

Dr. Killian Heads New NAS Study

Dr. James R. Killian Jr. has been named chairman of a committee formed by the Council of the National Academy of Sciences to study the relationships between science and technology and government.

Dr. Killian, former president of MIT and now Honorary Chairman of the Corporation, was appointed by President Eisenhower in 1957 as the first presidential science advisor.

The committee's main objective, the Council said, will be to suggest ways in which the contributions of science and technology "can most effectively be incorporated in the policy-making process so that their full potential" can be realized.

Both the national well-being and future progress require such a program, the Council said.

"Science and science-based technologies are relevant to virtually all agencies of the federal government and to the work of most committees of Congress," the Council said.

It said that the mechanisms "whereby policies and programs in these areas are planned, coordinated and monitored at the Presidential level" had evolved continually since Dr. Killian's appointment as the first Special Assistant to the President for Science and Technology.

But it noted that the President's Science Advisory Committee had

(Continued on page 8)

Underwater Robot Seeks Pollution Sources

By DENNIS MEREDITH
Staff Writer

Student engineers at MIT are developing a unique free-swimming underwater robot with an on-board minicomputer preprogrammed to guide the device. The robot will prowl coastal waters gathering oceanographic data or searching for the remains of sunken ships.

According to the student group, fleets of the torpedo-shaped submarine robots could become standard and inexpensive tools in oceanographic research.

The robot, funded by MIT and the MIT Sea Grant Program, is being developed by a dozen assorted undergraduate and graduate engineers under the sponsorship of Dr. A. Douglas Carmichael, professor of ocean engineering.

The robot is basically an eight-foot-long, 250-pound torpedo-shaped submarine with an aluminum body and fiberglass nose and tail. The MIT engineers will be able to load the robot with 50 pounds of scientific instruments, most prominently a movie camera and sonar device to function as the robot's eyes. Pressure tests indicate the robot can withstand depths of up to 600 feet, which is well within those found in coastal waters.

The computer brain of the robot

will be kept informed of the robot's position and underwater attitude by pitch, roll and depth sensors, and an electric compass. With this information, plus course and speed instructions preprogrammed into it by its operators, the robot will trace out a prescribed

Faculty Meets Today

A proposal for a new Institute requirement in humanities, social sciences and the arts will be presented at the monthly faculty meeting (Wednesday) in Room 10-250 starting at 3:15pm.

Other items on the agenda include:

A proposed change in faculty rules to add the associate provost as a member of the Committee on Educational Policy.

A motion from an ad hoc committee on end-of-term arrangements to move commencement, starting in 1975, to the second Monday following exam week (instead of Friday) and to make permanent the temporary policy of asking for grades to be turned in on Friday of exam week.

MIT Housing for Elderly Draws Praise

MIT last week drew warm praise both from the Cambridge City Council and from the Cambridge Committee of Elders, Inc., on the occasion of completion of MIT's \$17 million program to construct 684 new apartments for the city's elderly.

On Monday, the city council adopted a resolution sponsored by Mayor Walter J. Sullivan commending the university for the housing program—constructed on three different sites—which "was started some four years ago by MIT to help ease a critical housing shortage in Cambridge."

On Tuesday, Alfreda Simpson, president of the Cambridge Committee of Elders, Inc., and a resident of one of the apartment houses, presented a certificate of commendation to MIT in recognition of MIT's concern for and contributions to Cambridge senior citizens. Walter L. Milne, assistant to the chairman of the Corporation, accepted the certificate for the Institute.

The council resolution acknowledged conveyance of the final 304 apartments to the Cambridge Housing Authority and concluded:

"That this City Council go on record extending our sincere thanks and appreciation to the Massachusetts Institute of Technology for all they have done for the citizens of Cambridge and for their continued support for our various programs currently underway."

The apartment construction was carried out under the federal Department of Housing and Urban Development "Turnkey" program. Under Turnkey, a private developer—in this case MIT—acquires the sites, constructs the buildings and then conveys them "ready to turn the key" to the local housing authority.



Alfreda Simpson, president of the Cambridge Committee of Elders, Inc., left, presented a certificate of commendation to Walter L. Milne, right, with Catherine Hanley looking on.

At the time construction began in 1971 the MIT program was the largest Turnkey public housing development in the nation and the first Turnkey project ever to be sponsored by an educational institution.

Commencement Luncheon Replaced By Reception

An informal reception for graduates and their guests will replace the traditional commencement luncheon this year, according to Professor Ernest G. Cravalho, chairman of the Commencement Committee.

"We felt the commencement luncheon had become an overly

formal occasion," he said. "It is not as conducive to mingling of the new graduates, their families, and the faculty as we would hope."

Under the new arrangement, tents will be put up on Kresge Plaza for the reception, which will be held immediately following

commencement.

All persons attending commencement—graduates, their families and guests, faculty, alumni, etc.—will be invited. Faculty members who do not participate in commencement also will be welcome. Refreshments will be served. There will be no charge.

(Continued on page 8)

FY75 Energy Cost Will Hit \$5 Million

MIT could face a utility bill of \$5 million or more for the fiscal year that begins next July 1, Chancellor Paul E. Gray reported this week.

Oil costs—both to MIT directly and to utility suppliers—are the principal cause.

"When oil shortages began, we wondered if we could get by with whatever oil we could find," he said. "Now the question is can we pay for it?"

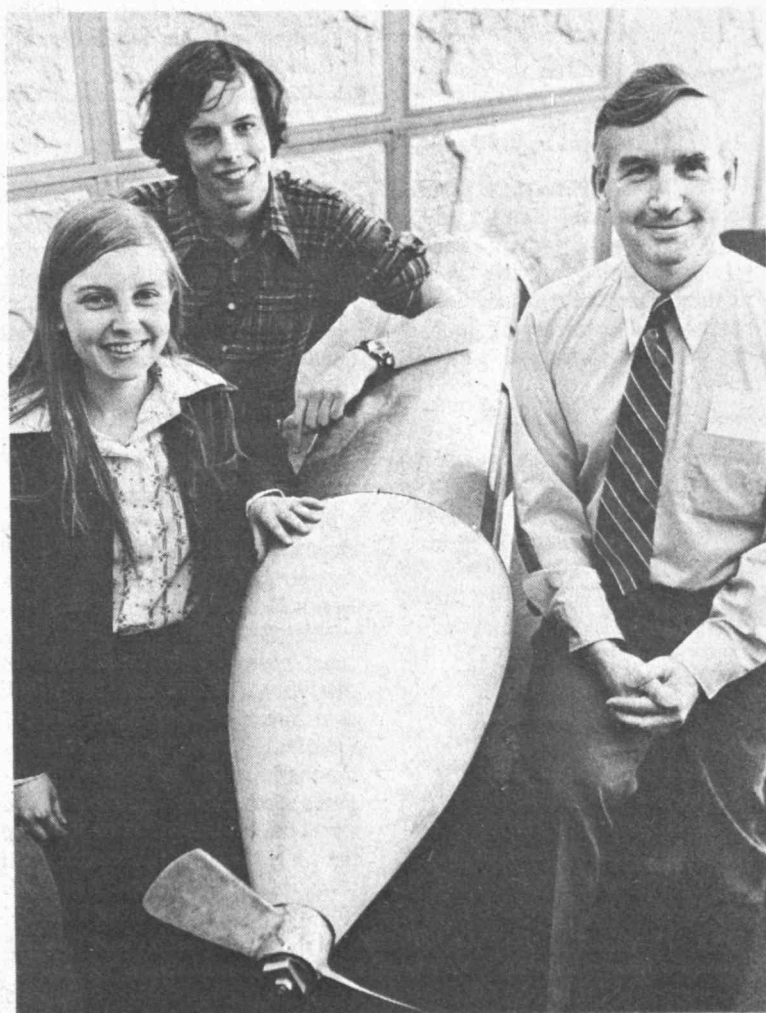
The university presently is paying from \$11.50 to \$13 a barrel for No. 6 residual oil, Dr. Gray said, and indications are these prices could go even higher before the current fiscal year ends.

"It now appears that our utility costs for this year will be at least \$4.5 million," he said. "We originally budgeted \$3.2 million and that included a 15 percent inflation factor."

"Unless there is some unforeseen break in the price of oil, utility costs for next year will be \$5 million or more."

Rapidly rising energy prices which afflict the entire nation, he said, are having a particularly serious impact on MIT's budget for the current fiscal year and on the budget now being prepared for next year.

"Originally, we anticipated that the university's deficit for the current year might be as high as \$2.2 million," he said. "We now see that it might reach as high as \$4 or \$4.5 million. Rising oil prices are not exclusively responsible for



ROBOT AND FRIENDS—A robot for oceanographic research is being developed by MIT students under direction of Professor A. Douglas Carmichael (right). Two members of the team shown are Deborah S. Hoover, a freshman from Higganum, Conn., and Arlie G. Sterling, a freshman from Norfolk, Mass.

(Continued on page 8)

Boston Musica Viva Will Give Kresge Concert

By WILLIAM T. STRUBLE
Staff Writer

The Boston Musica Viva, a professional chamber ensemble devoted to performances of contemporary music, will present a concert at 8pm Wednesday (Feb. 27) in Kresge Auditorium at MIT.

The concert, sponsored by the MIT Music Section, will be free and open to the public.

The performance, under the direction of Richard Pittman, will offer the world premier of Joseph Schwantner's *Shadows II* (Consortium VI), a composition for baritone and eight instrumentalists. Baritone David Evitts will be soloist for *Shadows II*, which is set to a text from Kenneth Rexroth's *One Hundred Poems from the Japanese*.

Shadows II will be the opening work on the program and, as is Mr. Pittman's custom in introducing new compositions, it will be repeated.

Mr. Evitts will be soloist also for Arnold Schoenberg's *Serenade*, Op. 24, a seven-movement work written in 1924.

The program will include *Cycle for 2 or 4 players* (1967), by Richard Orton, and *Density 21.5* (1936), by Edgar Varese.

Boston Musica Viva, founded in 1969, selects the best of all styles and periods of 20th Century music for its programs and, at each of its four concerts each season, presents a new work written by an American composer for the eight-member ensemble.

Music director Pittman is conductor of the Repertory Orchestra and teacher of orchestra conducting at the New England Conservatory of Music.

MIT composer John Harbison has received a \$10,000 fellowship

grant from the National Endowment for the Arts to compose an opera based on Shakespeare's play, "A Winter's Tale."

Professor Harbison, who recently received a commission from the New York State Council on the Arts to write a large-scale choral work for the New York Schola Cantorum, has also completed a contract with G. Schirmer Publishing Co. for publication of his compositions.

The MIT Logarithms' jam-boree Log Jan '74 concert, annual intercollegiate sing, will also feature the Amherst Zumbyes and two groups from Wellesley, the Tupeloes and the Widows at 8pm, Saturday (Feb. 23) in Kresge Auditorium.

The groups will present popular ballads and traditional barbershop and show tunes. The concert is free and open to the public.

First spring term rehearsals for the MIT Chamber Music Society will be at 7:30pm Monday (Feb. 25). Winds will meet with William Draper, lecturer in the Department of Humanities, in Room 473 of the Student Center. Strings will meet with Marcus A. Thompson, associate professor of music, in Rehearsal Room B in Kresge Auditorium.

UK Science Chief To Speak Monday

Sir Alan Cottrell, chief scientific advisor to the British Government, will speak on "Materials and Energy," Monday, Feb. 25, at 4pm in Rm. 9-150.

Sir Alan has been chief scientific advisor since 1971 and previous to that was deputy chief advisor. From 1955 to 1958 he served as deputy head of the metallurgy division of the Atomic Energy Research Establishment, Harwell, England.

The lecture is sponsored by the Energy Laboratory, the Center for Policy Alternatives and the Department of Metallurgy and Materials Science. Coffee will be available at 3:30.

Faculty Club Busy Following Improvements

Business is back to normal and improving at the MIT Faculty Club following renovation of the main dining room and lounge area.

Renovation was made possible by a \$180,000 loan from MIT which will be repaid at 6% interest over a ten year period, according to Professor William W. Buechner, Faculty Club president.

"We expect the renovation to be cost effective," Professor Buechner said. "By improving the physical surroundings, we hope to attract more business, especially for evening dining. If business continues to improve, the renovation will be well worthwhile."

Remodeling and refurnishing were designed by Joan Goody of Marvin E. Goody, John M. Clancy and Associates, Inc., Boston architects. Work began before

Graduate Residents

Applications from MIT graduate students are now being accepted by the Office of the Dean for Student Affairs for positions as Graduate Residents in the Institute housing system.

Responsibilities include academic assistance in basic undergraduate subjects, personal and career counseling, and participation in extracurricular activities. Room and meal allowances are provided. For information contact Alice Seelinger, Rm 7-133.

Luria Article

Dr. Salvador E. Luria, Institute Professor, Sedgwick Professor of Biology and director of the Center for Cancer research at MIT, is the author of an article, "What Can Biologists Solve?" in the Feb. 7 issue of *The New York Review of Books*. Dr. Luria was 1969 co-recipient of the Nobel Prize for Physiology or Medicine.

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. Undergraduates are also urged to check with the UROP bulletin board in the main corridor of the Institute.

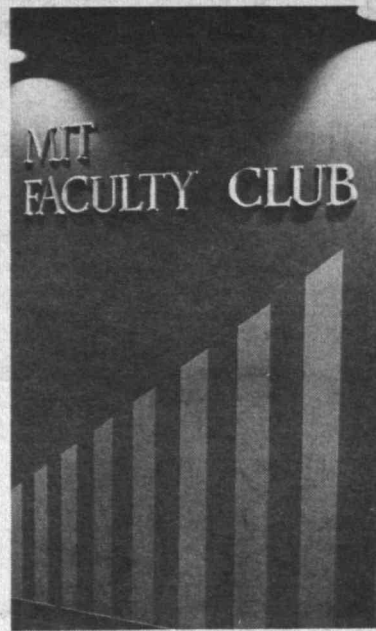
Research Grants Sponsored by the Class of 1970

As its class gift to MIT, the Class of 1970 created a fund to support research projects undertaken by undergraduates. Undergraduates are encouraged to submit proposals that demonstrate substantial student initiative and address a significant real-life problem through science and technology and/or the humanities. Basic modes and policies of UROP apply concerning credits, materials and supplies support and supervision. The Board tends to discourage requests for personal support. To be considered for the next round of funding, proposals must be submitted to the UROP Office, Room 20B-141, by Feb. 25, 1974. Proposals may come from individuals or groups of students. Contact the UROP Office, Ext. 3-5049, for more information.

Barnstead Corp. W. Roxbury, Mass.

A designer and manufacturer of water purification systems for research and medical applications, Barnstead has years of experience removing inorganic contaminants by distillation, ion exchange and other techniques. Experience is in the realm of making ultrapure water, although organic, colloidal and microbiological contamination problems are not fully understood or solved. The company wants to collaborate on a study of microorganisms in sterilizing and distillation purification systems. Barnstead can supply much of the equipment needed. Pay or credit modes available. Possibility of doing much work at MIT, with trips to West Roxbury as needed.

SCORE, Inc.
SCORE is a student run non-profit corporation which sponsors intercollegiate engi-



New sign at Faculty Club

Christmas and was completed the first week in February.

A champagne party last Friday night marked the official reopening.

Olmsted Parks In Photo Show

Indoor glimpses of the Boston regional park system designed by Frederick Law Olmsted will be exhibited in a photography exhibition, "Parks Where the People Are," beginning Wednesday, (Feb. 20) in the Bldg. 7 Lobby at MIT.

The exhibition, which will remain on view for two weeks, commemorates the Boston work of Frederick Law Olmsted, the first US landscape architect and also underscores a current public effort to restore and expand Boston's battered park system once aptly named the "Emerald Necklace."

The show, which is presented by the Lobby 7 Committee, was organized by the New England Olmsted Sesquicentennial Committee and the Brookline and Boston Conservation Commissions with the assistance of the Prudential Insurance Co.

neering design/construction competitions. It was established in May 1971 and the first project was the 1971-72 Urban Vehicle Design Competition. SCORE is now sponsoring the Students Against Fires competition (SAF). The objective of SAF is the development of prototype devices for the prevention, detection, and control of fire. An opportunity exists for a student to study the impact that SAF has had on the engineering curricula of approximately 50 universities participating in the competition.

Department of Nutrition and Food Science

A project is available in the Department of Nutrition and Food Science for a student with some chemistry background. The student would work on development of a solvent partition system for isolating trace compounds from food. Work with high performance liquid chromatography may be involved. Isolation steps will be monitored by UV spectroscopy or radioactive tracers. This project will provide the student with a broad background in some techniques of modern analytical chemistry. If interested contact Dr. Michael Archer, Room 56-311, Ext. 3-6793; Dr. Wayne Iwaoka, Room 16-215, Ext. 3-3106; or Mr. Tom Hansen, Room 16-215, Ext. 3-3106.

Foreign Studies

Senior Fulbright-Hays Appointments for 1974-75

Preliminary review of applications for all or part of the academic year 1974-75 has revealed a need for additional candidates for a number of appointments. All of the openings, with the exception of one research award, are lectureships, most of which allow time for research. Basic eligibility requirements: US citizen. For Lecturing: college or university teaching experience and, when indicated, foreign language competence. For Research: a doctoral degree or, in some fields, recognized professional standing as demonstrated by faculty rank, publications, etc. Terms of awards: Grants tenable in one country only; roundtrip travel for the grantee (transportation is not provided for dependents); a small incidental allowance for travel, books, and services essential to

Registration Set for HSSP

"A Brief Look at India," "Introduction to Astrophysics," "The Psychology and Technique of Conducting" and "Witchcraft: Fact and Fiction" are among new courses to be offered by the MIT High School Studies Program this spring.

Some 600-800 high school students from up to 40 miles away are expected to sign up for the ten-week courses. More than 80 courses will be offered including standard subjects such as languages, trigonometry, calculus and computer programming.

Registration will be Saturday (Feb. 23) 10am to 1pm in the main lobby. Classes begin Saturday (March 2) with additional registration beginning at 8am.

Nearly all courses are taught by area college students, mainly from MIT. For a \$4 registration fee, students can take up to three courses each term. Registration forms will be sorted by town so that students attending the program will be able to form car pools to conserve gasoline.

Young people between 14 and 18 who would like information about the program may call (617) 253-4882. An answering service will record their names and telephone numbers and a member of the HSSP coordinating committee will return the calls.

MIT Team in Charge Of Design Program

Architect and planner Julian Beinart, visiting professor of architecture, is program chairman for the 24th International Design Conference in Aspen, Colo., June 16-21.

Assistants helping Professor Beinart plan the conference program are Florian von Buttlar, graduate student in architecture, Roger Simmonds, graduate student in planning and Suzanne Weinberg, events coordinator for the Bldg. 7 Lobby.

the assignment; a grant to cover normal living costs of the grantee and family while in residence abroad. Specific terms differ from country to country. Appointments are available in the following fields and are tenable in the countries mentioned: Lectureships, American Studies: Argentina, Brazil, Cameroon, Guyana, Ireland, Lebanon, Malagasy Republic, Morocco, Nigeria, Venezuela; Urban and Regional Planning; Argentina; Biochemistry: Finland; Economics and Business Administration: Greece, Liberia, Malta, Mexico, Nigeria, Sri Lanka, Sudan, Tanzania, Zaire; Education: Lebanon, Lesotho, Nigeria, Peru; Engineering: Yugoslavia; Geology: Zambia; Linguistics and English as a Foreign Language: Cameroon, Chile, Mali, Morocco, Nicaragua, Singapore, Sri Lanka, Venezuela; Mass Communications: Lebanon, Nigeria; Mathematics and Physics: Argentina, Chile, Colombia, Ireland, Peru, Zaire; Research Award will be tenable in Kuwait or another Arab Gulf State. For application forms and information contact the Council For International Exchange or Scholars (formerly the Committee on International Exchange of Persons), 2101 Constitution Avenue, N.W., Washington, D.C., 20418. See the Foreign Study Office, Room 10-303, Ext. 3-5243 for further details.

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Seminar in LA On Health Care

MIT will present a special seminar Saturday, Feb. 23, in Los Angeles, Calif., where faculty members will describe how a leading university is focusing research and transferring technology to the vital area of health care delivery.

The seminar, sponsored by the MIT Club of Southern California, is aimed primarily at management executives. It will describe opportunities in health care delivery for the entrepreneur, the consultant and for profit-oriented organizations.

Speakers at the seminar, to be held at the School of Medicine on the University of Southern California campus, will include:

Dr. David F. Waugh, professor of biophysics, "A View of the Future as Charted by Fundamental Research."

Dr. Robert W. Mann, professor of engineering, "Opportunities in Engineering Arising from Clinical Relationships."

Dr. Leon S. White, senior lecturer at MIT's Alfred P. Sloan School of Management, "Managing Health Care Resources." Dr. White, on leave from his Sloan

School post, is Boston's commissioner of health and hospitals.

Howard W. Johnson, chairman of the MIT Corporation, will be the moderator of a panel of prominent business executives who will conclude the seminar by adding their point of view and their opinion of opportunities for growth in health care.

The executives are:

Dr. Launor F. Carter, vice president and director of development, Systems Development Corp., Santa Monica, Calif.

Ross U. Robinson, director, contract research and development, analytical systems, Abbott Laboratories, Chicago.

Daniel O. Wagster, regional manager of the Kaiser-Permanente program for Southern California and senior vice president of the Kaiser Foundation Health Plan and the Kaiser Foundation Hospitals.

The Kaiser-Permanente Medical Care Program is the nation's largest private provider of direct-service medical care through group practice and pre-payment. It covers 2.6 million persons in California, Ohio, Colorado, Oregon, Hawaii and the state of Washington.

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Two Appointed to Named Professorships

W.H. Matthews Is A.D. Little Professor in CE

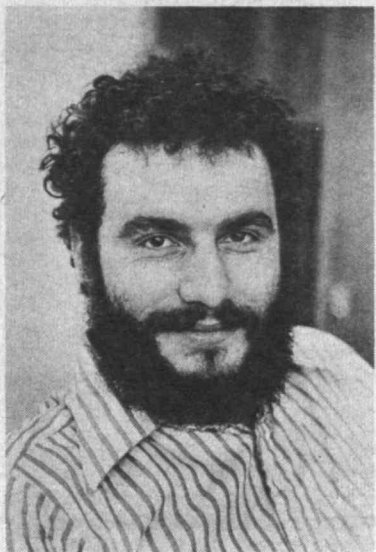
William H. Matthews, Assistant Professor of Civil Engineering, has been appointed to the Arthur D. Little Professorship of Environmental Sciences and Engineering at MIT for a term of one and one-half academic years.

Announcement of the appointment was made by Provost Walter A. Rosenblith, who is serving as Chairman of the Institute's Interdisciplinary Environmental Council.

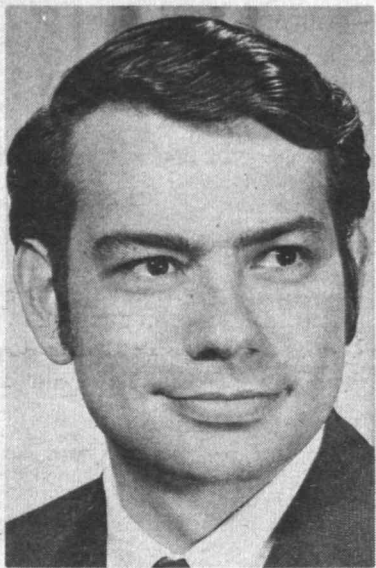
Professor Matthews is the second chairholder of this term professorship previously held by Michael W. Golay, Assistant Professor of Nuclear Engineering. The purpose of the term professorship is to encourage and support younger MIT faculty members in environmental studies of an interdisciplinary nature.

"As the holder of the Arthur D. Little Professorship of Environmental Sciences and Engineering, Professor Matthews will provide significant contributions in a new interdisciplinary field of environmental management," Professor Rosenblith said. "The thrust of his activity will be towards the understanding and determination of ways in which scientific knowledge is combined with societal value judgements and used in assessment, decision-making, and implementation processes in the environmental area. In attempting to resolve the growing conflict between rising demand for constructed facilities and escalating environmental constraints on their construction, engineers are increasingly drawn into the arena of public decision-making where scientific and technological information must be meshed with public preference. Professor Matthews' work is directed toward the resolution of these difficult questions."

Professor Matthews attended Lamar State College of Technology, Beaumont, Tex., as an undergraduate, receiving a BS in Mathematics in 1963, and a BS in Electrical Engineering in 1964. He then came to MIT where he received an SM degree in Electrical Engineering in 1965, and an SM in Political Science together with his PhD in Socio-Technological Engineering during 1970. His teaching here has been in the area of Environmental Management, and in Engineering and Public Policy.



Professor Morel



Professor Matthews

Doherty Chair In Ocean Area To F.M. Morel

Dr. Francois M.M. Morel, assistant professor of civil engineering, has been named MIT's first Henry L. Doherty Professor of Ocean Utilization for a term of two years.

Announcement of the appointment was made by Provost Walter A. Rosenblith.

The Doherty Professorships were established last year under a \$750,000 grant from the Henry L. and Grace Doherty Charitable Foundation of Darien, Conn., to encourage the development of promising junior faculty members whose research interests are in developing better ways to use the world's oceans. The Doherty Professors are associated with MIT's Sea Grant Program.

Dr. Morel's research interests are presently centered around understanding and modeling the biochemical processes in coastal waters.

"Professor Morel's work on the development of theoretical models to predict the biochemical behavior of coastal waters in accommodating and utilizing the results of man's activities in the coastal region, holds great promise for the rational utilization of the oceans," Professor Rosenblith said. "Such a predictive biological model has not really been developed before, and would be vital to those involved in waste management projects, food exploration, recreation and many other operations in the coastal zone.

"A reliable predictive model would permit a better understanding of how to manage rationally operations that impinge on the coastal region so as to enhance the oceans' usefulness."

According to Professor Ira Dyer, head of the Department of Ocean Engineering and director of the MIT Sea Grant Program, "Our hope is to use the new Doherty Professorships to encourage and support career development among young and promising faculty such as Professor Morel who can apply a broad interdisciplinary background to contemporary problems in ocean science and utilization."

Professor Morel received the MS degree in civil engineering in 1968 and the PhD degree in

Noted Statistics Scholar Named to Math Faculty

in the country.

Dr. Chernoff's research over the last 25 years has earned him international renown as both an applied and a pure mathematical statistician. His early work with the Cowles Commission at the University of Chicago helped to lay the foundations for estimation techniques in the modern field of Econometrics. His many contributions to statistical theory include pioneering work on the design of non-Gaussian experiments and on sequential analysis, utilizing approximation by Brownian motions.

Dr. Chernoff, most recently chairman of the Department of Statistics at Stanford University, is a Phi Beta Kappa graduate of the City University of New York. He received his master's and Ph.D. degrees in mathematical statistics from Brown University.

He is a fellow of the American Statistical Association and a member of the Council of the International Association for Statistics in the Physical Sciences. He has taught at Columbia University, the London School of Economics, the University of Rome, the University of Chicago, and the University of Illinois. In 1969 Dr. Chernoff was a Visiting Professor at MIT.

Bi-weekly, Exempt Meeting Tonight

A meeting to discuss responses to a questionnaire circulated recently to bi-weekly and exempt employees will be held tonight, Wednesday (Feb. 20) at 5:15pm in the Student Center Mezzanine Lounge.

Some 400 questionnaires have been returned out of 1,500. Respondents favored (90%) improved opportunity for promotion and (86%) the same vacation benefits as the administrative staff. They also strongly supported (94%) merit raises as deserved, and cost-of-living raises for all employees.

Sea Grant Review

The National Sea Grant Office will make its annual evaluation of MIT's Sea Grant Program during a visit here Feb. 27-28.

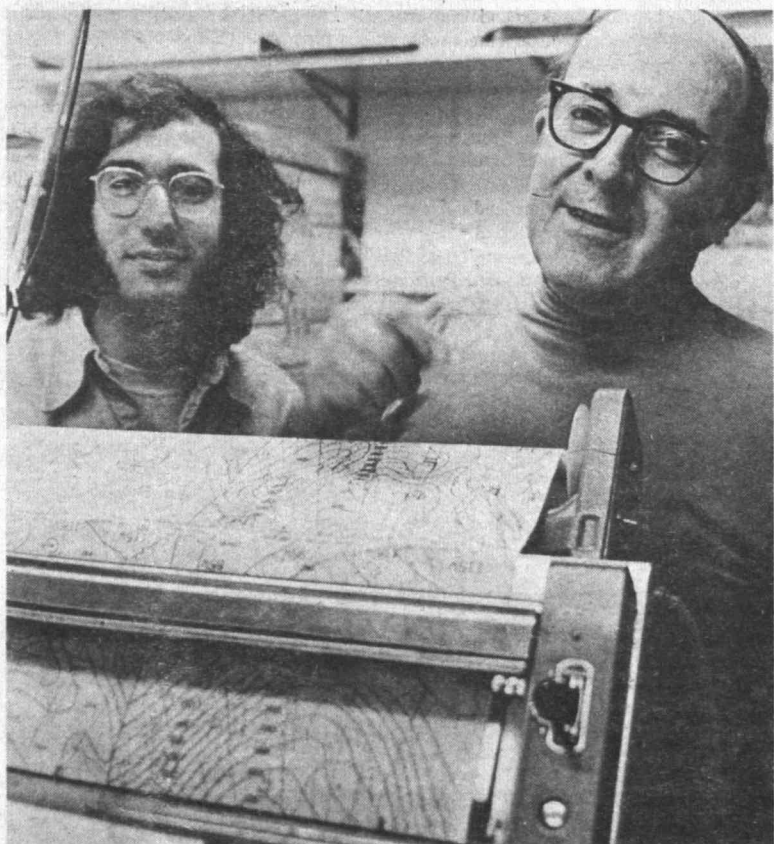
Meetings of the site visit team will be held in Marlar Lounge, 37-252 and are open to members of the MIT community. Agenda information can be obtained by calling 3-7041.

Goodwin Medal Deadline Mar. 18

Monday, March 18, is the deadline for filing nominations for the 1974 Goodwin Medal for conspicuously effective teaching by a graduate student.

Nominations may be made by faculty members or organized student groups and should include biographical information on the nominee as well as evidence of superlative teaching ability. Supporting letters from students and colleagues also are required. Nominations should be submitted to the Dean of the Graduate School, Rm 3-136.

The Goodwin Medal was established in memory of Harry Manley Goodwin, first dean of the Graduate School, by his widow and son. Presentation of the award is made at the annual Awards Convocation in May.



Professor of Meteorology Frederick Sanders (right) and meteorology graduate student Howard B. Bluestein wait for weather data from the National Meteorological Center, in Washington, D.C., to issue from MIT's weather map receiver.

Technology Review Article:

Weatherman's Guesses Constant with Time

With all the computers, weather satellites, and improved data collection methods, the local weatherman is still no better at predicting temperature and precipitation than he was six years ago, says an MIT meteorology professor.

Professor Frederick Sanders, writing in a recent issue of the *Bulletin of the American Meteorological Society*, bases his contention on an analysis of six years of predictions by a large number of MIT undergraduate and graduate students and professors in the Department of Meteorology. The report was also featured in the February issue of *Technology Review*.

Professor Sanders operates the MIT weather forecasting room to interest and train students in the science and art of weather prediction. The forecasters can try their skill at any or all of four sets of forecasts:

...forecasting the minimum temperature in Boston for each of four successive 24-hour periods.

...forecasting the minimum temperature probability distribution for the same period. In other words, how likely is it to reach a certain temperature?

...forecasting the probability that there will be at least 0.01 inches of precipitation in Boston in each of the next four 24-hour periods.

...forecasting the precipitation probability distribution.

For six years, from 1966 to 1972, Professor Sanders kept score on all the participants and made comparisons with what temperatures and precipitation actually occurred.

During those six years the amount and accuracy of teletyped weather data and air flow predictions available to the forecasters from the National Meteorological Center and other sources increased substantially. This was mainly because of greater expenditure of federal funds.

Nevertheless, there was no comparable increase in the fore-

casters' success during the same period. In fact, Professor Sanders found, the forecasters' ability to predict rain and snow actually deteriorated slightly during that period.

Professor Sanders was not really surprised at the findings, for the increased data on general atmospheric circulation still does not increase forecasters' ability to take into account small-scale atmospheric phenomena.

According to Professor Sanders errors in weather forecasting arise not from errors in predicting large-scale atmospheric motions, but from errors in predicting such phenomena as the occurrence of shallow hot and cold fronts and convective showers, small islands of hot air rising from cities, the contrast in temperature between land and sea, the time of beginning and end of rainstorms, and from many other undetected small-scale influences.

THE INSTITUTE CALENDAR

February 20
through
March 3

Events of Special Interest

Traditional Medicine in China Since the Cultural Revolution** - Hans Agren, MD, University Hospital, Uppsala, Sweden. Commentator: Nathan Sivin, humanities. Technology Studies Workshop. Thurs, Feb 21, 7pm, Rm 37-252.

MIT National Sea Grant Office Site Visit** - All meetings for this two-day program, Wed, Feb 27-Thurs, Feb 28, will be in the Marlborough Lge, Rm 37-252. For further information, call x3-7041.

Defense Against Unwanted Change** - Kenneth Boulding, economics, University of Colorado; Paul W. MacAvoy, management; David Dodson Gray, Harvard Divinity School, Harvard Business School. Karl Taylor Compton Lecture Series. Thurs, Feb 28, 4pm, Rm 9-150.

Seminars and Lectures

Wednesday, February 20

Manufacturing and Automation* - Introduction by Nathan N. Cook, mechanical engineering. Mechanical Engineering Seminar. 12:15-2pm, Rm 10-105.

Allende and US Power* - Edward Korry, president, United Nations Association of the United States of America. CIS Informal Luncheon Seminar. 12:30-2pm, E53-482.

Cycloadditions, Cycloreversions and Thermal Rearrangements: I - Jerome A. Berson, Karl visiting professor at Yale. Chemistry Seminar. 4pm, Rm 2-190.

Deterrence and Arms Control in a World of Uncertainty* - Fred Ikle, director, US Arms Control & Disarmament Agency. MIT-Harvard Joint Arms Control Seminar. 4-5:30pm, seminar rm 1, Harvard Center for International Affairs, 6 Divinity Ave, Camb.

Thursday, February 21

Development of Transsulfuration and Transmethylation in the Human Fetus* - Dr. Gerald Gaull, chief of pediatric research, New York State Institute for Basic Research in Mental Research. Nutrition & Food Science Special Seminar. 11am, Rm 16-139.

Thermal Fluctuations in Liquids - Modified Enskog Equation - Paul M. Furtado, G. Nuclear Engineering Doctoral Seminar. 2pm, Rm 24-117.

Advances in Stable Lasers for Communication* - S. Ezekiel, aero/astro. RLE-EE Communication Theory Seminar. 3-4pm, Rm 26-217.

Aerodynamic Sound Radiation from Aircraft Structures* - Richard Hayden, Bolt, Beranek & Newman. Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Activated Adsorption and Desorption of Hydrogen on Copper - Mehdi Balooch, G. Mechanical Engineering Thermodynamics Seminar. 4pm, Rm 3-343. Coffee.

Do Syntactic Dialects Exist?* - William Labov, University of Pennsylvania. Linguistics Colloquium. 4pm, Rm 4-270.

Cycloadditions, Cycloreversions and Thermal Rearrangements: II - Jerome A. Berson, visiting professor at Yale. Chemistry Seminar. 4pm, Rm 2-190.

Kindergarten Parton Model* - James Bjorken, Stanford Linear Accelerator. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments 3:45pm, Rm 26-110.

Village Life in Iran: Who Speaks for the Peasant?* - Freedoon Safi Zahed, anthropology, Harvard. Seminar on Foreign Students and Participation in Development. Discussion with slides. 7pm, International Student Lge, 2nd fl, Walker Mem. Coffee.

Friday, February 22

Radioactive Heat Transfer in Hot Gases* - D. Reed, G. Chemical Engineering Doctoral Seminar. 2pm, Rm 10-105.

Flame Spread over the Surface of Solid Fuels* - F. Wong, G. Chemical Engineering Doctoral Seminar. 3pm, Rm 10-105.

Energy and Mobility* - Raymond E. Goodson, chief scientist, US Department of Transportation, Washington, DC. Mechanical Engineering Seminar. 3pm, Rm 3-133. Coffee 4pm, Rm 1-114.

Cycloadditions, Cycloreversions and Thermal Rearrangements: III - Jerome A. Berson, visiting professor at Yale. Chemistry Seminar. 4pm, Rm 2-190.

Self-Steepening of Light Pulses and the Superposition of the "Tense Wave"* - Dr. John Armstrong, IBM. Center for Materials Science and Engineering Colloquium. 4pm, Rm 9-150. Refreshments 3:30pm.

Monday, February 25

Evaluating the Validity of Econometric Methods for Dynamic Systems** - Peter Senge, DSR staff. System Dynamics Group Seminar. 3-5pm, Rm E52-461. Coffee.

FAA Engineering and Development - Evolution to the 1980's** - Brig. Gen. Gustav E. Lundquist, USAF (ret), Federal Aviation Administration. Lincoln Lecture Series. 3:30pm, Lincoln Lab Cafeteria.

Materials and Energy - Sir Alan Cottrell, FRS, chief scientific advisor, British government. Energy Laboratory, Center for Policy Alternatives, Metallurgy & Materials Science Seminar. 4pm, Rm 9-150. Coffee 3:30pm.

Tuesday, February 26

The Role of the Rehearsal Process in Human Memory - Dr. Mary Naus, Wellesley. Cognitive Information Processing Group Seminar. 3:30pm, Rm 36-428. Coffee 3pm.

What You Always Wanted to Know About Modern Control Theory and Were Afraid to Ask* - J. Francis Reintjes, electrical engineering, director, Electronic Systems Lab. Electrical Engineering Decision and Control Group Seminar, ESL Colloquium. 4-5pm, Rm 9-150.

Power Transmission from Space* - Owen E. Maynard, Raytheon Corp. Aero/Astro General Seminar. 4pm, Rm 33-206. Coffee 3:30pm, Rm 33-411.

Wednesday, February 27

Thermal Fluctuations in Mixtures - Juan I. Castresana, G. Nuclear Engineering Doctoral Seminar. 2pm, Rm 24-117.

Thursday, February 28

Bayesian Outlier Rejection* - Terrence P. McGarty, Lincoln Lab. RLE-EE Communication Theory Seminar. 3-4pm, Rm 26-217.

Road Vehicle Aerodynamics, or Aerodynamics as an Annoyance* - E. Eugene Larrabee, aero/astro. Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Superfluidity in He³* - John Wheatley, physics, University of California at San Diego. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments 3:45pm, Rm 26-110.

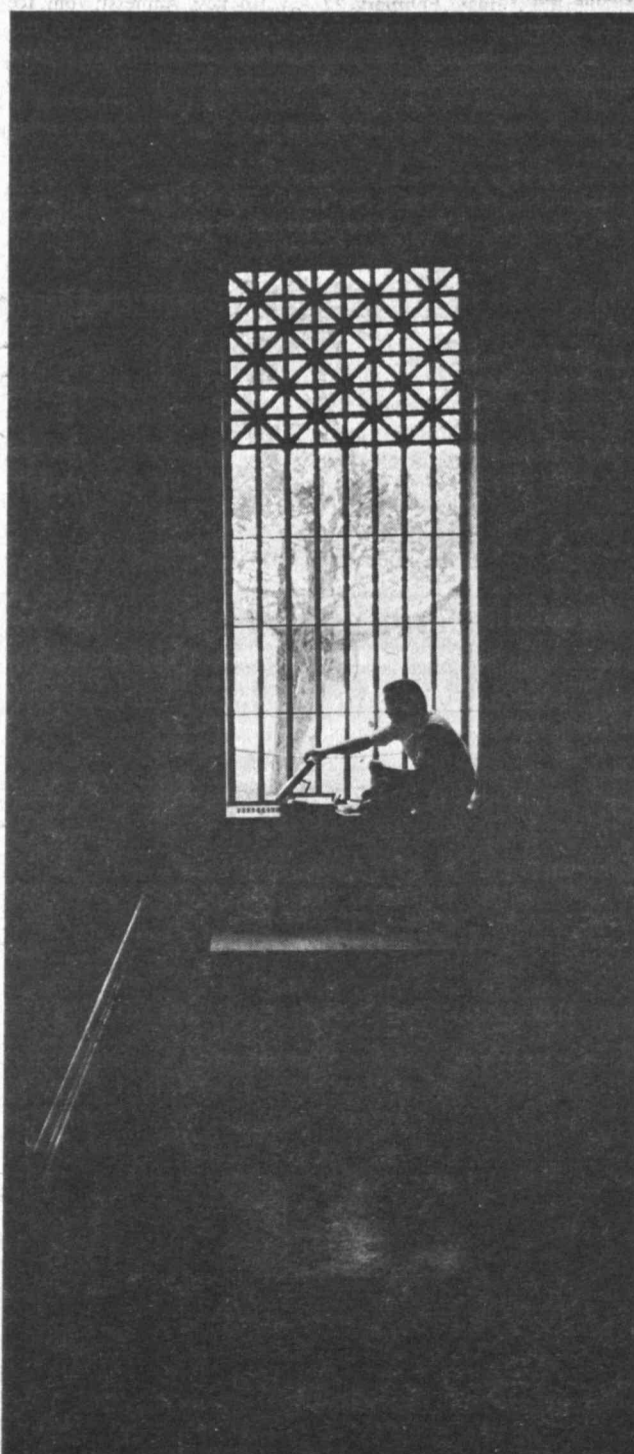
Friday, March 1

Modeling and Control of Fossil-Fuel Electric Power Plants - L. H. Fink, supervising engineer, research division, Philadelphia Electric Co. Mechanical Engineering Seminar. 3pm, Rm 3-133. Coffee 4pm, Rm 1-114.

Community Meetings

PDP-11 Users Group* - Wed, Feb 20, 2:30pm, Rm 13-5002. Coffee 2pm.

Course Evaluations** - Informal meeting. Faculty and administration are invited to drop in and meet Evaluations staff and exchange ideas with them preparatory to planning for next term's guide. Wed, Feb 20, 3-5pm, Stu Ctr West Lge. Refreshments. Info, x3-4885.



"STUDENT ON A WINDOWSILL" might be the title of this photograph, in which a solitary figure is silhouetted against the grillwork of a window in the lobby of the George Eastman Research Laboratories. —Photo by Margo Foote

Employees for Improved Conditions at MIT - There will be a meeting of interested biweekly and exempt personnel Wed, Feb 20, 5:15pm, Stu Ctr Mezzanine Lge.

Student Committee on Educational Policy* - Wed, Feb 20, 7:30pm, Stu Ctr Rm 473. Election of chairman, treasurer, secretary, and membership responsibilities in projects to be assigned.

Scheduling of Kresge Auditorium* - First opportunity for scheduling of main auditorium for next year. Thurs, Feb 21, 2pm, Stu Ctr Mezzanine Lge. Questions, Adriane Bishko, x3-7974.

Student Committee on Educational Policy* - Dr. Benson Snyder, Division for Study and Research in Education, will speak Thurs, Feb 21, 7:30pm, Rm 8-205. Note change of date and room.

Hillel Brunch** - Meet students from Harvard-Radcliffe, Wellesley, Simmons. Sun, Feb 24, 11am, Rm 10-105. Admission \$1.25.

Association of Student Activities* - Election meeting. Sun, Feb 24, 2:30pm, Stu Ctr West Lge.

Women's Forum - Emily Wick, dean of the faculty at Mt. Holyoke College, former professor of Nutrition at MIT, and founder of the Forum, will talk about her experiences in her new position. Mon, Feb 25, 12n, Rm 10-105.

Academic Projects Staff* - Open meeting Wed, Feb 27, 7:30pm, Stu Ctr Rm 473.

HoToGaMIT* - Open meeting Thurs, Feb 28, 7pm, Stu Ctr Rm 450.

MIT Club Notes and Meetings

Bridge Club* - ACBL Duplicate Bridge. Matchpoint pairs Thurs, 7-10:30pm; non-masters (less than 20 master points) Fri, 10pm-12m; small IMP-scored team of 4 (advance registration required) Fri, 8pm & Sat, 2pm; all Stu Ctr Rm 473. Club Tournament Open Pairs Thurs, Feb 28. Jeff, 864-5571.

Chamber Music Society** - First rehearsal will be held Mon, Feb 25, 7:30pm. Strings, Kresge Rehearsal Rm B; winds, Stu Ctr Rm 473.

Chinese Choral Society** - Sun, 3pm, Stu Ctr Rm 473. Note: March 3 meeting is in Stu Ctr Rm 407.

Constitutions Service - Wed, Feb 27, 6:30-7:30pm, Stu Ctr Rm 473.

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

Israeli Student Club - Meetings Wed, 8pm, Stu Ctr Mezzanine Lge.

Judo Club** - Sport and self defense. Mr. M. H. Yanagi, 5th degree Black Belt, chief instructor. Mon, Wed, Fri, 5pm; Sat 1pm, Exercise Rm duPont Gym. Beginners welcome. Info, Mike Portnoff, x3-7319.

MIT Auto Club** - Meeting, guest speaker. Mon, Feb 26, 7:30pm, Stu West Lge.

MIT/DL Bridge Club** - ACBL Duplicate Bridge. Tues, 6pm, Stu Ctr Rm 473. Jeff, 864-5571.

MIT Karate Club** - Evening classes Mon, Wed, 8-10pm, duPont Wrestling Rm. Hary Koba, x3-6232.

MIT Kung Fu Club* - Chinese boxing, northern praying mantis. Meetings Tues, Thurs, 7:30-9pm. Call, 876-5071 or 661-8765.

MIT Outing Club* - Meetings Mon, Thurs, 5-6pm, Stu Ctr Rm 461.

MIT Scuba Club** - Compressor hours: Mon, Fri, 4-6pm, Alumni Pool. Wed, Feb 20, 8pm Rm 20E-017. Steve Allen will present a slide show, "see in the Caribbean," of recent underwater trips.

MIT Soaring Association* - Talk of spring flying plans, 3 free movies. Thurs, Feb 21, 7:30pm, Stu Ctr Rm 491. Refreshments.

MIT UHF Repeater Association** - All current and new members are urged to attend the Thurs, Feb 21 meeting, 8pm, Baker House Master Suite Lge.

Strategic Games Society* - Offers opponents and discounts on merchandise to members plus gaming and periodical library. Sat, 1pm-1am, Walker Rm 318. Info, Kevin Slimak, x0389 Dorm.

Student Homophile League* - Meetings 2nd & 4th Sun of each month, 4pm, Rm 1-132; next meeting Sun, Feb 24. Info, talk, help in coming out, call Hotline, 494-8227.

Student Information Processing Board Meeting* - Mon, 7:30pm, Rm 39-200.

Tech Model Railroad Club** - Slide and movie night. Railroad photographs by members will be shown. Sat, Feb 23, 8:30pm, Rm 20E-210. Free.

Tiddlywinks Association* - Meetings Wed, 8-11pm, Stu Ctr Rm 491.

Unicycle Club* - Meetings Sun, 1-3pm, Stu Ctr Rm 407. Beginners welcome. We have unicycles.

Volleyball Club** - Practice, advanced level team competition. Sun, 1-4pm, duPont Gym.

Women's Gymnastics Club* - Mon-Fri, 4-7pm, duPont Gym. Info, Ursula, x3-5954.

Wellesley Events

An Evening with Shakespeare's Ladies* - Experimental Theatre production. Fri, Feb 22 & Sat, Feb 23, 8pm, Jewett Auditorium.

The Ascent of Man* - A series of 13 films on the history of science as a history of man, written and narrated by Dr. Jacob Bronowski. Wellesley Centennial Film Series. This week: "Music of the Spheres" and "The Starry Messenger." Sun, Feb 24, 2pm, 112 Pendleton East; Mon, Feb 25, 7:15pm, 105 Pendleton West.

Six Visiting Professors Are Listed

Six have been appointed as visiting faculty members at MIT, including two who will be here under the faculty exchange program with the Technical University of Berlin.

Dr. Uwe Pape has been appointed visiting professor in the Department of Electrical Engineering for one year, effective Feb. 4, 1974. Dr. Pape received the diploma in mathematics from the University of Goettingen and is a member of the faculty of the Technical University of Berlin.

Dr. William B. Schwartz has been appointed visiting professor, part time, in the Department of Electrical Engineering for one year, effective July 1, 1974. Dr. Schwartz received the bachelor's degree in 1942 and the MD in 1945 from Duke University. He is

chairman of the Department of Medicine at Tufts University.

Mr. Milton Shaw has been appointed visiting professor, part time, in the Department of Nuclear Engineering for four and one-half months, effective Sept. 1, 1973. Professor Shaw received the BS degree from the University of Tennessee and the MS from Pennsylvania State University. Now a private consultant, he formerly was director of the division of Reactor Development and Technology for the Atomic Energy Commission.

Dr. Dennis D. Buss has been appointed visiting associate professor in the Department of Electrical Engineering for six and one-half months, effective Jan. 1, 1974. He received the SB, SM and PhD degrees from MIT and is presently

associated with Texas Instruments.

Dr. Marie J. Adams has been appointed visiting assistant professor, part time, in the Department of Humanities for six months, effective Jan. 1, 1974. She received the MA degree in social sciences from the University of Chicago and the MA and PhD degrees in art history from Columbia University.

Mr. Lothar Wolf has been appointed visiting assistant professor in the Department of Nuclear Engineering for 13 months, effective Feb. 1, 1974. He received the diplom Ingenieur in 1967 from the Technical University of Berlin where he is presently an assistant professor.

MIT Swimmers In Live TV Meet

Two MIT swimmers will compete in a special meet to be televised by Ch. 5 Monday (Feb. 25), at 7:30pm, from Alumni Pool.

Richard M. "Rick" Ehrlich of Wilmette, Ill., a freshman who took up diving only last November, will go against divers from Harvard and Northeastern in a three-meter diving contest.

Nancy J. Spinka of Chicago, Ill., a graduate student, will compete in a 200-yard free-style race with women swimmers from Boston

College, Brandeis, Radcliffe, Northeastern and Boston University.

In a TV track meet from Tufts University last Monday, Donald E. Wesson, an MIT senior from Centerville, Ill., reached the finals in the 45-yard high hurdles and Gary R. Wilkes, a senior from Brooklyn, N.Y., competed in the long jump.

Lobby 7 Dance

Four improvisational dance concerts by Boston's "street company," the City Dance Theatre, will be presented in the Bldg. 7 Lobby at noon, Tuesday and Wednesday (Feb. 26-27), at 4:45pm, Thursday (Feb. 28) and noon, Friday (Mar. 1), sponsored by the Lobby 7 Committee.

Chinese Medicine

Dr. Hans Agren of University Hospital, Uppsala, Sweden, will speak on "Traditional Medicine in China Today" Thursday (Feb. 21), in the Marlar Faculty Lounge (37-252) at 7pm, sponsored by the Technology Studies Steering Committee.

Social Events

Hillel Coffeehouse* - Wed, 8pm, 312 Memorial Dr, basement. Refreshments.

Pot Luck Coffee House* - Fri & Sat, 8:30pm-12m, Stu Ctr Mezzanine Lge, sponsored by Stu Ctr Committee. Free coffee, cider, donuts, music. Come and listen. If you want to perform call Ernest Perevoski, x9610 Dorm, for auditions. Fri, Feb 22, Paul Cole; Sat, Feb 23, Louis Resajae.

Movies

Man and the Machine - Technology: Catastrophe or Commitment?; Man and the Machine; What on Earth?; 21-87. - BEL Spring Film Series. Thurs, Feb 21, 5pm, Projection Rm off 10-400. Coffee.

Pressure Fields; Flow Visualization* - Fluid Mechanics Films. Thurs, Feb 21, 4pm, Rm 33-419.

The Gospel According to St Matthew - Humanities Film. Thurs, Feb 21, 7-11pm, Rm 10-250.

Man and the Machine - Technology: Catastrophe or Commitment?; Man and the Machine; What on Earth?; 21-87. BEL Spring Film Series. Fri, Feb 22, 12n, Projection Rm off 10-400. Coffee.

The Plow That Broke the Plains - Humanities Film. Fri, Feb 22, 2-4pm, Rm 14N-0615.

Anne of the 1000 Days - LSC. Fri, Feb 22, 6:30pm, 10pm, Rm 26-100. Admission 50 cents, ID required.

Radical Cinema - The Women's Film** - Science Action Coordinating Committee. Fri, Feb 22, 6:45pm, Stu Ctr Rm 407. Donation \$1.

Kanchenjunga (Satyajit Ray) - MIT Film Society. Fri, Feb 22, 7:30pm, 9:30pm, Rm 6-120. Admission \$1.

Patton - With Pink Panther Cartoon. Midnite Movie Series. Fri, Feb 22, 12m, Sala. Free admission & popcorn. MIT or Wellesley ID. Bring Blankets.

Little Big Man - LSC. Sat, Feb 23, 6:30pm, 10pm, Rm 26-100. Admission 50 cents, ID required.

The President's Analyst - LSC. Sun, Feb 24, 8pm, Rm 10-250. Admission 50 cents.

Pressure Fields; Flow Visualization* - Fluid Mechanics Films. Tues, Feb 26, 4pm, Rm 33-419.

The Childhood of Maxim Gorky - Humanities Film. Wed, Feb 27, 7-11pm, Rm 10-250.

Fundamentals of Boundary Layers; Boundary Layer Control* - Fluid Mechanics Films. Thurs, Feb 28, 4pm, Rm 33-419.

Communication Technology - Communications Primer; Communications: The Wired World; Dialog (and) Striptease; Enter Hamlet* - BEL Spring Film Series. Thurs, Feb 28, 5pm, Projection Rm off 10-400. Coffee.

Communication Technology - Communications Primer; Communications: The Wired World; Dialog (and) Striptease; Enter Hamlet* - BEL Spring Film Series. Fri, Mar 1, 12n; Projection Rm off 10-400. Coffee.

Radical Cinema - Hunger in America** - Science Action Coordinating Committee. Fri, Mar 1, 6:45pm, Stu Ctr Rm 407. Donation \$1.

Mahanagar (Satyajit Ray) - MIT Film Society. Fri, Mar 1, 7:30pm, 9:30pm, Rm 6-120. Admission \$1.

Sounder - LSC. Fri, Mar 1, 7:30pm, 10pm, Rm 26-100. Admission 50 cents, ID required.

Cat on a Hot Tin Roof - With Pink Panther Cartoon. Midnite Movie Series. Fri, Mar 1, 12m, Sala. Free admission & popcorn. MIT or Wellesley ID. Bring blankets.

Cabaret - LSC. Sat, Mar 2, 7pm, 10pm, Kresge Auditorium. Admission 50 cents, ID required.

A Night at the Opera (Marx Bros.) - LSC. Sun, Mar 3, 8pm, Rm 10-250. Admission 50 cents.

Music

Noon Hour Concert* - April Showers, flutist. Thurs, Feb 21, 12n, Chapel. Free.

Log Jam '74* - MIT Logarithms is sponsoring an Invitational Intercollegiate Sing, with the Wellesley Widows, Amherst Zumbies, Wellesley Tupeloos, featuring barbershop, show tunes, ballads, and popular music. Sat, Feb 23, 8pm, Kresge Auditorium. Free.

Boston Musica Viva Concert* - Program: Schoenberg's *Serenade*, Joseph Schwantner's *Shadow's II*, Richard Orton's *Cycles for Two or Four Players*, and Edgar Varese's *Density 21.5*. Wed, Feb 27, 8pm, Kresge Auditorium. Free.

Noon Hour Concert* - Janet Packer, violinist, in a program of Baroque music. Thurs, Feb 28, 12n, Chapel. Free.

Recorder Ensemble** - Tues, 7pm, 6th fl Bldg 24. Info, David Dreyfus, x3-7787.

Theater and Shows

Noel Coward's Blithe Spirit* - MIT Community Players production. Thurs, Feb 28-Sat, Mar 2, 9pm, Kresge Little Theatre. Tickets \$2. Call x3-4720.

City Dance Theatre* - Will give performances in the Bldg 7 Lobby Tues, Feb 26 & Wed, Feb 27, 12n; Thurs, Feb 28, 4:45pm; & Fri Mar 1, 12n.

Selected Works of William W. Wurster* - Works of the late dean of the School of Architecture and Planning from 1944-50 will be presented in a photographic exhibit Mon, Feb 4-Fri, Feb 22, by the Department of Architecture.

Athletics

Wednesday, February 20 - JV/F, V Basketball. Suffolk University, 6:15pm, 8:15pm, Rockwell Cage. V Fencing. WPI, 7pm, duPont Fencing Rm. **Friday, February 22** - V Hockey. Amherst, 7pm, Ice Rink. **Saturday, February 23** - Rifle. Coast Guard, Norwich, Dartmouth, 10am, duPont Rifle Range. F&V Squash. Wesleyan, 2pm, duPont Squash Courts. Swimming. Bowdoin, 2pm, Alumni Pool. **Sunday, February 24** - W Fencing. Women's MIT Team Championships, 8:30am, duPont Fencing Rm. **Tuesday, February 26** - V Hockey. Bridgewater State, 7pm, Ice Rink. F&V Squash. Trinity, 7pm, duPont Squash Courts. **Wednesday, February 27** - F Squash. St. Paul's School, 3:30pm, duPont Squash Courts. **Saturday, March 2** - Pistol. Boston State, Newark College, 9am, duPont Pistol Range.

Exhibitions

Celebrations* - Photography exhibit, assembled by Minor White, at Hayden Gallery Sat, Mar 2-Sat, Mar 30. Public preview Fri, Mar 1, 8-10pm. Gallery hours: Mon-Sat 10am-4pm, closed Sun.

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.

Music Library Exhibit - Persian musical instruments.

Religious Services and Activities

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

Baha'i Firesides* - Discussion group about the Baha'i faith and its beliefs, for example, the Oneness of Mankind. Fri, 8:30pm, 95 Avon Hill St, Camb. Refreshments.

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

Celebration of Holy Communion* - The Revs John Crocker, Episcopal Chaplain; Peter Johnson, Boston/Cambridge Ministries; and Constance Parvey, Lutheran Chaplain. Wed, 5:05pm, Chapel. Supper following, 312 Memorial Drive.

Christian Bible Discussion Group* - Thurs, 1pm, Rm 20B-031. Prof. Schimmel, x3-6739, or Ralph Burgess, x3-2415.

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

Hillel*: Services - Mon-Fri, 8am, Rm 7-102; Fri, Traditional 5:30pm, Kresge Kitchen, Non-Traditional 8:10pm, Chapel; Sat, 9am, Chapel. **Classes** - many interesting classes offered, for full schedule call Hillel office, x3-2982. **Shabbos Meal** - enjoy a traditional Fri evening meal at Kresge Kitchen, must order by Tues each week. Info and to order, Herbie Levine, x8403 Dorm.

Islamic Society* - Juma prayers, Fri, 2:10pm, Kresge Rehearsal Rm B. Discussion on the Qur'anic Interpretations, Sat, 4pm, ISC Lge, 2nd fl Walker.

Latter Day Saints Student Association* - Discussion of beliefs. Thurs, 8am, Stu Ctr West Lge.

Protestant Worship Services* - Sun, 11am, Chapel. Sunday school and nursery at the same time in Stu Ctr Mezzanine Lge.

Roman Catholic Masses* - Sun, 9:15am, 12:15pm, 5:15pm; Tues, 5:05pm; Thurs, 5:05pm; Fri, 12:15pm. Chapel.

Tech Catholic Community Programs* - Wrestling with Prayer: Lenten services lead by Fr. MacNevin, with a free, simple supper: Thurs, Feb 28-April 11. **Catholic Belief Study Groups:** lead by Rev Basil DePinto, Tues, Feb 26-Mar 26, 7:30pm, 2nd fl seminar rm, Religious Counselors Bldg. **Creative Lunch Break:** Tues, Feb 26-Apr 30, 12n-1pm, 2nd fl seminar rm, Religious Counselors Bldg.

United Christian Fellowship* - Meet for dinner Thurs, 5pm, Walker; singing, sharing, praying meeting, 6pm, Rm 6-321.

Vedanta Services* - Fri, (except school holidays), 5:15pm, Chapel.

Westgate Bible Study* - Covering the gospel of Mark. Wed, 8pm, Westgate apt 1202. Info, 494-8778.

Announcements

Graduate Students - Applications for advanced degrees in June, 1974 must be returned to the registrar by Fri, Feb 22.

Metropolitan Opera Tickets* - Ticket orders for performances at Hynes Auditorium, April 22-27, may be placed at TCA office, Stu Ctr Rm 450, 10am-5:30pm, Mon-Fri. Info, TCA office, x3-4885.

BSU Tutorial Program - Black Student Union offers a full program of assistance to minority undergraduates for second semester. Teaching assistants available Mon-Thurs, 7:30-10:30pm, Rm 4-145, 146, 148 & 149 by appointment. Info, Karen Scott, x-0351 Dorm.

Placement Interviews

The following companies will be interviewing Wed, Feb 20-Fri, Mar 1. Those interested may sign up in the Career Planning and Placement Office, Mon-Fri, 9am-4pm, Rm 10-140, x3-4733.

Wednesday, February 20 - Amoco Chemicals Corp, Amoco Oil Co; Charles Stark Draper Laboratory; Eastman Kodak Co; The B.F. Goodrich Co; Fairchild Camera and Instrument Co; Howmet Corp/Gas Turbine Components; Naval Underwater Systems Center; Hazeltine Corp; Nippon Electric Co; Sperry Rand Corp; Turner Construction Co; United Engineers & Constructors Inc; Proctor & Gamble Co/Research & Development.

Thursday, February 21 - Procter & Gamble Co/Research & Development; American Cyanamid Co; Bell System (AT&T Co); The Procter & Gamble Co, International Divisions; Ryckman/Edgerley/Tomlinson & Assoc.

Friday, February 22 - US Army Engineer Div; Inland Steel Co; Leviton Manufacturing Co; National Semiconductor; New England Electric System; City of New York; Northrop, & Aircraft Div; Philco-Ford Corp, Aeronutronic Div; Texaco Inc; Uniroyal Inc, Chemical Div.

Monday, February 25 - J.T. Baker Chemical Co; Booz Allen & Hamilton; Computer Systems Engineering Inc; PRD Electronics, Inc, & Harris Intertype Corp; Insurance Services Office; Jaros, Baum & Bolles; NASA/Goddard Space Flight Center; Naval Coastal Systems Lab; The Perkin-Elmer Corp; Philip Morris USA Research Center; Joseph S. Ward and Assoc; Hughes Aircraft Co Equipment Engineering Div.

Tuesday, February 26 - Hughes Aircraft Equipment Engineering Div; The Bendix Corp, Navigation & Control Div; Gibbs & Cox, Inc; Institute for Defense Analyses; International Business Machines Corp; RCA Corp.

Wednesday, February 27 - Caltex Petroleum Corp; Danalab Inc; Joint Institute for Acoustics and Flight Sciences; Louis Berger Inc; Motorola, Inc; National Starch and Chemical Corp; General Electric Co.

Thursday, February 28 - General Electric Co; Atlantic Richfield Co; General Dynamics/Electric Boat Div; Motorola, Inc, Semi-Conductor Products Div; TRW Systems Group.

Friday, March 1 - General Electric Co; TRW Systems Group. Brier Manufacturing Co; GAF Corp.

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 February 27 through March 10 to the Calendar Editor, Room 5-111, Ext. 3-3279, before noon Friday, February 22.

Computer Systems Research Group. Good typing and dictaphone skills required. Willingness to use the computer for typing documents desired. 74-86-R (1/30).

Secretary IV Part-time to the Head and Associate Head of the Physics Department. Perform general secretarial duties in the headquarters office; answer questions from students and visitors; type a great deal of correspondence. Excellent typing shorthand required. 20 hour work week; afternoons. 74-5-R (1/9).

Secretary IV for several members in the Analytical Studies and Planning Group will type reports and correspondence, schedule appointments and meetings, maintain files. Office focus is on central administration and faculty committee projects, and preparation of documents such as the Report of the President and Chancellor and the Institute Catalogues. Excellent typing and proofreading skills, ability to set priorities and occasionally work under pressure required. 3 1/2 hour work week. 9-5:30. 74-133-R (2/13).

Secretary III-IV to the Assistant to the President and Chancellor will handle all secretarial duties in one-person office. Maintain appointment calendar, files; excellent typing skills needed for correspondence, occasional heavy typing under pressure. Office works closely with senior administrative offices and faculty groups with a wide variety of tasks. Flexibility, adaptability and cooperation; ability to organize and work independently, ease with visitors important. Occasional overtime necessary, MIT experience useful. 35 or 37 1/2 hour work week. 74-136-A (2/13).

Secretary IV for Urban Studies and Planning, community Fellows Program will maintain budgets and keep records of the accounts; type letters, reports for the Fellows and Staff. Attend a weekly Tuesday evening seminar, transcribe recorded tape of the seminar. Will also attend a 10-day Orientation Program and a 3-day Wrap-up Program off campus. Previous secretarial experience, good office skills, ability to work for several people required. 40 hour work week. 74-103-R (2/6).

Secretary IV to the Directors of Personnel Development will handle general secretarial duties; schedule seminars and classes, maintain budgets and files; assist with Tuition Assistance and Orientation activities. Candidate with good office skills, accuracy in grammar and math, strong organizational abilities required. Will have opportunity to contribute to the planning of career development programs. 74-119-A (2/6).

Secretary IV to two professors in the Lab for Nuclear Science will handle all general secretarial duties for several small projects. Good shorthand or the ability to take dictation desirable; highly skilled typing required. Initiative and organizational abilities important. 73-1374-R (1/9).

Secretary IV will handle all secretarial duties for the Institute Secretary. Plan travel schedules, make arrangements; assist in gathering and collating information on Corporations. Previous experience, excellent typing and shorthand skills required. Ability to organize and work independently important. 74-1-R (1/9).

Secretary IV for Institute Secretary for Corporations will organize and run the office. Very accurate typing needed for some letter-perfect copy; other typing duties require speed. Preliminary research on corporate prospects; gather backup information for visits; draft not-too-technical correspondence. Work closely with other Institute offices in obtaining pertinent data; receive visitors. Flexible, adaptable, good telephone presence. 73-1091-R (10/10).

Secretary III-IV will work for three professors in Economics. Type manuscripts (often mathematical), letters, class material, answer inquiries for and about students, schedules and subjects. Other duties include filing, travel arrangements, purchasing, student records, occasional library reference work. Good typing essential; adaptable. 74-163-R (2/20).

Secretary IV - Temporary for one year will work with staff in Real Estate Office. Duties include typing, transcription of shorthand dictation, phones, greeting visitors, ordering supplies, maintaining inventory, dealing with service personnel, occasional assistance working with figures, and other clerical duties. Skills must be good and accurate; typing speed also important. Pleasant attitude for dealing with a variety of people; liking for figures. 74-161-R (2/20).

Secretary IV will make appointments, answer phones, hand handle routine correspondence and memos, answer inquiries from students, faculty, staff and parents for a Dean in the Student Affairs Office. Will maintain student files and records; share office with

three other secretaries. Will work with Association for Women students. Ability to work in an often hectic atmosphere, to establish priorities. Tact, sensitivity to students; must be able to handle confidential information. 74-165- (2/20).

Secretary IV for a professor in Earth and Planetary Sciences will handle all secretarial functions; perform some administrative chores, some library research and editing. Excellent typing (some technical); shorthand preferred. Editorial and organizational skills important. 74-8-R (1/9).

Secretary III to the Superintendent for Construction and Engineering (Physical Plant) will handle general inquiry telephone calls concerning construction activities; schedule meetings; and reports. Good typing and shorthand skills essential. Ability to work with individuals from outside the MIT community important. 74-20-R (1/6).

Secretary III Part-time in Humanities and Social Science will provide secretarial support for a new program in Technology Studies. Transcribe dictaphone tapes; arrange meetings and handle other general duties. Accurate skills and willingness to work with details important. 20 hour work week; afternoons. 74-116-A (2/6).

Secretary III to an Industrial Liaison Officer will assist with the Institute publication distribution, symposia and faculty travel, research of briefings. Handle all other general secretarial duties. Good shorthand (speedwriting) and typing skills necessary. 74-99-R (2/6); 74-100-R (2/6); 74-123-R (2/13).

Secretary III in the Development Office will handle all general secretarial duties for the Assistant Director. Excellent typing needed for letters, reports, memos; shorthand helpful; general editorial skills useful. Organizational ability and good judgment important. 73-1351-A (1/9).

Secretary III in the Educational Council will be responsible for transcription of correspondence by dictaphone, several office procedures. Must be willing to assume responsibility and initiative; one to two years' experience preferred to work with a minimum of supervisor. 74-148-R (2/20).

Secretary III in Psychology will take shorthand, type correspondence, manuscripts and reports, file, answer phones, working with the Department secretary, but will also independently handle details of Introduction Psychology course, such as class lists, grades, papers, etc. Will also make some travel arrangements, arrange weekly colloquia, type occasionally for research staff. Good command of English. Shorthand and typing must be proficient. Some experience important; able to deal with confidential information discreetly. 74-154- (2/20).

Secretary III in Chemical Engineering will type quizzes, reports, technical manuscripts, proposals for three associate professors. Will arrange appointments, file, act as receptionist for the office. Dictation from tapes; technical typing experience preferred. Prompt, dependable, able to accept supervision, and follow through on details. 74-162-R (2/20).

Secretary III - Temporary to one professor and two research associates in Civil Engineering will handle general secretarial duties; type proposals; maintain account records. Good typing required, ability to work with variety of people important. Job ends 9/30/74. 74-39-A (1/23).

Secretary III - Temporary in Career Planning and Placement will type correspondence, job descriptions and job interview notes from IBM dictaphone for Associate Director. Answer phones, make appointments, receive alumni. Dictaphone experience necessary to handle two tapes a day easily. Mature, pleasant, able to work with interruptions. Temporary: 2/28 - 5/31/74. 74-142-R (2/20).

Senior Clerk III-IV in an administrative office must type letter-perfectly for all notices of Faculty appointments, letters, etc. File all appointment forms; set up Personnel folders; will learn use of IBM Mag Card Selectric typewriter. Other typing demands accuracy for records and Personnel changes; and for statistical counts and surveys. Discretion, maturity to work with highly sensitive material; liking for detail; ability to follow through important. 74-60-R (1/23).

Senior Clerk III to the Work Control Coordinator, Physical Plant will receive and dispatch service requests; assist with scheduling; monitor requisitions; perform other clerical assignments. Ability to learn details of procedures; good office skills required. 74-16 (1/16).

Senior Accountant Clerk IV in the Superintendent's Office in Physical Plant will compute, report time for all Physical Plant hourly employees. Will type requisitions, action forms, keep personnel records updated. Will check labor cards for keypunch; correct errors. Maintain perpetual inventory; will learn to handle accounts payable

reconciliation report. Minimum 3 years business experience, good English skills to communicate well with many employees and other Institute Offices. Some familiarity with EDP and accounting procedures. 74-141 (2/20).

Senior Clerk/Searcher III in the Micro-reproduction Laboratory of the Libraries will write search cards and retrieve books and other material requested from various MIT branch libraries; deal with customers by phone and in person, handling orders and inquiries. Accurate typing required for work orders. Cooperative, helpful attitude necessary for phones, and working with small staff. 74-145-A (2/20).

Technical Statistical Typist III in Comptroller's Accounting Office will type a variety of Institute reports including Financial and Treasurer's reports; Professorship, NIH, and Research Grant reports, etc; as well as other reports and typing that comes in from various departments. Will operate a 24 inch typewriter; work with A.B. Dick Masters; use the adding machine. Excellent typing skills and a minimum of one year statistical typing necessary. 73-1356-R (1/9).

Electronic Technician A in the Laboratory for Nuclear Science will service and operate high power radiofrequency transmitters. Candidate will be instructed in accelerator operation. Graduation from a two-year day technical school or its equivalent and a minimum of two years applicable experience required. Experience on high power radar systems desirable. Will work at lab in Middleton, Mass. 40 hour work week; rotating shifts. 74-22-R (1/30).

Electronic Technician B in the Laboratory for Nuclear Science will assist in laboratory research and operate experimental and technical equipment under the direction of scientific personnel. Graduation from a two-year technical day school or its equivalent in applicable experience is minimum requirement. Fundamental understanding of electronics, ability to read schematics, skill in wiring required. Will work at a lab in Middleton, Mass. 40 hour work week. 74-42-A (1/30).

Electronic Technician C in the Laboratory for Nuclear Science will perform various routine jobs such as chassis wiring maintain apparatus, perform laboratory tests and analysis. Candidate must be able to read simple schematics, including transistors and integrated circuits, and skill in soldering. Will work at lab in Middleton, Mass. 40 hour work week. 74-43-A (1/30).

2nd Class Engineer must have a Mass second class Engineer's license or higher. Individual must be willing to work on any shift. 73-182-R (11/24).

Technician B in the Environmental Medical Service will perform general radiation protection technician duties at the MIT reactor. Repair and calibrate instruments; conduct radiation surveys and sample preparation, decontamination and lab clean-up. Package radioactive waste and assist in construction of shields. Training and experience in electronics and radiation protection required. Afternoon shift. 40 hour work week. 73-1227-A (12/15).

Junior Detailer must know how to type, have one year of art school and must be able to do Leroy inking of graphs, wiring diagrams and block diagrams. 40 hour work week. 74-144-R (2/20).

Grounds crew member in Physical Plant will lift heavy loads such as rubbish, platforms, fertilizer, concrete blocks, lumber, gravel, and equipment onto trucks; shovel snow. Should be experienced in grounds crew duties such as cutting grass, watering lawns, and general care of lawns. Mechanical aptitude helpful. Special physical examination required. Hours will be irregular to meet needs of Grounds Operations. Mass driver's license required. 74-157-R 74-158-R (2/20).

Locksmith in Physical Plant must have five years in the trade, have knowledge of current trade practices in Builder's Hardware, lock repairing, master keying, and key changes. Must be reliable; have excellent work record. 74-159-R (2/20).

Laboratory Assistant in Biology will sterilize, wash, clean and prepare glassware for research laboratories. Ability to work well with people important. Maturity, reliability required. 40 hour work week. 74-104-R (2/13).

Campus Patrolwoman/Patrolman Minimum 10 years experience required in all phases of law enforcement to include knowledge of court procedures and case preparation, investigation of criminal and other complaints and reporting on same. Rotating shift/40 hour work week. 74-92-A (2/6).

Waitresses/Waiters-Part-time at the Faculty Club will set up silver & china on dining room tables. Take member orders, serve food and beverages. Clear, clean and reset tables. Experience helpful, but not necessary. Shifts: M-F 11:00am-3:00pm, (3 openings). All positions may require weekend work.

Second Compton Lecturer Will be Kenneth Boulding

University of Colorado Professor Kenneth Boulding, former president of the American Economic Association, will deliver the main address at the third program in MIT's Karl Taylor Compton Lecture Series at 4pm Thursday (Feb. 28) in Room 9-150.

Professor Boulding, professor of economics and Director of Research on General, Social and Economic Dynamics at the Institute of Behavioral Science at the University of Colorado, is the author of many significant economics studies including, *The Meaning of the Twentieth Century*.

The program is titled "Defense Against Unwanted Change."

The two respondents will be: Dr. Paul W. MacAvoy, professor

Energy Cost

(Continued from page 1)

this, but they are a major cause." MIT is unable to pass along price increases. Room rates in student residence houses for this year were fixed early last year, before prices began climbing steeply. The indirect overhead charges MIT can make against research grants and contracts from federal agencies likewise is fixed for the current fiscal year.

"Therefore, the impact of these increases falls directly on the general budget for this year," Dr. Gray said.

Meantime, Physical Plant officials, noting that electrical consumption is on the rise, urged members of the MIT community this week to conserve energy as diligently as before.

"People have heard that there will be sufficient fuel oil for the winter and they are relaxing," William R. Dickson, director of the Physical Plant, said. "Electrical consumption had been reduced by 20 percent but it has been creeping up and the reduction is now closer to 15 or 16 percent."

"Availability isn't the only thing we are concerned about," he said. "Cost is a major factor, too."

Dickson said it now appeared certain that MIT would have enough No. 6 residual heating oil to get through the winter, although it was necessary the first 15 days of February to use 75,000 gallons of the Institute's 380,000 gallons of reserve fuel. In a normal February, the Institute uses about 1,000,000 gallons of oil.

Dr. Killian

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been terminated a year ago, with the civilian functions of the White House Office of Science and Technology being transferred to the director of the National Science Foundation, H. Guyford Stever. He has since been named Science Advisor to the President.

The Council said its ad hoc committee would "evaluate these changing relationships between science and technology and government, examine the new requirements born of changes in national priorities and objectives and draw on the experience of past and present arrangements."

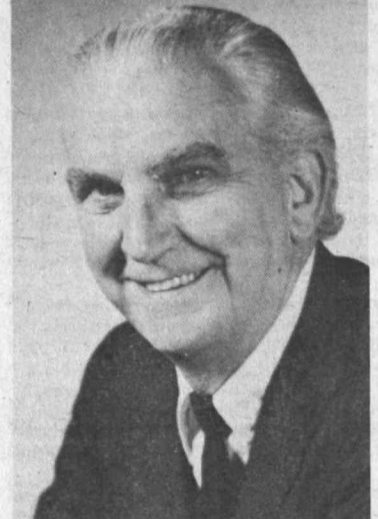
The committee is expected to make its report and recommendations in four to six months.

Its membership, although not complete, includes persons with experience in the problems of science and government. They are drawn largely from industry and universities and have backgrounds in the social, engineering, medical and natural sciences.

The members include Dr. Edwin H. Land, president of the Polaroid Corporation and Institute Professor, Visiting, at MIT.

of management at MIT's Alfred P. Sloan School of Management, an associate in the Energy Laboratory working on large-scale economic models of energy policy problems in the United States and a member of William Simon's Board of Economic Advisers in the United States Energy Office.

David Dodson Gray, who has been working closely with Professor Carroll L. Wilson of the Sloan School in his seminar on "Strategies for a Sustainable Growth."



Professor Boulding

Mr. Gray is the former Episcopal Chaplain at Washington University in St. Louis and is presently Episcopal Chaplain at Washington University in St. Louis and is presently Episcopal Chaplain in Westboro, Mass. He is associated with the Harvard Divinity School and the Harvard Business School and conducts seminars in the Boston financial, university and religious communities on ethics and investments.

Robot

(Continued from page 1)

this summer. So far this year they have constructed the robot's hull and cylindrical instrument containers and are in the midst of designing and building the controls and sensors.

Their first project with the robot will be a search for some of the 40 or so wrecks of revolutionary warships known to litter Penobscot Bay near Castine. In one previous summer expedition they have already found one such ship using conventional techniques from aboard a surface vessel.

Members of the group are working on several other ocean-related projects, including a compressed-air diver propulsion system, a magnetometer gradiometer to detect underwater wrecks, tide gauges, ocean mining techniques, and an underwater radio system.

Undergraduate members of the group are Joseph M. Driear, Theinsville, Wis.; Deborah S. Hoover, Higganum, Conn.; Brian G. Hughes, Ontario, Canada; Gene P. Masters, Bogart, Ga.; William E. Nixon, Raleigh, N.C.; James P. Radochia, Wilmington, Mass.; Melvin J. Schorin, Pittsburgh, Pa.; Arlie G. Sterling, Norfolk, Mass.; Thomas J. Teixeira, W. Newton, Mass.; and Douglas W. White, Los Alamos, N.M.

Albert M. Bradley, research associate, heads the laboratory developing the robot's instrumentation. Teaching assistant David Nowak, of Brighton, Mass. and graduate students Anthony Zolatas of Athens, Greece, and James W. Slack of Boston are aiding the students in developing the robot's design.

Professor Carmichael and his robot-construction team are seeking undergraduate students interested in helping to design and build the control mechanisms and the computer for their underwater robot. Call or see Professor Carmichael at Rm 5-222E, x3-4316.