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Taiwan Program Terminates

A two-year non-degree technology training program started Jan. 1, 1975, at MIT's Center for Advanced Engineering Study for 15 engineers from Taiwan—organized around the technology of inertial navigation and aimed at contributing to Taiwan's economic development—has been terminated six months early by agreement between the contracting parties.

Dr. Thomas F. Jones, MIT vice president for research, said the US Department of State's Munitions Control Office advised MIT in May of this year that the portion of the teaching program under which the students from Taiwan were carrying out "hands on" design and construction of a prototype inertial navigation system would not be in furtherance of the foreign policy and national security objectives of the US.

Dr. Jones said he and a representative of the National Taiwan University which contracted for the program, agreed, after examining alternative programs, that it would be in the best interest of both parties to end the program effective June 30 rather than try to change the focus of the training toward technological applications distinctly different from inertial navigation.

Dr. Jones said NTU officials have agreed to meet all costs incurred in the program. Had it run its full course of two years, the program would have cost \$917,000.

Inertial navigation systems are manufactured and sold commercially worldwide for airplanes and ships and draw upon the same fundamental engineering technology that is employed in the design and construction of inertial guidance systems for military ballistic missiles. Indeed, engineers experienced on one kind of project can work on the other with some adaptation.

The technology training program for the engineers from Taiwan was the subject of campus protest late last year and early this year. Opponents expressed fear that the engineers, after learning the principles of inertial navigation at MIT, would return to Taiwan where the

(Continued on page 4)

Vetter Sworn In



Edward O. Vetter, accompanied by his wife, is sworn in as Under Secretary of Commerce by Secretary of Commerce Elliot L. Richardson.

Edward O. Vetter of Dallas, Tex., president of the 60,000-member MIT Alumni Association and a member of the MIT Corporation, was sworn in as Under Secretary of Commerce in Washington July 7.

Mr. Vetter, who received the SB degree in mechanical engineering from MIT in 1942, was executive vice president of Texas Instruments, Incorporated, of Dallas, from 1969 until his retirement from the firm in 1975. He also had been a group vice president and general manager.

U.S. Secretary of Commerce Elliot L. Richardson said that Mr. Vetter, who was nominated for the post of Commerce Under Secretary by President Ford June 23, "is uniquely qualified" for the post, which makes him the second-ranking officer in the Department of Commerce.

"His 28 years of business experience have given him valuable familiarity and competence in such wide-ranging areas as international trade, energy development, science and technology, capital formation, trade in the Mideast and East-West relations," Secretary Richardson said.

He added, "Mr. Vetter is the first person with an engineering business background to serve as Under Secretary of Commerce since the mid 1950's. Technology is increasingly important to our competitive export position and our capacity to create jobs. His expertise will be a great resource to this Department in

working with industry and with other government agencies."

Mr. Vetter on July 1 began a one-year term as an ex officio member of the MIT Corporation by virtue of his election as the 82nd president of the Alumni Association. He also serves as a term member of the Corporation, having been elected in 1973, as well as a member of the Corporation Executive Committee, Corporation Development Committee and Chairman of the Nuclear Engineering Visiting Committee.

Sea Grant Receives \$1M Grant

The MIT Sea Grant Program has been awarded a grant of \$1,101,200 from the Office of Sea Grant in the National Oceanic and Atmospheric Administration, the US Department of Commerce has announced.

This federal grant, representing the fifth year of support for the MIT Sea Grant Program, will enable the Institute to continue its Sea Grant research, education and training, and advisory services aimed at expanding beneficial uses of ocean and coastal resources.

Matching funds from the Institute, from the Henry L. and Grace Doherty Charitable Foundation, Inc., and from industries, regional agencies, and cooperating institutions will bring the Program's total financial support to \$1,881,000 for the year July 1976 through June 1977.

McCord Experiment Planned for Moon Trip

By BARBARA BURKE
Staff Writer

MIT Professor Thomas B. McCord is one of eight scientists selected to develop experiments for an unmanned lunar mission proposed by the National Aeronautics and Space Administration for 1980.

The mission would be the first U.S. flight to the moon since Apollo 17 in 1972. It would also be the first mission to survey any planet, analyzing the chemical and mineralogical composition of its entire surface.

The unmanned spacecraft would orbit the moon around its poles at an altitude of 100 kilometers (68 miles), studying the moon's gravity field, magnetism and heat flow, as well as the surface composition. The polar orbit would enable the spacecraft to make a complete survey of the moon about once a month, as the moon rotates on its axis.

A smaller spacecraft would orbit the moon at an altitude of 5,000 kilometers (3,000 miles), to relay radio signals from the larger spacecraft to Earth when the larger spacecraft was hidden behind the moon.

Dr. McCord, associate professor of planetary physics in the MIT Department of Earth and Planetary Sciences, said that he hoped the mission would be the first of a series of mis-

sions to survey all the planets and satellites in the solar system.

The Apollo missions to the moon "were like trying to understand an elephant by looking at only six spots through a magnifying glass," he said. "They gave us very detailed knowledge about very small regions. But without an overview, it's hard to relate one part to another."

Dr. McCord said that the new mission would not only provide new information, but would also help scientists interpret information obtained from the Apollo flights. The survey would continue for at least a year, he said, "to be sure to cover all surface areas under optimum conditions and with sufficient precision."

Dr. McCord will be in charge of experiments to determine the minerals on the moon's surface. Most minerals have specific "colors" by which they can be identified. These "colors," mostly invisible to our eyes, are determined by the wavelengths (or colors) of electromagnetic radiation the minerals reflect. In the case of minerals on the moon, that radiation is sunlight, both visible and invisible.

Dr. McCord will develop a reflection spectrometer that can determine the wavelengths of sunlight reflected

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and promoting proper coastal development.

Sea Grant's Advisory Services will be working with the University of

(Continued on page 2)

Flu Vaccine Plans Outlined

Judging by the number of calls to the Medical Department, MIT people are very interested in development of the "swine flu" vaccine.

Here's what Dr. Melvin H. Rodman, acting medical director, has to say about it:

"It appears likely that the vaccine will be distributed through health departments for use in the fall. The Medical Department expects to be able to obtain a supply of vaccine to administer to the MIT community. We plan to offer inoculations at spe-

cified times convenient to the community.

"Because of uncertainty about proper dosage, the likelihood is that only people over 25 years of age will be inoculated at first. Vaccine for younger people may become available later."

Dr. Rodman said that further information concerning availability of the vaccine and the schedule of inoculations will be forthcoming as soon as it is known.

Folkwisdom of Wooden Bats Challenged by UROP Student

By JOANNE MILLER
Staff Writer

An MIT junior is out to disprove the folkwisdom of organized baseball that says aluminum bats drive balls further than the traditional wooden bats used by the major leagues.

And he's lined up assistance from the Boston Red Sox—at least to help him set up his experiment.

The shoulder and wrist motion of Red Sox outfielder Rick Miller was photographed in the MIT Stroboscopic Light Laboratory so that James M. Hagadus, a mechanical engineering student from Bedford Hills, N.Y., can design a batting machine to demonstrate the differences—if any—between balls hit by wooden and aluminum bats.

The strobe photography of Rick Miller will be used to determine the kinetics of the bat swing so that the batting machine can simulate the action. According to Hagadus, the rotation of shoulder and

wrist motions does not vary significantly from batter to batter so that the method of impact on a hit ball remains constant, although the initial stance may vary.

Because of their durability and economy, aluminum bats have been widely accepted in amateur baseball, Hagadus said. But they have been resisted by professional baseball because of a widespread belief that they would enable professional players to hit the ball further, giving an advantage to batters.

Hagadus plans to construct a batting machine based on the mechanics of the baseball swing as demonstrated by Rick Miller. The batting machine will be combined with a pitching machine to reproduce the effect of bat hitting ball and record it in strobe photographs.

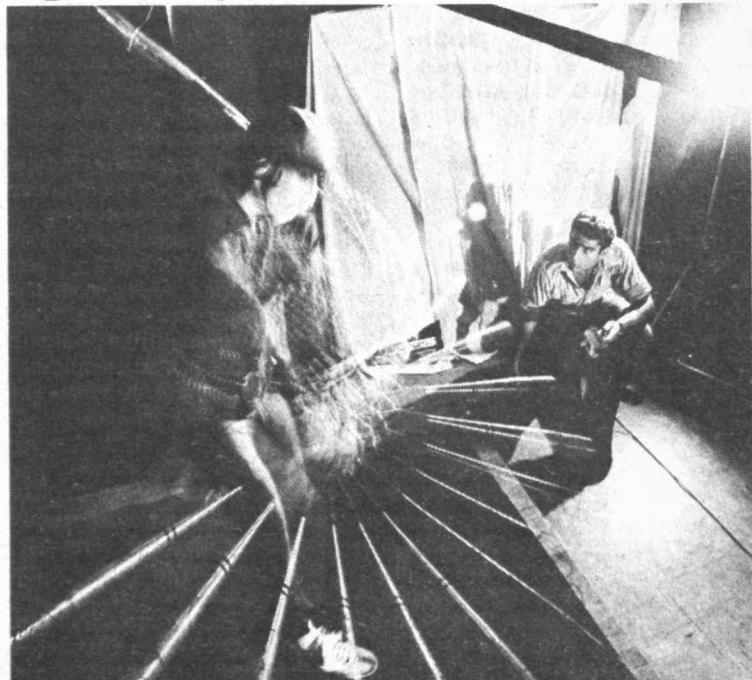
Using the multiple-exposure strobe pictures, Hagadus will be able to calculate the velocity of balls hit by both wooden and aluminum bats. He believes there will be no demonstrable differences be-

tween wooden and aluminum bats, but says that no solid scientific evidence has yet been produced.

Hagadus also plans to study photographs of both old and new bats and expects to find differences in resilience between them in both wooden and aluminum bats.

Hagadus' project is being conducted as part of the Undergraduate Research Opportunities Program (UROP) at MIT, which fosters project-based intellectual collaborations between faculty members and undergraduates. Faculty advisor for Hagadus' project is Dr. Adam C. Bell, visiting associate professor of mechanical engineering.

In UROP, students are involved with all phases of research activity—proposal writing, finance procurement, design of the experiment or research scheme, conduct of the work, analysis, presentation and rewards. Hagadus began his project last spring and expects to have final results during the fall semester.



Jim Hagadus sets his strobe to catch the swinging bat of Rick Miller of the Red Sox.

Chamber Music Concerts Scheduled for July

Chamber music concerts sponsored by the MIT Music Section will be given by the Cambridge Vocal Quartet on Tuesday, July 20, and by pianist Sylvia Glickman on Tuesday, July 27.

Both concerts are open to the public free of charge and will begin at 8pm in Kresge Auditorium.

The Quartet will sing quartets by Schubert, *From an Unknown Past* by Rorem, and other American works. The concert will conclude with a performance of the *Liebeslieder Waltzes*, Opus 52, by Brahms.

Quartet members are Maureen Myers, soprano, Emily Romney, mezzo-soprano, Ronald Coons, tenor, and David Ripley, bass; the accompanist is Marguerite Sirguy. Pianist John Buttrick will join the quartet for the Brahms Waltzes.

Sylvia Glickman, pianist-in-residence, director of chamber music, and member of the music department at Haverford College, will perform the following Tuesday, July 27.

Mrs. Glickman will play the Sonata in E by Reinagle, Beethoven's Sonata in E, Opus 109, No. 30, Copland's Piano Variations, and Waltz in C Sharp Minor, Nocturne in C Sharp Minor, Impromptu in A Flat, and Ballade in A Flat, all by Chopin.

Mrs. Glickman received the BA and MA degrees from the Juilliard School of Music, where she received the Loeb Memorial Prize for "outstanding talent and achievement." In 1955, while a Fulbright Scholar in London, she achieved Licentiate status at the Royal Academy of



Pianist Glickman

Music as well as the Hecht Prize in Composition.

She has concertized in London, in Eastern, Central and South Africa, and in Israel, as well as in the United States. Her composition, *Small Suite for Cello and Piano*, was performed at a 1973 concert sponsored by the National Association of American Composers and Conductors in Philadelphia.

Videotape Digital Signal Processing Course Available

Digital signal processing, a "hot topic" in such diverse areas as biomedical engineering, acoustics, sonar, radar, seismology, speech communication, telephony, nuclear science and image processing is the subject of 21 color videotapes recently produced by the MIT Center for Advanced Engineering Studies.

Dr. Alan V. Oppenheim, Cecil H. Green Professor of Electrical Engineering in the Department of Electrical Engineering and Computer Science is the video lecturer.

The 21 color videotapes are currently available for rental or purchase from the C.A.E.S. The subject's title is Digital Signal Processing.

Topics covered in the lectures and demonstrations include difference equations, discrete time Fourier transforms, the Z-transform, digital filter design and implementation and the fast Fourier transform.

John T. Fitch, director of technology based educational development and marketing at the C.A.E.S., said one of the most unusual and useful of the videotapes is a lecture demonstration of sampling, aliasing and frequency response.

A short "demonstrations only" version of this tape is also available for instructors who want the illustrations without the lecture.

Professor Oppenheim has written a 260-page study guide to accompany the videotapes. Both study guide and tapes are correlated with a text, *Digital Signal Processing* (Prentice-Hall, 1975) written by Professor Oppenheim and R. W. Schaefer of Bell Telephone Laboratories. The book, published less than a year ago, is in its fifth printing—an unusual performance for a college-level text.

Although most clients rent or buy the entire series of 21 videotapes as a complete self-study course, Mr. Fitch said, all the tapes are also available individually for rental or purchase. Prices vary according to the length, but on the average videotapes are 40 minutes long and rent for \$35.00 each. The average individual tape purchase price is \$340.00.

The entire set can be purchased for \$6,180.00 or rented for 105 days for \$646.00.

Professor Oppenheim, whose present research centers on the application of digital signal processing to speech and image processing, received the SB and SM degrees in 1961 and the ScD in 1964 from MIT. He was, until 1964, associated with the MIT Research Laboratory of Electronics working on the application of modern algebra to the characterization of nonlinear filtering problems.

Digital signal processing is one of a number of self-study subjects developed at the C.A.E.S. Other subjects, comprising more than 500 tapes, films, study guides and texts, include:

Artificial Intelligence, Calculus, Colloid and Surface Chemistry, Computer Languages, Economics, Engineering Economy, Friction, Wear and Lubrication, Introduction to Experimentation, Management of Technological Innovation, Mechanics of Polymer Processing, Modern Control Theory, Network Analysis and Design, Nonlinear Vibrations, Probability, Random Processes, Thermodynamics and Thermodynamics, and several special programs.

Five Receive New Fellowships

MIT has received five of 50 newly established fellowships for postdoctoral scientific research named in honor of the late Dr. Chaim Weizmann, the noted biochemist and first president of Israel.

The five MIT fellowship holders for 1976-77 are: Donald S. Grossman of civil engineering, Bruce L. Neff of chemistry, William D. Phillips of physics, Hubert Schoemaker of biology and Weldon W. Wilkening of mechanical engineering. They were selected by a committee appointed by the dean of the Graduate School from nominations submitted by faculty in the Schools of Engineering and Science.

The fellowships—made available by an anonymous donor—will be administered jointly by the American Committee for the Weizmann Institute and the California Institute of Technology. Twenty-five fellowships will support Israeli scholars studying in the United States; the remaining 25 were designated for US citizens engaged in postdoctoral study and research at a US institution.

Environmental Monitoring to be Studied

Scholars at MIT's Center for International Studies have launched a research program aimed at understanding the political, social and economic implications of environmental monitoring on a global scale.

Dr. Eugene B. Skolnikoff, who heads the center, said the program was stimulated by issues surrounding a major United Nations project to coordinate international monitoring of the environment.

How likely is it, scholars asked, that the UN effort alone can enable the nations of the world to respond to environmental threats in time to take effective action? And how likely is it that sovereign nations will then cooperate effectively to deal with environmental problems that cross national boundaries?

The program is supported by grants from the Rockefeller and Mellon Foundations and will be conducted in close cooperation with the UN Environmental Program.

The principal investigator is Professor George W. Rathjens, professor of political science. Dr. Rathjens holds degrees in chemistry from Yale University and the University of California and is widely known for his study and research on public policy problems, especially arms limitation and control.

Others in the program's core group, along with Dr. Skolnikoff and Dr. Rathjens, are Dr. Jule G. Charney, Alfred P. Sloan Professor

of Meteorology and head of the MIT Department of Meteorology, who is the program's scientific consultant; Howard Margolis, research associate at the Center for International Studies, and Marc Roberts of Harvard University's Kennedy School of Government and School of Public Health.

Dr. Skolnikoff said that the many international environmental issues which have arisen in recent years—fisheries depletion, oil spills, DDT, and threats to the earth's ozone shield among them—"represent a permanent aspect of international affairs."

While not all of these issues will remain of overriding importance, Dr. Skolnikoff said, they afford overwhelming evidence that "technology and the worldwide level of productive activity have reached a stage of development and dispersion at which we can expect questions to arise regularly about the international environmental effects of activities under national control."

There is a clear and immediate need for global-level environmental monitoring such as the UN project will provide. Dr. Skolnikoff said, "But to make effective use of the monitoring system requires some hard thinking about the political and social implications."

"Within the last decade or so it has become apparent that some of man's activities can cause changes in the

global environment that would be irreversible or reversible only with unacceptably long time constants, or severe enough, even if short term, to be regarded as catastrophic," he said.

The MIT program will focus primarily on the international policy and institutional questions, exploring these issues:

—The political, economic, and technical constraints on monitoring.

—The institutional choices in the operation of such systems.

—The economic and political implications of data from monitoring systems and the resulting alternatives posed for national policies.

—The levers by which governments can influence environmental behavior of other governments, including the role of international institutions.

The study group feels that the most effective way to deal with these issues is in the context of concrete case studies. Two selected thus far are the controversy over ozone depletion, and the effects of man's activities on the fraction of solar energy reaching the earth which is immediately lost by reflection back into space.

O'Neal Passes Bar

Charles D. O'Neal, Jr., director of the MIT Real Estate Office, who received the JD degree from Suffolk University last year, has been admitted to the Massachusetts Bar. He was sworn in at a ceremony on June 16.

Sea Grant Funding

(Continued from page 1)

Massachusetts Cooperative Extension Service in bringing useful information on the oceans and coasts to citizens of the Commonwealth, and will actively participate in the New England Marine Advisory Service, a consortium of the region's Sea Grant schools and ocean-oriented institutions.

The MIT Sea Grant Program's Marine Industry Advisory Service will be continuing its working partnership with companies of national and international stature, helping them to identify and exploit profitable business opportunities in the oceans.

In Sea Grant education, MIT's Program is starting a cooperative project with the Massachusetts Maritime Academy to develop a commercial fisheries training program that will produce highly qualified personnel for the New England fishing industry. At MIT, Sea Grant will continue to sponsor a summer laboratory for ocean engineering students and an interdisciplinary subject on topics in coastal zone management.

The MIT Sea Grant Program's objective of developing new technology for ocean uses will be promoted by research projects on ocean wave energy systems, on the seabed soil foundations and structural stability of offshore construction, on remote-controlled manipulators for undersea tasks, and on improved plastics for use in seawater.

MIT investigators sponsored by Sea Grant will be continuing a study on metal welding and cutting techniques for undersea construction,

rescue work, and salvage operations. Other researchers will analyze regulations for offshore technology under extended jurisdiction, and will design improved methods for containing and collecting offshore oil spills.

Sea Grant's major project on the seawater environment of Massachusetts Bay will be completed in the coming year; the predictive computer models developed to describe the Bay's behavior will be put to work by government agencies, utilities, and consulting firms. Investigators will also search for possible causes of New England's red tides, and will quantify rates of coastal erosion and deposition of sediments on shorelands.

Sea Grant research related to the fishing industry includes studies that will develop safer equipment for New England's side trawlers, invent new processes for skinning dogfish sharks, an underutilized food resource, and design a possible management system for the Georges Bank fishery resource under the 200-mile limit.

Investigators supported by Sea Grant are also analyzing the cholesterol content in fish and shellfish, and promoting the use of chitin, a material obtained from shellfish processing wastes, in commercial products.

The director of the MIT Sea Grant Program is Mr. Dean A. Horn. E.R. Pariser, Senior Research Scientist in MIT's Department of Nutrition and Food Science, heads the Program's Advisory Services, and Norman Doelling is manager of Sea Grant's Marine Industry Advisory Service.



Some 90 physics teachers from 27 nations were on campus recently for the International Conference on Teaching Physics for Related Professions. Left to right are Professor M. Mokhtar of the University of Cairo, Professor Anthony P. French, MIT host for the conference, and Professor Fikry Hassan of Ein Shams University, Cairo. The week-long conference focused on the design and curricula of physics courses used in training scientists and engineers in disciplines other than physics. The conference was organized by the International Union of Pure and Applied Physics and sponsored by the American Association of Physics Teachers.

INSTITUTE NOTICES

Announcements

Technology Children's Center Day Care Program—Immediate openings for children ages 3-5 years, for year-round or summer only. Info: Child Care Office, Rm 4-144, x3-1592.

Club Notes

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

Ecology Action*—Office open 9am-6pm, Stu Ctr Rm 002. All welcome, please drop in.

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

MIT Space Habitat Study Group*—Meetings Thurs, 7pm, Rm 37-252. Interdisciplinary studies on space colonization. Everyone interested is invited. Office: Rm 24-415. Info: B. Bugos, x3-6625.

Religious Activities

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

MIT Buddhist Association*—Weekly meditation Mon, 5:30pm, Rm 8-205. All welcome, prior experience in meditation not necessary.

Campus Crusade for Christ*—Family Time, Fri, 7:45pm, Rm 37-252.

Jesus Christ's Full Gospel Meeting*—Singing, praise, prayer, testimonies and other preaching. Sun, 2:30pm, Stu Ctr Rm 355. Info: 494-8888.

Prayer Time**—Lunch hour Bible classes led by Miriam R. Eccles. Fri, 1-2pm, Rm 20E-225. All are welcome.

Tech Catholic Community*—Sunday Mass: June 20, 10am, Chapel. Beginning June 27: 10am, Kresge Little Theatre.

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Philosophy, Linguistics Merge

Reorganization of departments in the School of Humanities and Social Science at MIT—including the elimination of one department as an administrative entity—has been announced by Professor Walter A. Rosenblith, MIT provost, and by Dr. Harold H. Hanham, dean of the School.

In the change, which became effective July 1, 1976, the linguistics program of the Department of Foreign Literatures and Linguistics merges with the Department of Philosophy to form the Department of Linguistics and Philosophy.

At the same time, the programs in foreign languages and their literatures become part of the Department of Humanities.

Professor Morris Halle, who has been acting head of the Department of Foreign Literatures and Linguistics since January, becomes acting head of the Department of Linguistics and Philosophy. Professor Halle has also been honored with appointment to the Ferrari P. Ward Professorship of Modern Languages and Linguistics.

Professor Richard L. Cartwright, who was head of the Department of Philosophy, returns to full-time teaching and research.

Dean Hanham said the changes were approved by all faculty members concerned and were unanimously endorsed by the visiting committees of both the Department of Foreign Literatures and Linguistics

Morris Halle Appointed Ferrari P. Ward Professor

Professor Morris Halle, a leading scholar in the modern field of linguistics, has been appointed to the Ferrari P. Ward Professorship of Modern Languages and Linguistics at MIT.

The Ferrari P. Ward chair was established at MIT in 1966 through a bequest from Mr. Ward, an inventor, industrial consultant and a member of the MIT Class of 1926. The professorship was the first to be established at the Institute in this field, in which Mr. Ward had a particular interest.

The appointment, effective July 1, was announced by Dr. Harold J. Hanham, dean of the MIT School of Humanities and Social Science. Professor Halle also becomes acting head of MIT's reorganized Department of Linguistics and Philosophy.

In the Ferrari P. Ward Professorship, Professor Halle succeeds Dr. Noam A. Chomsky, who has held the chair since it was established. Dr. Chomsky, whose research on the nature of language has revolutionized linguistic science, was recently appointed Institute Professor, a rank that MIT reserves for scholars of special distinction.

"Dr. Halle is one of the most distinguished linguists of our times," Dean Hanham said. At MIT, he said, "Professor Halle has special claims for recognition. He has been in charge of the linguistics program since its beginning and as thus virtually its department head, and he has served selflessly on Institute committees."

Professor Halle was born in Latvia in 1923 and came to the United States



and the Department of Philosophy.

In reviewing the background of the merger of linguistics and philosophy, Dean Hanham noted that during the last decade linguistics had undergone a rapid development, largely separate from literature and approaching philosophy in some of its important interests.

During this period, philosophers and linguists at MIT have drawn closer together in their intellectual interests—the philosophers with a growing interest in the philosophy of language, and the linguists with increasing involvement in philosophical questions, he said.

At present, graduate students in philosophy frequently take linguistics subjects and students interested in theoretical linguistics in turn study subjects in philosophy. There is, consequently, an area of common interest in the education of graduate students and in research, he said. The reorganized department will also develop a program in cognitive studies.

At the undergraduate level, the merger of linguistics and philosophy makes possible a new undergraduate major, "Language and Mind," whose domain will be the overlap of philosophy, linguistics, and cognitive psychology, including psycholinguistics. In addition to providing a grounding in the problems of language and mind, the program is also designed to prepare students for

in 1940. He received the MA degree in linguistics from the University of Chicago in 1948, then went to Columbia University to study with Roman Jakobson. In 1949 he accompanied Jakobson to Harvard University, where Halle received the PhD degree in Slavic Languages in 1955.

Dr. Halle joined the MIT faculty in 1951 as assistant professor in the Department of Modern Languages and as a staff member of the Research Laboratory of Electronics. He was promoted to associate professor in 1956, and was made full professor in 1961.

Professor Halle's academic honors include a J.S. Guggenheim Memorial Foundation Fellowship, in 1960-61, for studies in Russian dialectology. During the same year he was a fellow at the Center for Advanced Study in the Behavioral Sciences, at Stanford University. In 1962 he was named a fellow of the American Academy of Arts and Sciences and in 1974 he served as president of the Linguistic Society of America.

Professor Halle has made many contributions to the scientific study of the language, the most notable being in the areas of phonology, metrics, historical linguistics and the Slavic Languages. Among his principal publications are *Preliminaries to Speech Analysis* (with R. Jakobson and C.G.M. Fant), MIT Press, 1952, 1955, 1961; and *The Sound Pattern of English* (with Noam Chomsky), New York, 1968. Professor Halle also is co-author with Roman Jakobson of *Fundamentals of Language*, The Hague, 1956; and with S.J. Keyser of *English Stress: Its Form, Its Growth and Its Role in Verse*, New York, 1971, and the author of *The Sound Pattern of Russian*, The Hague, 1959, as well as more than 70 technical papers in various areas of linguistics.

New House Bond Issue Sold

The Massachusetts Health and Educational Facilities Authority has just sold on behalf of MIT \$6.3 million in revenue bonds to finance the cost of construction of MIT's New House residence along Memorial Drive on the west campus.

The MHEFA bonds were sold at a net interest rate of 5.989 percent. The building was completed and occupied last year, but the bond issue was delayed to obtain more favorable interest rates than were available in the bond market at that time. John A. Currie, MIT Director of Finance, said had the bonds been issued last year, the net interest rate could have been near 8.5 percent. New House

accommodates 300 students.

This is the third time that the MHEFA has issued bonds on behalf of MIT—previous issues were made of \$10.4 million in 1972 and \$10.5 million in 1970 to finance a variety of construction projects at the Institute.

The MHEFA was established by the state legislature in 1968 to aid colleges, universities and hospitals in financing eligible facilities through tax exempt bond issues. The MHEFA bonds are "revenue bonds" in that they are repaid out of revenues—i.e., rents, leases, etc.—that are generated by the facilities themselves.

graduate study in philosophy, linguistics, or cognitive psychology.

In the other merger, the transfer of foreign languages and literatures brings these disciplines closer to the Literature section of the Department of Humanities in a seemingly more natural relationship, Dean Hanham said.

In those areas of philosophy and linguistics that are not so closely related, the respective graduate programs will maintain their identities, he said. Strong emphasis on the teaching of undergraduate subjects in philosophy will continue, and the present broad spectrum of undergraduate offerings will remain.

3 Named To Faculty

One associate and two assistant professors have been appointed to the faculty of MIT effective July 1.

They are: Franklin F. Alvarez, associate professor for three years in the Department of Ocean Engineering; Sallie W. Chisholm, assistant professor for three years in the Department of Civil Engineering, and Michael P. Cleary, assistant professor for two years in the Department of Mechanical Engineering.

Professor Alvarez, Commander in the U.S. Navy, received the BS degree in 1957 from the U.S. Naval Academy, the SM degree in naval engineering in 1964 and the ScD in 1966, both from MIT. His extensive naval background includes service aboard the U.S.S. Los Angeles from 1957 to 1959 and the U.S.S. Cogswell from 1959 to 1961. From 1967-68 he was a project officer in Vietnam. Professor Alvarez served in various capacities at the Hunters Point Naval Shipyard from 1968-71, was Engineer Officer aboard the U.S.S. Midway from 1971-73 and from 1974 to the present has been Assistant for Engineering Systems at the Major Surface Combat Ships Project.

Professor Chisholm received the BA degree with honors from Skidmore College in 1969, and the PhD in 1974 from the State University of New York at Albany. From September 1974 until the present she has been a postdoctoral research biologist at the University of California at San Diego's Institute of Marine Resources.

Professor Cleary received the BE in 1972 from the National University of Ireland, the MSc in 1974 and the PhD in 1975, both from Brown University. Since January he has been a lecturer in mechanical engineering at MIT.

Shen Endows Lectureship

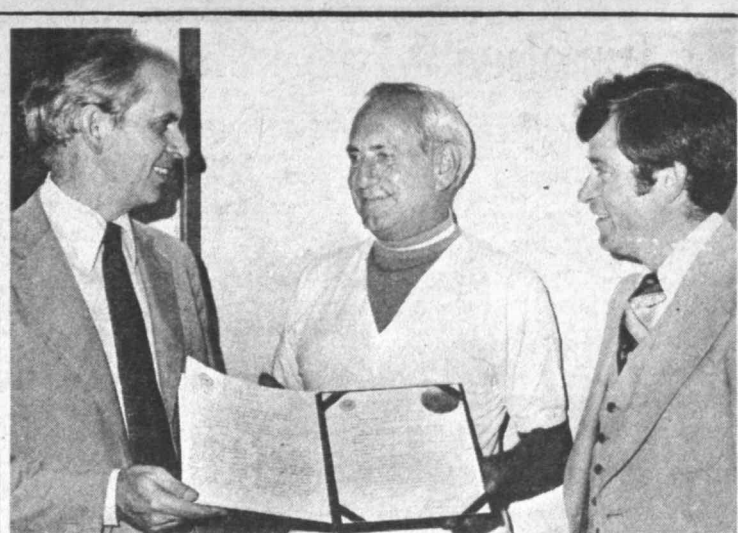
A visiting professorship in medicinal chemistry has been established in the Department of Chemistry by Dr. Tsung-Ying Shen, executive director of synthetic chemistry research for Merck Sharp and Dohme Research Laboratories.

Dr. Shen, a postdoctoral research associate in chemistry at MIT from 1952-56, received the Merck and Company, Inc., Directors' Scientific Award for his outstanding achievements in medicinal chemistry. Dr. Shen selected MIT as the recipient of the \$25,000 honorarium accompanying the award, to be used to bring distinguished synthetic and medicinal chemists as visiting professors at MIT.

In 1956, Dr. Shen joined the research laboratories of Merck and Company where he has been a leader in development of useful drugs. He is particularly well known for the discovery of the anti-inflammatory drug Indomethacin.

Schmitt Co-authors 'Science' Article

Dr. Francis O. Schmitt, Institute Professor Emeritus, and Foundation Scientist of the MIT Neurosciences Research Program, discusses "Electronic Processing of Information by Brain Cells" in the July 9 issue of *Science*. Co-authors are Dr. Parvati Dev, staff scientist of the Neurosciences Research Program, and Dr. Barry H. Smith, program director of the program.



PROCLAIMING Urban Executives Month in honor of the successful MIT Sloan School of Management Urban Executives Program is Cambridge Mayor Alfred E. Vellucci, center. Mayor Vellucci presents copy of the proclamation to Dr. William F. Pounds, left, Dean of the Sloan School of Management. At the right is Robert W. Healy, assistant city manager for administration in Cambridge, who attended the just-concluded ninth session of the Urban Executives Program. "The cities are the heartbeat of a nation, the health and vigor of which depends upon a constant upgrading and renewal of management skills," Mayor Vellucci said in the proclamation. "The City of Cambridge is proud to be the home of this unique program developed by MIT for Urban Executives."

Program Aids Dallas

The Dallas convention center had a Texas-size deficit—\$1.6 million—until a city management expert reduced it by three-quarters of a million dollars using techniques of planning and control he studied at the MIT Sloan School of Management program for urban executives.

How did Gerald W. Henigsman, assistant to the Dallas city manager, do it? He improved personnel productivity by staffing for normal requirements rather than for peak business—as the convention center had been doing.

"The approach sounds simple, but it had never been used here before," Henigsman was quoted in a *Business Week* article about "The New Public Managers."

Now in its ninth session, the Sloan School's Urban Executive Program seeks to help develop key managers who will influence the design and implementation of municipal policy. One significant measure of its success can be found in the fact that the 12th participant from Dallas is among the 24 executives attending the current four-week session at MIT. Seattle has its ninth participant at the current session and several other cities have sent a half-dozen or more managers to the Sloan School program.

Smith Named Acting Head Of Chemical Engineering

Professor Kenneth A. Smith has been named acting head of the Department of Chemical Engineering, succeeding Professor Raymond F. Baddour who has asked to be relieved so that he may devote full time to his duties as Lamont du Pont Professor of Chemical Engineering.

The announcement of Professor Smith's appointment, which was effective July 1, was made by Professor Alfred A.H. Keil, dean of the School of Engineering.

Professor Smith, who received the SB, SM and ScD in chemical engineering in 1958, 1959 and 1962 from MIT, joined the faculty in July, 1961. He was promoted to associate professor in July, 1967 and to full professor in July, 1971.

His main fields of research and teaching at MIT have been heat transfer, mass transfer, fluid mechanics, thermodynamics, biomedical engineering and desalination.

He has also lectured extensively at other universities (Stanford, Caltech, Wisconsin, Illinois, etc.) and has served as supervisor or co-supervisor of more than 30 PhD theses. His publication list covers more than 60 titles.

Professor Smith serves as associate director of the MIT Arteriosclerosis Center and has extensive connections with industry through

The content of the program is designed and presented by the Sloan School in conjunction with faculty members from engineering, economics and the School of Architecture and Planning.

"To an increasing extent," said Alan F. White, director of the urban executives program, "local governments must identify those men and women who can manage broadly oriented social and economic programs called for in urban centers. Educational opportunities, comparable to those offered business executives, should be offered to those who carry a leadership role in their communities."

The Urban Executives Program, offered by MIT with the advice and counsel of the National League of Cities, the U.S. Conference of Mayors, the International City Managers Association, and the American Society for Public Administration, seeks to accomplish these specific objectives:

—Provide participants with new knowledge on current research and future trends in management decision-making.

—Encourage participants to seek out new skills and tools.

—Help establish communications between MIT and organizations concerned with urban problems.

his broad consulting on chemical products and industrial processes. He has been active for years in the American Institute of Chemical Engineers, is now a member of the editorial board of the *AIChE Journal*, and was chairman of the 80th National Meeting of AIChE, which was held in Boston last year. He is serving as deputy chairman of the Committee on Engineering Education which was established by Dean Keil in December 1975.

Professor Smith and his wife, Ambia, and their four children live in Manchester, Mass.

Professor Baddour was appointed department head in 1969, succeeding the late Professor Edwin R. Gilliland. As head of the department, Professor Baddour was instrumental in the formation of several transdepartmental programs, including a program of enzyme technology which now involves a dozen faculty and research staff members from four departments and similar programs in catalysis and ion exchange.

Other major developments during Professor Baddour's tenure as department head were the campaign that led to the erection of the \$14.6 million Ralph Landau Chemical Engineering Building and the establishment of two professorships—the Willard Henry Dow Professorship of Chemical Engineering and the Edwin R. Gilliland Professorship of Chemical Engineering.

THE INSTITUTE CALENDAR

July 14
through
August 1

Events of Special Interest

Indrani* — Indrani Rahman, famous Indian dancer, will give a lecture with dance demonstration Sun, July 18, 8pm, Kresge Little Theater. Sponsored by Sangam. Free.

MIT Music Section Summer Musical Festival* — Tues, July 20 concert: The Cambridge Quartet playing Schubert Quartets, Rorem, *From an Unknown Past*, one or more other American pieces. Also featuring John Buttrick, pianist, with the Quartet, playing Brahms *Liebesslieder*, Op. 52. **Tues, July 27:** Sylvia Glickman, pianist, playing works by Reinagle, Beethoven, Copland and Chopin. **Fri, July 30:** Stephen Erdely, violin, and Beatrice Erdely, piano, playing works by Dvorak, Dohnanyi and Franck. All concerts 8pm, Kresge. Free.

Seminars and Lectures

Thursday, July 29

Glutamine Synthetase and Sporulation* — Jean-Paul Aubert, biology & genetic microbiology, Pasteur Institute, Paris, France. Nutrition & Food Science Seminar. 4pm, Rm 66-144. To arrange consultation: x3-1711.

Community Meetings

French Enthusiasts — French table for "brown-baggers" Wed, 12:30pm, Muddy Charles. All levels of fluency invited, beginners included. Info: C. Roberts, x3-5802.

The Wives' Discussion Group** — Led by Myra Rodrigues, social worker; Charlotte Schwartz, sociologist, & Carol Hulsizer, faculty family in

residence, Ashdown. Wed, 2:15pm, Stu Ctr West Lge. Babysitting Stu Ctr Rm 473.

MIT Women's Forum** — Meetings Mon, 12n, Rm 10-105 (Tues in case of holiday.)

TOPS — Tech Organization of Professional Secretaries. General meetings every Tues, beginning July 20 (except on Thurs, week of Aug 16), 12n-2pm, Rm 10-105.

Technology Children's Center Cooperative Nursery School — Accepting applications now for fall-winter-spring sessions. Hours: 9am-12n at Westgate, 9am-1pm at Eastgate (bring lunch). Ages: 2 years, 9 months to 4 years, 9 months. Call director for info: x3-5907.

Social Events

Strat's Rat — Fri, July 16, 8:30pm-2am, Sala. Cold beer, wine & coke sold cheap. Free, college ID required.

Movies

Days and Nights (Satyajit Ray)* — Film Society. Fri, July 16, 7:20 & 9:40pm, Rm 6-120. Admission \$1.

Village of the Damned** — LSC. Fri, July 16, 8pm, Rm 26-100. Admission 75c, MIT or Wellesley ID required.

Tom Jones** — LSC, Sat, July 17, 8pm, Rm 26-100. Admission 75c, MIT or Wellesley ID required.

Chupke-Chupke* — Sangam. Sun, July 18, 2:30pm, Kresge.

The Southerner (Renoir)* — Film Society. Fri, July 23, 7:30 & 9:30pm, Rm 6-120. Admission \$1.

Failsafe** — LSC. Fri, July 23, 8pm, Rm 26-100. Admission 75c, MIT or Wellesley ID required.

Torn Curtain — MidNite Movie. Fri, July 23, 12m, Sala. Free, college ID required.

Advise and Consent** — LSC. Sat, July 24, 8pm, Rm 26-100. Admission 75c, MIT or Wellesley ID required.

Benaam* — Sangam movie. Sun, July 25, 2:30pm, Rm 26-100.

Stromboli — (Rossellini)* — Film Society. Fri, July 30, 7:30 & 9:30pm, Rm 6-120. Admission \$1.

Dirty Dozen** — LSC. Fri, July 30, 8pm, Rm 26-100. Admission 75c, MIT or Wellesley ID required.

The Candidate** — LSC. Sat, July 31, 8pm, Rm 26-100. Admission 75c, MIT or Wellesley ID required.

Charitra-Heen* — Sangam movie. Sun, Aug 1, 2:30pm, Rm 26-100.

Dance

Summer Course in Dance and Exercise — Taught by Reeva Gibley. Exercise Mon & Wed, 10-11am; ballet Tues & Thurs, 10-11:30am; Aug 2, Aug 26. Each course \$12. Registration: Wed, July 28, 1-3pm, T Club Lounge. Payment due at registration. All students must have an athletic card.

Folk Dance Club Activities* — **Beach Party** Sat, July 24. For details come to dancing any Sun, or call Nina, x5-6243 Dorm. **Marathon:** Sat, July 31, noon to midnight, beginning in Killian Court and moving to Sala (Sala all day if rain). Info: dancing on Sun, or call Nina.

MIT Folk Dance Club — **International:** Sun, 7:30-11pm, Sala. **Balkan:** Tues, 7:30-11pm, Stu Ctr Rm 491. **Informal:** Fri, 12n-2pm, Kresge Ova (in good weather). **Israeli:** Thurs, 7:30-11pm, Sala.

Exhibitions

Strobe Alley* — High speed photographs by Harold E. Edgerton, Insitute Professor and Professor of Electrical Measurement, Emeritus. Bldg 4, 4th fl.

Music of the Celestial Diets* — Music Library exhibit of manuscript facsimiles & pictures. Daily, Bldg 14E.

Hart Nautical Museum* — Permanent exhibit of rigged merchant and naval ship models of yachts and engine models. Bicentennial exhibit: "1776-1976" — a frigate, 2 schooners, a gondola, and the Durham boat of the American Revolution. Open daily in Bldg 5, 1st floor.

MIT Historical Collections* — Permanent exhibition Mon-Fri, 9am-5pm, Bldg N52, 2nd floor. **Bicentennial Exhibits:** Katharine Dexter McCormick, '04; Vannevar Bush, '16; Karl Taylor Compton; and Norbert Wiener, 1876 exhibit, Bldg 4 corridor. **The New Technology Exhibit and Energy Exhibit:** 2nd floor balcony.

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 July 28 through Aug 15 to the Calendar Editor, Room 5-111, ext. 3-3279, before noon Friday, July 23.

Taiwan Program Terminates

(Continued from page 1)
government of the Republic of China —instead of encouraging them to develop new industries—might assign them to the building of inertial guidance systems for ballistic missiles to be used against the People's Republic of China on the China mainland.

A faculty-staff-student Committee on Institute International Commitments examined the Taiwan program in detail and concluded in May of this year that the program was too closely related to technology that could ultimately have military applications. In the course of its inquiries, the CIIC learned that the specific Taiwan laboratory from which the 15 engineers came deals predominantly in military research. The committee recommended the focus be changed or the program be terminated.

Simultaneous with the CIIC recommendation and in response to a request from MIT, the State Department's Munitions Control Office in early May rendered an opinion that the program was not in the best interests of US foreign policy.

MIT and NTU officials during May and early June examined possible alternative technologies around which the program might be re-organized. The conclusion of NTU representatives in which MIT representatives concurred was that with so little time left on the original contract, the program would best be terminated without prejudice to either MIT or NTU.

Dr. Jones said the 15 engineers will return to Taiwan within a week. A detailed listing of documents, instruments and equipment obtained for the "hands on" laboratory project at the expense of NTU has been submitted by the Institute to the Munitions Control Office to determine what items will require an export license from the State Department if they are to be taken to Taiwan.

BACKGROUND

The origins of what was to become the MIT Technology Training Program for Taiwan are to be found in the desires of several people at MIT with Taiwan relationships and of several people in Taiwan with MIT relationships to find ways in which MIT expertise might aid in the long-term industrial development of Taiwan. The specific intent of the program was to train a small cadre of engineering entrepreneurs who could go back to Taiwan and start technology-based commercial industries.

MIT has a long history in helping developing nations around the world achieve technology-based industrialization. Ordinarily this is done by foreign nationals who attend MIT and pursue undergraduate and graduate degrees as regular students in the Institute's various academic departments. Nearly 18 percent of all MIT's students are from foreign countries and MIT alumni have for decades had major roles in the industrialization efforts of many foreign nations.

Sometimes the Institute organizes special programs to meet the particular needs of specific nations. For example, the government of Iran has made a national decision to industrialize that nation using electrical power generated by nuclear power reactors instead of fossil fuel plants and has an urgent need for a corps of nuclear power reactor engineers. At Iran's request, MIT is providing up to 54 Iranian graduate students with nuclear power reactor training under a program paid for by the Iranian government and leading to the degree of master of science.

The special program designed for Taiwan originally arose out of several years of informal discussions and interactions between people at MIT, primarily people in the MIT Department of Aeronautics and Astronautics, and people in Taiwan with MIT backgrounds.

There have been over the years many students—both undergraduate and graduate—from Taiwan who have enrolled as regular students at MIT and MIT alumni are to be found throughout Taiwan universities and government positions. There were enrolled at MIT as regular students during the last academic year, for example, 102 students from the Republic of China studying everything from electrical engineering and physics to economics and biology. There is an MIT Alumni Club of Taiwan in Taipei as there are alumni clubs in many foreign capitals.

Moreover, MIT faculty members, as they do at universities all over the world, have served as visiting lecturers and scholars from time to time at the National Taiwan University and other Taiwan institutions of higher learning.

Through these contacts—alumni visits, student training, faculty exchanges—MIT people in recent years had come to discuss with NTU officials and others in Taiwan how MIT resources might be employed to aid in the economic development of Taiwan. That country is presently dependent upon an industrial base that is described as labor-intensive,

not technology-intensive.

One idea that emerged from these discussions was that of developing for Taiwan an entrepreneurial cadre of people. These would be people who, after MIT training, would return to Taiwan to organize and head the development of new commercial enterprises based on some field of high technology.

In 1974, the informal discussions reached a formal state when NTU officially requested that MIT provide such entrepreneurial training for 15 Taiwan engineers.

MIT professors selected the 15 engineers to be trained from a pool of nominees put forward by NTU. NTU agreed to pay full tuition plus all costs associated with the special program, including the costs of equipment purchases. Academic responsibility for the program was assumed by a group of faculty in the Department of Aeronautics and Astronautics and administrative responsibility was assumed by the Center for Advanced Engineering Study which has long experience in the conduct of special programs for working engineers from industry.

The field of technology selected as the teaching vehicle for the program was inertial navigation. This is a field in which faculty members in the MIT Department of Aeronautics and Astronautics have been world leaders. In addition, there is nearby to MIT the world-famous Charles Stark Draper Laboratory, founded by an MIT professor and once a part of MIT but now an independent non-profit entity, which is renowned for its design and development of inertial navigation and inertial guidance systems, both civilian and military, for operational ships, submarines, aircraft, missiles, rockets and spacecraft of all kinds. This, coupled with the fact that inertial navigation is a field in which there is a growing world commercial market for systems used in ships and airplanes, made inertial navigation technology an attractive area around which to organize a teaching program for future entrepreneurs. Under the original program plan, the "hands on" laboratory project was to have been carried out under a subcontract from MIT to the Draper Laboratory while formal instruction would be done at MIT. Although the entire program was not devoted to the "hands on" laboratory project, that was a key element in the success of the teaching effort because it would enable the engineers from Taiwan, with their particular technical backgrounds, to master a very difficult field quickly. The original estimate was that the

program would cost over its two-year period \$987,000, with more than \$600,000 of that going to the Draper Laboratory for the purchase of equipment and instruments for the laboratory project, for the supervision of the project and for special instruction services.

(Regular students studying inertial navigation at MIT do not have the opportunity to engage in start-to-finish design and construction of such a system and gain their first-hand working experience after becoming employed in industry. One reason regular students are not given this opportunity is the high cost of equipment required. Moreover, they must take many other subjects to satisfy degree requirements not included in the program for Taiwan since it did not lead to a formal degree. Instead, their studies concentrated on inertial navigation technology and on entrepreneurship.)

The program originally came to the attention of the Department of State by way of the National Aeronautics and Space Administration. The Draper Laboratory has numerous NASA contracts for design and development of various space systems. The Laboratory had planned to use a NASA-owned computer at the Laboratory in the "hands on" project and when NASA received a request for permission to use this equipment in this way the request was referred to the State Department's Munitions Control Office. In April, 1975, four months after the program had started, that office began making inquiries about the pro-

gram and in August, 1975, advised Draper Laboratory that, because of its connections to US military programs, the "hands on" laboratory project for the Taiwan students could not be done there.

Consequently, MIT withdrew the "hands on" project from the Draper Laboratory and re-established it in a laboratory at MIT with direction provided by MIT faculty. In that process, the "hands on" project was reduced in size, scope and sophistication. A new estimate was made that the entire program for two years would cost \$917,000, with only some \$300,000 going to Draper Laboratory for its previous work and for the continued use of Draper Laboratory personnel as lecturers at MIT.

In early 1976, a group known as the Student Action Coordinating Committee began protests against the program, expressing fear that the engineers, upon returning to their own country, would be put to work, not building up a high technology industrial base, but, rather, the designing and building of missile guidance systems for war use.

MIT's Committee on Institute International Commitments initiated its inquiry into the technology training program following the objections raised by SACC. At the same time, MIT opened discussions with the Munitions Control Office of the State Department to determine if the August, 1975, transfer of the "hands on" project from Draper Laboratory to MIT's own campus satisfied State Department concerns. Both the CIIC and the State Department responses were made in early May.

Obituary

Joshua B. Feldman Dies

Joshua B. "Bernie" Feldman, who had served as head of the Draper Laboratory's Administration and Facilities Department until his retirement in March, 1975, died July 2 in Peter Bent Brigham Hospital. He was 58 years old.

A 1940 graduate of MIT, Mr. Feldman joined MIT's Instrumentation Laboratory in 1946, after three years of service as an aircraft engineering officer in the US Navy. At the Instrumentation Lab, he played a major role in the development of the A-1 and A-4 gunsights. He later became project engineer of the Airborne Fire Control Group.

In 1954, Dr. C.S. Draper, Director of the Instrumentation Lab, appointed Mr. Feldman as an Associate Director. In 1955, he was named Executive Officer. When the Laboratory divested from MIT in 1973 to become the Charles Stark Draper Labora-

tory, Inc., Mr. Feldman assumed leadership of its Administration and Facilities Department.

At a memorial service held at the MIT Chapel July 6, Mr. Feldman was eulogized by three close associates: Dr. Draper, John V. Pulcini, and Dr. Nathaniel McL. Sage.

He is survived by his widow, Maureen, and three children, Joy, Hal, and Matthew Feldman, of Waban.

Memorial Mass Set for A. E. Mitsch

A memorial mass for Arthur E. Mitsch, who died June 14, will be held in the MIT Chapel Wednesday, July 21, at 12:10pm. Mr. Mitsch, an accountant at MIT for nearly 20 years, was a consultant to the fiscal planning and budget office up to the time of his death.

Boomtown Phenomenon Studied

By CHARLES H. BALL

Staff Writer

Boomtowns are sprouting again in the West—and they will soon come under the scrutiny of land use experts from MIT.

The modern boomtowns spring up in conjunction with the search for new sources of fuel. The MIT researchers want to determine what effects the boomtowns have on the environment and how the cost of providing public services to people living in boomtowns can best be handled.

In the West, the focus of the search for new fuel sources is on the mining of coal and shale and the construction of coal gasification plants.

"A gasification plant," Professor Lawrence E. Susskind said, "may involve as many as 5,000 people working over several years to build the plant. This temporary work force can create a new community over night."

"We're working with the National Governors Conference to look at ways in which state governments can cooperate with local governments and private energy companies

McCord

(Continued from page 1)

by small areas of the moon's surface (1/2 kilometer in diameter, or about 1/3 mile) in the spectrum from ultraviolet to infrared.

This technique of "reflectance spectroscopy" for remote analysis of the composition of planetary surfaces was developed by Dr. McCord and his colleagues at MIT; they have used it to study asteroids, the moon, Mars, and other objects in the solar system from telescopes on Earth.

But while previous devices measured radiation at only a few wavelengths at a time, the reflectance spectrometer for the proposed lunar mission will be able to measure radiation at 256 wavelengths simultaneously.

The experiment—like all the proposed experiments, except the study of the moon's gravity field, and some of the magnetics experiments—would study only the surface layer of the moon, in some cases only the upper few centimeters.

But Dr. McCord said that these seemingly superficial measurements reveal the present state and past evolution of the entire moon. Meteorites striking the moon plow up the surface, a phenomenon known as "impact gardening," mixing the upper several tens of meters.

In addition, he said, the content of the surface depends to a large degree on processes that take place deep within the planet; from it one can infer something about the lunar interior and its activity, now or in the past.

Although the primary goals of the mission are scientific, the possibility of finding useful materials on the moon "is in the back of people's minds," Dr. McCord said.

The spacecraft will study the emission of gamma rays by the moon's surface partly to find out whether there is ice—as many people suspect—on spots at the poles that are permanently in shadow. If ice is found, it could supply lunar colonies with water. And Dr. McCord's experiments might reveal useful deposits of metals such as titanium.

"If one were to seriously begin prospecting on the moon one would certainly want to begin by flying just such a survey mission as the lunar polar orbiter," he said.

Dr. McCord said he hopes to begin designing and building a test model of the reflection spectrometer this year, although the mission has not yet been officially funded. The instrument will be built at the Laboratory for Space Experiments (part of the MIT Center for Space Research), under the direction of Dr. Joseph H. Binsack.

Working with Professor McCord on the experiment will be staff scientists Dr. Robert Huguénin and Dr. Michael J. Gaffey and graduate student Carle Pieters, all in the Department of Earth and Planetary Sciences at MIT; Dr. James Head of Brown University; Dr. John Adams of the University of Washington in Seattle; Dr. Torrence Johnson of the Jet Propulsion Laboratory in Pasadena, Calif.; and Dr. Lawrence Soderblom of the US Geological Survey in Flagstaff, Ariz.

to minimize the adverse effects created by the boomtown phenomenon," Professor Susskind said.

Dr. Susskind, associate professor of urban studies and planning in MIT's School of Architecture and Planning, heads a team of researchers who will make on-site studies of the land use and community service impacts of boomtowns in Wyoming, Colorado, North Dakota and Texas.

The year-long investigation is being funded with a \$125,000 grant from the federal Energy Research and Development Administration.

There was a time when boomtowns could sprout, grow, decline and die in a life-cycle that barely caused a ripple in the vastness of the territories in which they existed. But all that has changed as available land has shrunk and the uses to which it is put has become the concern of conservationists and others.

"When energy facilities are being constructed, thousands come into an area—usually it's a fairly rural area—and all that activity eats up the land," Professor Susskind said. "Because most of this happens in unincorporated areas, there is no local government to plan the development pattern."

He said the study would try to find answers to some of the most important questions raised by the boomtown phenomenon, among them: What kind of temporary land use controls can state governments provide to ensure an orderly growth pattern and minimize costs? What is the public responsibility, as opposed to the private responsibility, for financing the services required by a boomtown?

Professor Susskind said the study would also try to develop ways of predicting when a project is going to become a boomtown. "If it's just a boomlet, major capital investments in community services may not be appropriate," he explained.

Professor Susskind said the research project has five major goals:

1. To produce a document for interested citizens, local officials and state legislators that spells out the

land use and community service impacts associated with energy facilities and outlines some of the most successful efforts to minimize the adverse effects of boomtowns.

2. To produce a series of case studies documenting the boomtown phenomenon and summarizing what four state governments have learned, so that other states can take advantage of it.

3. To make a movie based on the case studies about the boomtown phenomenon and what it means to the whole question of energy independence nationally.

4. To prepare a handbook for private energy companies analyzing the community service costs associated with the construction of various kinds of energy facilities.

5. To provide a check-list of methods for minimizing adverse environmental and community service impacts, listing the different methods and controls that can be implemented at the state level.

"Then we want to sit down with the Governors Conference to help them apply this general check-list in individual situations," Professor Susskind said. "We want to be sure that what we have learned becomes policy-relevant immediately."

Eventually, Professor Susskind said, the MIT researchers want to apply their findings to home territory—Massachusetts and New England. "This phenomenon isn't at all limited to the West," he said. "Here, in New England, for example, offshore oil explorations are being conducted and there's also the possibility of a substantial coal find."

The MIT research team includes Dr. Michael O'Hare, assistant professor of urban studies and planning in the MIT Department of Urban Studies and Planning; Dr. Stanley A. West, assistant professor of civil engineering in the Department of Civil Engineering, and graduate students Catherine A. Lu of Tallahassee, Fla., Debra R.S. Stinson of Beaumont, Tex., Lynne Monaco of West Seneca, N.Y., and Robert B. Foster of Boston.

Sloan Management Review Variety Marks Spring Issue

A new understanding of the R&D process by practitioners at one of the country's best known manufacturers, a description of a joint MIT-Association of National Advertisers project to discover the best marketing mix for industrial products, an investigation of cultural norms indigenous to individual organizations, a condensed version of a prize-winning thesis, and a new mandate for economists distinguish the Spring issue of the *Sloan Management Review*.

Proctor & Gamble is the manufacturer.

Professor John D. C. Little and Assistant Professor Gary L. Lilien of the Sloan School are the designers of The ADVISOR Project, a study of industrial marketing budgets intended to bring to product managers the systematic quantitative guidance long available to consumer advertisers.

In "Changing the Corporate Culture," Stan Silverzweig and Robert F. Allen of The HRI Human Resources Institute focus on corporate cultures and describe a four-step change program for organizational change.

"The Serendipity of the Fully Functioning Manager" is the title of the thesis by George W. Cherry, a 1974-75 Sloan fellow. It won the Brooks Prize at the Sloan School in 1975. In his thesis, Mr. Cherry asks if the present corporate orientation toward maximization of productivity is compatible with the humanistic orientation toward self-actualization. (Yes, the author concludes.)

Another article by Associate Professor Howard H. Stevenson of the Harvard Business School discusses the managerial implications of organizational attributes perceived by managers, and concludes that the outputs of the process of defining corporate strengths and weaknesses are best utilized as feedback in an individual manager's strategic planning process.

Professor Marina v. N. Whitman of the University of Pittsburgh, former member of the Council of Economic Advisers, writes about "Economics in America's Third Century," pointing out that as political relationships increasingly turn on economic issues, economists must understand and accept their growing involvement with "a heightened capacity for self-criticism."

The issue also reviews current books in the field of management, including *The Cultural Contradictions of Capitalism* by Daniel Bell (reviewed by Donald A. Schön, Ford Professor of Urban Studies and Education at MIT) and Courtney C. Brown's *Putting the Corporate Board to Work* (reviewed by Myles L. Mace, Professor of Business Administration Emeritus at the Harvard Business School).

The *Sloan Management Review* is the professional journal of the Alfred P. Sloan School of Management. Now in its 17th year, the *Review* publishes three times a year, Fall, Winter and Spring. Its articles reflect the orientation of the Sloan School by covering general management issues in an analytical, occasionally technical, mode.

The vast majority of the 8,000 subscribers are practicing managers. Approximately one-fourth live in foreign countries.

Since its founding in 1960, the journal has grown to become the largest student-edited publication of its kind in the country. The 1976-77 student editors, all second-year masters' candidates at the Sloan School, are Anne Quinn, Robert Garman, and Paula Cronin. The Managing Editor is Gay Van Ausdall. Single copies of the *Review* are available from the Review office at E52-062 for \$4.00; annual subscriptions are \$12.00.



SAILING FACILITY GROWS—Heavy support timber is lowered into place at MIT's Sailing Pavilion which is being expanded. The construction work will increase the pavilion's capacity by about 25 percent and add 120 feet of dock space. Mooring slips and boat lifts also are being constructed. The lifts will allow boats to be hauled out of the water for storage or for towing to off-campus races. The MIT sailing program, oldest collegiate program in the nation, dates to 1936. George Warren Smith of Rockport, Mass., Class of 1926, heads the Sponsoring Committee for rejuvenation of the Sailing Pavilion. Nearly \$285,000 in gifts and pledges has been raised to date.

Pressure to Land Viking I Mounts Daily, Toksoz Says

The pressure to land Viking I increases daily, said M. Nafi Toksoz, professor of geophysics in the Department of Earth and Planetary Sciences.

"We have Viking I in orbit around Mars looking for a place to land and Viking II is approaching the planet rapidly," said Dr. Toksoz, a member of the Viking Seismology team, during a seminar held on Friday, July 9, where he discussed the motivations and mechanisms of the Viking I mission.

"The pressure to land is mounting for three reasons," he said. "The first is that mission control does not want to handle two spacecraft in orbit at the same time, which is rather like handling an armful of kittens. Secondly, starting the second week in November the sun will be between the Earth and Mars and interfere with communications. The third reason, which has also been the main driving force of the entire mission is curiosity—we want to see what is at the surface of Mars and if there's any sign of life."

Dr. Toksoz said the Viking spacecraft has two components: an orbiter, which never gets closer than 1500 kilometers to the surface, and a lander, which carries out experiments on the Martian surface.

The lander's experiments will examine the biology and organic chemistry of the environment, the composition and meteorological properties of the atmosphere, the composition and the magnetic and physical character of the soil and the seismic properties of the planet.

"The main thrust of the experiments is to find out if life ever existed or if it still exists on the planet," said Dr. Toksoz.

Referring to the possibility of large, polar-bear like creatures on the planet, an idea expressed by Carl Sagan of Cornell and Joshua Lederberg of Stanford, Dr. Toksoz joked, "If large creatures exist on the planet then the lander's cameras will detect them. If the creatures try to sneak around the cameras during the day, or come up to the spacecraft at night, then the seismometers, which are very sensitive, will detect their presence."

"If the creatures are very tiny or no longer in existence then the biological and organic chemical data collectors will show them."

Dr. Toksoz explained that the biological experiments are designed in three subdivisions. The first system places about half a gram of soil into a sealed environment that replaces the Martian atmosphere with carbon-14 labeled carbon dioxide, carbon monoxide and water vapor. The system also regulates light and temperature. In this way scientists hope to find any photosynthetic type organism that might exist.

The second system is used to determine whether there are organisms that metabolize nutrients from outside sources. In this case, about a gram of soil is incubated in a duplicate of the Martian atmosphere while surrounded by carbon-14 labeled nutrients. After a given period of incubation the system is analyzed for metabolic products.

In case Martian organisms do not fit into either of these classifications, the third system is a very richly supplied medium that the scientists call "chicken soup." In this case the scientists will watch changes in gas concentrations to detect the presence of living beings.

The three experiments were devised by the Active Biology team of the Viking project. Dr. Alexander Rich, professor of biophysics and Sedgwick Professor of Biology in the Department of Biology, is a member of that team.

Other MIT scientists involved in the Viking effort are Klaus Biemann, professor of chemistry and leader of the Viking Molecular Analysis team, Dr. Irwin I. Shapiro, professor of physics and professor of geophysics in the Department of Earth and Planetary Sciences and the Department of Physics and Drs. Robert Goldstein and Robert Reasenberg, staff researchers in the Department of Earth and Planetary Sciences.

Dr. Toksoz, the director of the George R. Wallace, Jr., Geophysical Observatory, concluded that the Viking project will determine if Mars is "a vast wasteland or a beautiful combination of Zion and Monument National Parks."

City Council Votes 3-Month Moratorium on DNA Work

The Cambridge City Council last Wednesday (July 7) voted a three-month "good faith" moratorium in Cambridge on laboratory research involving recombinant DNA molecules at the P3 or P4 levels (see resolution printed separately) and ordered the city manager over the next four weeks to design a Cambridge Laboratory Experimentation Review Board so that the Council "can consider his recommendations at the earliest possible date and the important work of this review board can begin" (see order printed separately).

Recombinant DNA experiments which, under NIH Guidelines, require containment at the lower P1 (minimum) and P2 (low) levels are presently underway at Harvard and MIT, but are unaffected by the Council action. MIT has a facility in the Center for Cancer Research which can be modified to satisfy the moderate containment, P3, requirements, but no recombinant DNA experiments requiring this level of physical containment are underway. No high risk P4 facility is presently planned or contemplated at MIT.

Faculty members at MIT have been planning to do so-called P3 experiments, but have been waiting for the establishment of NIH Guidelines. Processes for the examination of these experiments from the stand-

point of adequacy of physical and biological containment and precautions to be observed are underway. Professor Maurice S. Fox is chairman of the MIT Committee on Assessment of Biohazards, which is responsible for the institutional processes specified in the NIH Guidelines. Since these are new processes, it is not clear how much time will be required to carry out these steps.

The City Council resolution as

introduced by Mayor Alfred Vellucci would have asked for a "good faith" moratorium for three months on all recombinant DNA experimentation, including P1 and P2 level experiments already underway. An amendment by Councillor David Clem limited the "good faith" moratorium to P3 and P4 level experiments. The resolution as amended passed by a vote of 5-to-4.

An order introduced by Mayor

Vellucci directing City Manager James Sullivan to recommend over the next four weeks the membership of and the duties of a Cambridge Laboratory Experimentation Review Board was passed 5-to-3 with one voting "present." The relationship of the new municipal board to the Harvard and MIT biohazard committees will also be discussed. MIT has always cooperated with the state and city public health agencies and has indicated its willingness to lend its talents and expertise to a joint effort with Cambridge and research institutions within the city for an assessment of facilities and procedures, both in universities and in industries.

The votes came midway through the second of two public hearings initiated by the Council following announcement of plans by Harvard to build a P3 containment facility on the fourth floor of its Biological Laboratories Bldg., 16 Divinity Ave. The first hearing lasting 5½ hours was held June 23 with scientists and members of the general public offering statements for and against the Harvard plan and recombinant DNA experimentation in general.

The hearings resumed at 7:30pm last Wednesday and continued until 12:45am. The Council interrupted the hearings at 9:30pm to vote on the resolution and order, then resumed the hearings.

City Council Order

(Following is the text of an order adopted by the Cambridge City Council by a vote of 5-to-3 with one voting "present" July 7.)

"WHEREAS: Cambridge now faces a dilemma concerning recombinant DNA experimentation that will likely surface again in one form or another, given the fact that a great deal of scientific research takes place within our city, and

"WHEREAS: It would be useful if we established an ongoing process for reviewing potentially dangerous experimentation so that the public sector was involved and the public welfare and safety was kept foremost in mind, therefore be it

"ORDERED: That the City Manager, understanding that it is the wish of the City Council to establish a CAMBRIDGE LABORATORY EX-

PERIMENTATION REVIEW BOARD, immediately begin to prepare a plan for the organization of this Board which addresses the following issues and any other he may deem appropriate:

- Responsibility of the Board
- Powers of the Board
- Membership of the Board
- Relationship of the Board to the internal Bio-Hazards Committees already in operation at Harvard and MIT.

and be it further

"ORDERED: That the City Manager set to work immediately on this project and report back in four weeks so that the Council can consider his recommendation at the earliest possible date and the important work of this Review Board can begin."

City Council Resolution

(Following is the text of a resolution passed by the Cambridge City Council by a vote of 5-to-4 July 7.)

"WHEREAS: Although the Mayor of the City of Cambridge personally favors a two year moratorium on all research involving recombinant DNA molecules within the City of Cambridge, recognizes that this is a major policy statement, and

"WHEREAS: The Mayor and the Council have been forced to deal with this complex and controversial issue with little preparation, and

"WHEREAS: We should be able to review all relevant testimony and

evidence as well as call for additional hearings should they be necessary, and we should be able to do this in a climate that is not dominated by crisis, therefore be it

"RESOLVED: That the Cambridge City Council establish a 'good faith' three month moratorium in Cambridge on laboratory research involving recombinant DNA molecules at the P3 and P4 levels so that all concerned can properly review relevant testimony, and be it further

"RESOLVED: That the Council use all available powers to see to it that the moratorium is respected."

Volunteers

Bilingual and/or multilingual volunteers are being sought to welcome MIT newcomers who will be arriving from abroad during the summer.

Especially needed are persons who speak Persian, Farsi, Japanese, Chinese, Portuguese, Greek, Urdu, Hindi and other Asian and African languages. The program, coordinated by the MIT Medical Department, seeks to ease the transition of foreign students and guests as they settle here.

Those willing to be listed—and called as the need arises—may give names, telephone numbers and languages spoken, to Cheryl Prevot or Charlotte Schwartz, x3-4911, Rm 12-127.

National Search Underway to Fill Sports Post

A person ready and willing to wear three hats in one of the country's largest and most varied collegiate athletics programs is the subject of a nationwide search now being conducted by MIT.

The successful candidate will become 1) assistant director of the Department of Athletics, 2) associate professor of physical education and 3) director of women's intercollegiate athletics at MIT.

Professor Ross H. Smith, director of athletics at MIT, said the creation of the new position within the central administration of the athletics program at MIT is a major step forward in the continued development of women's sports at MIT.

The new position is in addition to two recent appointments to the athletics staff also designed to strengthen the women's sports program.

Jane Rosenkrans of Windsor, Ct.,

coach of women's varsity basketball, cross-country and track and field at Hall High School, Hartford, Ct., since 1970, has been appointed assistant professor of physical education. She will assume coaching responsibilities for the MIT women's varsity basketball team and additional such assignments as the programs continue to grow.

Deborah S. Clum of Sandwich, Mass., assistant coach for field hockey, basketball and softball at Sandwich High School for the past year, has been named instructor and coach of the women's softball team, presently a club sport at MIT. Ms. Clum earlier served as coach of women's varsity field hockey and tennis at Winchester (Mass.) High School.

They will join Mary-Lou Sayles, assistant professor and director of women's athletics at MIT for the past three years. Professor Sayles who has served as women's gymnastics coach, will hold the new position of director of the MIT Dance Workshop.

The new appointments become effective with the start of the fall term in September, Professor Smith said. The date of appointment of the assistant director of athletics/associate professor/director of women's intercollegiate athletics will be made to accommodate the commitments of the successful candidate.

"We hope, however, to have the new person join the staff early in the 1976-77 academic year," Professor Smith said.

Advertisements of the new position are being run this month in the *Chronicle of Higher Education* and other national publications.

The person being sought will be responsible for the continued development of all phases of women's athletics at MIT, particularly the organization of intercollegiate athletics for women; will hold a coaching assignment in team sports and/or a teaching assignment in a physical education skills program; will work in close liaison with division heads in physical education, intramural athletics and recreation, and will share responsibility for administration of the department in areas such as long-range planning, personnel actions and facilities allocation.

Creation of the new position, Professor Smith said, is in response to the increasing participation in sports taking place nationwide and particularly the growing athletic interests of young women.

"The changing trends are even more dramatic at MIT," he said, "because of the rapidly increasing number of women students. Over the past five years, for example, the number of women undergraduates has risen from about 250 to more than 600.

"During the same period, the num-

ber of intercollegiate sports for women has increased from two to eight," Professor Smith said, "and two others—softball and field hockey—may move to varsity status."

Professor Smith said the two women who will come in the fall will add significantly to the coaching strength for women's sports.

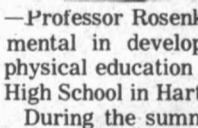
Professor Rosenkrans is a graduate of Springfield College where she also received the M.Ed. degree in 1975. In addition to solid coaching achievements in her three major sports—women's basketball, cross-country and track and field—Professor Rosenkrans was instrumental in developing an elective physical education program at Hall High School in Hartford.

During the summer of 1973, Professor Rosenkrans was manager at the Springfield College training camp for the US Women's Gymnas-

tics Team preparing for the World University Games held in Moscow, USSR. In the summers of 1974 and 1975, she was program director of the Springfield College Sports School and also coached gymnastics.

Ms. Clum also graduated from Springfield College in 1974, where she was selected outstanding woman athlete. She was a member of the Springfield College Women's Softball Team which traveled to Holland in 1971 to play their national team and conduct clinics.

A Red Cross Certified water safety instructor and member of the Boston Board of Officials, Ms. Clum was director of the Eastern North Shore State Tennis Tournament in the spring of 1975 and a coach at the Sam Jones Basketball Camp at Stonehill College during the summer of 1975.



Draft-Resisting Alumnus Elected Delegate to DNC

Fritz Efaw, the indicted draft-resister who returned to the United States last week after seven years of exile to take his seat as a delegate to the Democratic National Convention, is a member of the Class of 1968 at MIT. Efaw did not graduate. He was in Course 21B, Humanities and Science.

The 1968 issue of *Technique*, the MIT yearbook, lists him as a member of Theta Xi fraternity and gives his home address as 1440 N.W. 34th St., Oklahoma City, Oklahoma. He went to Harding High School in that city.

Efaw returned to the United States July 8, and the New York Times reported the event the next day.

"Although a warrant is out for his arrest, Mr. Efaw, 29 years old, was not arrested as he walked out of Customs to a resounding welcome from his family, friends and amnesty supporters, including Gold Star Mothers for Amnesty and the families of other deserters and draft resisters."

Efaw surrendered to authorities the next day and was brought before a U.S. magistrate on the charge of failing to report for induction. The magistrate ruled that Efaw could remain at liberty in New York City as long as he has "any cognizable function" at the Democratic convention. He was placed under a \$5,000 personal recognizance bond and ordered to surrender to the U.S. authorities in Oklahoma City by July 26.

Efaw, who had worked as a computer analyst while living in Britain,

was one of nine delegates and alternates to the convention elected by Democratic Party members living abroad. This is the first convention in which Americans living overseas were given representation.

He won his seat on the basis of his stand for unconditional amnesty involving full pardons for draft resisters, deserters, veterans and dishonorable discharges and civilian antiwar activists.

The plank the Platform Committee proposed to the convention calls for blanket pardons only for draft resisters and offers the possibility of a case-by-case review for deserters.

"I am going to the convention," Efaw was quoted in the New York Times, "to bring the message of total amnesty to all of the delegates either on the floor or on the podium. I plan to circulate a letter calling for total amnesty to demonstrate to Governor Carter that there is a broader support for total amnesty than he has indicated."

Baram Appointed To ABA Group

Professor Michael S. Baram, an attorney and associate professor in the MIT Department of Civil Engineering, has been appointed a member of the Council on Science, Technology and Law of the American Bar Association (ABA).

The Council is the governing body of the ABA Section on Science, Technology and Law. Professor Baram previously served as chairman of the Section's Technology Assessment Committee, and has been succeeded by Robert Rines, lecturer in the MIT Department of Electrical Engineering and Computer Science.