Massachusetts Institute of Technology

TECH TALK

February 2, 1977
Volume 21
Number 24

SENIOR CHESS MASTER Kenneth Rogoff played 30 simultaneous chess games at an exhibition held in Lobby 7 last week. The chess exhibition began at 12:30pm and was over about five hours later. Mr. Rogoff, a graduate student in economics from Rochester, N.Y., won 24 games; six ended in draws. He is ranked seventh in the US by the US Chess Federation and is an international master in the World Chess Federation. The chess exhibition was one of more than 500 activities held during MIT's 1977 Independent Activities Period.

MIT-WHOI Ocean Scientists Seek Hot Springs in Pacific

By JANET SNOVER
Editor, MIT Bulletin

A team of ocean scientists—including two from MIT and two from the Woods Hole Oceanographic Institution—will be trying hard to get themselves into hot water this month as they dive to the bottom of the Pacific Ocean in a 22-foot, three-person submarine.

Dr. John M. Edmond, associate professor of oceanography, and Dr. Tanya Atwater, assistant professor of marine geology, both in the Department of Earth and Planetary Sciences, and Dr. Richard von Herzen and Dr. Robert Ballard of WHOI, are part of a team from several universities that will be searching for deep ocean hot springs on the Galapagos ridge crest. It will be the first exploration of its kind.

The rocky ridge crest is formed as molten lava bubbles up to the seabed's surface, is cooled by seawater, and thus forms new oceanic crust, according to Dr. Edmond.

"A large proportion of the lava doesn't make it to the surface of the seafloor and is cooled at depth," he said.

Hot springs, with a convection system like a coffee percolator, should occur in the same area.

Sea water enters the ocean floor through cracks and fissures where

(Continued on page 8)

'Roots' Discussion to Open Black History Observances

A discussion of *Roots*, Alex Haley's bestselling novel recently dramatized on ABC TV, will be the first in a series of four February noontime programs sponsored by the MIT Minority Interest Group in observance of Black History Month.

Dr. Monroe H. Little, Jr., instructor in the Department of Humanities, will lead the discussion on Friday, Feb. 4, from noon to 1pm in the West Lounge of the Student Center. Dr. Little, a student of black history, teaches American Social History at MIT.

The second event in the series, to be held on Tues., Feb. 8, from noon to 1pm in the Bush Room (10-105), will be a slide show with sound, "Black Leaders in Technology" and "Black Cultural Leaders in Theatre," courtesy of the Martin Luther King, Jr., Center of Boston University.

Black History Month is an amplification of the annual Black History Week, started in 1926 by Carter Woodson and the Association for the Study of Afro American Life and History, Inc. (formerly Association

(Continued on page 8)

Kaiser Foundation Grant To Aid HST

A two-year grant of $150,000 has been made to MIT by the Henry J. Kaiser Family Foundation to assist the Harvard-MIT Program in Health Sciences and Technology in developing a new curriculum in medical engineering and medical physics.

The grant was announced by Dr. Walter A. Rosenblith, MIT Provost, and Robert J. Glaser, MD, president of the Kaiser Foundation.

In commenting on the grant, Dr. Glaser said the foundation's trustees "recognize the need to bridge gaps in understanding between engineers and physicians jointly involved in incorporating advanced technology into health care systems."

Dr. Rosenblith said the long-range objective of the new studies at the interface of medicine with engineering and the physical sciences is to create a new health profession of medical engineers and physicists who will apply their knowledge and skills to important clinical problems. "These individuals should be leaders in establishing research activities focusing on the application of the best and most appropriate technology to clinical medicine and health care delivery," Dr. Rosenblith said.

The Harvard-MIT Program in Health Sciences and Technology which draws on the resources of MIT, Harvard Medical School and the Harvard teaching hospitals, is directed by Irving M. London, MD, professor of medicine at Harvard and MIT and professor of biology at MIT.

The planned new curriculum seeks to provide for the education of individuals highly qualified as engineers or physicists with extensive knowledge of human biology and medicine who will be well prepared to engage in creative scholarly work on significant medical problems. Students will be admitted simultaneously as candidates for a Master's degree in a department of engineering or physics and as candidates for a PhD degree in medical engineering or medical physics. Further information on this new program will be presented in the near future.

IRS Withdraws Tuition Remission Tax Proposal

The Internal Revenue Service has withdrawn the changes in regulations it recently proposed to tax tuition remission programs. At MIT, the proposed changes would have treated the tuition scholarships available under the Children's Scholarship program as taxable income of the parent instead of as a tax-free scholarship.

The proposed changes in regulations were withdrawn by the IRS following a hearing in Washington on Jan. 7. Walter L. Milne, Assistant to the Chairman of the Corporation, was present at that hearing along with other university representatives, to present the case against the proposal. The Institute had also filed earlier written objections with the Commissioner of the IRS and with the Secretary of the Treasury.

In its filing, the Institute argued:
1. that the proposed changes were inconsistent with the intent of Congress as clearly expressed in the statutory history of the relevant section of the tax code and as recognized by the long-standing practice of the Internal Revenue Service, and
2. that the proposed regulations were inconsistent with the statute they sought to interpret since they would subject to tax, payments which constitute scholarships under long established definition and practice.

When the proposed changes were withdrawn, the Assistant Secretary of the Treasury announced that the withdrawal "was based upon testimony presented at the public hearing held on Jan. 7," and on "written statements previously submitted." The present withdrawal does not preclude, of course, other action on this matter by the IRS or the Congress at some future date.

Art Symposium Rescheduled

A symposium, "Art in Public Spaces at MIT," originally scheduled for January 10, has been rescheduled for 7:30pm on Thursday, February 10, in Rm. 9-150.

MIT Professor Donlyn Lyndon, chairman of the Committee on the Visual Arts, will be moderator. Panelists will include Hugh Davies, Arthur Blumenthal, Whitney Chadwick, Otto Piene, Jerome Rothenberg, Larry Bell and Guy Nordenson.

Among issues to be discussed are: what does the artist hope for from placement of art in public spaces? what do exhibitors seek? what role do non-artist members of a community expect such works to play in their experience of the place? how do questions posed by placement of art relate to more general processes of community planning?

Demarco Family Thanks Institute

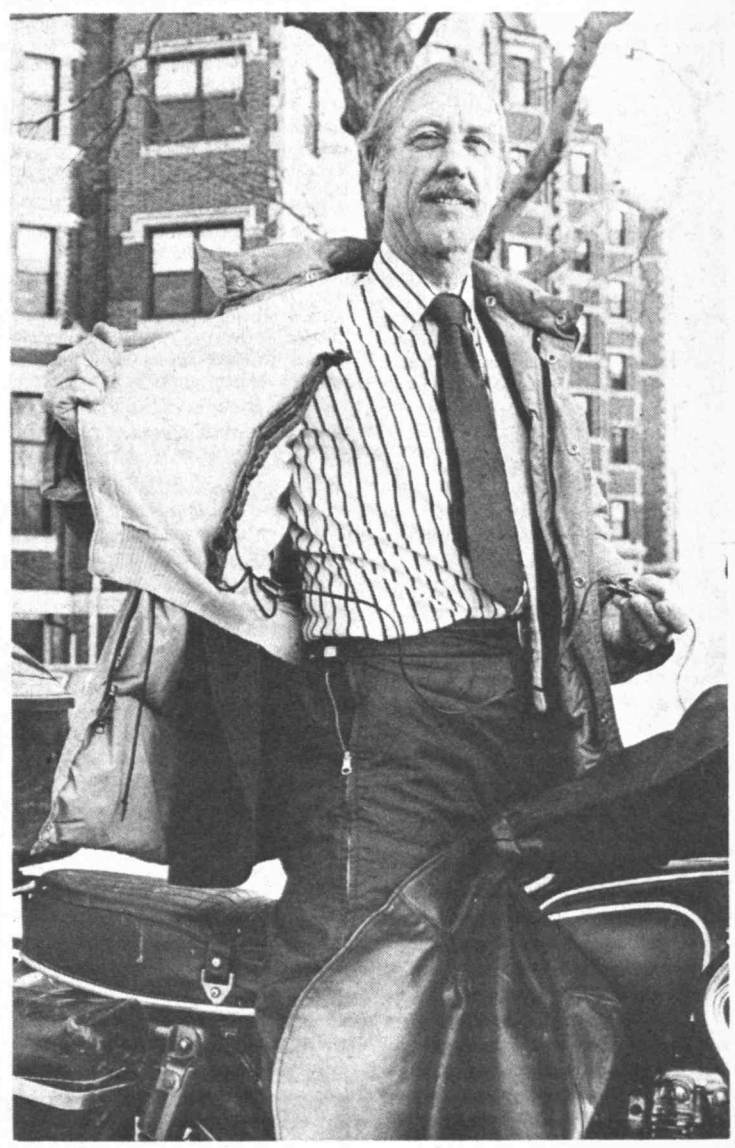
"We the De Marco family wish to thank the great people at MIT for the generosity shown us at the time of our disaster," began a note to Tech Talk received this week.

Author of the note was Ralph De Marco, a day supervisor in the building services section of Physical Plant, who was responding to an outpouring of donations following a fire January 2, which destroyed his apartment and three others in Boston's North End. Fortunately, no one was injured.

Mr. and Mrs. De Marco and their four children were at Mass during the fire and were unable to salvage anything from their home.

MIT and Mr. De Marco's co-workers sprang into action, providing beds, linens, a refrigerator, clothing and cash donations to help reestablish the De Marco home.

The De Marcos are now living temporarily in Charlestown and looking forward to moving into a renovated North End apartment within the next week or two.



WARM & TOASTY on a motorcycle in winter?—That's Albert Murray, research associate in the Center for Policy Alternatives, whose love of motorcycle riding—especially its maneuverability in traffic—led him to design a heating system that keeps him warm on his daily commute from Grafton, Mass. Mr. Murray demonstrates the heating element above. Similar to those used in electric blankets, the element is attached to the inside of a cardigan sweater with velcro strips. Mr. Murray rewired his motorcycle to accomodate a regular electric outlet because it provides a steadier connection than a cigarette lighter, an alternative he has already explored. Bundled up in ski pants and parka, he plugs himself in and is ready to roll. —Photo by Calvin Campbell

INSTITUTE NOTICES

Announcements

MIT Cheder-MIT Institute of Jewish Studies—Course registration, Thurs, Feb 3, at one of the following: du Pont Lobby (nr athletics desk); Lobby, Bldg 10; Hillel Office, 321 Memorial Dr. Info: x3-2982.

21.297 English Classes for Foreigners—Spring Semester Schedule: Advanced Conversation, Wed, 11am-1pm or 2-4pm, Rm 14N-225; Grammar Review and Oral Drill, Wed, 7-9:30pm, Rm 14E-311; Writing, Thurs, 7-9:30pm, Rm 14E-311. Students, faculty and staff welcome. Preregister or attend first class meeting. Info: B. Raither or L. Sibley, x3-3925, Rm 14N-221; Dept secretary, x3-4771, Rm 14N-207.

Graduate Student Council Meeting—Wed, Feb 9, 5pm, Walker, Blue Rm, (2nd fl, rear, next to Pritchett Lng).For dinner see Walker Dining Rm Cashier. RSVP.

GSC Housing & Community Affairs Committee—Meeting, Tues, Feb 8, 5pm, International Stu Lng, Rm 50-210 (Walker, 2nd fl front). Agenda: discussion of upcoming Graduate Survey.

NY Metropolitan Opera— Get priority seating for the Met's performances in Boston in mid-April (Apr 18-23) by ordering tickets at TCA, Stu Ctr Rm 450, x3-4885, 1am-3pm. Place orders by Feb 10.

Physical Education—Registration for third quarter classes, Thurs, Feb 3, 8:45am-12:30pm, du Pont Gym. **Self Defense**—new course open to all members of the MIT community. Info: x3-4291. Registration, as above.

Seminar on International Students & Participation in Development*—Organizational meeting, Thurs, Feb 3, 7pm, Rm 14N-313.

New Subjects

4.898 Holography as an Art Medium (A)—(see Tech Talk 1/26 for description) to be taught by Harriet Casdin-Silver, CAVS Fellow.

8.206J/21.794J Seminar in Public Interest Science
Prereq: none
Year: U(2)
2-0-4
Mon, 3-5pm, Rm 26-214
Bernard T. Feld, Henry W. Kendall, Charles Weiner

Joint offering by Dept of Physics & Technology Studies Prog.

Intended to introduce students in science and engineering to the approaches and methods used by professional scientists and engineers in contributing to the solution of technical aspects of issues of social relevance. A series of 2-hour seminars; specific issues will be presented and discussed by professionals (either from the MIT staff or from outside) who have contributed to the policy resolution or public discusion of the issues in question. Students will be expected to prepare a paper on some technical aspects of one of the issues discussed and to present the work to the class. Subjects discussed will include: The future of nuclear power and nuclear weapons; weapons technology and the dangers of war; problems raised by new developments in molecular biology.

21.744 Writing and Reading Short Stories—Humanities distribution subject will be offered spring term. See catalogue for description. Professors Chodakowska, Cumming; Mr. Breakstone. Meets Mon, Wed, 3-4:30pm or Tues, Thurs, 1-2:30pm & 3-4:30pm, Rm 13-2010. Contact: Writing Program Office, Rm 14E-310, x3-7894.

4.938 Special Projects in Photography:
Option 1: Photography and Architecture
Prereq: Consult Instructor on or prior to registration day, Rm W31-310
Year: U(1,2)
0-12-0
Fri, 9am-12n, Rm W31-325
John Messina

Subject designed to assist student in acquiring necessary skills and perception to photographically document aspects of the built environment. Students with minimal or non-existent experience with sheet film & darkroom equipment will be instructed. Those who demonstrate adequate ability will advance to more skill-requiring assignments immediately. Class time occupied with problems of camera placement, lighting, contrast control, etc. and evaluation of work in progress. Lectures provide overview of architectural imagery in photography, historical & current. Group project, coordinated with the Total Studio, to document specific site.

Option 2: History of Photography
Prereq: Consult Instructor on or before registration day, W31-310
Year: U(1,2)
0-9-0
Mon, 1-4pm, Rm W31-325
Brent Sikkema

First segment designed to familiarize student with basic historical framework from which several histories of photography have emerged. Chronological development of processes, practitioners and their images and parallel developments in art, science sociology, politics and trivia will be studied. Second segment designed to explore cultural affects of the "exactly repeatable pictoral statement." Examination of how introduction and development of photography and mass printing processes have shaped our perceptions of history and affected our lives. Final segment will examine use of photography by individuals as a means to explore personal histories. Each student will write and illustrate their personal history. Subject is a working seminar. One segment will offer series of slide lectures. Segments 2 and 3 require each student to involve themselves in research.
Contact: Vivian Harvey, 3-4424, 10am-4pm, for reading list and further info.

Graduate Studies

Joint Center for Urban Studies Fellowships

The Joint Center is offering fellowships to graduate students in any department of Harvard or MIT who are planning to write a doctoral dissertation in urban affairs and who anticipate having passed their general or qualifying exams by summer, 1977. Applicants will be judged primarily on quality of their research proposals and their proposals' relevance to the Joint Center program. Awards are for a one-year period and will include up to $1,000 for research expenses, a stipend of up to $3,000, and tuition, with consideration given to other sources of income.
Deadline: April 1.
Contact: Joint center for Urban Studies of MIT and Harvard.

National Tax Association-Tax Institute of America Outstanding Doctoral Dissertation Awards

The NTA-TIA Doctoral Dissertation Award will be given for an outstanding dissertation dealing with the financing of government. The author of the winning entry will receive $1,000 and two honorable mentions of $500 each may be awarded for other outstanding entries. Recipient must have completed all requirements for doctoral degree by the time the award is presented (usually November). A copy of the dissertation, an abstract of the dissertation, and a completed entry application must be submitted to the Chairperson of the NTA-TIA Awards Program Selection committee by June 1, 1977.
Contact: Graduate School Office, Rm 3-136

National Center for Health Services Research Doctoral Dissertation Grants

A student enrolled in a doctoral degree program in social, medical, management, or health sciences who intends to conduct or is conducting dissertation research on an aspect of health care delivery and who will have completed all requirements for doctoral degree except dissertation by the time of grant award is eligible to apply for NCHSR's dissertation research support grants. US citizenship is not required. Allowable costs include salary, direct project expenses such as travel, data processing and supplies, and indirect costs to the sponsoring institution. Proposed projects must focus primarily on a significant problem on the delivery of health care and the anticipated results or methodology of the project must have national interest, provide a basis for generalized conclusions, or have practical applicability.
Contact: Graduate School Office, Rm 3-136
Deadline: March 1, 1977

Other Opportunities

Additional information on the following available from Preprofessional Advising and Education Office, Rm 10-186, x3-4158.

Smith College Intern-Teaching Program June 27-Aug 5, 1977

The Summer Intern Teaching Program offers six weeks of intensive training to MIT gradutes who plan to teach in secondary schools. The program includes both practice teaching and study in the intern's field. Requirements for admissions: 1) undergraduate record; 2) Miller Analogies Test; 3) personal qualifications. No undergraduate study in education or experience in teaching is required.

Research Participation Program in Science —1977, Roswell Park Memorial Institute, Buffalo, NY.

The research program combines actual laboratory research under senior staff supervision with lectures, seminars and scientific films. Basic research is conducted in biology (genetics, microbiology, gnotobiotics, hematology, immunology, physiology, endocrinology), chemistry (immunochemistry, biochemistry, organic chemistry), physics (radiation physics, biophysics, crystallography) and biostatistics. Objectives of the program are: 1) to expose the participant to an atmosphere of intensive research where he is in constant contact with scientists and continually challenged by them; 2) to help him develop his own scientific creativity, and 3) to aid in planning his career. Preference is given to college students who are juniors at the time of application. Applicants should demonstrate an aptitude in science, an imagination and discipline in their methods of investigation. Support will be dependent upon availability of funds. The program will run from June 20, 1977 to Aug 18, 1977. Application deadline is April 1, 1977.

Baylor Surgery Laboratory Program

This program helps to develop and maintain the interest of well-qualified students who have a medically oriented career in mind. Students assist in scheduled experiments as well as conduct independent experiments. A stipend to help defray living expenses is provided. Applications are to be completed as soon as possible.

Mellon Summer Research Program in Psychiatry for Undergraduates

This program is held at Western Psychiatric Institute and Clinic at the University Health Center of Pittsburgh. It provides six fellowships to college juniors and seniors for an eight-week research experience in psychiatry, June 6 to July 29. This will involve close collaboration with faculty who are conducting investigations in clinical and basic psychiatric research. Deadline for application is Feb 15, 1977. There is a stipend of $750 plus travel expenses.

Summer Program for College, Graduate & Medical Students—The Jackson Laboratory, Bar HarBor, Maine

This program enables undergraduates, graduate, medical and veterinary students to participate in the research program of a member of the Laboratory's scientific staff. Twenty undergraduates and a varying number of graduate and medical students are selected each summer. The primary basis for selection are statements in the individual's application, his/her interest in science, scholastic achievement, education, and career goals. Also important are letters of recommendation. Undergraduates receive a stipend of $900 for the 10-week program. Students must pay for their own room and board. Application deadline is March 7. A brochure describing the 1977 Programs at the Jackson Laboratory is available in Rm 10-186. Applications are available from the Research & Training Office, The Jackson Laboratory, Bar Harbor, Maine 04609.

Placement

The following companies will be interviewing during the time period covered by the current Institute Calendar. Those interested may sign up in the Career Planning and Placement Office, Mon-Fri, 9am-3pm, Rm 10-140, x3-4733.

Thursday, February 3—Caltex Petroleum Corp (jointly owned by Standard Oil Co of Calif and Texaco Inc); Hewlett-Packard Co; IBM Corp; Naval Undersea Ctr; US Army Material Dev & Readiness Command; Weyerhauser Co. **Friday, February 4**—IBM Corp; Weyerhauser Co. **Monday, February 7**—Am Management Systems, Inc; Hazeltine Corp; Northrop Corp; Wheelabrator-Frye Inc. **Tuesday, February 8**—Bechtel Power Corp; Corning Glass Works-SB/SM, PhD; Cummins Engine Co; Data General Corp; Hewlett-Packard Co; Pratt & Whitney Aircraft. **Wednesday, February 9**—Corning Glass Works-SB/SM; Exxon Enterprises, Inc-Lionville Div; Hewlett-Packard Co; ICI US Inc; Lutron Electronic Corp, Inc; Microwave Rsrch Corp; MIT Lincoln Lab; Naval Coastal Systems Lab; Pratt & Whitney Aircraft; Turner Construction Co. **Thursday, February 10**—Atlantic Richfield Co; The Aerospace Corp; Celanese Corp; Consolidated Rail Corp; Crawford & Russell, Inc; Eastman Kodak Co; Varian Assoc; Westinghouse Electric Corp. **Friday, February 11**—Aerospace Corp; Analog Devices Semiconductor; Allied Chemical Corp; Eastman Kodak Co; GTE Sylvania, Inc; Norton Co; The Shell Companies; US Nuclear Regulatory Commission; RCA Corp.

Student Jobs

On Campus: Several undergraduates are needed to help grade homework in 6.032 for the spring term. If you have completed 6.032 and are interested in the job, contact Prof. Robert G. Gallager, 35-206, x3-2533.
Library Researcher—Must be reliable. 5-10 hours per week, $3.00 per hour. Contact Prof. S.West, x3-3965.
Off Campus: Seeking 3 to 6 students who would be interested in learning the operation aspects of the Bates Linear Accelerator located at Middleton, MA, which is located about 25 miles north of the MIT campus. Work would be on weekends, day, evening, and night shifts. 16-24 hours per week on Friday, Saturday, and Sunday. $3.25 per hour starting. Contact Dick Adams, Lab for Nuclear Science, x3-2362.
Belmont family needs responsible person to take care of two girls, 7:30-8:30am and 2:30-6:30pm. Live in own room with TV, and bath, plus salary. Easy walk to Harvard Square bus. Contact Mrs. Goitein, 484-1973.

For information on other student jobs, visit the Student Employment Office, Room 5-122.

New UROP Listing

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

Call For Proposals

If you haven't read the "How to Participate" section of the 1976/77 UROP Directory, do it now. All that information was put together for you with loving care and won't fit in this column. Spring Term Proposals: Feel free to start submitting them. General Principles: Don't ask for what you don't absolutely need. Be sure to have submitted your past UROP evaluations. Write a good proposal. Announcement of Awards: Starting the week of Feb 21. Please don't call and bug us that week; answers will get out as fast as we have them. Decisions will be made in order of receipt of proposals until we are broke. Availability of funds: 1) Generally available for materials and supplies requests within reason; 2) Generally available for overhead waiver requests when faculty or departments offer wages to UROP students; 3) Tougher to get if you're asking for significant wages from UROP itself, but possible.

Special Additional Funds for UROP Research Support

Basic modes and policies of UROP will apply for all of the funds below.
Clapp and Poliak—Awards are granted to undergraduates submitting outstanding proposals in engineering design. Student wage support and materials may be granted. **Class of '70 Fund**—As its class gift, the Class of '70 created this fund to support socially oriented research projects undertaken by undergraduates. Generally, materials and services funds rather than personal support are available. **James McCormack Fund**—The McCormack Fund supports students doing undergraduate research in areas relating to technology and the humanities. Some personal support is available. **Sigma Xi**—The Scientific Research Society of North America funds proposals in applied science research. **Uniroyal Grants**—Uniroyal supports first-time undergraduate researchers in the first-time undergraduate researchers in the physical, chemical, and engineering sciences. Requests for personal support and/or materials are welcome.

Department of Nutrition and Food Science

A project is available that involves studying the effect of high pressure homogenization on the physical properties of plant cell wall tissue suspensions. Changes in water holding capacity, suspension viscosity and polysaccharide extractability will be examined as a function of suspension concentration, number of times homogenized and homogenization pressure. Cellulose will be recovered from the cell wall tissue to study its role in maintaining suspension physical properties. For credit only.
Contact: Prof ChoKyun Rha, x3-3492, or Brad Holmes, x3-3688

The Portrayal of Boston in Popular Literature

This is a research project on how Boston, its history and present, is represented in popular literature. The students involved will assist with reading and analyzing fiction and autobiography that is set in Boston. The source material includes books written from 1850 to 1976.
Contact: Prof Rob Hollister, Rm 7-335, x3-2012

Mass Mental Health Center Boston

Current studies at Mass Mental Health Center will involve correlative behavioral and biochemical experiments using: 1) models of classical conditioning; 2) escape-avoidance training; and 3) intracranial self-stimulation in rats. The student will need to become acquainted with the literature, do some library search work, will run experiments on animals, and do analysis of data.

Children's Hospital Medical Center Boston

Cultured, isolated cardiac cells represent a useful tool in studying the interaction of sympathomimetic and sympatholytic drugs with their receptors. As part of this study, the chronotropic effects of these compounds at various concentrations and under different environmental conditions are being detailed and will allow the determination of physiocochemical parameters (binding properties) of the effectors and their cardiac cell receptors. An opportunity exists for a student to be involved in the planning, execution, and reduction of data of experiments associated with the project.

Club Notes

APO Saturday Service Project*—AX chapter, APO. Join us doing painting & renovations work at the Christopher Columbus Community Ctr, N Boston, in preparation for their Mardis Gras. Sat, Feb 5, meet in APO office, W20-415, 8:30am. Call x3-3788 to let us know you are coming.

MIT Badminton Club**—Join the MIT Team in MBA Division III League matches, MBA Tournaments or come just for fun. Meetings Fri, 7-10pm, Sun, 10am-1pm, du Pont Gym. Info: E. To, Ext. 3-6780, 5-9671 Dorm.

MIT Bridge Club*—ACBL Open pairs duplicate bridge. Thurs, 7pm, Stu Ctr Rm 407.

MIT/DL Bridge Club**—ACBL Duplicate Bridge. Tues, 6pm, Stu Ctr Rm 473.

MIT Figure Skating Club**—Meetings Sat, 9-11am, Sun, 11:30am-1pm, MIT Ice Rink, Free. For anyone interested in developing figure skating ability. Participants must be able to skate backwards.

Gays at MIT*—(formerly SHL) Coffeehouse/meeting, first Sunday each month, 5pm, Gay Lng (Walker Rm 50-306). Everyone welcome. For info or just an ear to listen call x3-5440, or come to Gay Lng for lunch.

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

MIT Shotokan Karate Club**—Rigorous training for intercollegiate competition & self-defense, given by 6th degree black belt. Thurs, 8pm; Fri, 6pm; Sun, 10am, du Pont T Club Lng. Info. x3-7220.

Tae Kwon Do Club*—Workouts on Tues, T-Club Lng (W31-125), & Thurs, W31-225, 6-7pm. Info: Jim Cole, x3-3283.

Tech Model Railroad Club—Meetings, Sat, 4pm; Operating Sessions, Fri nights; Rm 20E-214, x3-3269.

Informal Tu b'Shevat Celebration & Brief Hillel Meeting*—Wed, Feb 2, 8pm, Stu Ctr West Lng. Meet new Hillel officers and munch a little.

White Water Club**—Pool sessions alternate Tues, 8-10pm, Alumni Pool. Next session Feb 15.

Religious Activities

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

Hillel Services*—Orthodox: Fri, sundown, Rm 50-005; Sat, 8:30am, Rm 10-105. **Traditional/Egalitarian:** Sat, 10am, 312 Memorial Dr (Religious Counselors Bldg). **Reform:** Fri, 7:30pm, Chapel.

Looking for a community context for your religious growth at MIT? Try the **Interdenominational Communion Service**, Wed, 5:05pm, Chapel. Get-acquainted supper following.

Prayer Time**—Lunch hour Bible classes led by Miriam R. Eccles. Fri, 1-2pm, Rm 20E-207, prayer, music, guest speakers and refreshments. All welcome.

Protestant Worship Service*— Worship, prayer, praise & teaching. Sun, 10:45am, Chapel. Coffee, donuts & fellowship following.

Tech Catholic Community —Roman Catholic Liturgies will be offered as follows: Sun, 9:15am, 12:15 & 5:15pm; Tues, Thurs, 5:05pm; Fri, 12:05pm.

MIT Vedanta Society*—Meditation and discourses on the Gita by Swami Sarvagatananda, of the Ramakrishna Vedanta Society of Boston. Fri, 5:15pm, Chapel.

Echoes

January 29-February 4

50 Years Ago

William Moy-Ding '20, is now chief instructor to the Chinese Nationalist army under General Chiang Kai Shek. During the World War Mr. Moy-Ding was a member of the US Reserve Officers Training Corps and was politically active against Chinese Bolshevists in Boston.

40 Years Ago

Charles Edison '13, son of the late Thomas A. Edison, was appointed assistant secretary of the Navy.

25 Years Ago

"Emmett Kelly," a portrait of the famous clown, is one of the works of Karl Zerbe on display at Hayden Gallery this month. The artist has been head of the Painting Department of the Boston Museum School since 1937.

Prepared by Marcia Conroy, MIT Historical Collections, x3-4444.

TECH TALK
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CABLE TV SCHEDULE

February 2-February 8

Channel 8
Wednesday, Feb. 2
No Scheduled Programming

Thursday, Feb. 3
No Scheduled Programming

Friday, Feb. 4
11-12 Noon

STANFORD'S EXPERIENCE WITH TVI Professor J. Gibbons of Stanford University will discuss their use of Tutored Video Instruction. Live from 9-150.

Monday, Feb. 7
No Scheduled Programming

Tuesday, Feb. 8
12-1pm

TUESDAY NOON

Report Cites Potential in Ocean Floor Sand and Gravel

The sand and gravel vital to virtually all construction projects, now being hauled largely from rural deposits to nearby metropolitan centers, may soon be coming as well from the ocean floor, according to a report published by the MIT Sea Grant Program.

"Offshore mining of sand and gravel could become a viable business in the US," the report says.

"Current trends in delivered prices for land-based sources, growing environmental problems for land-based sources, adequacy and proximity of reserves offshore, and depletion of reserves on land—all point towards the future use of the offshore resource."

The report, "Offshore Mining of Sand and Gravel," is one of a series of business opportunity briefs prepared by the Sea Grant Program's MIT Marine Industry Collegium. Organized in 1975, the collegium seeks to promote the commercial development and application of new marine technologies by working with American industries.

The opportunity briefs deal with specific business opportunities growing out of Sea Grant or other MIT-sponsored marine research.

Dean A. Horn, director of the MIT Sea Grant Program, said the briefs are "a joint effort of subject experts, the MIT Sea Grant Marine Advisory Service and collegium members. The briefs remain anonymous to give greater freedom to the expression of opinions and speculation about particular future opportunities."

Although available land-based reserves of sand and gravel are "virtually inexhaustible on a global or national scale," the report says, "regional shortages do exist and are rapidly becoming more severe and more widespread. Such regional shortages increase the delivered price of sand and gravel to the point that offshore recovery of these aggregates is becoming a financially attractive alternative to inland mining, particularly for costal urban areas. Offshore mining of sand and gravel is already financially attractive and operational in the United Kingdom, Japan and other countries."

According to the brief, the consumption of sand and gravel aggregates in the United States will at least double and may triple by the year 2000. Production in 1974 was valued at $1.6 billion.

"As cities and suburbs expand, existing supplies of sand and gravel are depleted and potential supplies become inaccessible beneath highways, buildings, factories and homes. Thus, mining operations are gradually being forced further from the market areas in which the demand is greatest, increasing the delivered cost of sand and gravel."

"Because of the high bulk and low value of construction aggregates, transportation costs are a major element in determining the delivered price of sand and gravel... Thus, an extensive sand and gravel deposit in the Rocky Mountains is, for all practical purposes, inaccessible to New York City's construction industry."

The report also says that increasingly strict environmental controls on land-based mining operations, coupled with increased prices, "further suggest that the availability of reasonably priced construction aggregates near urban areas will continue to decrease."

Marine deposits of sand and gravel are large, the report continues. For example, the upper 10 feet of the ocean floor off the northeastern part of the United States has been estimated to contain about 450 billion tons of sand—a supply sufficient to meet construction needs for hundreds of years. Specific studies have also been made off the southeastern states, California, Hawaii and Long Island Sound. All the studies indicate that "vast amounts of exploitable mineral aggregates could be made available to coastal metropolitan centers where a very substantial amount of U.S. construction occurs."

However, since the economics of transportation and distribution are of key importance in the sand and gravel industry, the report says, marine-recovered aggregates will probably be limited to a market measured in a few tens of miles from the seacoast.

The report cautioned that operating costs incurred by such operations in the United Kingdom are not applicable to the United States, and that crew costs would be much higher in this country. Also, the capital costs for foreign operations are based on ships built in Europe in the mid 1960s. U S federal law prohibits dredges of foreign ownership or manufacture from working in this country. This means U S-built dredges would be necessary to establish a domestic sand and gravel industry to recover ocean resources.

With respect to the protection of the ocean environment, the report suggests the establishment and study of a prototype marine mining operation. After the prototype leasing stage, ongoing monitoring requirements would probably be needed, the report said.

The key environmental issues involved, the report says, are erosion, effects on bottom-dwelling organisms and the relocation of fine sediments.

Television Instruction Lecture Planned

Dr. James F. Gibbons of Stanford University, who developed the tutored video instruction (TVI) concept, will deliver a lecture on the video instruction system at MIT Friday, Feb. 4, at 11am in Rm 9-150.

MIT, through its Center for Advanced Engineering Study, has recently launched a new continuing education program based on the TVI concept. The program makes it possible for on-the-job engineers to take MIT graduate subjects for credit without leaving their place of work.

Dr. Myron Tribus, director of the center, said the results of comparative tests at Stanford after three years experience with TVI found that students at all levels of achievement favored TVI and that TVI students did better than either the on-campus students or students who learned from TV courses viewed "live" without a tutor but with "talkback."

In the MIT TVI program, a videocamera will "look over the shoulders" of MIT graduate students taking regular graduate subjects and record a videotape of each class session. The videotape will be reproduced at MIT and distributed to companies participating in the program. The practicing engineers taking the subject will meet at their plants with the same frequency as the graduate students on the campus, view the same lecture, have access to the same printed material, complete the same homework assignments and compete with the on-campus students for grades.

The engineers in industry will watch the videotapes with a tutor, usually a company employee, who will stop the tape and lead a discussion whenever a question is raised.

Subjects at MIT being offered through the TVI program with the start of the second semester in February are Electronic Circuits, Introduction to Optical Electronics, and Switching Circuits, Logic and Digital Design.

US Industry is Losing Edge, Roberts Tells Research Group

US industry is losing its international competitive edge as a result of overemphasis on short-term financial measures, lack of focus on technological planning and inadequate understanding of what causes successful commercial innovation. Japanese industry, in contrast, has emphasized gaining technological advantage in product performance as the basis for market penetration.

This assessment of why US industrial innovation is slowing down was the underlying theme of a recent address by Dr. Edward B. Roberts, the David Sarnoff Professor of the Management of Technology at MIT, to the Boston Research Directors Club. In repeated references to conclusions drawn from fifteen years of management studies on technological innovation carried out at MIT's Alfred P. Sloan School of Management, Professor Roberts stressed several aspects of industry management that have resulted in the present situation.

"First," Dr. Roberts said, "the past ten years have witnessed increased growth of corporate financial planning as the dominant strategic technique of American firms. This has led to an undue stress on the quarterly profit-and-loss statement and on near-term cash flow projections as the basic measures of corporate performance. The longer term technological underpinning of sustained industrial growth has tended to be overlooked by senior management.

"In only exceptional cases," Roberts continued, "have the corporate planners adequately considered the role of technology in creating a company's future. To the extent that technical planning has been carried out, it has seldom been integrated effectively into corporate strategy." Roberts cited techniques of corporate technological planning and strategy analysis that would now permit more successful management of and investment in a company's technological resources.

In addition, Dr. Roberts argued that corporate thinking about innovation has placed over-attention on the role of creativity in the research process. "This has been done to the detriment of other equally important aspects of technological innovation," Professor Roberts observed. "Let me assure you that we have no shortage of creative and talented people in American industry. However, there has been a shortage of management attention to other key elements needed for successful commercial innovation."

He went on to cite MIT research studies that have demonstrated these other critical roles to be: linkages to innovative users and the marketplace generally, the flow of adequate and timely technical information, entrepreneurial incentives within the corporation, and the availability of research and development staff who can fill sponsorship and project management roles needed as an innovation develops.

Dr. Roberts presented research evidence to support the findings, and indicated a number of practical applications of these concepts that have begun in some US firms.

He concluded that we now have the knowledge and tools to improve importantly the process of technological change so that it can fully contribute to achieving profitable corporate growth. "This will require an integration of a firm's technological strategy, organizational structure and R&D staffing into overall corporate considerations," he said.

Three Assume New Posts In Medical Department

Changes in responsibility for three members of the MIT Medical Department staff, effective immediately, were recently announced by Dr. Melvin H. Rodman, medical director.

Dr. Warren Point, appointed associate medical director, will assume responsibility for medical education and professional standards. This includes coordination of training programs for residents in primary care, continuing education for Medical Department staff members and colleagues and interactions with the MIT Clinical Research Center and other entities within and without the Institute.

Dr. Point joined the Medical Department staff in 1967 and has been assistant medical director since 1969. He received the AB degree from West Virginia University in 1942 and the MD from Harvard Medical School in 1945. From 1949-51 Dr. Point was a clinical and research fellow in medicine at the Massachusetts General Hospital. He is board certified by the American Board of Internal Medicine and has a subspecialty in gastroenterology. Dr. Point is also assistant clinical professor of medicine at the Harvard Medical School.

Dr. Point

Dr. Samuel Stein, assistant medical director since 1967, will assume responsibility for the MIT Infirmary including coordination for all inpatient activities within the Medical Department. He will also continue to consider the questions concerning MIT's function as a hospital and the relationship of the Medical Department to third party payers such as Medicare.

A graduate of Yale University, Dr. Stein received the MD from Harvard Medical School in 1954. In addition to his MIT position, he is an instructor in medicine at the Harvard Medical School. From 1958-60 he was a research fellow at Boston City Hospital. Dr. Stein is board certified by the American Board of Internal Medicine and has a subspecialty in cardiology.

Dr. Stein

Dr. Michael Kane has been appointed assistant medical director and will assume responsibility for ambulatory care activities including the ambulatory clinics in Building 11 as well as the Off-Hours Clinic in Building W-5.

A member of the Medical Department staff since 1974, Dr. Kane received the AB degree from Boston College in 1964 and the MD from Boston University in 1968. From 1970-73 he was a clinical associate and senior staff fellow at the Laboratory of Clinical Investigation of the National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland. Dr. Kane was a fellow in rheumatology at the Boston University School of Medicine from 1973-74. He is board certified by the American Board of Internal Medicine in internal medicine and rheumatology.

Dr. Kane

New Art Classes Offered

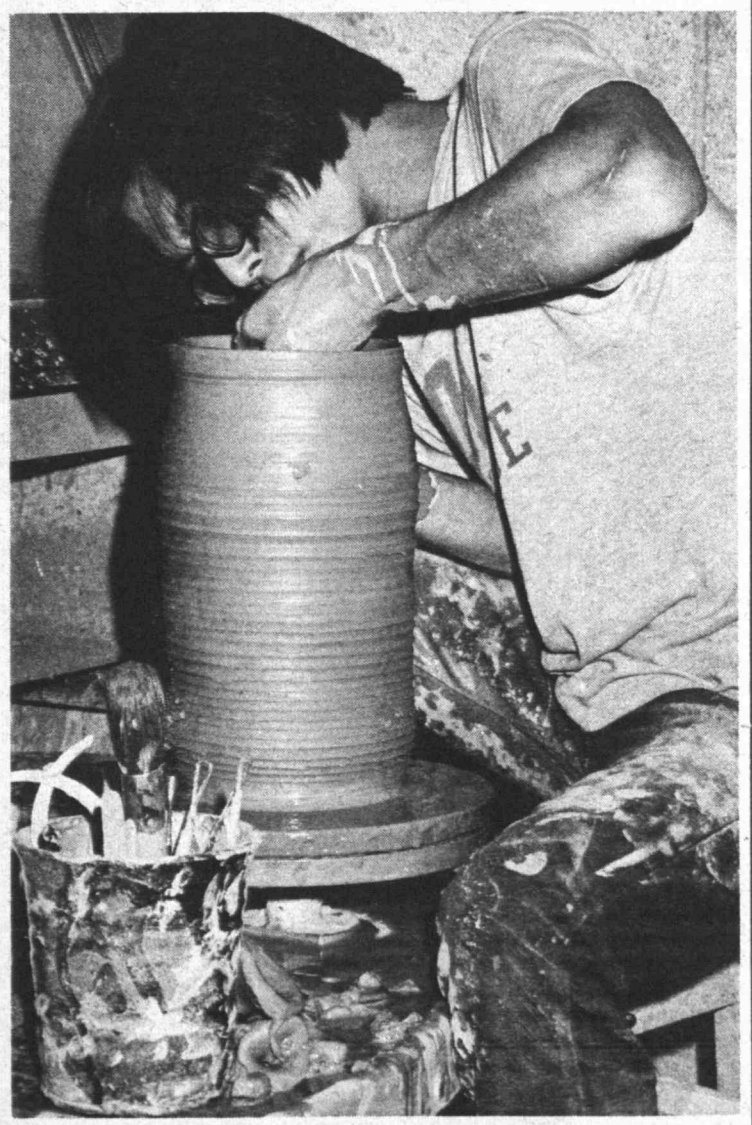
Of the five new courses being offered to members of the MIT community this term by the Student Art Association (SAA), four have been added to the schedule because of their popularity as IAP courses this January.

They are color photography, calligraphy, woodworking and a batik workshop. The fifth new course, clayworks/body parts, rounds out the schedule of classes in drawing, pottery, photography and other arts.

Registration will be held through Friday, Feb. 11, in the SAA office in the Student Center, Rm W20-429. Hours for registration are 1-5pm daily. There will also be evening registration hours (5:30-7:30pm) on Wednesday, Feb. 9. Classes begin Monday, Feb. 14.

Class fees range from $10 to $50, and include most materials. Payment is due at registration. Students receive a slight discount, and will be given preference if enrollment is limited.

For more information on classes and registration, call x3-7019 from 1-5pm or stop by the SAA office, W20-429.



Charles Nakumara, '74, demonstrates his proficiency in pottery, one of the many popular courses offered each term by the Student Art Association (SAA). —Photograph by Thery Mislick

THE INSTITUTE CALENDAR

February 2 through February 13

Seminars and Lectures

Thursday, February 3

Space Flight Via Maxwell's Equations: Constraint without Contact; Magnetic Lift* — Gerard K. O'Neill, Jerome Clarke Hunsaker Professor of Aeronautics and Astronautics (Visiting). Aero/Astro Special Seminar. 3pm, Rm 37-252.

Materials Problems for Fusion Reactors* — Gerald L. Kulcinski, nuclear engineering, University of Wisconsin. Nuclear Engineering, Nuclear Reactor Laboratory & Materials Science & Engineering Seminar. 3:30pm, Rm NW12-222. Coffee 3:15pm.

Use of Enzyme Immunology as a Tool in Microbiology* — Francis Gasser, Institute Professor, Paris. Industrial Microbiology, Biochemical Engineering Group Seminar. 4pm, Rm 16-134. Consultation: A.L. Demain, x3-1711.

Friday, February 4

Experiences with Tutored Video Instruction* — James Gibbons, Stanford University. Center for Advanced Engineering Study Seminar. 11am, Rm 9-150.

X-Ray Emission from High Density Plasma (Would You Believe 10^9 Watts?)* — David J. Nagel, Naval Research Laboratories. 3:30pm, Rm 36-261. Refreshments 3pm.

The Growth Structure and Electronic Properties of Ultra Thin Al_x, As, Ga_{1-x} As-GaAs Heterostructures* — Raymond Dingle, Bell Laboratories. Center for Materials Science & Engineering Colloquium. 4pm, Rm 10-105. Refreshments 3:30pm.

Monday, February 7

Research and Education in Computer Science at Carnegie-Mellon University* — Joseph F. Taub, head, Department of Computer Science, Carnegie-Mellon University. Laboratory for Computer Science Seminar. 3pm, Rm NE43-512A. Refreshments 2:30pm.

The Shape of a Steady-State Oil Slick in Front of a Containment Boom* — Robert van Houten, research associate. Ralph M. Parsons Laboratory Water Resources & Environmental Engineering Seminar. 4pm, Rm 48-316. Coffee 3:45pm, Rm 48-410.

The Mean-Field Approximation in Quantum Field Theory* — Carl Bender, applied mathematics. Applied Mathematics Colloquium. 4pm, Rm 2-338. Tea 3:30pm, Rm 2-349.

Tuesday, February 8

Southern Africa in Crisis, Reflections on a Trip* — Robert Rotberg, history & political science. CIS Seminar. 12n-2pm, Rm E53-482.

On the Fast Computation of Algebraic Functions with Applications* — Joseph F. Taub, head, Department of Computer Science, Carnegie-Mellon University. Laboratory for Computer Science Seminar. 3pm, Rm 9-150. Refreshments 2:30pm.

VI-A Orientation Lecture — For sophomores interested in EE&CS VI-A Program. 3:30pm, Rm 26-100. Students in program and faculty advisors available for discussion.

Observation of Economic and Environmental Phenomena with Satellite Photography* — Franklin Lindsay, president, ITEK Corp. CIS Seminar on Technology and International Security. 4pm, Rm E53-482.

Chemiluminescence and Photoluminescence of Metal Atom Reactions* — Herb Broida, physics, University of Cal., Santa Barbara. Seminar in Physical Chemistry. 4pm, Rm 4-370. Coffee 3:45pm, Rm 6-321.

Radioastronomy of the Planet Earth* — David H. Staelin, electrical engineering. Astrophysics Colloquium. 4:15pm, Rm 37-252. Refreshments 3:45pm.

The Structure of Ribosomal DNA in Drosophila Melanogaster* — Dr. Igor David, Carnegie Institute, Baltimore, Md. Biology Colloquium. 4:30pm, Rm 6-120. Coffee 4pm, Bldg 56, 5th fl vestibule.

Wednesday, February 9

The Aswan High Dam: Problems in Evaluating Impacts* — Alician V. Quinlan, mechanical engineering, Arthur D. Little Assistant Professor of Environmental Sciences & Engineering. Mechanical Engineering Seminar. 12n, Rm 3-465. Coffee & tea. Smoke-free.

The Organization of Spiral Rain Bands in a Hurricane — A Global Eigenvalue Problem* — Inez Fung, G. Oceanography Sack Lunch Seminar. 12n, Rm 54-311. Coffee, bring lunch.

The Air Force Integrated Computer Aided Manufacturing Program* — Dennis E. Wisnosky, Air Force Materials Laboratory. Special Seminar in Manufacturing. 3pm, Rm 37-232.

Aero/Astro General Seminar* — Speaker and title to be announced. 3pm, Rm 37-212. Coffee preceding.

Thursday, February 10

Your Job Search: How an Employer Evaluates You* — Kevin J. Sullivan, manager of manufacturing employment, Digital Equipment Corporation. Career Planning & Placement Seminar. 4pm, Rm 66-110.

Options for Fusion* — Benjamin Lax, physics, director of Francis Bitter National Magnet Laboratory. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments 3:45pm, Rm 26-110.

Friday, February 11

Some Constitutive Restrictions in Plasticity* — P. M. Naghdi, engineering science, University of California, Berkeley. Mechanical Engineering Seminar. 3pm, Rm 3-133.

Nonlinear Behavior of Tokamak Instabilities* — Marshall Rosenbluth, Institute for Advanced Study, Princeton, NJ. MIT Fusion Center-Plasma Dynamics Seminar. 3:30pm, Rm 9-150. Refreshments 3pm.

On Language and Human Cognition* — Karel Culik, computer & information science, UMass Amherst. Linguistics & Philosophy Colloquium. 3:30pm, Rm 36-153. Info: x3-3221, x3-3228.

New Methods for Studying Non-periodic Solids and a Unique Isomorphism Between Electronic Vibrational Excitations* — John D. Joannopoulos, physics. Center for Materials Science & Engineering Seminar. 4pm, Rm 10-105. Refreshments 3:30pm.

Community Meetings

Student Art Association Classes** — Registration for spring classes will be held thru Fri, Feb 11. Hours: 1-5pm, plus 5:30-7:30pm on Feb 9, all Stu Ctr Rm 429. Payment due at registration. Schedules available in SAA office, Stu Ctr Rm 429, x3-7019.

Alumnae-Student Informal Dinner** — Come share an inexpensive meal (less than $4) with women students and alumnae. Meet Wed, Feb 2, 6pm, Zorba's in Central Square.

Wive's Group** — Group leaders: Charlotte Schwartz, sociologist & Myra Rodrigues, social worker, both from Medical Dept; Carol Hulsizer, faculty spouse in residence, Ashdown Hse. Wed, 3-5pm, Stu Ctr West Lng. Babysitting Stu Ctr Rm 473. Cheryl, x3-4911. **Feb 2:** Muriel Birchette, lecturer, Education Div., will speak on social & motivational development in elementary school children.

Association for Women Students** — Spring planning meeting to discuss recruitment and other issues. Wed, Feb 2, 5pm, Rm 3-310. Refreshments.

AARP Meeting** — All members of MIT community aged 55 or more are invited to meeting — MIT chapter of American Association of Retired Persons Thurs, Feb 3, 4pm, Rm 9-150. Membership will be explained and officers elected. Refreshments.

Orientation '77** — MIT community invited to highlight of spring '77 graduate student orientation activities, sponsored by Graduate Student Council (GSC). Sat, Feb 5, 8pm, Walker Memorial. Entertainment provided by Eastern Reunion. Refreshments (nominal cost). Free. Info: x3-2195.

Low Back Problem Exercise Class* — Thurs, 1-2:30pm, Stu Ctr West Lng. Bring 3 pillows and an OK from your doctor. $15/ea class. Info: x3-4138, Mon, 9am-5pm.

AMITA Student Awards Brunch** — Presentation of AMITA awards and showing of videotaped interview with Florence Luscomb, '09. Sponsored by Association of MIT Alumnae. Pot luck brunch: bring your best creation or make a small donation (seniors are guests.) Sun, Feb 6, 11am-2pm, Rm 10-340.

Sangam Meeting — General meeting Tues, Feb 8, 5:30pm, Stu Ctr Mezzanine Lng. Very important meeting, officers will be selected. All members or prospective members urged to attend. Door prize and refreshments: beer, samosas, golab jamuns, soft drinks, etc.

Chinese Brush Painting Demonstration** — Demonstrated by Mrs. Lee, artist. Sponsored by TWO. Tues, Feb 8, 7:30-9:30pm, Rm 10-105. Free. Info: B. Wall, 484-1716.

Fraternity Symposium*** — National fraternity representatives, MIT professionals, alumni & undergraduates will speak at symposium sponsored by MIT Interfraternity Conference (IFC) and Alumni AFC. Program of seminars & workshops on physical house operations & fraternalism. Sat, Feb 12, 12n-5pm, Bldg 66. Free. Cider & donuts.

TOPS* — Tech Organization of Professional Secretaries. Meetings Thurs, 12n, Walker Blue Rm.

MIT Women's Forum** — Meetings Mon, 12n, Rm 10-105. **February Medical Series — Feb 7:** Dr. Melvin H. Rodman, director of MIT Medical Department, will discuss medical services available to MIT community.

Wellesley

The Composit Image: Photo Montage 1855-1935* — Lecture by Robert A. Sobieszek Wed, Feb 9, 8pm, Jewett Art Center, Wellesley. Jointly sponsored by Creative Photography Gallery & Wellesley College Art Department.

Social Events

60's Rock Revival — Traditional rock revival updated a decade, Sponsored by Student Center Committee. Fri, Feb 4, 8:30pm-1am, Sala. Beer & punch free. Come enjoy great dancing music! Admission $1/prsn, $1.50/cpl, college ID required.

Movies

The Virgin Spring (Bergman)* — MIT Film Society. Fri, Feb 4, 7:30 & 9:30pm, Rm 6-120. Admission $1.25.

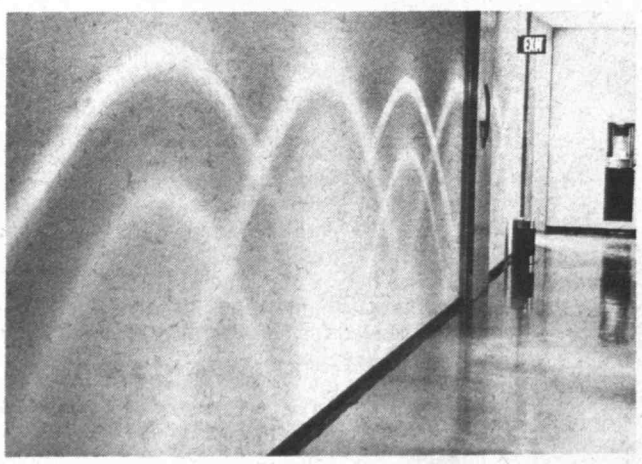
The Exterminating Angel (Bunuel)* — MIT Film Society. 7:30 & 9:30pm, Rm 6-120. Admission $1.25.

Lobby 7 Events

Folk Dance Club* — Will be dancing Fri afternoons in Lobby 7 throughout the winter months. Come and join in! Fri, 12n-2pm, Bldg 7 Lobby. Free.

Music

Kontarsky Brothers in Concert* — Duo pianists Aloys & Alfons Kontarsky will give a concert Fri, Feb 4, 8pm, Kresge. Program: *En Blanc et Noir* and *Six Epigraphs Antiques* by Debussy, *Monument, Selfportrait, Motion* by Ligeti, and Variations and Fugue on a Theme by Beethoven, Opus 86, by Reger. Sponsored by MIT Music Section. Free.



ARCHES OF LIGHT—are projected on the walls of one of the halls in the Dreyfus Building. Charming enough to capture the hearts of environmental artists, this "mural" is created more by accident than design by the placement of normal electric lights.

MIT Choral Society — Rehearsal Mon, Feb 7, 7:30pm, Kresge. Auditi for new members will be held after rehearsal.

Chamber Music society Concerts* — Wed, 5:15pm, Music Library. C x3-3210 for information.

Renaissance Vocal Music* — Sponsored by Chamber Music Socie Auditions & rehearsal Thurs, 7pm, Rm 4-160.

Theater

Misalliance* — MIT Dramashop production of George Bernard Sha play, directed by Joseph Everingham. Performances Fri & Sat, Feb 4 & and Thurs-Sat, Feb 10-12, 8pm, Kresge Little Theatre. Tickets: $2.50, $1 on Feb 4, sold at door. All seats reserved. Reservations: x3-4720.

Dance

Tech Squares* — Square dancing course for beginners beginning Tues, F 8, 8pm, Sala. Eight week course.

Balkan Workshops* — Balkan dance workshop taught by Marty Koe Sat, Feb 12, 10am-12:30pm & Sun, Feb 13, 11am-2pm. Balkan singi workshop taught by Ethyl Rain Sat, Feb 12, 1-3pm. Culture corner Sat, F 12, 3-5pm. All in Sala. Party with live music Sat, Feb 12, 8am-12m, Lobde Tickets available for all events. Info: Joan, 277-1033 or Nina, x5-6241 Dor

MIT Dance Workshop — Tues & Thurs evgs, 5-7pm, duPont Arm dance studio.

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

Renaissance Dance* — Sponsored by MIT SCA. Beginners welcome. We 8pm, Burton dining hall. Info: Beth Parkhurst, 964-1840.

Exhibitions

Redesigning Architecture Headquarters: Results of the 1977 IAP Sta Design Studio* — Models and drawings on display thru Wed, Feb 2, Rot Library, Rm 7-304, Info: x3-7053.

Experimental Photography: A Travelling Exhibit from the Visu Study Workshop, Rochester, NY* — Jointly sponsored by Creati Photography Laboratory and Visual Language Workshop. At Creati Photo Lab (Bldg W31-310) thru Jan 31. At Skidmore Rm (Rm 7-304) a adjacent corridor display cases Feb 1-Feb 15.

Works on Paper by Sculptors* — From the MIT Collection. Thurs, Jan 1 Sat, Feb 26, Hayden Corridor Gallery. Open daily.

The Iceberg and Its Shadow: Two Views* — Monumental glass structu environment by Calif artist Larry Bell. Exhibit Sat, Jan 15-Sat, Feb 2 Hayden Gallery. Hours: Mon-Sat, 10am-4pm. Configuration of *Iceberg* wi be changed by Bell Feb 7-9, during viewing hours.

Faculty Club Exhibit* — Paintings by Anne Brock on exhibit during Fe 9am-11pm.

Forgotten Photographs* — From the collection of R. P. Kingston. On e hibit at Creative Photography Gallery thru Thurs, Mar 3. Hours: Mon-Fr 9am-10pm; Sat, 10am-6pm; Sun 12n-8pm, Bldg W31.

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

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

Facsimiles of Composers' Manuscripts* — Including Bach, Haydn an Beethoven. Music Library, Rm 14E.

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

Athletics

Home Schedule — Wednesday, February 2 — M JV, V Basketbal Amherst, 6:15 & 8:15pm, Rockwell Cage. **W V Fencing.** URI, 7pm, duPo fencing rm. **W Gymnastics.** URI, 7pm, duPont Gym. **JV Hockey.** Emerso 4pm, ice rink. **V Squash.** Tufts, 7pm, duPont squash courts. **M Swimmin** Amherst, 6pm, Alumni Pool. **V Wrestling.** Boston College, 7pm, duPo wrestling rm. **Thursday, February 3 — W Swimming.** Boston Colleg 7pm, Alumni Pool. **JV Wrestling.** Emerson, 7pm, duPont wrestling rm **Friday, February 4 — W V Basketball.** BU, 7:30pm, Rockwell Cag **Saturday, February 5 — M JV, V Basketball.** Clark, 6:16 & 8:15pm Rockwell Cage. **W & M V Fencing.** Holy Cross, 1pm, duPont fencing rm. **Gymnastics.** Coast Guard, 2pm, duPont Gym. **V Hockey.** Bates, 7pm, i rink. **W & M V Swimming.** Trinity, 2pm, Alumni Pool. **JV, V Squash** Williams, 2pm, duPont squash courts. **V Squash.** Bowdoin, 4pm, duPo squash courts. **V Wrestling.** Williams, 2pm, duPont wrestling rm. **Monday February 7 — JV Hockey.** BB&N, 4pm, ice rink. **JV Squash.** Middlese 3:30pm, duPont squash courts. **Tuesday, February 8 — W V Basketbal** Wheaton, 7:30pm, Rockwell Cage. **JV, V Fencing.** Harvard, 7pm, duPo fencing rm. **W V Fencing.** Radcliffe, 6:30pm, duPont fencing rm. **V Wrest ing.** U. Conn, WPI, 7pm, duPont wrestling rm. **Wednesday, February 9 W Gymnastics.** Norwich, 7pm, duPont Gym. **W V Swimming.** Wellesle 7pm, Alumni Pool. **Thursday, February 10 — M JV Basketball.** Harvar 7:30pm, Rockwell Cage. **Friday, February 11 — M & W V Fencing** Cornell, 7pm, duPont fencing rm. **Saturday, February 12 — M V Baske ball.** Gordon, 8:15pm, Rockwell Cage. **M V Fencing.** Colgate, 1pm, duPo fencing rm. **W Gymnastics.** NU & Mt Holyoke, 2pm, duPont gym. **Hockey.** Assumption, 7pm, ice rink. **Pistol.** Army, Boston State, 9am, du Pont pistol range. **Rifle.** Maine, Norwich, Coast Guard, 9am, duPont rif range. **V Squash** (Stevens Tech) & JV Squash (Tufts), 2pm, duPont squas courts. **Track.** Bates, 1pm, Rockwell Cage.

Maggie's Self-Designed Fitness Class — Classes 12n-1pm & 1-2pm, du Pont fencing & wrestling rms; 5-6pm, duPont T Club Lng. PE credit cours but all are welcome.

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

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

Send notices for Feb 9 through Feb 20 to the Calendar Editor, Room 5 111, Ext, 3-3270, before noon Friday, Feb 4.

Change Ringers Create 'A Happy Noise to Hear'

By KATHARINE CHILDS JONES
Staff Writer

In the bell tower of Old North Church above the rooftops of Boston's North End are the oldest bells in North America hung for change ringing. The eight bells were cast in 1744 by Abe Rudhall of Gloucester, England.

The bells were once rung by Paul Revere. Today they are rung by the MIT Guild of Bell Ringers. The 17-member Guild was formed in 1975 after a course, "Introduction to the Art and Science of Change Ringing," was offered during MIT's January term, Independent Activities Period. The course has been offered each January since. This January eight students regularly came for three practices each week. Instructors are graduates of earlier courses.

Change ringing is an old English art whose popularity never spread to the continent. Ringing in the more intellectual manner used today was developed in the early 1700s. There are 18 ringable towers in North America with five, the largest cluster, in the greater Boston area.

Ringing methods are based on changes in the sequence of the bells. In a change each bell is rung once. The sequence of changes in a method moves each bell one position ahead or behind the position it had during the previous change. One goal of a method is not to repeat changes. The order of bells for the first change is usually 1-2-3-4-5-6-7-8; for the second, perhaps 2-1-4-3-6-5-8-7. Hundreds of methods are possible.

Change ringing is usually done on four to 12 bells. The number of possible changes on any number of bells is that number factorial. For example, the number of changes possible on seven bells is seven factorial (7!) or 5,040. This is, by definition, the minimum length of a peal. A peal requires about three hours of continuous ringing.

The MIT Guild of Bell Ringers rings the bells at Old North Church on the second Sunday of each month, on special occassions, and on feast days. They had the honor of ringing on July 11, 1976, when Queen Elizabeth II and Prince Philip worshipped at the church. Honorary chairman of the Guild is the Reverend Robert W. Golledge, vicar of Old North Church.

The eight bells in the tower of Old North Church are tuned in a major scale of F and range in size from the treble, the highest in tone and lightest weighing about 600 pounds, to the tenor, the lowest in tone and heaviest weighing 1596 pounds.

The eight bells, arranged clockwise in a circle from treble to tenor, are lined up on different axes so forces are in balance when the bells ring. If the bells were lined up on the same axis, the tower could sway dangerously when the bells ring. The bells are hung in an oak frame with plain bearings. Each is attached to a wheel to which is attached a rope. The ropes extend down to a room beneath the bell tower where the ringers stand, each one holding a rope.

The bells can be rung three ways. By hitting a clapper or hammer against the side of the bell, one can play a set of bells rather like a piano, producing tunes. The second way is to swing the bell through a small arc. One cannot control when the bell will sound in this type of ringing. In the third type of ringing, the bell swings around full circle, beginning and ending with the bell's mouth facing skyward. First the bell swings around in one direction; on the next stroke it swings back in the opposite direction. The bell is designed so that it cannot continue to turn around. Each time the bell swings around, the clapper strikes just once, providing the ringer with perfect control over when the bell will sound. At practices, the clapper is tied against the side of the bell, silencing its sound.

Change ringers use two strokes: the backstroke and the handstroke, each corresponding to one of the two ways the bells swing.

RINGING THE BELLS at Old North Church are (left to right) John Kolega, a junior in chemistry from Willimantic, Conn.; Beryl Nelson, a junior in mathematics from Williamsville, NY, and a course instructor; and Alice Coggeshall. Standing at far right is Marjorie Batchelor, a graduate student in mathematics from Washington, DC, who is also a course instructor.

Course instructors are Marjorie Batchelor, a graduate student in mathematics from Washington, DC; Beryl Nelson, a junior in mathematics from Williamsville, NY, and Kay Parkin, a graduate student in earth and planetary sciences from Burlingame, Calif.

"With beginners, we first try to make the physical aspects of the strokes a habit," Ms. Nelson said. "Then they must learn to listen and adjust what they see to what they hear."

When the strokes' physical aspects are a habit, students learn to ring rounds, adjusting the speed of their ringing to the speed of other members of the band. (A band is a group of people who gather to ring a set of bells at a certain time.)

What draws people to change ringing?

"For one thing, it's a challenge," Ms. Nelson said. "Also, you're always working with other people. A band can play only as well as its least experienced member."

Aloys and Alfons Kontarsky To Perform

Duo pianists Aloys and Alfons Kontarsky, whose international reputation is based on their brilliant four-handed piano playing as well as on their interpretation of contemporary music, will give a concert on Friday, February 4, at 8pm in Kresge Auditorium.

The concert is sponsored by the MIT Music Section and is open to the public free of charge.

The Kontarsky brothers, who perform only original compositions for two pianos, will play *En Blanc et Noir* and *Six Épigraphs Antiques* by Debussy, *Monument, Selfportrait, Motion* by Gyorgy Ligeti, and Variations and Fugue on a Theme by Beethoven, Opus 86, by Reger.

Many aspects of the three pieces that make up *En Blanc et Noir* point forward to Stravinsky. Debussy wrote of the three, they "draw their colour and feeling solely from the piano."

Six Epigraphs Antiques show the influence of archaic and oriental melismata, church modes, and the whole-tone scale. The six brief pieces have an almost abstract tonal character and a challenging keyboard technique; each player's hands enter at times his partner's territory. Debussy also wrote a version of his work for piano solo, and Ernest Ansermet orchestrated it in 1932.

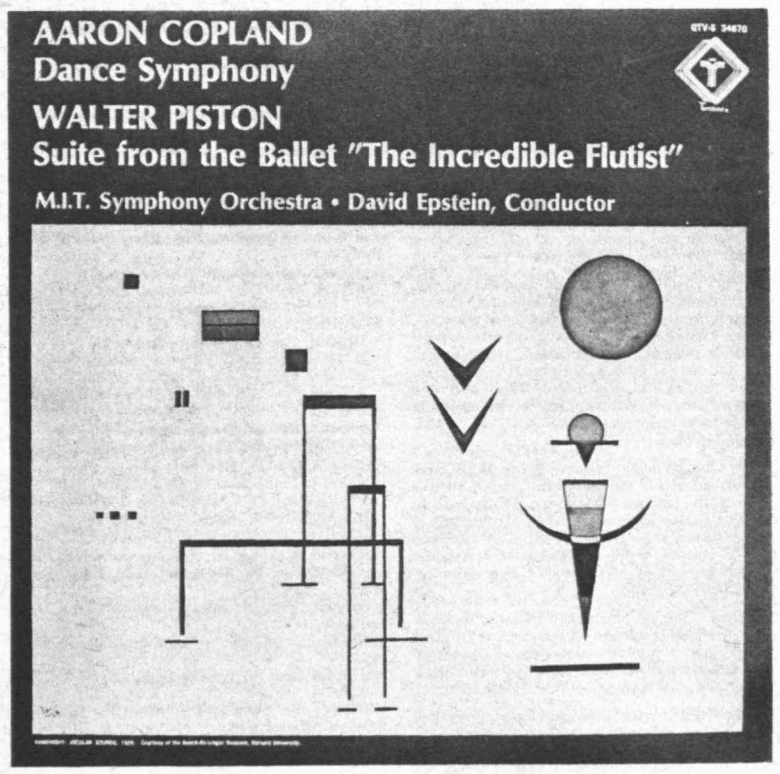
Monument, Selfportrait, Motion was commissioned by West German Radio, Cologne, and completed by Hungarian composer György Ligeti in April, 1976. The three pieces, dedicated to the Kontarskys, are connected and make up a closed unity. Each begins with the statement of a relatively simple musical idea, which is then developed in an increasingly complex way.

Ligeti wrote about these pieces, "The music is indeed composed in such a way that the musical shapes arise only out of the collaboration of the two pianos. On the other hand the fact that two interpreters who are independent of each other produce the music permits the most complicated polyrhythmic effects and metrical shifts."

The Kontarskys, natives of West Germany, studied piano independently of each other at the State Academy of Music in Cologne where they are now professors. In 1955 they received first prize for duo pianists at the Fourth International Music Competition organized by the German Federal Republic in Munich.

They began their professional concert careers in 1957 and have toured extensively in Europe, the Near East, Israel, Australia, South and Central America, South Africa, and Japan. They first toured the United States in the 1966/67 concert season and have returned almost annually since then. This will be their second concert at MIT, they having performed here in January, 1975.

They have performed repeatedly at festivals in Warsaw, Zagreb, Lisbon, and Lucerne, and have led piano seminars for the International Festival for New Music at Darmstadt. They have performed as solists with such orchestras as the Berlin Philharmonic, the Minneapolis Symphony, Japan's NHK Symphony, and the Stuttgart and Zurich Chamber Orchestras. Their recordings range from Mozart to Pousseur.



MIT SYMPHONY ORCHESTRA marks its recording debut with a record issued in mid January on the Vox/Turnabout label. The orchestra, under the direction of David Epstein, recorded Aaron Copeland's Dance Symphony and Walter Piston's Suite from the Ballet "The Incredible Flutist" on location in Kresge Auditorium. The record is the first of four to be released by Vox Productions, Inc., of New York City in 1977. The repertoire includes some works that have never been recorded before. The records will be sold at the Tech Coop for $2.90.

English Classes

The Department of Humanities offers an English subject (21.297) intended for students, faculty and staff members who are native speakers of foreign languages experiencing difficulty with English.

The subject, taught by Barbara Raither and Linda Sibley, instructors of foreign literature in the Department of Humanities, is divided into three areas so that the student may concentrate on the aspects of English which he or she finds most difficult.

The class on advanced conversation has two sections, and meets Wednesday from 11am-1pm or 2-4pm, in Rm 14N-225. Another class, dealing with grammar review and oral drill, meets Wednesday, 7-9:30pm, in Rm 14E-311. The third class, writing, meets Thursdays from 7-9:30pm, also in Rm 14E-311.

Anyone wishing further information on any of the classes should attend the first class meeting or contact Ms. Raither or Ms. Sibley (Rm 14N-221, x3-3925) or the department secretary (Rm 14N-207, x3-4771).

Drama Notes

Dramashop to Present Shaw's 'Misalliance'

PLAYING THE ROLE of a Polish aviatrix and acrobat in MIT Dramashop's production of *Misalliance* by George Bernard Shaw is Susan Morgello. Ms. Morgello, a junior in biology-nutrition from The Bronx, New York, is Lina Szczepanowska in Shaw's witty comedy.

MIT Dramashop will present George Bernard Shaw's witty comedy *Misalliance* at 8pm on Friday and Saturday, February 4 and 5, and on Thursday, Friday, and Saturday, February 10, 11, and 12 in Kresge Little Theatre at MIT

The play will be directed by Joseph Everingham, director of drama and professor of literature in the MIT Department of Humanities, and will feature costumes by Cecelia Eller, sets by William Fregosi, and lighting by Edward Darna.

The play is set in the 1910 summer home in Surrey of millionaire underwear manufacturer John Tarleton. Action centers on the marriage of the daughter of the house, Hypatia, to a member of the English aristocracy. Two people, whose airplane crashes into the Tarleton property, arrive on the scene with surprising results. Much of the Shavian satire concerns the relationships between parents and children.

Tickets are $1.50 on opening night and $2.50 for all other performances. All seats are reserved. Call x3-4720 for reservations. Remaining tickets will be sold at the door.

Production of *Misalliance* was an IAP activity sponsored by Dramashop.

Epstein Rescues St. Louis Concert

MIT Professor David Epstein received an emergency request from St. Louis, Mo., on Thursday, Jan. 20, to conduct the St. Louis Philharmonic in performance of Mahler's Symphony No. 1 and Schubert's Symphony No. 3 that same night.

The conductor of the St. Louis Philharmonic was indisposed, and a substitute conductor was needed in a hurry. Professor Epstein, conductor of the MIT Symphony Orchestra, was recommended to the orchestra management and asked to step in and conduct the Philharmonic without rehearsing with the orchestra.

"It was a wild thing to do," Professor Epstein said, but after considering the proposal he decided to accept the challenge. A few hours later, he was flying to St. Louis, studying the scores of the symphonies he was to conduct.

"I saw the orchestra for seven minutes before the concert," Professor Epstein said, and then it was time to perform.

The concert was well received. Sue Thomas wrote in the St. Louis *Post-Dispatch*, "The Mahler is a tough customer under any circumstances, and it is to the Philharmonic's, and Epstein's, credit that it came off so well. Epstein knows the symphony well and never lost control."

Sanders Elected

Dr. Frederick Sanders, professor of meteorology at MIT, has been elected a councillor of the American Meteorological Society for a three-year term. Announcement of Professor Sander's election was made at the recent annual meeting of the society in Phoenix, Ariz.

CLASSIFIED ADS

Ads are limited to one per person per issue and may not be repeated in successive issues. All ads must be accompanied by full name and Institute extension. Only Institute extensions may be listed. Members of the community who have no extensions may submit ads by coming in person to the *Tech Talk* office, Room 5-111. Please submit all ads before noon, Friday, Feb 4. They will be printed on a first come first serve basis as space permits.

For Sale, Etc.

Healthway scuba 10 air tank, 72 cu ft, stl, 5 yrs, 77 DOT test, J valve & tankboot, $75; Turtle ¾" textured wetsuit, 3 yrs, sz XL, gd cond, $40. Ginger, x8-1135 Draper.

Sz 8 Heirling skis, Swiss made, $20. Call 696-3750.

Lange comp ski boots sz 8, $50; Sony 8 trk rcrdr deck, $50; 8 trk tapes, $1-$2.50; Tenna 8 trk car deck, nds repair, $5; Avalon stl belt radial on Camaro whl, ER70x14, $15; Raleigh Grand Prix 10 spd bike, 21" frame, $70. Al, x5-9472 Dorm.

Coleman slp bag, rectangular, dacron 88 fiberfill, used once, $25. Sandy, x3-5717.

Nikkormat EL, 50mm f2.0, $260; 43-86mm Nikkor zoom lens, $130. R. S. Taylor, x3-5142.

Must sell 90" blu couch; 60" gold loveseat; print ovrstuf chr; exc cond. Call 325-2813.

Blu plaid Danish mod couch, $20. Call 924-0868.

Pr stud 195SR-14 stl belt ww radial snows, mtd, gd cond, $50 or best. x3-4588.

Pr f sz 9 ice skates. Cara, x3-2058.

Mobile Spec motor oil, 10W-30, 16 qts, $8. Szeto, x3-7950, lve msg.

Bose 901's, perf cond, w/wrnty. Howard Pien, 247-8764.

Polarguard Mtn Lion Super slp bag, rated to -5F, $75 nw, $40 nego. Sue, x5-7169 Dorm.

Fig skates: M sz 9 , $11; f sz 8; hamburg cooker. Bret, x5-7165 Dorm.

Pr Burt retractable ski bndgs, exc cond, easily mtd any skis, $60. x5-6672 Dorm.

Pr m hcky skates, sz 7½, $7. Mike, x3-6275.

Art nouveau handblown glass vases, one-of-a-kind, signed, dated, registered. x5-8555 Dorm, kp try.

Wurlitzer baby grand, about 40 yrs, fine cond, est $1,200, nego. Call 527-5328.

Pr 4 lug whls, 12" by 6", fit Datsun, $10/pr. Linda, x7838 Linc.

Acoustic guitar, Yamaha FG-160, w/case, mint. Dave, x3-1637.

(2) xtra long sgl beds w/stl spr frames & matt, exc cond, $60/ea or best; sturdy wd K chrs. Call 876-1593, evgs.

Hotplate; toasteroven/brlr; elec frypan; $12/ea or best. Janice, 566-0030.

Castro conv ottoman (hassock/sgl bed) w/red cover, lk nw, $50; folding 3 spd bike, $50. Susan Moskowitz, x3-1356.

Blk Persian lamb coat w/ranch mink collar, exc cond, sz 16, $275; natural slvr blu mink stole, $95. Marcia, 232-6339.

Sears 5 spd 27" girl bike, $40; Sears 11,000 BTU AC, $100; asst furn, cheap, lvg cntry soon. Steve, 566-2891, except Sat.

Scuba equip: compl wetsuit, stl tank, regulator, mask, fins, snorkel, $200 or best. x3-4562.

Port computer terminal, DCI #1030 Teleterm, blt-in accoustic coupler, phone adapter, upper & lower case, carry case, maintenance contract, $2,000 incl 24 roll box paper. Larry, x3-2930.

Integral Sys mdl 10 preamp, $150; Heath AJ-1214 tuner, $90; both exc cond. Rich, x3-6886.

Melcor scientific calc w/compl access, ownrs manual, exc cond, $30. Call 267-0945, aft 6.

Rotel RA-810 integrated amp, 40 W/ch, lk nw, carton & manual, $125. Call 267-2199, lve msg.

Refrig, $50. Call 923-9044.

Dbl matt, free; sofa, $15; fondue set, $10; coffee perc, $5. Keith, x3-1357.

Sgl bed, $25. Call 661-0661.

Amana refrig/frzr combo, $130; Rand McNally Cosmo World Atlas, planet earth ed, '74, 30+ pgs satellite photos, nw. Conrad, x3-4418.

Coffee tbl, $10; end tbl, $2; birdcage w/stand, access; sew mach w/cab, $40; lg flower vase, $1; plants, cheap. Bonnie, 494-8418, evgs.

Sgl bed, top qual interspring matt, box spr, frame, $80. Pete, x3-6771.

Mtch brim hat & scarf, crocheted to order, yr choice colors, $15/set. Diane, x8-1766 Draper.

Frye tan boots, f sz 8, worn 2X, $25; leath ski boots, f sz 8½, $10. Ginny, x3-3822.

Advent 201 cassette deck w/dolby sys, incl dust cover, hookups, intact wrnty card, unused cond, ask $200; DBX 117 dynamic range enhancer, supplements sound of yr rcrding medium, unused cond, ask $100. Susan, 864-2065, aft 9pm.

Kodak supermatic 60 super 8 cassette proj & over 50 history 8 min film cassettes; 16 mm Bell & Howell sound self-wind proj. Carolyn, x3-3045.

M hcky skates, sz 7½-8½, $15; W fig skates, sz 8½-9, $15; MacGregor golf clubs, full set & bag, $75; War & Peace, 4 rcrd set, nvr opened, $10. x3-6659.

Fr Prov 8 pc BR set, worth over $800, $500 or best; lots nw toys; costume jewlery; GE child organ; GE tape rcrdr; 2 alum lng chrs; child sz 3 skis & boots; GE amfm clock radio; 2 sm humidifiers. x8-3591 Draper.

Hotpoint frzr, approx 17 cu ft, wht upright, $50; fish tanks, all szes, 10-30 gal, mtch hoods, flour lites, stands, etc; asst plastic dishes, $5; birdcage, $5; 4x8' plywd, ½", $8; ¾", $10; 8'x2"x4", $1; 16'x2"x4", $2; 4"x4"s. Call 646-7158.

Glenwood gas range w/heating log, exc cond, ask $175. Bob, x3-4119.

Meyer electrohydraulic snowplow, fits jeep or sm truck; tires for Dodge Dart; child elec organ; cheap. Chuck, x8-3705 Draper.

Sturdy, attractive pine chests, exc for storage, toys, valuables, furn & shipping, 3 mdls, $12 & up. x5-6676 Dorm.

Handmade, washable Holly Hobby dolls, $17/ea; Sony TC-55 mini tape rcrdr, batt pack, AC adapter, 6 tapes, $85. J. May, x8-2843 Draper.

Vehicles

'68 Merc Cougar, nds rear springs, exh line, $100. x3-3806.

'68 Pont Tempest, great cond, $200 or best. x5-9559 Dorm, aft 5pm.

'69 Mustang, 302 V8, p st & br, 3 spd std, $550 or best. Ray, x3-7235.

'69 Cutlass, gd cond, auto, AC, 20 K on trans, brite red, CB antenna mtd, best. Donald, x3-6596.

'69 Ford LTD Squire wgn, cln, hi mileage but exc run cond, $750. Call 235-1843, aft 6pm.

'69 Chevy Kingswood Estate 9 psgr wgn, gd cond, p st, radio, stl belt radials, ask $850; screens for 12' sq porch incl 36" W door, ask $150; 20" girl Schwinn bike, $25. Tony Annetti, 438-6911, evgs.

'71 Saab wgn, gd cold weather car, runs well, less than $1,000. x3-1592 bef 12:30pm, lve msg.

'73 Pont Lemans Safari wgn, 40 K, orig ownr, full power, AC, 7 mtd tires incl 2 snows, mint cond, $2,990. x3-4493.

'74 Caprice, yel, gd shape, V6, 4 spd, decor grp, amfm radio, rustprufed, gd tires, $2,400. Joe, x7603 Linc.

'74 VW lovebug, gd cond, nw tires, amfm radio, $2,100 or best. Paul Livingstone, x8-1231 Draper.

Housing

Belmont, lovely older home in qt area, gd cond, 60's. Call 862-8523.

Belmont Hill, v lg furn bsmnt rm w/or w/out adjoining LR, $100 or $135. Call 484-6833, morn or evgs.

Bos, Beac St nr Mass Ave, lg BR, mod K, B, frpl, bay wndw, sunny, $300 incl util. Louis, 266-1014.

Camb, 2 BR apt, 15 min walk MIT, avail 2/15 or earlier, $175 + util. Mike, x3-1917.

Camb, 2 fam hse, Agassiz sch district, nr Harvard, 3 BR apt + $5,000/yr income, $67,000. Mary, 491-4298.

Camb, sub 4 rm apt, Windsor St, furn, $165 incl ht. Mark, x3-4067.

Concord Ctr, 4 BR cape, 2 car garage, alum siding, exc loc, mid 50's. Call 369-2773.

Lex, lg '69 hse on conservation land, exc views, nr Camb but v qt, 4-5 Br, huge playrm, 80's. Al, x3-3603.

Manomet, 2 BR cottage, screened patio, cstm barb-q in fenced yd, hot-top driveway, exc cond, desirable loc, 2 min walk to beach, mid-20's. Jan, x7138 Linc.

Animals

Welsh terrier w/papers nds home w/plenty of love & attention, he's hsebrkn, free. Call 846-4625, aft 5pm.

Homes desperately nded for unwanted old Eng sheepdogs. Helen, x3-1880.

Free to gd home, 6 mos m cat, frndly & healthy, gd w/kids. Ruth, x3-1540.

AKC apricot mini poodle, 8 mos, $75. Randy, x3-5555.

Free kittens, tiger markings, blk, org, tan & wht, all m. x3-5650.

POA mare, 5 yrs, 13.2 hands, bay w/wht blnkt & stockings, 1 blu watch eye, grn broke, ridden mostly wstrn but loves to jump, gd 4H proj, $300 or best. x3-7872.

Lost and Found

Lost: reward for 3 wire-wrap boards left in hall nr Rm 16-311, my UROP project. Jeff, x3-7441.

Found: blk leath fur-lined glove in Rm 39-430, around 12/2. x3-4105.

Found: pr contact lenses in Wlkr bldg (dining hall), 1/25. Guy, x3-2714, 10:30am-7:30pm.

Wanted

MAC amp & preamp. D. Fortunato, x7713 Linc.

BR apt wanted for MIT grad & cat, nr T, cln, safe nbrhd. x3-3788, lve name & nmbr.

Want to buy sm refrig, under counter sz. x5-6124 Dorm.

Used elec typwrtr, gd cond, $100 or less, nego. Roger or Deborah, 661-0956, evgs.

Want to rent to borrow for wknd: sweep frequency & marker gen for TV alignment. Phil, x8-4087 Draper.

(2) drwr file cab. x5-7169 Dorm.

Nd 2 stu w/van to move 2 pces furn from Walden St, Camb to Back Bay, Feb 4 or 5, fee nego. Joyce, 423-3400, days.

Alloy or stl whls, 7"x14"D, for Datsun sportscar (240Z, 2000). redrillable alloy OK. Bob, x3-7571.

Polaroid color pack 2, 3, 4 or similar camera, view finder nd not work. Ralph, x5545 Linc.

Manual slide proj, 35 mm. Helen, x3-2218.

(2) drwr file cab. John, x5-6179 Dorm.

Spirit duplicator, any cond, buy for cash or exch for wet-style office copier. Wilson, x3-5121.

Nd help moving, have van, nd help loading. Annette, 783-4385.

I collect sand samples as hobby, if take trip, could U bring back sm sample? Fred, x3-3913.

Out-patients nded for nutrition study, 2 full days at your convenience, $25. Kathy Doyle, x3-6732.

Roommates

Xtra lg rm avail in 3 BR apt, nr campus, 5 min walk, $52 htd. Brad, x3-3688.

Prof f w/dog seeks 1 or 2 other prsns, 27+, to find or share hsehold, must be responsible, neat, pref suburban loc. Sandy, x3-2022.

F, 25+, to share spac 3 BR duplex, Belmont, nr T, pkg avail, non-smoker pref, $100 incl ht. Call 484-8289.

BR avail 4 BR Nwtn Crnr apt, mod K, well equip, furn, nr lndry & bus, $94 + util. John, x3-4476.

M for rm in MIT prof's Fresh Pond hse, $100 + share util. x3-4065.

M or f for 6 rm apt, Winter Hill, Som, pref grad or working, nr T, $62.50 + util. DJ, x3-3410.

Carpools

Nd ride Norwood-MIT, M-F, wl pay. Geri, x3-6903.

Nd ride down Mt Auburn St to MIT, M-F, 8-5 flex, or 1 way, wl pay. Pamela, 494-0392.

Miscellaneous

Wl type theses, manu, etc, IBM Selec. Carol, x3-4152.

Typing: fast, accurate, reliable. Jean, 628-8271.

Approx 30-40 hrs of somewhat tedious data reductions, $3.50/hr. Prof. Unkel, x3-2193.

Prsns who are certified emergency medical technicians (EMT) are asked to call Campus Patrol, x3-2997.

Typing, fast, accurate & reliable, theses, term papers, manu, letters & rpts. Barbara, x3-7582.

Hrdwd floors sanded & refinished prof, 40¢/sq ft. Christine, x3-2743.

Flute & guitar lessons given by music grad, all lvls, reas rates. Sue, x3-1702.

Wl type theses, manu, tech, fast & accurate, IBM Correct Selec. Debbie, x3-1848.

POSITIONS AVAILABLE

This list includes all non-academic jobs currently available on the MIT campus. Duplicate lists are posted on the Women's Kiosk in Building 7, outside the offices of the Special Assistants for Women and Work (10-215) and Minority Affairs (10-211), and in the Personnel Office (E19-239). Personnel Interviewers will refer any qualified applicants on all biweekly jobs as soon as possible after their receipt in Personnel.

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

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

Dick Higham	*3-4278*
Pat Williams	*3-1594*
Carolyn Scheer	*3-1595*
(Secretary — Ann Perkins)	
Virginia Bishop	*3-1591*
Mike Parr	*3-4266*
Ken Hewitt	*3-4267*
(Secretary — Paulette Chiles)	
Sally Hansen	*3-4275*
Lewis Redding	*3-2928*
Richard Cerrato	*3-4269*
(Secretary — Jenni Leibman)	

NOTE: Effective with jobs opened 1/1/77, Sponsored Research Staff positions will be identified by an "R" prefix. (Sponsored Research Staff positions opened prior to that date are identified by a "D" prefix.)

Admin. Staff, Liaison Officer, part-time, through the Office of the Vice President for Research, will coordinate and direct activities of an MIT-Detroit Institute of Technology association designed to strengthen DIT's academic program; assist in developing program objectives; coordinate public relations activities; perform other duties as necessary to give administrative support to the program. A minimum of 2 years applicable administrative experience with particular strength in the areas of problem solving and communication required. College training desirable. Position is approximately half time and funded through June, 1977, but may be extended. A77-4 (2/2).

Sponsored Research Staff in the National Magnet Laboratory to do postdoctoral research on matter at high magnetic fields. A theoretician and/or experimentalist with a Ph.D. in Physics is required. Applicants must have background in magnetism and superconductivity and have demonstrated ability to do independent research. D76-246 (2/2).

Sponsored Research Staff, Program Manager, in the Energy Laboratory End Use Technology group will be responsible for technical coordination and management of existing programs; will assist in developing and initiating new projects. Related project management experience, an advanced degree (preferably a Ph.D.) in Mechanical Engineering, or equivalent training in a related engineering field required. Applicants must be experienced in area of applied thermal science. R77-16 (2/2).

Admin. Staff, Industrial Liason Office, in a Program providing interface among MIT faculty, staff and representatives of member companies of Program. Will also solicit new member companies. Position involves extensive foreign and domestic travel. A Bachelor's degree in a science or engineering field, as well as Master's degree, or equivalent experience required. Candidates should also possess a management perspective and have at least 2 years industrial experience. A77-1 (1/26).

Admin. Staff, Systems Programmer, in Information Processing Services Programming Development Office. Primary duty will be performing quality assurance for MULTICS system: test and intergrate changes; carry out crash analysis and performance tuning. Experience in systems, systems programming, PL/1, knowledge of MULTICS or other advanced time sharing systems required. Applicants should have a Bachelor's degree or equivalent combination of education and experience. A77-3 (1/26).

Acad. Staff, Tech. Asst. to assist in Biology Dept. research involving isolation and physical characterization of key components of the blood coagulation systems by which components interact in fulfilling their physiological roles. Bachelors degree, a background in physical chemistry and some background in biochemistry required. Good laboratory skills also necessary. C76-14.

Sponsored Research Staff, Programmer, half time, for a Laboratory for Nuclear Science study to determine the feasibility of the use of a remote computer via Multics and the ARPA net as well as use of networks for mail teleconferencing, etc. Applicants should be experienced in teleconferencing message systems on networks, design of large data bases and the programming language used on IBM, CDC and Honeywell computers. The ability to write network protocals as well as in depth knowledge of Multics system and the ARPA network, and a Physics background also necessary. Half-time appointment. R77-13 (1/26).

Sponsored Research Staff, Staff Petrographer, in Earth and Planetary Sciences to examine and describe thin sections and crack sections of terrestrial rocks with standard and scanning electron microscopy; do compositional analysis of rocks using electron microprobe and x-ray diffraction equipment; prepare technical and petrographic reports. Coursework in petrology equivalent to MS level, experience in using and interpreting data from electron microprobe, scanning electron microscope and x-ray diffraction equipment required. R77-14 (1/26).

Sponsored Research Staff, in the Center for Cancer Research Immunology Laboratory. Will immunize, bleed and breed mice; purify cells and proteins; culture cells. Position also involves work with radioactive isotopes. Bachelor's degree or equivalent combination of education and experience required. R77-12 (1/26).

Sponsored Research Staff, in the Electronic Systems Laboratory to do research in the general area of large scale systems, decentralized communications and control and their applications. An interest in the application of systems theory to complex systems (transportation, communication, energy, manufacturing, economic systems) is necessary and related working experience is desirable. A Ph.D. with solid theoretical background in modern systems theory and/or operations research required. D76-239 (1/5), R77-17 (2/2).

Secretary IV-V to the Executive Officer, Office of the Provost to perform general secretarial duties which include report typing; maintenance of special project files; arranging meetings and appointments; processing of special funding requests. Candidates must be able to operate IBM Executive typewriter and to handle figures with accuracy. 40 hr./wk. B77-27 (1/26).

Secretary IV in the Sloan School of Management to a full and part time faculty member. Will coordinate activities of students involved in research; type technical manuscripts including tabular material; prepare course materials; arrange travel; handle some accounting related duties. Excellent typing, including technical typing, and machine transcription experience required. Applicants must have flexibility to handle inconsistent (and occasionally very heavy) workload. Command of English grammar is also necessary. B77-42 (2/2).

Secretary IV in the Information Processing Center to perform secretarial duties for Director of Computer Services, Academic and Research, and other professional staff: transcribe and type machine dictation; set up and maintain a filing system; schedule meetings and maintain calendar; coordinate public relations for educational courses, demonstrations and other events. Will work with computer based document preparation systems. Several years of secretarial experience, excellent general secretarial skills required. Competence in computational skills desirable. B77-23 (1/26).

Secretary IV to the Director of Alumni Records, Alumni Association to handle varied secretarial and general office duties: type correspondence, reports; answer phone inquiries; maintain files. Secretarial experience, good typing and organization skills required. Applicants must be able to set priorities and work independently. Ability to use MTST equipment (or willingness to learn) also necessary. B77-33 (1/26).

Secretary IV to Earth and Planetary Sciences geophysics faculty and research staff members to handle general secretarial duties including typing of technical manuscripts; scheduling appointments and travel. Excellent typing, ability to type technical material, English grammar skill, ability to proofread and perform light editing duties required. B77-28 (1/26).

Secretary IV to Sloan School faculty member working in finance and investment securities fields. Handle volume correspondence and manuscript typing, including some technical data. Arrange appointments and travel; do occasional library research. Position includes opportunity to learn securities field. Excellent typing, organization skills and telephone manner required. Familiarity with investment securities and options helpful. B77-30 (1/26).

Secretary IV to two Civil Engineering faculty members working in the field of water resources. Type technical materials; prepare course material; schedule meetings; monitor research accounts. Ability to assess priorities, to handle several projects simultaneously required. Excellent technical typing and general office skills necessary. B77-26 (1/26).

Secretary IV in the office of the Associate Dean, Sloan School of Management to handle varied secretarial duties related to School's teaching programs; arrange meetings and seminars; maintain Dean's appointment calender; answer phones; interact with School faculty and representatives of outside organizations. Excellent secretarial skills, including shorthand, secretarial experience and ability to organize required. College training preferred. B77-31 (1/26).

Secretary IV to 3 Biology faculty members; type correspondence and scientific manuscripts; arrange travel; answer student inquiries; handle purchasing procedures; maintain expense records; assist in budget preparation. Excellent typing, ability to organize and complete work with minimal supervision required. Familiarity with MIT accounting and purchasing procedures desirable. B76-498.

Secretary III-IV, part time in the Office of Personnel Relations Benefits Office will explain benefits program to employees (on telephone and in person); file; type correspondence and other material; maintain files; handle special projects as necessary. Good secretarial skills and ability to exercise tact and sensitivity in dealing with people required. 17½ hr./wk., (9am-12:30pm preferred) B77-39 (2/2).

Secretary III-IV, part-time, to two faculty members in the Center for Cancer Research to type correspondence, grants, manuscripts; maintain grant records and files; handle general office duties as required. Good typing and general office skills required. Familiarity with chemical and biological terminology and knowledge of MIT procedures helpful. 30 hrs./wk. B77-29 (1/26).

Secretary III-IV, in Mechanical Engineering. Will independently answer routine inquires; monitor accounts; arrange conferences and social meetings; prepare course materials, correspondence, reports including some technical material; maintain student and faculty groups. Secretarial school training or equivalent experience, shorthand and machine dictation skill required, as well as ability to type technical material. B77-15 (1/19); B77-21, B77-34 (1/26).

Senior Clerk IV in the Student Accounts Office to review contracts of students sponsored by various agencies and perform the billing collection, etc. To assist with the computerized accounting controls of a large receivables system. To maintain time and payroll records. Good knowledge of accounting procedures and of computerized operations required. B77-19 (1/26).

Sr. Clerk III in the Registrar's Office to assist in registration of students; verification of student status; use computer terminals to maintain records; keypunch; prepare transcripts; file. Excellent typing skill required. B77-41 (2/2).

Sr. Clerk III, in the Accounts Payable section, Comptrollers Accounting Office will process invoices; apply discounts; audit invoices; accumulate data on outstanding commitments, on dollar volume totals; prepare records for keytape entry. Ability to operate adding machine and to work with figures required. Candidates should have 1-2 years related experience. B77-24 (1/26).

Sr. Clerk III in the Medical Department MIT Health Plan Office will handle various clerical duties related to processing of claims: post claims on log; type related correspondence, forms; maintain claims records. Position involves extensive xeroxing and filing activity. Will also act as office receptionist and handle some Plan enrollment processes. Excellent typing, facility to handle details, judgement and sensitivity in dealing with people required. B77-22 (1/26).

Library General Assistant III in the Student Center Library will verify identity of individuals who enter library; provide directions to users; issue keys to special facilities; tabulate statistics; perform other clerical duties as necessary. Good judgement, facility with detailed work required. 3pm-11pm, Mon.-Fri. B77-36 (2/2).

Library General Assistant III in Rotch Library to handle circulation and reserve duties; maintain circulation records; identify books for reserve; collect and process reserve books; type related lists and charge cards. Will also perform other library procedures as necessary. Ability to handle details with accuracy as well as typing skill required. Position is for 10 months each year, running through mid-June, 1977, and mid-August through mid-June each year thereafter. Position also includes evening and weekend work. B77-37 (2/2).

Library General Assistant III, part-time, in the Rotch Library will handle circulation duties: charge, discharge, renew books; maintain books in stocks. Will also handle reserve duties: identify, collect, process books for reserves. Handle other library procedures as necessary. Accuracy with detail, typing skill required. Some library experience desirable. 25 hrs./wk. including some evening and weekend work. Position is through mid-June, 1977, and will resume (at 15 hrs./wk.) 9/77 through 5/78. B77-38 (2/2).

Library General Assistant IV, part-time, in the Libraries Catalogue Department will perform various duties to update computerized data base for *Serials and Journals in the MIT Libraries:* prepare code sheets, edit print outs; investigate and resolve conflicts in data. Will also participate in special projects as required. Related library, publishing or periodical oriented experience, aptitude for work involving computer applications, ability to organize and carry out detailed work required. College or business school training also necessary. 20 hr/wk. B77-40 (2/2).

Typist/Pasteup Artist IV in the Illustration Department of Graphic Arts Service will perpare camera-ready justified and tabular material on IBM Proportional Spacing Typewriter; size photos; pasteup copy and prepare finished mechanicals for offset reproduction (black/white, color). Excellent typing skills plus 2 years experience in pasteup preparation required. 40 hrs/wk B77-35 (1/26).

Asst. Computer Operator III in the Office of Administrative Computing Services to operate IBM Model 145 and associated peripheral equipment under DOS/VS Power. A good knowledge of DOS job control, multi programming experience and ability to follow standarized operating instructions required. One years related working experience also necessary. 4pm-Midnight shift. B77-25 (1/26).

Technician A, hourly, in Electrical Engineering and Computer Science. Duties involve construction, repair, trouble shooting, operation, calibration and preventive maintenance of department's highly technical and complicated digital electronic apparatus. Will also maintain digital labs wire wrap and electronic area. Graudation from a 2 year day technical school or equivalent and a minimum of two years applicable experience required. Knowledge in the field of digital electronics, digital circuits, equipment and theory desirable. H77-6 (2/2).

Hourly, Waitress/Waiter, part-time at Endicott House, Haven Street, Dedham, Mass. to serve meals; set up food for coffee breaks and clean up serving areas after coffee breaks; wash dishes. Will also be responsible for keeping conference rooms and pantry clean and orderly; polish silver. Previous experience as waiter/waitress required. Normal hours will be 6:30am to approximately 10:30am Monday through Saturday. The flexibility to occasionally serve lunch or dinner is desirable. Own transportation is necessary. H77-24 (2/2).

Bartender, hourly, part-time, in the Faculty Club to serve drinks; mix cocktails; charge checks; make change; clean glasses, bar, tables; set up and break down bars in private dining rooms; handle other related duties as necessary including closing bar. Experience in making drinks, ability to speak English and to work well with people required. 12-20 hrs./wk., as necessary (Mon.-Fri., evenings) H77-11 (1/26).

Asst. Animal Technician, hourly, in the Division of Laboratory Animal Medicine to perform routine animal care assignments such as cleaning cages and equipment; feeding and watering animals, perform other miscellaneous duties as necessary including lab housekeeping functions. Graduation from high school, or equivalent, knowledge of animal care required, as well as willingness to participate in formal job training programs. H77-2 (1/26).

Designer/Draftsperson (Mechnical), hourly, in the Energy Lab to support several project groups; turn sketches and rough designs into finished drawings and layouts; design standard and special experimental equipment for combustion, magnetohydrodynamics and gas turbine research projects. Will also do electrical layouts. A minimum of 5 years applicable experience, familiarity with machine shop, welding and construction practices and requirements necessary. H77-17 (1/26).

The following positions were still available at *Tech Talk* deadline. The date following each position is the date of the most recent *Tech Talk* issue in which the position was described.

ADMINISTRATIVE STAFF:
A76-44, Applications Programmer, Off. of Admin. Info. Syst. (12/1)
A76-46, District Officer, Resource Devel. (11/10)
A76-51, Applications Programmer, Off. of Admin. Info. Syst. (12/1)
A76-52, Applications Programmer, Off. of Admin. Info. Syst. (12/1)
A76-53, Systems Analyst, Off. of Admin. Info. Syst. (12/1)
A76-58, Asst. Dir., MIT Assoc. Prog. (1/12)
A76-59, Asst. Dir., MIT Assoc. Prog. (1/12)

BIWEEKLY:
B76-334, Sec. III, Sloan School (8/25)
B76-592, Sec. III-IV, Mechanical Eng. (11/24)
B76-609, Sec. IV, Sloan School (12/1)
B76-613, Sec. IV, Ctr. for Policy Alternatives (12/1)
B76-617, Sec. III-IV, Chemical Eng. (1/5)
B76-626, Sec. IV, Physical Plant (1/5)
B76-634, Sec. IV, Res. Lab. of Elec. (1/5)
B76-635, Tech. Asst. IV, Psychology (1/12)
B76-636, Sec. IV-V, Health Sci. & Tech. (1/12)
B76-637, Sec. IV, Medical Dept. (1/12)
B76-640, Sr. Clerk IV, MIT Press (1/12)
B76-644, Sr. Clerk III, Admissions Office (1/12)
B76-646, Sec. IV, Secondary Tech. Educ. Proj. (1/12)
B76-653, Sec. III, Student Financial Aid Off. (1/12)
B76-656, Sr. Clerk IV, Summer Sessions Off. (1/12)
B76-658, Sec. IV, Physics Dept. (1/12)
B76-659, Sec. IV, Nutrition & Food Sci. (1/12)
B76-661, Sr. Clerk III-IV, Off. of the Dean for Student Affairs (1/19)
B77-5, Sec. IV, Div. for Study & Res. in Educ. (1/19)
B77-6, Sec. IV, Athletics Dept. (1/19)
B77-9, Tech. Asst. IV, Architecture (1/19)
B77-11, Clerk III, Div. of Lab. Animal Medicine (1/26)
B77-16, Sec. III-IV, Resource Devel. (1/26)
B77-18, Acct. Clk./Sec. III, Student Accts. Office (1/26)

ACADEMIC STAFF:
C76-6, Microbiologist, Medical Dept. (4/21)
C76-19, Institute Archivist, Librarian, Libraries (10/27)

Trussell Takes Real Estate Post

Philip A. Trussell of Needham, a specialist in real estate development, has been appointed Investment Real Estate Officer at MIT, effective January 1.

Mr. Trussell will be responsible for directing the development and management of MIT's real estate holdings. Announcement of his appointment to the newly created position was made by Glenn P. Strehle, treasurer of the MIT Corporation.

A graduate of MIT with an SB degree in civil engineering in 1956, Mr. Trussell also received the BA degree from Bowdoin College in 1956 and the MS degree from Northeastern University in 1966.

Before coming to MIT, Mr. Trussell was a project director for Cabot, Cabot & Forbes Co. with responsibility for development of Northcross Mall, a shopping center in Austin, Texas, and, earlier, for several buildings in Technology Square in Cambridge.

Mr. Trussell

He has also been associated with a number of other construction and real estate development companies including Jackson & Moreland, Inc., Simpson Gumpertz & Heger, Inc., LeMessurier Associates, Inc., and Sprague Industries.

Mr. Trussell is a member of the Needham Town Meeting and of its capital budget subcommittee of the Town Finance Committee.

C76-23, Tech. Asst., Biology (1/12)

SPONS. RES. STAFF:
D75-48, Economist/Econometrician, Energy Lab. (1/25)
D75-161, Economist/Policy Analyst, Energy Lab. (9/15)
D76-17, Biochemist, Res. Lab. of Elec. (2/25)
D76-49, Plasma Physicist, National Magnet Lab. (4/14)
D76-71, postdoc. res., Physics, Lab. for Nuclear Sci. (5/5)
D76-108, Eng. Prog., Res. Lab. of Elec. (7/14)
D76-115, Immunologist, Clinical Res. Ctr. (7/14)
D76-121, Res. Engineer, Energy Lab. (7/28)
D76-123, Staff Biophysicist or Biochemist, National Magnet Lab. (7/28)
D76-126, Immunologist, Clinical Res. Ctr. (8/11)
D76-140, Operations & Instrumentation Manager, National Magnet Lab. (8/25)
D76-172, Chemist, Elec. Eng. (10/6)
D76-175, Scientific Prog., Earth & Planetary Sci. (10/6)
D76-180, postdoc. res., Physics, Lab. for Nuclear Sci. (10/13)
D76-182, Staff Engineer, Elec. Eng. & Computer Sci (10/13)
D76-182, Staff Engineer, Elec. Eng. & Computer Sci. (10/13)
D76-187, Postdoctoral Scientist, Ctr. for Space Res. (10/13)
D76-188, Postdoctoral Scientist, Ctr. for Space Res. (10/13)
D76-208, Technical Writer, Aero./Astro. Innovation Ctr. (11/13)
D76-210, Radiochemist, Nuclear Reactor Lab. (11/3)
D76-212, Fusion Reactor Res., National Magnet Lab. (11/10)
D76-220, Research Analyst, Ctr. for Policy Alternatives (11/24)
D76-224, Policy Analyst, Energy Lab. (1/5)
D76-225, Sci. Applications Prog., Lab. for Nuclear Sci. (1/5)
D76-231, Mngr. of Syst. Prog. & Devel., Lab. for Nuclear Sci. (1/19)
D76-232, High Energy Physics Res., Bates Linear Accelerator (1/5)
D76-233, High Energy Physics Res., Bates Linear Accelerator (1/5)
D76-235, Technical Officer, Tech. Adaptation Prog. (1/5)
D76-239, Systems Theory Res., Elec. Syst. Lab. (1/12)
D76-243, Metallurgist, National Magnet Lab. (1/12)
D76-244, Manager, Combustion Facility, Energy Lab. (1/12)
D76-245, Chemist/Biologist, Earth & Planetary Sci. (1/19)
R77-5, Energy Syst. Analyst, Energy Lab. (1/19)
R77-6, Staff Scientist, Arteriosclerosis Ctr. (1/19)
R77-9, Systems Analyst, Elec. Eng. (1/26)

EXEMPT:
E76-41, Principal Oper., Physical Plant (12/1)
E77-1, Food Serv. Super., Food Service (1/19)
E77-2, Super., Ctr. for Cancer Res. (1/26)
E77-3, Mech. Shop Super., Physical Plant (1/26)

HOURLY:
H76-130, Tech. C. Lab. for Comp. Sci. (1/12)
H76-134, Tech. B (Elec.), Lab. for Nuclear Sci. (1/19)

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

B76-660	Sec. III
D76-221	Spons. Res. Staff
H76-133	Mech. B
H77-3	Waitress
H77-10	Waitress
B76-630	Sec. IV
B76-647	Comp. Oper. III
B76-539	Clk. IV
H76-132	Sr. Tech.
D76-136	Spons. Res. Staff
D76-137	Spons. Res. Staff
B76-511	Asst. Comp. Oper.
A75-71	Admin. Staff
D76-179	Spons. Res. Staff
B77-32	Clk. III

The following positions are on HOLD pending final decision:

A76-45	Admin. Staff
D76-240	Spons. Res. Staff

Polymers Lecture Series Available on Videotape

The chemistry and physics of plastics and elastomers have become increasingly well understood in the last few years, but the mechanical behavior of polymer melts has not been easy to describe.

A vivid aid to understanding processing techniques of polymer melts is a series of 32 color videotape lectures and demonstrations on the "Mechanics of Polymer Processing" made by Professor J.R.A. Pearson of Imperial College, London, available for rent or purchase from the MIT Center for Advanced Engineering Study. There is an accompanying set of three study guides. The videotapes were recorded while Dr. Pearson was a visiting professor of chemical engineering at MIT.

Professor Pearson demonstrates in the videotapes that the most unusual properties of polymer melts are mechanical, and that these properties vary greatly—with material, with temperature, and with type of deformation.

Much of the first set of eight programs, entitled "Introduction," deals with typical plastics processing equipment and demonstrates the kinds of problems that are encountered. These programs, Dr. Pearson feels, are quite suitable as orientation material for technicians. Later programs on the "Fundamentals of Polymer Melt Mechanics" and "Applications to Polymer Processing," however, are more analytical in approach and require a background in mathematics.

The study guides, published by MIT, provide lecture notes, photographs, problems, and problem solutions. There is also a textbook, *Mechanics of Polymer Melt Processing*, originally published by Pergamon Press, but now published in a revised edition by MIT.

Further information on "Mechanics of Polymer Processing" and other MIT courses may be obtained by writing or calling Russell Seidel, Room 9-230, x3-3976.

Films on Women at Work Destroy Myths, Stereotypes

What's the best way to combat myths and stereotypes that say engineering is no work for a woman? And that neither is management?

Make a film called *Women's Work: Engineering* and one called *Women's Work: Management* in which women engineers and managers destroy these myths and stereotypes with the testimony of their own experience.

That's what's been done at MIT and both films are available for rent or purchase through the MIT Center for Advanced Engineering Study where the films were produced.

Women's Work: Engineering explores the experience of being an engineer and a woman by focusing on the professional and personal lives of several students and working engineers.

Women's Work: Management shows what being a woman manager means in terms of skills, responsibilities and satisfactions as reflected in the lives of six working women.

Both sound and color documentaries are available in either 16mm film, 3/4-inch videocassette or 1/2-inch videotape for purchase or rent from the MIT Center for Advanced Engineering Study, Department 8, Room 9-234, Cambridge, Mass., 02139.

The five-day rental cost for each film is $30. The purchase price is $245 for the management film and $295 for the engineering film. Rental fees can be applied to the purchase price.

The engineering film has an educator's guide and a student guide included with each purchase or rental. Additional copies are $1 each for the educator's guide and 50 cents each for the student guide. There is a film guide for *Women's Work: Management.*

A $30,000 grant from the Aetna Insurance Co. and a $5,000 grant from the MIT Sloan School of Management supported the production of the management film which relies on *cinema verite* to bring the viewer into the world of the principal characters as they go about their daily lives.

Major support for the engineering film came from the National Science Foundation, the MIT School of Engineering, IBM and Polaroid.

neering Study provides on-campus engineering education for mid-career engineers from industry, government and academic institutions. The center also provides off-campus continuing education opportunities to practicing engineers, industrial scientists and technical managers through videotaped self-study subjects. These videotapes and study-guides are described in the center's catalog.

For further information contact Russell Seidel, x3-7444.

NBC Negotiator For Olympics Is MIT Alumnus

Carl Lindemann, Jr., NBC vice president for sports who has been in the news this week as one of three NBC executives in Moscow negotiating with the Soviets for US television rights to the 1980 Olympic games, is an MIT alumnus.

A native of Hackensack, N.J., he entered MIT in 1940 as a member of the Class of 1944. He served in the US Army from 1942 to 1946, returned to the Institute and received his SB degree here in general engineering in 1947. He joined NBC in 1948 and has been a vice president since 1959.

A former member of the Corporation Visiting Committee on Student Affairs, he presently is a member of the National Sponsoring Committee working on behalf of a new Athletics Facility and Special Events Center at MIT, the chairman of which is Clint W. Murchison, Jr., owner of the Dallas Cowboys professional football team and also a member of the Class of 1944. The athletics facility, part of MIT's five-year $225 million Leadership Campaign, is expected to cost $7.2 million.

News reports from Moscow Tuesday said NBC had won the Olympic rights, although Soviet officials earlier denied it. Those in Moscow competing against Mr. Lindemann and his association included ABC sports vice president Roone Arledge.

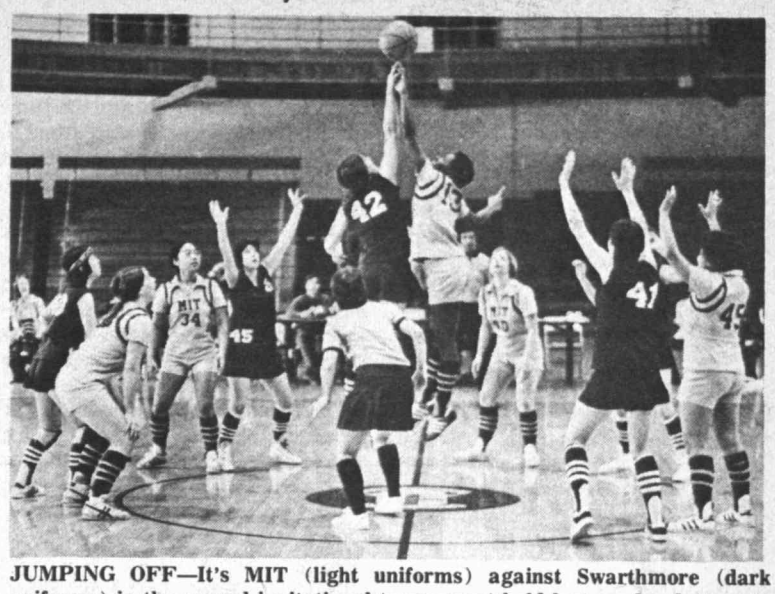
Reporting Advisory

Certain former and retired military officers and former civilian employees of the Department of Defense (DOD) now employed by defense contractors are required to file a report of DOD and defense-related employment, under provisions of Public Law 91-121. Reports must be filed by February 15.

No former or present employee is required to file a report for any year prior to July 1, 1972. Retired or former military officers and former civilian officers and employees of DOD are not required to file a report of employment with a defense contractor if their employment began three years or more after termination of DOD employment.

Institute employees who have questions about their DOD employment status should call Susan Lester, Office of Personnel Services, x3-1593. Forms are available in E19-239.

This Week in Sports



JUMPING OFF—It's MIT (light uniforms) against Swarthmore (dark uniforms) in the annual invitational tournament held last weekend (Jan. 28 and 29) at Brown University in Providence. MIT players are Sheila Luster (No. 13) jumping, Lisa Jablonski (No. 14), Sylvia Barrett (No. 34), Susan Stulz (No. 40) and Delonia Watson (No. 45). At far left, wearing No. 10 for Swarthmore, is Cori Mar, daughter of MIT Professor James Mar of aeronautics and astronautics.

—Photo by Caren Penso

Basketball Team Upsets Bowdoin; Suffers 2 Defeats

By JILL A. GILPATRIC
Director, Sports Information

The MIT men's basketball (4-8) team brought in a 59-55 upset victory over Bowdoin College on Saturday, Jan. 22 at MIT. Fine performances were turned in by senior **John Doyle** (St. Petersburg, Fla.) with 14 points, junior **Richard Van Etten** (Brandon, Fla.) who also had 14 points and by freshman center **Ray Nagems** (San Diego, Cal.) who scored 13 points.

The Tech hoopmen met Tufts Monday night, Jan. 24, and were defeated 82-69. High scorers for MIT were Ray Nagem with 22 points, senior **John Cavolowsky** (Dedham, Mass.) 16 points, senior Captain **Pete Maimonis** (Brookline, Mass.) with 14 points and Rich Van Etten who scored 11 points.

The MIT team travelled to Coast Guard this past weekend and were beaten 64-50 by the stronger Cadet team.

Tech meets Amherst at home tonight at 8:15pm.

Women's Basketball

The MIT women's basketball team is really feeling the loss to injury of sophomore center **Diane Ozelius** (Plymouth Mass.). Diane's recent injury has meant that adjustments have had to be made in Tech's starting lineup. MIT's problems were particularly apparent when they participated in the Brown Tournament this past weekend. They lost all four of their games in the two-day tournament with scores of 62-32 against the U. of Chicago, 68-29 against the U. of Penn., 31-23 against Swarthmore and in the final game against host Brown they were defeated 61-18. Senior **Sheila Luster** (Camp Springs, Md.), taking over the center position, played well under the circumstances as did freshman **Sue Stulz** (West Muscatine, Iowa). The eventual winner of the Brown Tournament was the U. of Chicago.

MIT's next match is against Boston University at MIT on Friday, Feb. 4.

Indoor Track

The MIT indoor track (6-1) team has been extremely active this past week, competing in three meets. On Saturday, Jan. 22, the Tech team accumulated an incredible 92½ points against Lowell University's 37 and Tufts 10½ at the meet held at MIT. Tech ran away with the meet, winning five of the six running events and the mile relay and setting two new MIT records in the field events. Freshman **Kwaku Temeng** (Tema, Ghana) set a new MIT freshman long jump record of 22'1½", topping the old record by an impressive 4½". Junior **Reid Von Borstel** (Edmonton, Alberta) also set a new MIT varsity high jump record of 6'7¼", breaking his previous record of 6'6½".

In mid-week action, Tech traveled to Waterville, Maine, to meet Colby College. Colby proved no match for the Engineers as Tech piled up 78 points to the Mules' 35. Senior **Rich Okine** (Aflao, Ghana) was Tech's only double winner with victories in the 60 yard dash and the 60 yard hurdles.

On Saturday, Jan. 29, MIT's winning streak was broken by Bowdoin College in an exceptionally close 59-54 match. The meet went down to the anchormen of the mile relay, the final event on the schedule. The Engineers had drawn even in the meet when senior Co-Captain **Frank Richardson** (Sac City, Iowa) won the two-mile in a Bowdoin Cage record of 9:19. MIT was in the lead throughout the first three legs of the mile relay, but was overhauled by Bowdoin All-American Bill Strang. The five points to the winning relay team gave Bowdoin the 59-54 decision.

MIT's next competition is the annual Greater Boston Championships at Tufts University on Friday and Saturday, Feb. 4 & 5.

Women's Fencing

The Tech women's fencing (5-3) team brought in a big win over Concord/Carlisle on Wednesday, Jan. 19, with a score of 11-5. This is the first time that the MIT women have beaten this perenially strong team. The women increased their winning streak to three with their victory over Dartmouth on Saturday, Jan. 22. The match was tied 8-8 in number of bouts won so the match was decided by the lesser number of touches, with MIT beating Dartmouth 59-62. Good performances were given by senior Captain **Judith Austin** (Austin, Tex.) who took her bout 15-4 as did sophomore **Michelle Prettyman** (Richmond, Va.) 14-9. The team's next match is against URI at MIT tonight.

Wrestling

MIT's wrestling team is having an "off" season but sophomore **Norm Hairston** (Gary, Ind.) is having a great year. The 118 pounder has posted a perfect 9-0 mark in his weight class, including a Greater Boston Championship title. The only loss of the year for Norm was when he went up a weight class, 126 lbs., and was defeated by a Mass. Maritime opponent.

Women's Sports Brochure Issued

A new foldout poster/brochure, "Athletics for Women at MIT," has just been published by the Athletic Department and is being distributed to prospective students by the Admissions Office and the Educational Council.

Copies of the brochure are available in the Information Center, Rm 7-111, or in bulk from the Director of Women's Athletics, x3-4920.

Florida Festival to Feature MIT Engineering Forefronts

ORLANDO, Fla.—The underwater camera search for the Loch Ness monster, bionic replacements for human limbs, and future engineering plans for Walt Disney World will be described starting on Saturday, Feb. 19, when some 200 MIT alumni and guests gather at Orlando Hyatt House near Disney World for their second MIT Florida Festival.

Speakers will be strobe light pioneer Dr. Harold E. (Doc) Edgerton who helped lead the Loch Ness expeditions, biomedical engineer Dr. Robert W. Mann who helped develop the electronic elbow-and-forearm prosthesis called the "Boston Arm," and Harvey C. (Tom) Jones, MIT '50, director of the Reedy Creek Utilities Co. that serves Disney World. Speaker at the festival banquet Saturday evening will be MIT President Jerome B. Wiesner, science advisor to the late President John F. Kennedy and the late President Lyndon B. Johnson.

Professor Edgerton, who pioneered development of the electronic flash known as stroboscopic light and its application to both high speed and underwater photography, will speak on strobe lights, cameras and sonar for underwater research. He will describe the use of such systems at Loch Ness in Scotland last summer and the summer before in a continuing effort to make underwater photographs of the fabled Loch Ness monster. A frequent collaborator with underwater scientist Jacques-Yves Cousteau, Dr. Edgerton is Institute Professor Emeritus at MIT and Professor of Electrical Measurements Emeritus. He will show slides and movies of underwater photography and sonar.

The "Boston Arm" developed by Professor Mann and his associates can be operated by an above-elbow amputee simply by thinking. The arm is activated by electrical signals generated by the amputee by flexing residual muscles in the stump. Dr. Mann, MIT's Whitaker Professor of Biomedical Engineering, also has been a leader in development of electronic-based aids that help the blind move about, work and learn and other game-like electronic aids that assist in the training and rehabilitation of brain-injured children. His lecture, too, will include movies.

Mr. Jones, of Lake Buena Vista, is a member of the Director's Operating Committee at Walt Disney World and, in collaboration with the Disney design organization, WED Enterprises, is developing energy systems for the Experimental Prototype Community of Tomorrow. A civil engineer, Mr. Jones formerly was Supervisor of the Harbor of New York and New York District Engineer for the Department of the Army before joining Disney World in 1969. For Festival attendees who remain over until Sunday, Feb. 20, Mr. Jones will lead a backstage tour of Disney World with special emphasis on engineering and technology.

Organizers of the Florida Festival include Peter C. Hand, '48, and George W. (Bill) McClary, '51, both of Winter Park; Douglass E. Root, Sr., '44, of Orlando; William B. Towles, '50, of Windermere; Barrett L. Taft, '40, of Martland; E. Newton Roberts, '26, Fernandina Beach; James A. Hooper, '50, Merritt Island; Parke D. Appel, '22, Venice; John Chamberlain, '44, Lake Park; Russell L. Law, '48, Coral Gables; and Henry D. Humphreys, '34, and Donald E. Robison, '46, both of St. Petersburg.

BY TRUCKFUL AND SCOOPFUL the snow from MIT's walks, roads and parking lots is slowly disappearing—thanks to the prodigious efforts of MIT's groundsmen, truck drivers, gardeners, movers, mechanics and their supervisors. Altogether some 50 people have been involved in the effort, using shovels, snow blowers and sidewalk clearers in addition to the bigger equipment. "The rain two weeks ago did us in," said Larry Pickard, manager of grounds. "We were making good progress against the snow when suddenly we had to stop and get the storm drains open for the rain." With more manageable snowfalls recently, the crew has been able to grind up some of the big piles of snow and carry it off to a HUGE pile of snow at a lot on Albany Street. Oscar J. Manuppelli, above, assistant foreman in Physical Plant, supervised dumping. Physical Plant records for the winter so far show 12 storms and a total accumulation of 46 inches of snow. —Photo by Calvin Campbell

Brandon to Give Kurtz Lecture

Dr. David G. Brandon of the Department of Materials Engineering at Technion-Israel Institute of Technology in Haifa, Israel, will deliver the Jacob Kurtz Memorial Lecture in Materials on Wednesday, Feb. 9, in Rm 9-150 at 4pm (coffee will be served at 3:30pm).

Professor Brandon's subject is "Metallurgical Research in Small Countries."

The lecture is one of a series provided for by the Jacob Kurtz Memorial Fund which was established by the Kurtz family to promote interchanges between MIT and Technion in the field of materials. The program includes visiting lectureships at each university and an exchange of young scientists.

Dr. Morris Cohen, Institute Professor and professor of materials science and engineering, and Dr. Cyril S. Smith, Institute Professor, Emeritus, and professor, emeritus, of metallurgy and of the history of technology and science, have given lectures at Technion under the program.

Dr. Brandon's lecture will be the first in the exchange to be given at MIT.

Jacob Kurtz, founder and chairman of Kulite Tungsten Corp. and Kulite Semiconductor Products of Ridgefield, N.J., was a pioneer metallurgist in the development of refractory metals. He was graduated from Columbia School of Engineering with a ChE degree in 1919. His strong relationship with MIT developed when he attended several special summer programs at the Institute in physical metallurgy.

Mr. Kurtz held more than 30 patents involving various aspects of metallurgy.

Professor Brandon, who holds degrees from the University of Cambridge in his native England, is known internationally for his research on the quantitative analysis of microstructures and their relationships to the mechanical properties of materials.

Dr. Brandon

He will discuss the research and development options available to developing countries.

The Kurtz program is administered by Professors Walter S. Owen and Morris Cohen of MIT and Professor B.Z. Weiss of Technion.

MIT Seeks $1.5 Million

The Division of Laboratory Animal Medicine of the Medical Department at MIT has resubmitted its application to the National Cancer Institute to provide $1.5 million of the $2.4 million needed for renovations and alterations of facilities where professional care and supervision are provided for animals used in cancer-related biomedical research at MIT. MIT would provide the balance from other sources.

The division, headed by Dr. James G. Fox, associate professor of laboratory animal medicine, supervises and cares for all animals used in research at MIT.

The proposed plan involves renovation of facilities located in MIT's Uncas A. Whitaker Bldg. (Bldg. 56) and in the Horace Sayford Ford Bldg. (Bldg. E18). NCI has taken the request under advisement.

Susanna Fein Is Scrabble Champ

Such words as "roque," "groaned," and "runic" helped Susanna Fein become Scrabble champion at MIT.

Ms. Fein of Waltham, an editorial secretary in the publications section of the Department of Nutrition and Food Science, defeated John Feldman, a junior in mathematics from Poughkeepsie, NY, in the finals of the Institute-wide Scrabble bee on Thursday, January 27. Placing third was Len Keshishian of Watertown, an observer in the Department of Meteorology; placing fourth, Don Huang, a graduate student in materials science and engineering from Towson, Maryland.

Fifty-six people spent a total of nearly 170 hours during IAP playing Scrabble in the bee organized by Jeff MacGillivray, a graduate student in physics from Bethesda, Md.

MIT-WHOI Scientists Seek Hot Springs

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it is warmed by contact with this molten material. Since hot water is lighter than cold water, it rises as a hot spring.

The expedition will attempt to locate the hot springs and take water samples for on-site and later chemical testing at MIT. Rock and sediment samples also will be obtained to help explain formation of deep sea sediments rich in metals such as manganese and iron.

The dive area, almost two miles deep, is located 200 miles northeast of the Galapagos Islands which are 500 miles west of Ecuador.

"Last summer, we got definite evidence of hydrothermal activity in this region," Dr. Edmond said.

The scientists plan to make 15 to 20 dives in the WHOI research submarine Alvin between February 8 and March 25.

A pilot and two scientists will be housed in a six-foot pressure sphere at the front of Alvin during the dives. Each of the dives can last up to eight hours. A claw outside Alvin will gather the rock and sediment samples. Water samples will be pumped into containers through a teflon tube attached to the end of the claw.

"We're working at the limit of the available technology. We know the bottom topography of the area to within a few meters," Dr. Edmond said. "We should be able to navigate as well in Alvin as you could drive around in Cambridge," he said.

"We also will be taking two miles of color film provided by the National Geographic Society which is interested in this project," Dr. Edmond said.

The research is being funded by the International Decade of Ocean Exploration, a program of the National Science Foundation. Project coordinator is Dr. John B. Corliss, assistant professor of oceanography at Oregon State University.

In addition to Drs. Corliss, Edmond, Atwater, von Herzen and Ballard, other divers include Drs. Jack Dymond and Louis Gordon of Oregon State, Dr. David Williams of the US Geological Surveys and Dr. Tjeerd H. van Andel of Stanford University.

Three pilots from WHOI will navigate Alvin during the dives.

Three from MIT Speak in Series

Three MIT professors — Victor Weisskopf, Philip Morrison and Seymour Papert—will participate in a lecture series sponsored jointly by MIT, Harvard University and the Harvard-Smithsonian Center for Astrophysics, which is being offered spring semester at Harvard's Science Center.

The series, titled "Views from the Edge," will be given Monday evenings at 8pm in lecture hall D at the Harvard Science Center, 1 Oxford St., Cambridge. All lectures are open to the public free of charge. The frontiers of the physical universe will be the overall theme of the talks.

The first MIT professor to participate will be Victor Weisskopf, Institute Professor and professor of physics, emeritus. He will speak on Monday, Feb. 7, on "What is an Elementary Particle."

On Feb. 21 Philip Morrison, Institute Professor and professor of physics, will address the topic, "First and Last Things: Issues in Cosmology." Seymour Papert, Cecil and Ida Green Professor of Education, professor of applied mathematics and director of the LOGO Group, a division of the Artificial Intelligence Laboratory, will give a lecture titled "Can Computers Think?" on Apr. 11.

O'Neill to Give Lecture Series

"Space Flight via Maxwell's Equations," a series of four lectures, will be delivered starting Thursday, Feb. 3, by Professor Gerard K. O'Neill, the Jerome Clarke Hunsaker Professor for the 1976-77 academic year. All of the lectures will be in the Marlar Lounge, Rm. 37-252, and will begin at 3pm.

The titles and dates of the lectures are:

Feb. 3—Constraint without Contact; Magnetic Lift; Feb. 24, Flameless Rocketry; Acceleration of Reaction Mass; April 11, System Optimization and the Bootstrap Process; May 5, Research Directions; Where to, and How.

Black History Month Program To Present Discussion of *Roots*

(Continued from page 1)

for the Study of Negro Life and History), traditionally celebrated during the week of Lincoln's Birthday.

"The purpose of Black History Month is to raise the consciousness of all Americans and make them aware of the rich cultural history of the Afro American people," said Rosa Hunt, administrative assistant in the Office of the Special Assistant to the President and Chancellor for Women and Work, and coordinator of the MIT program.

"The Minority Interest Group extends a warm welcome to all members of the MIT community," she continued. "We hope that you will join us in becoming more familiar with the cultural history of Black America, a topic of importance in all segments of today's society."

As part of Black History Month, the Minority Interest Group also plans to sponsor the showing of two films, "Black Orpheus," and "Behind the Mask," part of a series to benefit the Roxbury Action Program. The films will be shown on Saturday, Feb. 5, at 7:30pm at the William Trotter School, Humbolt Ave., Roxbury. Donations are $1.50 for adults and $1.00 for children.

Future noontime programs at MIT include a slide and lecture presentation by Robert Hayden, Community Fellow, entitled "Blacks in Science and Technology," and the showing of a feature film.

Seminar to Discuss Job Creation

William Ronco, PhD candidate in the Department of Urban Studies and Planning, has a suggestion for students worried about getting jobs: create your own.

Beacon Press will be publishing Mr. Ronco's book, *Jobs: How People Create Their Own*, this spring. Mr. Ronco is teaching an undergraduate seminar this term on "Work," which will review many of the issues discussed in the book.

Jobs details a variety of self-employment arrangements and analyzes why such arrangements are personally or socially meaningful. Mr. Ronco has built the book around a series of interview-profiles of people who have created their own jobs.

His favorite interviews include a basket weaver from Nantucket, an encyclopedia salesman-turned-landscape painter and a married couple who left their jobs as elementary school teachers to pursue a "career in quilting."

"I'm most impressed by the extreme love of some for work, the extreme money orientation of others and the intense dedication of all of them to make their work personally satisfying," Mr. Ronco said.

The author's seminar on "Work" is being co-sponsored by the Division for Study and Research in Education and the Department of Urban Studies and Planning. It will familiarize students with research on alternative work styles and organizations. In addition, it will engage students in determining their own career goals and routes to meeting them.