; proofread articles for publication. Position requires travel overseas and to other US facilities (NY, Illinois) for varying durations. Applicants should be able to speak and write German and French fluently. B75-112 (3/26).

Secretary V in Resource Development will take and transcribe dictation; maintain busy calendar; schedule meetings; make travel arrangements; maintain files, supervise part-time secretary; independently organize and carry out varied projects including research of topics. Minimum of 2 years experience, shorthand, organization skill required. College training desirable. B75-114 (3/26).

Admin. Asst. V to Director, Fossil Fuels Program, Energy Lab, will handle administrative and secretarial duties: type, edit, verify accuracy of technical material; independently compose correspondence; coordinate work of other secretary during peak loads; arrange meetings, travel; assist in registration process and perform other duties as required. Individual may monitor accounts and set up library. College degree, 5-7 yrs secretarial experience, knowledge of MIT procedures required. B75-85 (3/5).

Secretary V to Civil Engineering Department will handle standard secretarial duties; act as liaison with public, administration, faculty, students; maintain affirmative action and publication lists; prepare and maintain confidential material and records; handle special projects as required. MIT experience and shorthand are necessary. Bachelors degree preferred. B75-98 (3/12).

Secretary IV-V, part-time, in Center for Space Research will assist other secretary in providing secretarial and administrative support for Director and Associate Director; arrange scientific meetings and travel for large groups, type from machine dictation and shorthand notes. Good typing, shorthand skill, mature judgment required. 15-20 hrs/wk. B75-107 (3/19).

Secretary IV to faculty and research group members in Nutrition and Food Science involved in food and biomed-

cal engineering; perform standard secretarial duties including shorthand and machine dictation; supervise part-time secretary. Secretarial school training, or equivalent, ability to use dictating equipment required. Knowledge of medical/biological and/or technical terminology helpful. B75-116 (3/26).

Secretary IV to Associate Director, Systems Dynamics Group: type and edit correspondence, manuscripts from handwritten and machine dictation; maintain files; arrange travel and appointments; research subjects as required. Excellent typing, organization skill, command of English grammar and minimum of 2 years secretarial experience required. Shorthand/speedwriting helpful. B75-121 (3/26).

Secretary IV to Materials Science and Engineering faculty members will handle general secretarial duties including typing technical papers, class notes, student reports; schedule travel and meetings; do occasional library research and type for 2 other faculty members. Secretarial skills and experience, preferably including shorthand/speedwriting, command of English language required. Technical typing and MIT experience helpful. B75-119 (3/26).

Secretary IV, part-time, in Civil Engineering will type statistical tables and charts; independently reply to standard requests; compose non-routine replies from oral instruction; arrange travel and appointments; keep course records; maintain accounts; assist students; Technical typing skill required. Knowledge of French, shorthand, editing skill helpful. 20 hrs/wk. B75-120 (3/26).

Secretary IV to professor in Nutrition and Food Science will type material including difficult terminology from machine dictation and handwritten copy; do some editing; make appointments. College degree, or equivalent, and at least 3 years responsible experience required. B75-101 (3/19).

Secretary IV to an Associate Director of the Alumni Fund. Will develop and maintain consolidated file for major gift development, compose some correspondence independently, arrange meetings, luncheons, do some statistical work. Good typing, shorthand/speedwriting, and some college training required. Flair for writing and financial public relations background helpful. Will be trained to use IBM Auto Typist. B75-86 (3/5).

Secretary III-IV to two Physics faculty members: will type technical manuscripts; course material; handle sponsored account records; assist students and others visitors to office. Technical typing skill required. B75-113 (3/26).

Secretary III-IV in Project MAC to two faculty members will type technical material, general correspondence; arrange schedules; maintain files; Excellent technical typing skill, knowledge of office procedures required. MIT experience desirable. B75-111 (3/26).

Secretary III in Chemical Engineering will handle general secretarial and receptionist duties for several faculty and research staff; type technical reports, course material from handwritten notes and machine dictation. Fast, accurate typing; ability to work independently required. Technical typing skill helpful. B75-117 (3/26).

Secretary III in Medical Department Business Office will perform varied duties related to medical insurance plans; verify printout data on membership and claims, type enrollment applications and other materials; prepare deduction forms; post payments; verify payment receipts. Accurate typing skill, ability to handle a variety of details required. Previous office experience desirable. B75-102 (3/19).

Secretary III to faculty and staff in Center for Space Research Man-Vehicle Laboratory will perform general secretarial duties requiring excellent typing and dictaphone skills. Medical terminology desirable. B75-90 (3/12).

Sr. Clerk IV in National Magnet Lab will type letters and various forms, process invoices for payment, reconcile accounts, prepare budget reports and perform related duties as required. High school graduate, or equivalent, typing skill, previous office experience required. B76-84 (3/5).

Sr. Clerk IV in Earth and Planetary Sciences will assist secretary in duties for 4 faculty members: have primary responsibility for monitoring several research accounts (review statements, expenditures); also file, arrange travel, answer phones, do library research and some typing. Ability to handle a variety of administrative and clerical duties required. College training, communication skills helpful. B75-100 (3/19).

Sr. Clerk IV-V, Accounting Assistant, in Sponsored Accounting Section, Comptroller's Accounting Office, will tabulate sponsored project research expenditures and cash flow; collect forecast data; maintain daily balances;

prepare monthly billings and fiscal reports. General business background plus 2-4 yrs. accounting experience required. Typing skill desirable. B75-99 (3/12).

Sr. Acctg. Clerk IV in Earth and Planetary Sciences will monitor several accounts, process accounting and payroll material; maintain current records to assist in budget proposal preparation and purchasing decision; perform related duties as required. Some typing may be included in position. Ability to handle detail and work with figures required. Accounting background helpful. B75-89 (3/5).

Sr. Clerk III-IV to the Director of Purchasing and Buyer for Furniture and Office Equipment will handle a variety of clerical duties. Accurate typing required for correspondence, purchase orders, budgets, price lists; process invoices; maintain log books, files and schedules. Ability to determine priorities, to deal with figures and details, and to work with frequent interruptions required. B75-83 (3/5).

Clerk III in MIT Press Journals Department will process subscription orders through computerized system; type invoices; handle other aspects of subscription process (claims, cancellations). Typing skill required. Familiarity with computerized business systems and interest in publishing field helpful. B75-115 (3/26).

Clerk III, Receptionist in Environmental Medical Service will answer phones, greet visitors, do general and technical typing, deliver materials to other Institute offices; perform other general office duties. Pleasant telephone personality, poise in dealing with people, good typing skill required. B75-109 (3/19).

Tech. Typist II-III in Comptrollers Acctg. Office, Transfer Voucher Section, will type various accounting and other reports, use adding and mimeograph machines. Typing skill and ability to operate above equipment required. B75-94 (3/12).

Technical Typist III, part-time, in Chemical Engineering will type reports, manuscripts, proposals from rough drafts and with use of word-processing equipment. Excellent typing, organization and grammatical skill, technical typing (or willingness to learn), necessary. Work will be coordinated by secretarial supervisor. Morning segment of job-sharing position. 15-20 hrs/wk. B75-38 (1/29).

Clerk II in Medical Department, Records Room will obtain medical records in response to telephone and written requests, check records for required forms; file material into records; assist with maintenance of index file; answer telephone. Speed and accuracy with detailed work, capacity to be on one's feet all day required. 40 hr/wk. B75-118 (3/26).

Clerk Typist II in Industrial Liaison Office will assist in the distribution of publications to member companies; maintain records of available reports, compile statistics, file, reproduce and mail weekly activity report; maintain postage meter and xerox machine. Good typing and organization skill required. B75-103 (3/19).

Telephone Operator II, temporary, in Telecommunications will perform a variety of general switchboard functions for assisting callers. Previous training and experience on Centrex switchboard desirable. Ability to follow directions; use judgment, deal courteously with callers essential. 4-day wk; 8 1/2 hrs/day. Variable schedule, some weekend and holiday work. Temp. to 6/30/75. B75-104 (3/19).

Tech A (E-M), for the Radioactivity Center will assist in laboratory, research or analytical work; operate technical experimental apparatus. Maintain electronic equipment associated with controlled low-background facility, breath radon, thoron equipment. Troubleshoot nuclear pulse instrumentation, construct, wire, perform routine tasks associated with measurement of subjects and administration of laboratory. Strong background in pulse and digital circuits; experience in use of oscilloscopes and test instruments required. 74-922-R (12/18).

The following positions have been FILLED since the last issue of *Tech Talk*:

| | |
|----------|-----------------|
| B75-79 | Tech. Asst. IV |
| A75-8 | Admin. Staff |
| B75-95 | Clk-Typ. III-IV |
| D75-14 | DSR Staff |
| B75-91 | Secretary III |
| B75-88 | Secretary V |
| 75-858-A | DSR Staff |
| B75-110 | Secretary III |
| A75-3 | Admin. Staff |
| B75-77 | Secretary III |
| B75-96 | Sr. Clerk III |
| C75-5 | Acad. Staff |

The following positions are on HOLD pending final decision:

| | |
|----------|-------------------|
| E75-4 | Exempt |
| D75-32 | DSR Staff |
| H75-8 | Emerg. Med. Asst. |
| 75-182-R | 2nd Cl. Eng. |

Incentives Needed to Spur Housing Market

(Continued from page 1)
next six months and completed within a year.

Senator Brooke, in a statement accompanying the introduction of the legislation, said: "Before proposing this plan I considered a number of other approaches. Economic analysis indicates that the home purchase incentive program will have a far greater and more certain effect on new housing production than a temporary, shallow, mortgage interest subsidy-program."

Dr. Bernard Frieden, director of the Joint Center for Urban Studies, noted that the new plan is an outgrowth of the Center's research interest in the causes and effects of instability in housing construction. "The roller-coaster of housing production in the United States is one of the chief obstacles to meeting the country's pressing housing needs," he commented. "It destabilizes the housing industry, adds greatly to our unemployment problem, and ultimately the consumer pays the bill. Dr. Rosen's analysis of seasonal and cyclical changes in housing starts has been a path-breaking piece of work, and his current proposal is an excellent application of academic research to public policy."

Dr. Rosen, in testimony presented earlier this month to the Senate housing subcommittee and the Committee on Finances, said

the housing market in 1975 "is facing a demand crisis, not a mortgage credit crisis."

"Not since the Great Depression has the effective demand for housing looked so weak," he continued. "This demand crisis, caused by rising unemployment, falling real income, and a lack of consumer confidence, has begun to feed upon itself and threatens to create a depression-style collapse in economic activity. Because of this demand crisis and because of the large builder inventories of unsold homes, those who look for a sharp recovery in housing to lead to an economy-wide recovery may be tragically disappointed."

The incentive proposal will be more effective than other sugges-

55 NSF Fellows to

Come to MIT
Of the 550 first and second year graduate students winning National Science Foundation fellowships in 1975, 51 Fellows—nearly 10 percent of the total—have indicated MIT as their fellowship institution.

Eleven of the 51 students who chose MIT completed their undergraduate work at MIT. Six are currently first year graduate students at MIT and 35 will come from other universities. In addition, 10 Fellows who earned their SB degrees at MIT have received NSF grants to study elsewhere.

The NSF Fellows were selected from more than 5,770 applicants who competed on the basis of

merit. Of the 550 fellowships granted, 146 were given to women. This year, NSF awarded 25 more graduate fellowships than were awarded in 1974.

All of the fellowships carry a stipend of \$3,600 per year for full-time study and an educational allowance of \$3,000 is provided by NSF to the US institutions in lieu of tuition and fees.

Each fellowship is awarded for three years of graduate study and may be used over a five-year period, allowing Fellows to teach or become research assistants for a year or two without the loss of the fellowship.

Normally graduate work would be expected in order to qualify for a grant. Applicants are required to submit an application containing relevant biographical information along with an outline of their proposed study. Grants will be offered for studies requiring a period of work between six and 12 months. Deadline: April 30, 1975.

MIT Club Notes

A'nanda Ma'rga—Meditation classes Tues, 1:30-3:30pm, Stu Ctr Rm 407 and 8-10pm, Rm 36-153; Wed, 10am-12n, Stu Ctr 407.

MIT Ballroom Dancing Club—The club will be very active this term, with regular workshops, lessons & dances. For specific info watch for signs, or call Pete "Twinkle-Toes" Travis, 536-1300.

Bridge Club—ACBL Duplicate Bridge. Open pairs Tues, 6-9pm & Thurs, 7-10:30pm. Multi-week team of 4 events Fri evg & Sat aft (separate events), call for details. Intermediate Lessons: Thurs, 6:45pm, nonexpert pairs games 7-8:30pm. All events Stu Ctr Rm 473. Jeff, 864-5571.

MIT/DL Bridge Club—ACBL Duplicate Bridge. Tues, 6pm, Stu Ctr Mezzanine Lge.

Goju Karate Club—Mon, Wed, Fri, 7-9pm, Stu Ctr Rm 407. Black Belt instructors. Cost: \$10/semester. Terry, 524-1251 or Shawn, x3-2018.

MIT Gospel Choir—Members and musicians needed. Rehearsals are Sun, 4-6pm, Stu Ctr Rm 407. Those interested are encouraged to attend.

MIT Guild of Bell Ringers—Change ringing done on tower and handbells; tune ringing on handbells. Change ringing Tues, 7pm, 1st Church Advent, Bos; Thurs, 6:30pm, Senior Hse (crafts, 1st fl); tune ringing Sun, 7pm, Senior Hse. Info: Ruth Cross, x0669 Dorm.

Hobby Shop—Mon-Fri, 10am-6pm, Rm W31-031. Fees: \$10/term for students, \$15/term for community. Info, x3-4343.

MIT Karate Club—Shotokan style. Classes Mon, Wed, 8-10pm, duPont Wrestling Rm; Fri, 6-7:30pm, T-Club Lge. Beginners welcome.

MIT Kung Fu Club—Instruction in the art of Chinese boxing, Northern Praying Mantis style. Classes Tues, Thurs, 7-9pm, Stu Ctr Rm 407. Visitors welcome. Info, Dave Smith, 494-8663.

MIT Numismatic Society—Wed, 7pm, Theta Delta Chi (312 Memorial Drive).

MIT Outing Club—Mon & Thurs, 5-6pm, Stu Ctr Rm 461.

Student Committee on Educational Policy—Meeting Wed, Apr 2, 7:30pm, Rm 8-105.

Strategic Games Society—Offers opponents and discounts on merchandise to members plus gaming and periodical library. Info: Steve Simmons, x8265 Dorm or Gary Brennan, x0280 Dorm.

Student Homophile League—Meetings 1st & 3rd Sun of the month, 4pm, Rm 1-132. Info, talk, help in coming out, call Tom at the Hotline, x3-5440. Come on out—the water's fine!

MIT Tae Kwon Do Club—Beginner and advanced classes. Tues, Thurs, 5-7pm, Stu Ctr 491.

TCA General Meeting—Plans will be discussed for Kaleidoscope, the Apr 12 dinner, next workday, course evaluation. Old & new

\$35,000 bank loan. Thus, this double multiplier effect is extremely potent. Each dollar of government expenditure brings forth \$12 in private money."

A further advantage, Dr. Rosen said, is that his proposal is a "one-shot program which concentrates all expenditure in the current year. There is no long budgetary tail stretching far into the future."

While the incentive plan may resemble the recent and apparently successful auto industry rebate plan, Dr. Rosen said it is derived instead from a similar Canadian program in the early 1960s.

Dr. Rosen urged the Senate subcommittee to make the program truly countercyclical by including a trigger mechanism that would automatically activate or deactivate the plan.

"Thus when start activity falls below certain floor levels or unemployment in the construction industry or the entire economy (depending on the plan) rises above certain levels, efforts to stimulate the housing and mortgage markets should begin.

"I would suggest that programs to aid the housing industry be triggered by the failure of housing starts to achieve some floor level (say 1.7 million units) for three consecutive months.... In addition the program must be immediately deactivated if starts exceed the floor level for three consecutive months."

members welcome. Tues, Apr 1, 7:30pm, Stu Ctr Rm 450.

MIT Unicycle Club—Unicycle riding & basketball. Sun, 11am, Walker gym (Rm 50-340). Beginners welcome. Info: come, or call Mike, x0680 Dorm.

MIT Wheelmen—Meetings Tues, 7:30pm, Rm 1-203.

MIT Women's Choral—Wives and working members are encouraged to join. Thurs, 8pm, Rm 10-340.

Religious Activities

The Chapel is open for private meditation 7am-11pm daily.

Baha'i Discussion Group—Thurs, 7-9pm, Rm 8-105. Dale, 354-1907.

Campus Crusade for Christ/College Life—Family time, singing, prayer, teaching from God's word. Fri, 7:30pm, Rm 37-252.

Catholic Belief Classes—Study group to look deeper into the Catholic faith. Thurs, 8pm, 2nd fl seminar rm, Bldg W2.

Christian Science Organization—Weekly meetings, including testimonies of healing. Tues, 7:15pm, Rm 8-314.

Hillel Services—Fri: Traditional 6:15pm, K kosher Kitchen; non-Traditional 8:30pm, Chapel. Sat: Traditional 9am, Chapel. Mon-Fri, Minyan 7:30am, Rm 7-102. Tues, Apr 1: 5:15pm, K kosher Kitchen (Mincha, Maariv). Wed, Apr 2: 9am, Chapel (Shacharit, Musaf); 7:15pm, K kosher Kitchen (Mincha, Maariv). Thurs, Apr 3: 9am, Chapel (Shacharit, Musaf).

Interdenominational Holy Communion Service—All members of the Institute welcome. Wed, 5:05pm, Chapel. Revs Parvey and Crocker.

MIT Islamic Society—Congregational prayers Fri, 3:15pm, Kresge rehearsal rm B; discussion session Sat, 4pm, International Stu Lge (2nd fl Walker). Refreshments.

Maulid Un Nabi—MIT Islamic Society celebration of the birthday of Prophet Muhammad Fri, Mar 28, 7:30pm, Sala. The 2 1/2 hour program includes speeches, children's presentations, prayers, refreshments. Community invited.

Lenten Prayer Group—Fri, 7:30pm, Interfaith (Bldg W2) bsmt. Will follow theme of Sun readings.

Prayer Time—Lunch hour prayer and Bible class led by Miriam R. Eccles. Fri, 1-2pm, Rm 20E-226a.

Prophets—Wed, 12n, 2nd fl seminar rm, Bldg W2. Bring lunch, drinks provided. Discussion of Old and New Testament Prophets.

Roman Catholic Mass—Sun, 9:15am, 12:15pm & 5:15pm; Tues & Thurs, 5:05pm; Fri, 12:05pm; Chapel. Good Friday, March 28, Mass 12:05pm, meditation 1-3pm, Chapel.

United Christian Worship Service—Sun, 10:45am, Chapel.

United Christian Fellowship—Sunday school and nursery for infants and children during United Christian Worship Service. Sun, 10:45-12n, Stu Ctr Mezzanine Lge.

Vedanta Society—Services Fri, 5:15pm, Chapel. Swami Sarvagatananda will lead meditation & Gita discourses.

INSTITUTE NOTICES

Announcements

Irwin Sizer Award—Nominations are being accepted for the Sizer Award for the most significant improvement to MIT education. The award may be given to any person, group, or organization, with a \$150 cash award for the project involved. Nominating letters, including supporting reference material, should be sent to the Sizer Awards Committee, c/o GSCAPP, Rm 50-110, by Mon Apr 7.

Spring Academic Midway—Wed, Apr 2, 2:30-4:30pm, duPont Gym. This is a good opportunity for freshmen and undesignated sophomores to meet and talk with people from a variety of departments, labs, projects, etc. Info: x3-6771.

Playwrights—WTBS, 88.1 FM, is soliciting original radio plays, maximum one hour, no pay. If you want it returned, send a self-addressed, stamped envelope with the play to WTBS FM, Walker Memorial. Info: Chris, x3-4000.

MIT Concert Band—People needed for spring term. Activities include Bicentennial Concert at City Hall Plaza, May concert, possibly a mini-tour. Rehearsals Mon & Wed nights, Kresge. x0669 Dorm.

MITV News—News program in & around MIT during the week. Fri, 9am-5pm, Bldg 10 Lobby.

BSO Discount Tickets—Tickets for Wed, Apr 2 open rehearsal are now available at TCA, Stu Ctr Rm 450, x3-4885, 11am-3pm.

Summer Softball—Persons wishing to umpire for the fast-pitch softball league (June 9-Aug 15) should take the officiating course offered Tues & Thurs, 12n or 1pm, duPont conference room. First class Thurs, Apr 3. Sign up duPont Lobby Mon, Mar 31, 1-3pm or Tues, Apr 1, 10am-1pm or 2-3pm. Info, Sam Benichasa, x8-3686 or x8-3661 Draper.

New UROP Listings

For more detailed information on UROP opportunities listed, MIT undergraduates should call or visit the Undergraduate Research Opportunities Program Office, Room 20B-141, Ext. 3-5049 or 3-4849 unless otherwise specified in the listing. Undergraduates are also urged to check with the UROP bulletin board in the main corridor of the Institute.

Arthur D. Little Cambridge
1) Cancer Chemotherapy—The goal of this project is to devise ways of increasing the therapeutic effectiveness of drugs by decreasing their toxicity. Using laboratory animals, the effect of hypothermia on drug toxicity will be studied. 2) Location of Catheters—Directed

at developing a precise method which does not depend on x-rays or palpation for locating the end of a catheter in airways. Both projects are offered for credit only.

Raytheon Service Co. Burlington
Resource Recovery from Wastes—A project on the recovery of nonferrous metals will involve testing and modifying existing equipment which uses electromagnetic forces to separate non-ferrous metals from mixed solid waste or auto scrap. The project will have practical significance and the results will be considered in the design of full-scale recovery plants.

Massachusetts General Hospital Boston
The following projects are offered for students with some biochemistry background. 1) Auto-Immune Phenomena of Degenerative Arthritis—The use of immunological methods for the detection of auto-immune antibodies in the serum of patients with degenerative joint disease. 2) Isolation and Purification of Enzymes from Osteoarthritic Human Cartilage—Extracting enzymes from cartilage, fractionating cartilage extracts using chromatographic methods and testing for enzyme activity. 3) Nuclei Acid Precursors as Modulators of Protein Synthesis—Isolation and disc electrophoretic characterization of nucleic acids (RNA, DNA), determination of nucleotide pools in cartilage and alterations in the synthesis of tissue components following stimulation by nucleotide precursors. 4) Effect of Substrates on the Prevention of Experimental Osteoarthritis—Rabbit surgery will be performed to produce an osteoarthritic type lesion, various agents will be administered to the animals, and biochemical tests will be performed on the tissue to monitor any metabolic alterations. 5) Isolation and Characterization of Chondrocytes from Normal and Osteoarthritic Cartilage.

MITRE Corporation Bedford
MITRE is developing a series of software systems called security kernels that offer a sufficient basis for secure computer operation. A student would be expected to familiarize himself with the security kernel design and verification efforts in sufficient depth to understand the relative importance of each phase of the techniques involved. Then the student would measure the development time and costs for each phase of the PDP-11/45 security kernel designs and establish a framework for making these measurements for the current Multics security kernel development. Car needed for transportation to Bedford. Pay or credit available.

Graduate Studies

The following brief descriptions of selected graduate fellowships have been received recently by the Graduate School Office. More complete descriptions are available in the office, Rm 3-136.

NATO Committee on the Challenges of Modern Society Fellowship Programme

The Programme is designed to stimulate serious study of public policy in relation to natural and social environment. Priority consideration will be given to proposals in the following areas: 1) environmental impacts related to energy, 2) solid waste disposal and recycling, 3) advanced programs for the care and well-being of older citizens, and 4) selected aspects of noise pollution. Proposals dealing with the purely scientific or technical aspects of environmental protection will generally not be taken into consideration. Fellowship grants are available to any national or permanent resident of NATO member coun-

Natural Gas Is Most Serious Energy Difficulty

By PAUL W. MacAVOY

The energy industry in most serious difficulty at the present time is natural gas production and distribution. At various times in the last few years, petroleum, electricity and coal companies have been unable to deliver supplies sufficient to meet national demands, but these periods were very short and the causes for the shortages have been dealt with or can be dealt with in the near future by policies put before the House of Representatives. This is not true for natural gas.

There have been persistent and growing shortages of natural gas. These shortages affected most parts of the country first in 1971, when interstate gas distributors were 3.7 percent short of meeting consumption demands of communities and industries. The shortages are clearly going to exceed 10 percent of demands in the 1974-1975 winter heating season.

The exact size of the excess demand is not known, since many retail utilities have long since disallowed the introduction of service to new customers so that their excess demands are not registered. But, of national deliveries of approximately 24 trillion cubic feet in recent years there have been demands for at least 3 trillion cubic feet more given opportunities to connect to distribution systems.

There is small prospect for reduction of shortages in the next five years. Unless there are large, unexpected discoveries, or unless Federal Power Commission (FPC) regulation changes in some unforeseen way, excess demand is expected to grow to more than one-quarter of total demands by 1980. This is not only the prediction of econometric models at MIT and the American Gas Association, (AGA), but that also of the FPC staff of gas experts.

Indeed, the FPC staff forecasts that, assuming continuation of present-day regulatory conditions, the shortage will be larger than 30 percent of demands by the end of the decade.

Not all regions of the country are expected to get the same amount

of shortage. Consumers in the North-Central, the Northeast, and the Southeast—in that order—will incur most of the shortage, as they have in the last few years. New residential buyers, and new as well as old industrial buyers in these regions, will be eliminated from most distribution systems. By the late 1970s shortages in the North Central region are expected to be so great that all industrial and commercial establishments will be eliminated from gas distribution systems. This will have to be done so that there will be enough gas to meet the demands of households on the system since the middle 1960s. In the Northeast and Southeast parts of the country only one-half of industrial demands will have to be curtailed, according to the present outlook.

Most detailed forecasts show these conditions for 1980. Industry forecasts, as exemplified by the American Gas Association TERA model forecasts, show shortages as large as 25 percent by 1977 out of demands of only 30 trillion cubic feet. FPC staff forecasts are similar to the AGA forecasts. The MIT econometric model indicates that shortages will be slightly less in 1977 out of demands of approximately 33 trillion cubic feet. The Federal Energy Administration (FEA) *Blueprint* forecasts show little-to-no shortage at all, because of the absence of any growth of demand; this is a defect in the model caused by the inappropriate fitting of regression equations to data from early in the 1960s. Ignoring the FEA *Blueprint* forecasts, there would seem to be general agreement on the size of the shortage, if not on the size of demands. The demand forecasts of the FPC and AGA are low, for a number of reasons; using the MIT model demand forecasts, with supply forecasts of AGA and FPC produces shortages as large as 40 percent by the late 1970s. This more pessimistic view says that consumers as a group will not get almost half the gas they demand and that there will have to be curtailment of consumption in households in most of the north and eastern parts of the country by that time.

The conditions are the product of

the FPC's determination to "hold the line against increases in natural gas prices in the early and middle 1960s." The FPC in fact succeeded in keeping new contract prices approximately the same from 1961 to 1969, while prices for distillate fuel oil at wholesale increased by 15 percent, and coal increased by more than 25 percent. This made natural gas a desirable fuel for industrial boiler use in the states in which price controls could not apply and it dampened incentives for new exploration and development of gas by field producers. Reversals in regulatory policy in 1971 and thereafter were not sufficiently strong and rapid to reverse the long lags in discovery and production. The FPC has stopped short of deregulating new contract prices at the wellhead and, as long as it does, the shortage will persist.

Are there policies which, if put into effect, could ameliorate the shortage in the next few years? The Congress could pass legislation that allowed new contract prices to seek market-clearing levels over a reasonable period of time—for example, by phased deregulation in which price controls were put into effect by FEA for the expressed purpose of arriving at market-clearing prices in 1980 or 1981.

The MIT model forecasts that this could be achieved by taking new contract prices from the present control levels of 50 cents per thousand cubic feet (Mcf) to 65 cents right away, and then allow 5 cent per annum increases until a level of 90 cents were reached in the early 1980s. Under the assumption that oil prices will be approximately \$7 a barrel, and that the economy operates at full employment, with growth of 3 percent per annum, this should balance supplies of gas from new exploration with demands for gas at approximately 35 trillion cubic feet. Phased deregulation would prevent sharp price increases on new contracts—to the level of \$2 or more per Mcf—while achieving the longer term goals of eliminating the shortage and distributing gas to those who need it the most. Other forecasts indicate that the

MIT model may be producing optimistic projections. The AGA TERA model predicts equilibrium, but only at levels close to 25 trillion cubic feet at prices on new contracts 50 cents per Mcf higher than shown in the MIT model forecast. The Federal Power Commission staff forecasts, built on the assumption that supplies and demands are not responsive to price, surprisingly finds that supplies and demands are not responsive to price and therefore there is no way of eliminating the shortage through regulatory policies (other than by rationing).

Abandoning this last forecast, on grounds that it comes from an agency seeking to increase its authority over the gas industry, probably the best that can be said is that a policy of phased deregulation will produce somewhat more supplies, and eliminate excess industrial demands for gas, over the next five years. The policies may require more price increase than predicted by the MIT model, and less price increase than predicted by the AGA model. The best policy to follow would have FEA experiment with price changes that will be put into effect for two-year periods and would not increase by more than the rate of interest.

Other policies will not work as well. Excise taxes and windfall profits taxes would have the effect of reducing demand, but not adding to exploration and development of new reserves to increase production supply. It is forecast with the MIT model that excise taxes or windfall profits taxes would have to be equal to the new contract price in order to clear markets by 1980. This implies that, if the Federal Power Commission were to allow prices on new contracts to rise 70 cents per Mcf by 1980, excise taxes would have to be 70 to 80 cents per Mcf on new contracts to clear the market. The consumer would end up paying 50 cents more per Mcf for approximately 5 trillion cubic feet less gas than would follow from phased deregulation.

The same results would follow from a combination of deregulation and windfall profits taxes. As

now designed, windfall profits taxes would take the form of "taxes on excess prices" and would have the same implication for demands and supplies as excise taxes. If the windfall were to apply on prices above the present level—as indicated in most proposed bills—then it is very likely that prices would have to rise to \$1.50 to \$2 per Mcf, with excise taxes accounting for half the increase, in order for demands to be dampened to the appropriate level of supplies.

Of course if excess profits taxes were to apply on previous years' net incomes, rather than on prices, the effect might not be as substantial. But in the present circumstances it is likely that excess profits taxes would have the effect of raising prices to consumers, reducing total consumption and production of natural gas, while increasing the size of receipts to the Federal Treasury. This would not seem to be appropriate in a time of energy stringency and inflation.

In fact, phased deregulation without taxes would appear to be deflationary. This occurs because the gas shortage requires consumers to go without gas delivered at the equivalent of \$6 to \$9 per barrel of oil, and to replace this short gas with \$12 per barrel oil. If prices of gas are increased, so as to add to supplies and reduce the shortage, cheaper gas replaces more expensive oil. Combining the MIT econometric gas model with the Hudson-Jorgenson inter-industry energy model shows these effects. Gas deregulation in 1975 is forecast to reduce the GNP deflator in 1980 and to increase total consumption and production of energy and energy-related products. The solution to shortages and inflation would seem to be along the lines of phased deregulation of gas field prices.

(Dr. MacAvoy, Henry R. Luce Professor of Environment and Public Policy at the Sloan School of Management, delivered these remarks recently as testimony on natural gas policy problems before the US House of Representatives Ways and Means Committee.)

Colleges' Aid in Desegregation Plan Under Court Review

(Continued from page 1)

quality of the Public School System.

"We request immediate opportunities to explore with the masters and their advisors guidelines for developing constructive efforts and contractual relationships that engage the professional competences of our institutions within the current limits of our present capacities. As a first step to the earnest effort that each of us wants to make, we need more information and knowledge about ways and means to make effective contributions to improving the quality of the Boston School System."

"We are eager to indicate at the outset that our institutions do not desire to enter into the governing structure of the Boston School System.

"We are also aware of the wide variations in the capacities of our institutions and expect that these variations will be reflected in the contracts that may be drawn."

Three meetings were held on March 14 by Robert A. Dentler, Dean of the Boston University School of Education, and Marvin Scott, Associate Dean, to present the proposal to representatives of the 17 schools. Dr. Dentler and Dr. Scott are the experts appointed by Judge Garrity to assist the masters: Francis Keppel, former US Education Commissioner; Jacob Speigel, retired Massachusetts Supreme Judicial Court justice; Edward McCormack, a former Massachusetts attorney general, and Dr. Charles Willie, professor of education and urban studies at the Harvard Graduate School of

Education. All of the masters also were at the meetings.

Walter L. Milne, assistant to the chairman of the MIT Corporation and special assistant to President Wiesner for urban relations, attended the meeting in behalf of the Institute. Mr. Milne and the other university representatives were given a paper by Dr. Dentler and Dr. Scott entitled "Study Outline for Masters of Possible Higher Education Collaborative and Support Relations With Boston Public Schools."

The paper contained the specific assignments linking the 17 institutions of higher education with the Boston Public School System, assignments which the masters, in their report, called "pairings tentatively developed to date."

East Boston High School, city

school officials reported, has slightly over 1,571 students in grades 9 through 12. The 49-year-old building is located on White Street. The acting headmaster is Alfred Brewer. Dr. Leo Tarutz is assistant headmaster.

The Barnes Middle School on Marion Street now serves about 700 children in grades six through eight. A new middle school (referred to as the new Barnes school, but which may carry a different designation when it is named officially) will accommodate 1,000-1,200 students in grades six through eight. It is under construction on Border Street and is expected to be finished—but not ready for immediate occupancy—early in 1976. When the new school is occupied, the current Barnes Middle School will probably be used as an annex to the high

school, according to area superintendent Peter Ingeneri.

The other colleges and universities mentioned by the masters in their draft report are: Boston College, Boston State College, Boston University, Brandeis University, Bunker Hill Community College, Emerson College, Emmanuel College, Harvard University, Northeastern University, Regis College, Simmons College, Suffolk University, Tufts University, University of Massachusetts-Boston, Wellesley College and Wheelock College.

At a news conference March 21, during which their plan was explained to reporters, Dr. Dentler said that some "very resourceful" institutions of higher learning were missed in the masters' initial list. He mentioned Lesley College and Wentworth Institute.