Massachusetts Institute of Technology



April 24, 1974 Volume 18 Number 40

Giant Radio Antennas Map Earth's True Measurements

An MIT scientist reported this week on how giant radio antennas thousands of miles apart and radio sources billions of light years from earth are being used to make ever more accurate measurements of the earth's surface.

In a paper given (Monday, April 22) at the joint meeting of the American Physical Society and the Optical Society of America in Washington, D.C., Charles C. Counselman, MIT assistant professor of planetary science described how his colleagues at MIT and elsewhere have used socalled very-long-baseline interferometry (VLBI) to make precision measurements of the width of America, to detect the slight straining of the earth caused by the pull of the sun and moon, and even to track the movements of the Lunar Rovers on Apollo moon

VLBI geodesy, developed by scientists and students at MIT and Haystack Observatory only in the last five years, utilizes the natural radio waves generated by quasars in outer space. Two or more giant (Continued on page 8)

Announced

A radioastronomer at MIT outlined advances he and his colleagues have made in understanding the characteristics of water vapor masers in galaxies millions of light years from earth.

MIT Professor of Physics Bernard F. Burke addressed an audience at the joint meeting of the American Physical Society and the Optical Society of America Monday, April 22, in Washington, D.C. Professor Burke described how he and his colleagues at MIT

and the Naval Research Laboratory, at Greenbank, West Virginia, used the technique of very-longbaseline interferometry (VLBI) to study clouds of vapor in space which are sources of strong radio emissions characteristic of water molecules. These clouds are called masers because they amplify the cosmic radiation at a single frequency, using the same mechanism discovered in the laboratory and used to produce laser beams.

(Continued on page 8)

Secretaries' Week Noted

In commemoration of National Secretaries' Week, members of the Women's Forum outlined several accomplishments in improving the outlook for women working at MIT and listed some areas where more work is needed.

Among accomplishments the women listed were: job posting, resulting in increased employment mobility; improved tuition assistance benefits; better career development paths for promotion within the Institute, and development and videotaping of the consciousness-raising skits.

They also cited establishment of the women's advisory committee to aid Mary Rowe, special assistant to the President and Chancellor for Women and Work; appointment of Maureen and Adam Yagodka, career development specialists, who share one position representing a new precedent in professional employment policies, and organization of AWARE (Association to Work for Action Reform in Employment).

The women reported that active planning is underway for pro-

grams in employee career counseling, improved benefits, and job enrichment and promotion.

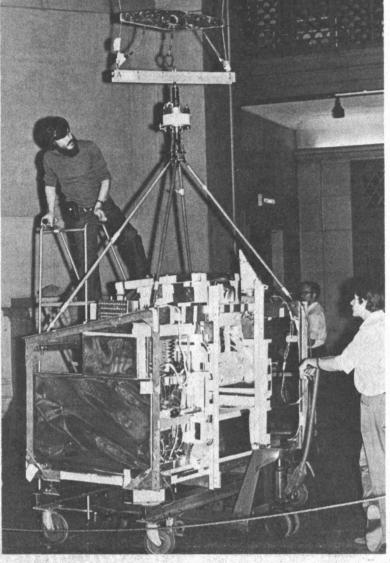
A longer range goal, the group said, is professionalization of biweekly employees to improve or equalize salaries and benefits and reduce the prestige gap between professional and bi-weekly employees.

Arts Council Seeks Proposals

Friday, May 3, is the deadline for submission of proposals to the Council for the Arts for funding summer and early fall art projects.

Proposals should include a written description of the project and an itemized budget. Proposals for matching funds are encouraged. Send proposals to Rm. 20D-220, Ext. 3-4004.

The Program Committee of the Council will consider funding requests at its next meeting, June 4.



A 1500-pound x-ray telescope is prepared for hoisting in the Building 7 Lobby for tests of its stabilization and pointing accuracies prior to a launch next month in Texas. Dr. George R. Ricker, Jr., atop the apparatus, lines up the fittings of the telescope and rigging with the help of Dr. Anton Scheepmaker, background, and Jerry B. Roberts, and John P. Doty, a graduate student. The telescope was designed and built under the direction of Dr. Ricker, Dr. Scheepmaker, and Professor Walter H. G. Lewin, who took this picture.

Six from MIT Elected to Engineering Academy

Three MIT professors, two professors emeriti and lecturer are among 78 American engineers elected recently to the National Academy of Engineering, the nation's most prestigious professional organization for engineers.

The six are Professors Mildred S. Dresselhaus, Donald R. F. Harleman, Hoyt Clarke Hottel (Emeritus), Ascher H. Shapiro, Carl Richard Soderberg (Emeritus) and Richard H. Battin of the Charles Stark Draper Laboratory and a lecturer in the MIT Department of Aeronautics and

Astronautics.

A third emeritus professor-Professor Walter G. Whitman, retired professor of chemical engineering-also was elected, but died at his home in Scottsdale, Ariz., a few days after the elections were announced.

Of the remaining 71 members elected this year, 13 are MIT alumni, which means that a quarter of all those elected this year are MIT faculty or staff members or alumni. Of the total 506 members who now make up the Academy, 34 are MIT faculty or

(Continued on page 3)

Whitaker to Endow New Chair

The Uncas A. Whitaker Professorship in Biomedical Engineering has been established at MIT and Dr. Robert W. Mann, MIT professor of engineering and a widely known pioneer in this field, has been appointed the first holder of the chair for a five-year period.

Howard W. Johnson, chairman of the MIT Corporation, and Dr. Jerome B. Wiesner, MIT president, said establishment of the chair was made possible by a grant from Uncas A. Whitaker, a 1923 graduate of MIT in mechanical engineering, a Life Member of the Corporation, and founder and now chairman of the board of AMP, Inc. (formerly Aircraft-Marine Products, Inc.) of Harrisburg, Penn.

Professor Walter A. Rosenblith, MIT provost, in announcing the appointment of Professor Mann as the first holder of the Whitaker Chair, said establishment of the professorship and the support it will provide for Professor Mann draws attention to the growing concerns at MIT with programs related to teaching and research in the developing areas of biomedical engineering.

Mr. Whitaker has had a long interest in strengthening education and research in the life sciences and biomedical engineering at MIT. His interest led to a major

(Continued on page 12)



Reactor Safety Likened to Nest of Chinese Boxes Accident Processes Being Investigated

The major debate over whether nuclear power plants should be built is actually a series of controversies nestled one within the other, like a set of Chinese boxes.

The center of the nuclear plant controversy is whether they are safe. The center of the safety controversy is whether the Emergency Core Cooling System will cool the hot, radioactive nuclear core in the unlikely event of an accident. And finally, the center of the emergency core cooling controversy is whether nuclear engineers have an accurate understanding of heat transfer

between the nuclear fuel rods and cooling water during a power plant accident.

Two MIT engineers are doing research within this center "Chinese box." Professors Peter Griffith and Warren M. Rohsenow of MIT's Department of Mechanical Engineering are doing experiments to determine the nature of heat transfer for conditions likely to occur during a nuclear accident. They are measuring the "heat transfer coefficients" of the nuclear reactor core-how well heat naturally flows from metal to coolant during the progress of an accident.

The "maximum credible accident" the engineers postulate in conducting their studies consists of a clean break in one of the massive pipes that carries pressurized water into the nuclear core. Experts postulate that such a large break would cause rapid depressurization in the reactor core-called a blowdown-and a rapid rise in core temperature as cooling water escapes. Like water splashed on a hot stove, core water after a blowdown would begin to sizzle slowly into steam without extracting much heat from the fuel rods. Also, steam which forms in the inner chamber would become too dry to cool the hot fuel elements

The researchers perform two basic kinds of experiments on heat transfer. Using what they term a "transient loop," a circuit of pipe through which freon is pumped, they simulate the reversal of coolant flow which would occur in a blowdown. Using the freon as an analog of cooling water they can measure the time and flow conditions at which the heat transfer deteriorates.

Another apparatus consists of a long tube through which the engineers pump a steady stream of nitrogen. At room temperatures nitrogen displays behavior

(Continued on page 12)

Dramashop's 'Pygmalion' Gurney Play Draws London Raves Opens in Little Theatre

By SALLY M. HAMILTON Staff Writer

"Pygmalion," George Bernard Shaw's highbrow spoof of the English, will open Thursday evening, April 25 in Kresge's Little Theatre for five performances.

The MIT Dramashop production, directed by Professor Joseph D. Everingham, will also be presented Friday and Saturday, April 26 and 27 and Friday and Saturday, May 3 and 4. All performances will be in the Little Theatre, at 8:30pm.

Set in Cockney gutters and upper crust drawing rooms of Edwardian London, "Pygmalion" is Shaw's best known work. In the 1950's, the play was adapted into the popular musical, "My Fair Lady.

The Dramashop production will feature period sets styled after the work of prominent designers and architects. Franco Colavecchia, designer and consultant at the Loeb Drama Center has created stage sets based on the work of Charles Rennie MacKintosh, the Scottish architect and interior designer and Victor Horta, the Spanish architect.

In conjunction with Colavecchia's sets, Joseph Schuyler, a photographer, has created a kaleidoscopic slide show spliced with music to further capture the mood of turn-of-the-century Lon-

Costumes are by Patricia Hagan, a costume designer and

Another well-known Shaw play, "Androcles and the Lion," will be presented in May by the MIT Community Players. Performances will be in Kresge's Little Theatre, 8:30pm, Thursday, Friday, Saturday, May 16-18 and Thursday, Friday, Saturday, May 23-25. Tickets are \$2.50 and will be on sale in the Building 10 Lobby and at the

technical assistant in design in the Department of Humanities.

Leads for the production are James H. Eckhouse, a sophomore, from Glencoe, Ill. as Henry Higgins and Eileen Schuyler, of Somerville, a frequent member of Dramashop casts, as Eliza Doo-

For more detailed information on UROP

opportunities listed, MIT undergraduates

should call or visit the Undergraduate Re-

search Opportunities Program Office,

Room 20B-141, Ext. 3-5049 or 3-4849. Under-

graduates are also urged to check with the

UROP bulletin board in the main corridor

As its class gift to MIT, the Class of 1970

created a fund to support research proj-

ects undertaken by undergraduates. Un-

dergraduates are encouraged to submit

proposals that demonstrate substantial

student initiative and address a socially

significant real-life problem through sci-

ence and technology and/or the humani-

ties, using these disciplines as tools for ex-

ploring a question which relates to the

human condition. Basic modes and poli-

cies of UROP apply concerning credits,

material and supplies support and super-

vision. The Board tends to discourage re-

quests for personal support, but will con-

sider summer materials and supplies re-

quests. To be considered for the next round

of funding, proposals should be submitted

to the UROP Office, Room 20B-141. Pro-

posals may come from individuals or

groups of students. Contact UROP, Ext.

3-5049, for more detailed information.

of the Institute.

by the Class of 1970

Research Grants Sponsored

Stephen C. Nuding, of Princeton Junction, N.J., plays Henry Higgins' friend, Pickering. Nuding, who will graduate in June with a degree in Biology and Nutrition, has frequently played lead parts in MIT Musical Theatre Guild productions as well as in Wellesley College theatricals.

Tickets are \$2.50 at the door. For reservations call Ext. 3-4720.



Members of the Commonplace Theater masked troupe.

Accidents occur naturallyevery day-but "Accident Routines," a play of masks, will happen in the Building 7 Lobby today, Wednesday, April 24 at noon.

Created and performed by members of the Commonplace Theater Company and students from MIT and Tufts, "Accidents" will be repeated at 4:45pm, Thursday, April 25 and Friday, April 26 at noon in Lobby 7. The performances are sponsored by the MIT Dance Workshop and the Lobby 7 Committee.

"Accident Routines" was created at MIT during an IAP course in masks and movement taught by Deborah Fortson of the Commonplace Theater.

Boston

for the Blind **New UROP Listings**

A project opportunity has been suggested in which a student would design a mechanism which will enable a blind and handicapped individual to manipulate the controls of a casette tape recorder. The recorder is used to receive instruction in a high school equivalency program for individuals who wish to acquire their diplomas. Interested students should call or visit the UROP office for further details, Room 20B-141, Ext. 3-5049.

Harvard Medical School Boston A laboratory at Harvard Medical School is involved in the development of an innovative electron probe microanalyzer capable of localizing any element heavier than boron with a spatial resolution of less than one micron and sensitivity of less than 10-15 grams. Thus, the instrument is capable of chemical localization and quantification on a subcellular scale, as well as complete elemental analysis of liquid samples of 10-10 liters or less. Specific potential UROP projects include: 1) Design and construction of a controlled temperature refrigerated stage for the electron proble. 2) Design and construction of an electron beam evaporator to evaporate Beryllium to get less than 5000 A° Be foil. 3) Design and construction of an automated system for driving the electron probe spectrometers (i.e. construction of mechanical adaptation system for the step motors, design of interface of probe and HP2100 A computer). 4) Experimental and theoretical study of the effect of beam bombardment on the biological sample analyzed with the electron probe. 5) Experimental study of the freezing rate of a simple model and of biological material in different quenching medium.

By PATRICIA M. MARONI Staff Writer

Albert R. Gurney, Jr., Professor of Literature at MIT, has written a play that has been hailed by the London Times as "the best mainstream play to come out of America since the debut of Arthur

"Its author has the capacity to discover arresting dramatic patterns in commonplace experiences without telling any lies," says Times drama critic Irving Wardle.

The two-act satire called "Children" opened April 8 for a sixweek run at London's venerable Mermaid Theatre. The "cleverly constructed" family drama, which Wardle's colleagues are comparing to the writings of O'Neill, Chekhov and Pirandello, is expected to continue its run at the west end London theatre after May 11 and then in a regional US company. It is Gurney's second full length play to be produced professionally and his first to be produced in London.

Gurney, who has been writing one-act plays since 1956, premiered his first full-length drama, Scenes from American Life, at the Forum Theater in New York's Lincoln Center in 1971. London audiences at the King's Head Theatre



have previously seen Gurney's work in one-act productions of The Love Course (1970), The Problem (1969) and The Golden Fleece (1969), which was televised on the National Education Television Network and published in "The Best Plays of 1969."

In the MIT professor's current

work, Constance Cummings plays the widowed mother of a middle-Massachusetts family caught between a changing culture and the greedy self-concern of its own thirtyish adolescents, played by Tony Robins, Sarah Marshall and Bob Sherman. The Alan Strachan production is based on the story "Goodbye, My Brother" by John Cheever.

A 1970-71 recipient of the Drama Desk Award, Professor Gurney is a graduate of the Yale School of Drama. He joined MIT in 1960 as an instructor in Humanities after receiving the BA from Williams College in 1952 and the MFA from Yale in 1958.

His works prior to "Children" have been produced by the Theater Company of Boston, the Studio Arena Theater of Buffalo. and the Boston University Playwright Workshop at Tanglewood. In 1972 he was commissioned by Columbia Pictures to write the screenplay of Edith Wharton's novel The House of Mirth. Recently he completed his first novel, The Gospel According to Joe, which will be published by Harper & Row this week.

"Given Mr. Gurney's nationality," concludes the Times reviewer, "his are rare and precious

Precede White Retirement Photo Shows

Minor White who will retire in June, is winding up 10 years at MIT as first head of the Creative Photography Laboratory with a trio of photography exhibitionsall to open here in May.

Photographs selected for two of the upcoming exhibitions, as with many previous shows, will reflect Professor White's interest in the "works in progress" of young photographers and photography stu-

"Interface," an exhibition of photographs of Rome taken recently by a group of 10 MIT students led by Minor White and Myron Guran, a lecturer in the Architecture Department will be on exhibit in the Building 7 Lobby, May 3 through May 17.

The photographs were made during an IAP project sponsored by the Architecture Department and the President's Office. The purpose of the project was to compile a photographic study of relationships between the environment of Rome and the people who use it. The 85 photographs selected for the Lobby 7 display are a small sample of thousands taken during the project.

Following this exhibition will be the annual spring student show comprised of photographs by Laboratory students which will open Thursday, May 9 in the Creative Photography Laboratory and remain on view until the end of

Another show "A Thousand Photographers Doing Their Own Thing" will open Thursday, May 2 at the Creative Photography Laboratory, with an evening preview from 5pm-7pm.

As for Professor White's retirement-it will be occupied by work, primarily. His plans include camera work, finishing three educational books he is writing and a possible return to MIT in 1976 "in some capacity" as Professor Emeritus and Senior Lecturer.

The three educational books "in the works" were derived from courses offered at the Photography Laboratory. The book titles are Visualization by Principles and Concepts for Photography, a revised text of White's Zone System Manual issued in 1952; Creative Audience—Application of Sensitivity and Gestalt Principles to Reading Photographs in Depth and Equivalence in the Art of Pho-

Questionnaires to Sample Student Career Objectives

What's it like being a student at range of careers.

Does it make a difference if you are a male-rather than femaletype person?

Confidential questionnaires seeking student opinions on attitudes, services and facilities at six Massachusetts institutions-including MIT-will be circulated this week. Approximately 250-300 questionnaires will be distributed to 10 percent of the freshman and senior classes at MIT-both men

Also participating in the survey are Brandeis University, Boston College, Hampshire College and the Universities of Massachusetts at Amherst and Boston. The survey is supported by part of a \$400,000 Carnegie Corporation grant to the national project on 'Women and Career Options."

The participating schools are all coeducational with predominantly male administrative bodies. A prime purpose of the poll is to determine whether this factor is indicative of subtle barriers to the advancement of women in a wide

Baker Award

Nominations are still being sought for the annual Everett Moore Baker Teaching Award which is presented by a student committee to a young faculty member for excellence in undergraduate teach-

Written letters of nomination should be sent to Marko Slusarczuk, chairman of the Baker Memorial Committee, in Room 7-101, as soon as pos-

.......

Results of the survey may suggest ways to widen the spectrum of career options for undergraduates now constricted to 'certain fields,' according to Dr. Melissa Richter, director of the project based at UMass-Boston.

Results of the poll will be pooled and analyzed by Dr. Richter's office. Copies of the analysis, she said, will be distributed to participating institutions so that they may adjust their programs and curricula where necessary to improve career choices for wom-

Kendall Square City Dicision Due

The Cambridge City Council will vote next week on a concept for the redevelopment of the Kendall Square Renewal Area just across Main Street from the MIT Ford Building.

Various groups in the City are presently discussing two quite different concepts. One would redevelop the area for industrial uses, almost entirely, to maximize blue collar and non-professional white collar employment. The second concept would merge in combination office, industrial, commercial (shops and services) and residential development.

Anyone who wishes more information or who desires to express a view on the redevelopment of Kendall Square should call Walter Milne (3-5278) or Robert Simha (3-5831). MIT has taken a position favoring the mixed-use concept. Institute officers will refer callers interested in the industrial plan to its proponents.

TECH TALK Volume 18, Number 40 April 24, 1974

Tech Talk is published 50 times a year by the News Office, Massachusetts Institute of Technology. Director: Robert M. Byers; Managing Director, News Office Publications: William T. Struble; Assistant Directors: Joanne Miller, Margo Foote (Photojournalist), Charles H. Ball, Dennis L. Meredith, Robert C. Dilorio; Reporters: Sally M. Hamilton, Pat M. Maroni, Damon P. Wright; Calendar of Events/Want Ads: Susan E.

Address news and editorial comment to the MIT News Office, Room 5-111, Massachusetts Institute of Technology, Cambridge, Ma. 02139. Telephone Ext.

Mail subscriptions are \$6 per year. Checks should be made payable to MIT and mailed to the Business Manager, Room 5-111, MIT, Cambridge, Ma.

Page 2, Tech Talk, April 24, 1974

Massachusetts Commission

First MacDonald Show to Feature Buddhist Art



Dr. MacDonald

A Tibetan Buddhist art exhibit featuring a high-ranking Lama as visiting curator is one of the projects planned by Dr. Bruce K. MacDonald, assistant director of exhibitions at MIT, when he succeeds Professor Wayne V. Andersen as director of that office, effective in June.

Professor Andersen announced last June that he would transfer the duties of his post at the conclusion of Dr. MacDonald's first year as assistant director to devote more time to duties as Chairman of MIT's Committee for the Visual Arts and to teaching responsibilities in the Department of Architecture, where he is Professor of the History of Art.

The Tibetan Buddhist exhibit scheduled to open at the Hayden Gallery in the spring of 1975 will bring together works from the collections of the Metropolitan Museum of Art, the American Museum of Natural History, the Boston Museum of Fine Arts, the Parrish Museum, and the John Gilmore Ford Collection. Co-sponsor of the landmark exhibit is the Nalanda Foundation, a non-sectarian educational institute concerned with non-religious applications of the Tibetan Buddhist traditions to cur-

Certificates of completion were

awarded to 28 participants in ADP

II (Administrative Development

Program) in commencement ex-

ercises held Tuesday, April 16, at

for administration and personnel,

opened the ceremonies by intro-

ducing Maureen and Adam Ya-

godka, the new co-directors of the

Office of Personnel Development.

The Yagodkas told the group they

would like to work with ADP

"alumni" in other programs and

John M. Wynne, vice president

rent Western intellectual teachings. Its director, the Ven. Chogyam Trungpa, Rinpoche, a former Spaulding Fellow at Oxford University and Supreme Abbott of the Surmang monasteries in Eastern Tibet until 1959, will write the catalogue for the MIT exhibit and narrate a special supplementary film while serving as visiting curator at the Institute.

Also planned for the new director's first term is a survey of abstract expressionist drawings with guest curator Eila Kokkinen from the Museum of Modern Art, where Dr. MacDonald interned in curatorial training from 1967-68. An exhibition of the work of Brassai, entitled "Photographs Before Surrealism," for which Dr. MacDonald wrote the catalogue during his year at the Museum of Modern Art, has been designated for a circulating MIT-sponsored exhibit early next year.

Dr. MacDonald will also author the catalogue for MIT's "Nineteenth Century Painting from the Museo D'Arte de Ponce" exhibit by Luis Ferre, a member of the MIT Corporation, former governor of Puerto Rico and graduate of the Class of 1924. The exhibition is scheduled for May 17-June 8.

Dr. MacDonald is a graduate of Trinity College in Hartford, Conn., where he received the BA degree in 1961, and of Harvard University, where he received the MA in 1967 and the PhD in June 1973. Following his extensive museum training at Harvard's Fogg Museum, he participated in a George Eastman House seminar on the problems of small museums in 1967. During his thesis study of Nineteenth and Twentieth century painting, he lived in Europe for a period of 16

Dr. MacDonald will assume his new post at a time when the scope of art at MIT is expanding in the form of the Council for the Arts and a new Institute requirement in the Humanities, Arts and Social

ADPII Program Completed asked the graduates to suggest what programs would be useful.

> The current ADP group, ADP III, recently completed the first part of the two-part program (Organizational Psychology) and will be starting the second section (Financial Management) in the

Applications for ADP IV will be available in August for administrators interested in applying for the new session, which starts in the fall.



Peter Buttner, associate dean for student affairs, receives ADP certificate of completion from Vice President John M. Wynne.



Dr. Battin



Professor Hottel





Professor Shapiro



Professor Harleman



Faculty, Alumni Named NAE Fellows

(Continued from page 1) staff or Corporation members and another 82 are alumni.

Announcement of the new members for 1974 was made by Dr. Robert C. Seamans, Jr., himself a former professor of aeronautical engineering at MIT.

Election to the Academy is considered to be the highest professional distinction that can be conferred on an American engineer and honors those who have made important contributions to engineering theory and practice or who have demonstrated unusual accomplishments in the pioneering of new and developing fields of technology.

Professors Shapiro and Soderberg also are members of the National Academy of Sciences as are nearly a dozen other MIT faculty, staff and Corporation members. The NAS annual election of new members is expected to be announced later this week.

Professor Dresselhaus was cited for "contributions to the experimental studies of metals and semimetals, and to education." She is Abby Rockefeller Mauze Professor in the MIT Department of Electrical Engineering and is a former associate head of the department. A graduate of Hunter College with advanced degrees from Radcliffe and the University of Chicago, she was a solid state physicist at MIT's Lincoln Laboratory from 1960 to 1967, was visiting professor 1967-68, and was

appointed professor of electrical engineering in 1968.

Professor Harleman was cited for "leadership in the development of theoretical and experimental techniques in the field of fluid mechanics." He is professor of civil engineering and director of MIT's Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics. A graduate of Pennsylvania State University with advanced degrees from MIT, he joined the Institute staff in 1945. He became professor in 1963.

Professor Hottel was cited for "contributions in radiative heat transfer, combustion and fuels technology." A graduate of Indiana University with an advanced degree from MIT, Professor Hottel has been a member of the MIT faculty since 1927. He was professor of fuel engineering from 1941 to 1966 when he became Carbon P. Dubbs Professor of Chemical Engineering. He became emeritus professor in 1968. For more than 30 years he was director of MIT's Fuels Research Laboratory.

Professor Shapiro was cited for "contributions to fluid mechanics research and education." He is Ford Professor of Engineering and head of the Department of Mechanical Engineering. A graduate of MIT with his advanced degree from MIT, Dr. Shapiro has been a member of the MIT teaching staff since 1938. He has been professor since 1952, was appointed Ford Professor in 1962 and has been head of the department since 1965.

Professor Soderberg honored for "leadership in turbine design and innovation in engineering education." A graduate of MIT, he became professor of mechanical engineering at MIT in 1938 after nearly two decades of 1966, he served as head of the Department of Naval Architecture and Marine Engineering.

Dr. Battin was cited for "contributions to the technology for control, navigation and guidance for Apollo missions." Now associate department head for NASA Army Programs at the Draper Laboratory, he was director of mission development and was responsible for trajectories, guidance concepts and programming of the guidance computers found in the on-board guidance systems developed by the Laboratory for the Apollo spacecraft used to carry astronauts to the moon and back. A graduate of MIT, he has been on the Draper Laboratory staff since 1951, except for two years in industry. He has been a lecturer in the Department of Aeronautics and Astronautics since 1961.

Among the alumni elected were: Howard C. Barnes (Senior Executives Program, Sloan School '60), American Electric Power Service Corp., New York City.

Jordan J. Baruch (SB '47, SM '48, ScD '50 VI), Harvard University, Cambridge, Mass.

William B. Bergen (SB '37 XVI), Rockwell International Corp., El Segundo, Calif.

Roy W. Carlson (ScD '39 I), consultant, Berkely, Calif.

James L. Everett III (Sloan Fellow SM '59), Philadelphia Electric Co., Philadelphia.

Daniel J. Fink (SB '48, SM '49 XVI) General Electric Co., Philadelphia.

Joseph G. Gavin, Jr. (SB '41, SM '42 XVI), Grumman Aerospace Corp, Bethpage, N.Y.

Vladimer Haensel (SM '37 X) Universal Oil Products Co., Des Plains Ill.

John Lowe III (SM '37 I) Tippetts-Abbett-McCarthy-Tratton (TAMS), New York City.

Fujio Matsuda (ScD '52 I), University of Hawaii, Honolulu, Hawaii.

Robert Plunkett (SB '39 I, ScD, '48 II), University of Minnesota, Minneapolis, Minn.

Ronald F. Scott (SM '53, ScD '55 I), California Institute of Technology, Pasadena, Calif.

Thornton A. Wilson (Sloan Fellow, SM '53 XV), Boeing Co., Seattle Washington.

Smith Photos

A one-man show of photographs by Gregory Smith is on exhibit in the Undergraduate Research Opportunities Program (UROP) conference room, Rm 20B-139.

Mr. Smith, a member of the MIT Corporation and parttime staff member at UROP, is the former president of the Eastman Gelatine Corporation of Peabody. He is a wellknown amateur photographer in the Boston area, whose works were last seen at MIT in an exhibit in Hayden corridor-last year.

work in the electrical engineering industry. He was head of the Department of Mechanical Engineering at MIT from 1947 to 1954 and was dean of engineering from 1954 to 1959 when he was appointed Institute Professor, MIT's highest academic honor. He became Institute Professor Emeritus in 1960. From 1965 to

Tech Talk, April 24, 1974, Page 3



Tennis ace Bill Young.

Bill Young Is Shooting for Moon in More Ways than One

Young, MIT's tennis star, is reprinted from the March 28 issue of The Boston Globe.)

> By BOB MONAHAN Globe Staff

MIT tennis star Bill Young is shooting for the moon in more ways than one.

The 21-year-old senior from Austin, Texas, who won the New England singles and doubles tennis titles last year, hopes to capture the NCAA title this year and then enter the Air Force where he'll put his degree in aeronautics and astronautics to work.

"I got knocked out of the NCAAs in the first round last year," said the 6-2, 165-pound redhead. "I had won 21 matches in a row and I should have done better. I will this

Bill's opponent in that first round was Bob Chappell from the

(The following article on Bill U. of California. He was leading the first set, 5-2, and then bowed out, 7-6, 2-6, 6-3.

> As far as the Air Force goes, Bill is anxious to graduate and go into the service. "I guess I just have a thing about height. I really like it. I'm just three hours of flying away from getting my pilots license and the space program and flying in general are why I applied to MIT which is the best college in the world for that field.'

Another of Bill's "things" about height is mountain climbing.

He explained, "A few friends got me interested a few years back and I've spent most of recent summers climbing mountains. Last summer we climbed Mr. Assidone which is the highest mountain in the Canadian Rockies. That was a six-week job.

"Now a few of us are thinking

about attempting Mt. McKinley this summer. That would be quite a thrill."

Bill was introduced to tennis at an early age by his father, David, who played tennis at Harvard. Now he's a math professor at the University of Texas. In 1970 the Youngs won the Texas father and son doubles title.

"Dad was great to me," said Bill. "He didn't push the game but got me interested slowly. And once you get to like tennis you just want to stay with it."

Coach Ed Crocker explained, "I've been coaching at MIT for 18 years and there's no doubt that Bill is the best player we ever had.

'He has a tremendous service and all the moves that are necessary to be a great player. He's also a fierce competitor. He really attacks an opponent with everything he has. Yes, you can call it the killer instinct.

"But as good as he is he still hasn't come close to his potential. He lacks tournament experience which he's missed in recent years because he doesn't play that much in the summer.

"If he were to devote all his time to tennis I think he could make that new World Team Tennis League. Yes, he can be that good. But still, a young man has to do what he feels he should do, so I can't fault him for wanting to climb mountains. He's his own man on and off the court."

There's no doubt Bill will be the hottest singles player in New England again this year and the same goes for the Young-Lee Simpson combination in doubles.

Bill Young is taking moon shot. It wouldn't be smart to bet against

Progress Reported on Biological Freezing

Staff Writer

In his brilliant comedy film "Sleeper" comedian Woody Allen is frozen by a group of surgeons after an operation on him goes awry. In real life several people have already directed that their bodies be frozen in liquid nitrogen after their deaths, in hopes that science will find a way to revive them in the future and cure the illness to which they succumbed

In reality, medical science is far from successfully freezing whole humans-or even individual organs-to preserve them. Freezing wreaks havoc with the intricate, delicate machinery of the cell, and the just as intricate, delicate higher organization of tissues and organs.

But progress is being made in understanding the effects of freezing on individual cells, and in reducing freezing damage to an acceptable level.

The research is being carried out by MIT undergraduate and graduate students under the supervision of Ernest Cravalho, associate professor of mechanical engineering at MIT, and Charles E. Huggins, M.D., associate professor of surgery at the Harvard Medical School and clinical director of the Massachusetts General Hospital (MGH) blood bank.

The team is part of the large-scale program in biomaterials of the joint Harvard-MIT Program in Health Sciences and Technology.

Professor Cravalho, Dr. Huggins and their colleagues had already done considerbale work in discovering the optimum freezing rates, and preservation methods for blood cells. Dr. Huggins was a pioneer in developing a method of preparing red blood cells for freezing. His process is now in use at MGH, as well as in hospitals in other countries throughout the world.

But red blood cells are quite different from other human cells, as other human cells are different from each other. Different cell types have different biochemical tasks within the body, and thus different kinds of protective membranes, different surface-to-volume ratios, and different chemical interiors.

To get an idea of how the generalized human cell reacts to freezing and thawing, the scientists use the so-called "HeLa" cell, a cultured human epithelial cell taken from a cancer patient named Helen Lane in 1951.

One team member, MIT doctoral student John McGrath, has recently performed a series of what scientists term "very elegant experiments" to learn how these cultured human cells react to freez-

To control precisely the cooling rate of the cells, he used a unique cryomicroscope developed at MIT. This microscope allows the scientists to observe the cells during cooling and warming at precisely controlled rates. McGrath encountered a major problem in quickly determining whether his frozen and thawed cells were alive after each test on the cryomicroscope. He overcame it by using an ingenious method developed by two scientists at the Syntex Institute of Molecular Biology in Palo Alto, Calif.

The scientists, Boris Rotman and Ben Papermaster, found that if they soaked living cells in a dilute solution of a harmless molecule called diacetylflourescein, the living cells would take up the molecule and change it to a fluorescent dye, which would glow greenish under blue light. This flourescent dye cannot easily escape from a normal cell. If a cell died, however, it would break open and release the dye back into the surrounding solution, losing its color. Rotman and Papermaster demonstrated a one-to-one correspondence between flourescent activity and the cell's ability to reproduce, thereby assuring that the fluorescence was a valid measure of the cell's viability.

Thus, McGrath could determine the numbers of cells surviving his freezing and thawing experiments by merely counting the ones which still glowed green under blue light.

Since the dye concentration he used to detect fluorescence was one million times more dilute than the salt normally surrounding the cell, the dye could be present throughout freezing and thawing without interfering with the experiment.

Using the cryomicroscope and the dye detection method, McGrath set out to study how HeLa cells responded to freezing. He discovered that the graph of cell survival percentage versus the cooling rate resembled in its shape the curves for all other living cells that had been experimentally frozen-including yeast cells, hamster cells, marrow cells, and red blood cells

The curve was an inverted U-shape, in which few of the cells survived very slow rates of cooling, but more survived as cooling rates were increased in the experiments. The survival reached a peak of 30

percent for a cooling rate range of 20 to 40 degrees centigrade per minute, but dropped off rapidly as the cooling rates increased further.

Thus, the optimum cooling rate for HeLa cells is substantially less than the optimum for human red blood cells. Other scientists had found a maximum survival rate of 65 percent at a cooling rate of 2500 degrees Centigrade per minute.

If other human cells were as individualistic in their reaction to freezing, a medical scientist seeking to freeze an organ with many different kinds of cells would have to contend with a host of different optimum freezing rates and maximum survivals. It seems that medical science has far to go to freeze successfully whole organs, much less whole humans.

But why this peculiar curve of survivability? Why did more and more cells survive freezing as the temperature was dropped more quickly in successive experiments, only to reach a maximum, after which fewer and fewer cells survived even faster cooling?

Scientists have theorized that the reason for this survival curve is that the cells undergoing freezing are caught between the devil of salt concentration death and the deep blue sea of internal ice formation death.

At low cooling rates, most of the cells are killed because ice forms outside the cell, causing the concentration of salts in solution to shoot up. Less water means the salts become more highly concentrated. To reach equilibrium with the outside environment, the cell loses water, and the salts both inside and outside the cell build up to lethal concentrations.

As higher cooling rates are used, salt concentration death becomes less of a problem because the cells are exposed to these increased salt concentrations for a shorter period of time. However, at faster cooling rates, the water within the cell is more likely to turn to ice, rather than leaving the cell and turning to ice externally. This is dangerous because ice within a cell is usually lethal.

To help confirm this dual-damage theory, McGrath set out to see if ice formation could account for the fast cooling rate end of the survival curve. By using a special lighting arrangement on the cryomicroscope he could actually observe ice crystals forming in the freezing cells and count the number of cells in which ice occurred. Indeed, McGrath found that more cells were likely to be frozen internally at higher cooling rates, offering strong evidence that scientists were understanding the mechanics of freezing death correctly.

The MIT scientists will continue their work by searching for the maximum survival rate with different warming rates, for they believe, depending on the circumstances, just as many cells can be damaged on thawing the cells as on freezing them. Until now, all their experiments have been done with a single standard warming rate.

After the best cooling and warming rates have been found, the scientists will still be far from their goal of successfully freezing and thawing living cells, for a large percentage of cells may still die even at optimum rates.

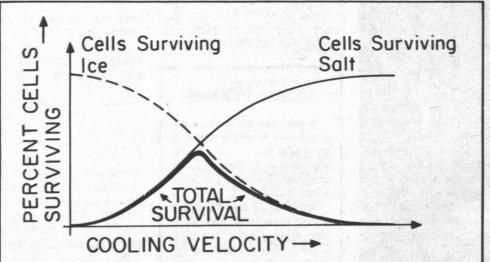
To overcome this problem they will call on another concept which has already proven helpful in preserving blood cellsthe cryophylactic.

A cryophylactic substance is a chemical additive which protects cells from freezing damage, usually by acting as an "unfreezable" solvent surrounding the cell. The cryophylactic substance protects cells from experiencing too-high salt concentrations, by keeping the salt concentration in the surrounding medium low, so that water will not be drawn out of the cells. From microscopic observations, the scientists also conclude that some cryophylactic substances may protect cell membranes from disruption by freezing.

Dr. Huggins successfully used glycerol as a cryophylactic agent in his blood preparations, achieving up to 98 percent survival rates. The MIT scientists will experiment with glycerol, dimethylsulfoxide, and ethylene glycol (best known as automobile antifreeze) in their search for the perfect cell protector.

Members of the MIT team are also taking a more direct tack in searching for the ideal cold storage method for living tissues. They are using whole rat hearts in experiments to find the optimum ways of introducing cryophylactic agents into intact organs. They are presently developing an organ container that can precisely control not only cooling temperatures, but also the rate of addition of the cryophylactic agent.

Though the payoff for their work appears years away, the MIT scientists are confident that they and their colleagues at other institutions at least have a handle on the enormous problem of reversibly stopping the machinery of life to save the mechanism for later use.



In freezing and thawing human cells at different cooling velocities, MIT scientists have found an inverted U-shaped curve of survivability. Scientists postulate that this curve is a combination of two curves-death from ice formation, which increases with increasing cooling velocity, and death from salt concentration, which decreases.

Faculty Approves New Institute Requirement

The faculty approved and completed action on recommendations concerning a new Institute Requirement in the Humanities, Arts and Social Sciences at its monthly meeting Wednesday, April 17.

The recommendations had been presented by the Committee on Educational Policy in support of a proposal made earlier by the School of Humanities and Social Sciences to revise the require-

A key recommendation was that the faculty endorse the general features of the revision and the manner in which the School proposed that the new requirement be administered. The CEP said the "evolution of the requirement" would "proceed in consultation with the Committee on Curricula and the CEP."

In another action, the faculty rejected, by a vote of 55-34, a motion to establish, for a two-year trial period, a committee to consider the impact of MIT research projects. The program would have been voluntary.

The motion was presented, without recommendation, by an ad hoc committee appointed last year by the President Jerome B. Wiesner to consider the advisability of such

Much of the discussion concerned the difficulty of making a meaningful analysis of the potential impact of research projects. Some suggested that an intensive research effort is needed, based on a relatively few projects, to learn more about predicting the impact of research.

Dr. Wiesner, commenting that he hoped the issue would be kept alive, said he believed that such concerns were the responsibility of 'an Institute of this kind."

It was also voted as the sense of the faculty that the Institute's Policies and Procedures should include specific reference to the relationships of senior and junior faculty, and of faculty and students, in outside professional ac-

MIT BURD Suffers Failure

A manpowered aircraft being designed and tested by MIT aeronautical engineering students experienced a structural failure during a planned high speed taxi test last Wednesday (April 17) at Hanscom Field, Lexington, Mass.

Probable cause of failure was ascertained to be a deterioration in the strength of the balsa wood at the wing trailing edge. Witnesses said the airplane wings folded forward and upward. The vehicle had attained a speed slightly in excess of take off speed and probably was in flight at the instant of the failure.

When it came to rest, the lower wings were loose, but had not come apart completely from the fuselage. There was also damage to the fuselage and to the upper right wing. Many of the vehicle parts appear to be reuseable.

Two volunteer test pilots were uninjured. The test pilots, although not students at MIT, had been selected earlier from among volunteers because they are both pilots and bicycle racers and because they are both of small stature. Both had made earlier taxi tests with the vehicle, but at lower speeds

Since BURD, an acronym for Biplane Ultralight Research Device, appeared to fly briefly before the failure, and behaved well during taxi tests, the MIT students are at least confident the basic design has merit. The purpose of the test was to test a new steering mechanism and the aerodynamic controls (canard and spoilers). The students are considering plans for the redesign and repair of the

The 126-pound craft is constructed of balsa wood and aluminum tubing and covered with polypropylene, a clear material only one-half of a thousandth of an inch in thickness. The craft was powered by two pilots in a tandem arrangement with a bicycle type of drive mechanism which turned both the bicycle wheels and a 10 foot diameter balsa wood pro-

The BURD project was started by a group of five students who wanted to center their aeronautical education around the design, testing and fabrication of a vehicle. They chose the manpowered airplane because Henry Kremer, the British industrialist, offered a prize to stimulate the achievement of manpowered flight. When the MIT aeronautical group started; the prize was 10,000 British pounds, but in May of 1973 the prize was raised to 50,000 British pounds in recognition that flight of a manpowered craft over a one-mile, figure-eight course requires the utmost in performance from man and machine.

Bell Gives Bldg. 7 Nautical Sound

A 485-pound bronze bell that once warned sailors they were closing in on Graves Point in Boston Harbor has recently been ringing out nautical watch times in the lobby of MIT's Building 7.

The bell was recovered by SCUBA divers in 1963 from the harbor floor. It was put on display by Harold E. Edgerton, Institute Professor, emeritus. Professor Edgerton bought the bell because of his interest in undersea exploration and because xenon-flash lighthouse lamps were first used at Graves Light in 1964. They now are used at Coney Island and at Norfolk, Va.

The bell, crusty from spending 85 years at the bottom of the sea, was cast in 1864 by Henry Cooper & Co. It was fastened to a 25-foot bell boat which was moored off Graves Point. The motion of the sea rocked the boat and caused the bell to strike a stationary clapper, warning sailors of the danger posed by the point.

A relay system has been used to ring out nautical watch times in the lobby by striking the bell with a magnetically operated clapper.

Professor Edgerton, whose work in stroboscopy changed what had been a scientific curiosity to a useful engineering tool, turned his attention several years ago to undersea exploration. He has developed special sonar devices to detect underwater wrecks and strobe lights capable of functioning at extreme depths.

"I'd like to see the bell permanently used somewhere-perhaps at MIT," Professor Edgerton said. "And I'd like to challenge the students to develop a more sophisticated way of timing the operation."

MIT/Holyoke Joint Concert

The Mount Holyoke Concert Choir will join the MIT Glee Club in a joint spring concert, 3pm, Sunday, April 28, in Kresge Auditorium.

A program of Easter choral works will be featured including Haydn's Cellensis Mass, Regina Coeli by Mozart and Bach's Cantata #4, Christ Lag In Todesbanden.

The concert will be conducted by John Oliver, director of the MIT Glee Club.

The two groups first performed this program Easter Sunday at Mount Holyoke.

Soloists for the concert will be Richard Burke, tenor; Sheila Wall, soprano; Phyllis Hoffman, alto and Gregory Reinhart, bass.



Harold E. Edgerton, Institute Professor, Emeritus, right, and his laboratory assistant William MacRoberts check the old Graves Point bell on display in the lobby of Building 7.

Luria Wins Book Award

Dr. Salvador E. Luria, MIT Nobel Laureate in medicine, added to his distinctions last week when he received the 1974 National Book Award for science as author of Life: the Unfinished Experiment, published in 1973 by Charles Scribner's Sons.

The book received wide critical acclaim for Dr. Luria, who is Institute Professor and director of the MIT Cancer Research Center. Recently the book was reviewed in Tech Talk, March 13, by Dr. Luria's colleague, Dr. David Baltimore, American Cancer Society Professor of Microbiology at

The book was one of ten selected from a total of 110 titles to receive a 1974 award. The award, which carries a prize of \$1,000, was presented at ceremonies Thursday evening, April 19, at Lincoln Center in New York.

In his acceptance remarks, Dr. Luria said:

"I wanted to explain science and its relevance to mankind in such a way that the non-scientist could assimilate it and use it effectively in his or her own thinking.

"At the same time, I wanted to see if I could send science streaking along in its glorious nakedness. stripped of the veil of professional jargon and without even a plastic raincoat of pseudo-philosophy.

Big Brothers Seek Volunteers

The Big Brother Association of Boston is looking for MIT students to be companions for fatherless boys.

There is a growing need for Big Brothers in the Boston area and more than 200 boys, 7 to 16 years old, presently are on the waiting list, according to Donald L. Grimes, an MIT senior in mechanical engineering who has been a Big Brother for the past 18 months.

Representatives of the Association will be at MIT on Friday (April 26) from 10am to 2pm in the Building 10 lobby, to talk to interested students. Students should not be put off by the fact that they are going home for the summer. It can be arranged to start in the fall after returning to Boston.

Fall Term Wellesley Exchange Applications Due May

Applications from students wishing to participate in the Wellesley-MIT Exchange during the Fall Term of 1974 are due Friday. May 10.

Listings of Wellesley subjects and class schedules for the Fall Term will be available Monday (April 29) and will be distributed to living units, department headquarters and the MIT Information Center to give out to those requesting them.

In addition, during the weeks of April 29-May 3 and May 6-10 there will be a Wellesley-MIT Exchange Program information booth in the lobby of Bldg. 10 where Wellesley students will be on hand to answer questions about subject offerings at Wellesley.

Officials of the Program hope that students thinking about participation in Fall Term will hand in applications by May 10 so they will be certain to receive information about the exchange during the summer. Students may make changes in the fall by checking with Wellesley instructors during

Although the MIT calendar is not available yet for next year, academic calendars for both schools are likely to be similar. Wellesley, for example, is scheduling final examinations before the winter vacation.

The Program has a new office, Room 7-141, but its telephone extension number, x3-1668, remains unchanged.

This term some 250 Wellesley students are taking 304 MIT subjects in 21 of MIT's 25 academic departments under the Program. Largest concentrations are: Psychology 60, Architecture 51, Humanities 48, Political Science 23, and Urban Studies and Planning 22.

At the same time, 159 MIT students are taking 221 Wellesley subjects in 25 of Wellesley's 27 departments. Concentrations include: Psychology 32, English 31, Economics 26, History 20, and Art

Numbers for the current term

the first two weeks of the term. are somewhat ahead of those for the Fall Term of 1973 when 196 Wellesley students took subjects at exchange and at MIT administra-MIT and 159 MIT students took subjects at Wellesley.

> In a recent development, a group of women students from MIT has met this year with Wellesley students to discuss the exchange, how it affects students at both schools, and what opportunities it offers. One area of common interest includes offerings in the field of women's/human studies at MIT and at Wellesley. A number of students and faculty from both schools met in December to explore these offerings and the possibility of joint efforts in the area.

> The Wellesley-MIT Exchange Program was started in the late 1960s as an experiment and after several yars of successful operations the faculties of the respective schools last year voted to continue the exchange as a regular part of the program of both institutions. A joint committee with faculty and

students from both institutions would continue to oversee the tive responsibility for the exchange was placed in the Office of the Provost. A regular shuttle bus service operates between the two campuses to accommodate participating students.

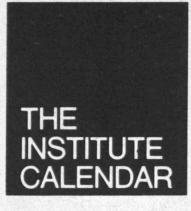
MIT members of the Wellesley-MIT Exchange Committee for the 1974-75 year are just being appointed and student representatives from MIT are still to be selected. Nominations are being sought.

Co-chairmen for the committee for this year are Mrs. Alice Ilchman, dean of the college at Wellesley, and Kenneth M. Hoffman, professor and head of the Department of Mathematics at MIT.

MIT faculty and staff members serving this year are: Mildred Dresselhaus, Abby Rockefeller Mauze Professor of Electrical Engineering; Anne Ellison, assistant dean for student affairs; Eugene Goodheart, professor of humanities; Jonathan Green, associate professor of architecture; Louis Menand III, lecturer in political science and assistant to the provost; Joel Orlen, assistant to the provost; Provost Walter A. Rosenblith, ex officio; Jane Sauer, MIT coordinator for the Exchange Program; Annamaria Torriana-Gorini, associate professor of biology; and President Jerome B. Wiesner, ex-officio.

Wellesley members include: Sheila Berniard, Class of 1974; Jon Ellertson, political science; S. Beth Farmer, Class of 1974; Miranda Marvin, art and Greek departments; Rodney Morrison, economics; President Barbara Newell; Kathryn Woodward, Class of 1974; Torsten Norvig, mathematics; Helen Padykula, Laboratory of Electron Microscopy (Biological Sciences); and Bettina Blake, acting dean of studies and coordinator for special academic programs.

Tech Talk, April 24, 1974, Page 5



April 24 through May 5

Events of Special Interest

Massachusetts State Science Fair* – High school winners of 6 regional fairs will display their experiments and exhibits Sat, Apr 27, 12n-3pm, Rockwell Cage. Award ceremony will be 3:30pm, Kresge Auditorium. Sheila E. Widnall, aero/astro, will speak. Sponsored by MIT, Boston Globe and Massachusetts State Science Fair Committee.

Underwater Adventures* - Robert Marx, underwater archaeologist. Doc Edgerton calls him "another Jacques Costeau." LSC Lecture. Mon, Apr 29, 8pm, Rm 26-100. Free.

White Elephant Sale* – Sponsored by the MIT members of the Cambridge Business & Professional Women's Club. Proceeds to benefit the Olive Libitz Memorial Scholarship Fund, which is awarded to a Cambridge girl. Tues, Apr 30, 10am-2pm, Rm 10-105. Donations may be sent to Julia McLellan, Rm 3-103, x3-4770. Clothing is not part of sale.

Festival of Women Poets* – sponsored by Humanities and Council on the Arts. Tues, Apr 30: Ellen Bass, Celia Gilbert and Sam Stamper. Thurs, May 2: Denise Levertov and Miriam Palmer. 8pm, Rm 14E-304.

A Panel Discussion on Technology Transfer and Hunger: Food Technological Approaches to Malnutrition in Low Income Countries* – F. James Levinson, director, International Nutrition Program, nutrition & food sciences; Chokyun Rha, food sciences technology; James E. Austin, business administration, nutrition policy and planning, Harvard University Technology Adaptation Program Seminar. Thurs, May 2, 4:30pm, Rm 9-150.

Spring Craft Sale* - Sponsored by Technology Wives Organization Fri, May 3, 8am-4pm, Bldg 10 Lobby.

Seminars and Lectures

Wednesday, April 24

Resonance Self-Shielding Near LMFBR Blanket Interfaces - O. K. Kadiroglu, G. Nuclear Engineering Doctoral Seminar. 3pm, Rm NW12-222.

Communication Requirements in Telemedicine Systems* – Roger G. Mark, electrical engineering. Telecommunications Policy Planning and Research Seminar. 4pm, Rm 9-450.

Color Vision* – Jerome Y. Lettvin, M.D., biology, electrical engineering; M. Brill, G. Electrical Engineering IEEE Branch Seminar. 4pm, Rm 9-150.

Best Use of Power Reactors for Electric Utilities – T. Zimmerman, G. Nuclear Engineering Doctoral Seminar. 4pm, Rm NW1 2-222.

Implementation of Computer-Based Information System for a General Contractor* – Walter McCarthy, Southeastern Massachusetts University. Civil Engineering Seminar. 4pm, Rm 1-353.

Spirits of the Polar Night* - Robert Eather, Boston College. Elapsed time motion pictures of the northern lights. Strobe Lab Lecture. 4pm, Rm 4-402.

Theories of Light* - Laszlo Tisza, physics, emeritus. Undergraduate Physics Colloquium. 4:15pm, Rm 6-120. Followed by social hour, Rm 6-209.

Thursday, April 25

Drug Abuse – Dr. Richard Dodds, Harvard Community Health Plan. Course 11.547 The Human Life Cycle: Children and Adolescents Seminar. 1:30pm, Rm 7-102.

Health – Dr. Edward Rendall, medical department; AARP – Nancy R. Woodman, Associate Benefits Officer. Pre-Retirement Seminar. 3pm, Rm 39-400. Open to employees.

Electromechanical Design for Free-Inertia Spool Superconducting Generators* – N. Dagalakis, G. Electric Power Systems Engineering Laboratory Seminar Series. 4pm, Rm 10-280.

Photometric Titration of Ascorbic Acid by Photonometric Generation of Iodine – Joseph B. Zumpano, G. Analytical Chemistry Seminar. 4pm, Rm 8-105.

High-Modulus Polymers - Roger S. Porter, head, polymer science, University of Massachusetts. Polymer Science and Engineering Seminar. 4pm, Rm 4-231. Tea 3:30pm, Rm 8-314.

The Renormalization Group: The Physicist's St. George – Kenneth Wilson, Cornell University. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments 3:45pm, Rm 26-110.

Molecular Photoelectron Spectroscopy Studies of Some Compounds of Nitrogen, Phosphorous and Arsenic – Alan H. Cowley, University of Texas at Austin. MIT-Harvard Inorganic Chemistry Colloquium. 5pm, Rm 4-370. Refreshments 4:45pm, Rm 6-321.

Efficient Simulation of Queues* - Ronald Wolff, University of California. Operations Research Center Seminar. 4pm, Rm 24-121.

The Sahel: The Drought and Development Needs* – Wilbert Wills, the Sahel Project. Seminar on International Students and Participation in Development. 7pm, Intn'l Student Lge, 2nd fl Walker. Coffee.

Heat Pumps – Dr. Leon R. Glicksman, mechanical engineering. Thermodynamics Seminar. 4:10pm, Rm 3-343. Coffee 4pm.

Organization and Plasticity of Motor Coordination – Emilio Bizzi, MD, psychology. Harvard-MIT Rehabilitation Engineering Center Seminar. 4pm, Rm 10-105. Refreshments 3:30pm.

Friday, April 26

Thermal Factors in the Ultrasonic Destruction of Mammalian Tissue – William L. Hsu, G. Mechanical Engineering Doctoral Thesis Presentation. 1:30pm, Rm 3-464.

An Experimental Study of Macromolecular Conformation in Extensional Flow – Pramuan Leopairat, G. Chemical Engineering Doctoral Seminar. 2pm, Rm 10-105.

Immobilized Enzyme Reactions for ATP Regeneration – M. Nemet, G. Chemical Engineering Doctoral Seminar. 3pm, Rm 10-105.

Physiochemical Wastewater Treatment for Pollution Control and Water Reuse – Walter J. Weber, Jr, chairman resources program, University of Michigan. Mechanical Engineering Seminar. 3pm, Rm 3-133. Coffee 4pm, Rm 1-114.

Hungarian Intellectual Life Today** – Miklos Vajda, literary editor, New Hungarian Quarterly. CIS Seminar. 12:30pm, Rm E53-482.

Marxist Critique of Bourgeois Ideology** – Bertell Ollman, political science, NYU. CIS Political Science Seminar. 2pm, Rm E53-482.

Universal Source Coding Subject to a Fidelity Criterion* – David L. Neuhoff, Stanford University. RLE & Electrical Engineering Communication Theory Seminar. 3pm, Rm 26-217.

Status of Naval Ship Design Efforts* - Clark Graham, ocean engineering. Ocean Engineering Tankard Seminar. 4pm, Rm 5-314. Refreshments.

Space-Charge and Electrode Effects in Solids and Liquids* – J. Ross MacDonald, Texas Instruments. Materials Science Colloquium. 4pm, Rm 9-150. Refreshments 3:30pm.

Monday, April 29

Structural and Surface Properties of Small Particles – James A. Dumesic, Stanford University. Chemical Engineering Seminar. 2pm, Rm 12-150.

Proof Testing of Brittle Materials by Thermal Shock – James R. Matthews, G. Mechanical Engineering Doctoral Thesis Presentation. 2pm, Rm 5-217.

Stimulated Light Scattering in Inverted Media* – Dr. Howard Lowdermilk, Lawrence Livermore Lab, California. Francis Bitter National Magnet Laboratory Seminar. 2:15pm, 2nd fl conference rm, Magnet Lab. Refreshments 2pm.

A National Metropolitan Model Based on Urban Dynamics** – John H. Murphy, postdoctoral fellow. System Dynamics Group Seminar. 3pm, Rm E52-461.

Application of Nuclear Energy to Process Heating* – Herman Webke, manager of corporate development, Stone & Webster. Nuclear Engineering ANS Seminar. 3pm, Rm NW12-222. Refreshments.

Current Status of Massachusetts Bay Project – Dr. Bryan Pearce, research associate, civil engineering. Civil Engineering Water Resources and Hydrodynamics Seminar. 4pm, Rm 48-316. Coffee 3:45pm. Rm 48-410.

A New Method of Wire Drawing* – Milton C. Shaw, head of mechanical engineering, Carnegie-Mellon Institute. Mechanical Engineering Materials Processing Seminar. 4pm, Rm 37-187.

NONSAP – Development and Application of a General Nonlinear Analysis Program* – Dr. Klaus-Jurgen Bathe, University of California at Berkeley. Applied Mechanics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Unstable Spiral Modes of Rotating Gaseous Disks – James M. Bardeen, physics and astronomy, Yale University. Applied Mathematics Colloquium. 4pm, Rm 2-338. Tea 3:30pm, Rm 2-349.

Between Science and Society: The Engineering Career of Robert Henry Thurston** - Robert J. Kwik, history & sociology, University of Pennsylvania. Technology Studies Workshop. 4:10pm, Rm 14E-304. Coffee 4pm.

The People Against the Managers: Nixon, the Media and the Public*

- Samuel Lubell, author of *The Hidden Crisis in American Politics*.

Kennedy Institute Fellow. Political Science Seminar. 12n, Rm E53-482.

Tuesday, April 30

A High Power Hollow Cathode CO₂ TEA Laser - A. Forbes, G. Nuclear Engineering Doctoral Seminar. 12n, Rm 38-166.

Drug Abuse – Dr. David Lewis, Washington Center for the Addictions; Dr. Edward Khantzian, Cambridge Hospital; Dave Richo, Turnabout; Jim Amalphatano Third Nail; Nathaniel Wade, First, Inc. Course 11.547 The Human Life Cycle: Children & Adolescents Seminar. 1:30pm, Rm 7-102.

Race, IQ and Socioeconomic Status* – John U. Ogbu, University of California at Berkeley. Anthropology/Archeology Program Lecture. 3pm, Rm 14E-304.

Medicare & Medex - John Raleigh, Blue Cross and Blue Shield Account Executive. Pre-Retirement Seminar. 3pm, Rm 39-400. Open to faculty and staff.

Conflict and Collusion: Police Collective Bargaining* — Margaret Levi, Harvard University. Innovative Resource Planning Project — Operations Research Center Seminar. 3:30pm, Rm 3-133.

UNIX Operating System for PDP 11/45* — Dennis Richie, Bell Telephone Labs. Information Processing Services Seminar. Talk & discussions of UNIX, a multi-user general purpose time sharing system. 3pm, Rm 39-530. Coffee 2:30pm.

Some Recent Studies on Atmospheric and Sea Surface Chemistry*

- Robert A. Duce, University of Rhode Island. Meteorology
Seminar. 4pm, Rm 54-100. Coffee 3:30pm, Rm 54-923.

Technology Fixes Versus Real Solutions: A Sociological Analysis*

— Pierre R. Aigrain, Henry R. Luce Professor of Environment and Public Policy. Respondent: Elias P. Gyftopoulos, Ford Professor of Engineering, Technology and Culture Seminar. 4pm, Rm 9-150.

The Laser Generation* - Shaoul Ezekiel, aero/astro, RLE. Aero/Astro General Seminar. 4pm. Rm 33-206.

Wind Driven Convection in the Ocean - Sidney Leibovich, Cornell University. Interdepartmental Fluid Mechanics Seminar. 4pm, Rm 2-338. Coffee 3:30pm, Rm 2-349.

The Organization of Immunoglobulin Genes – Dr. Philip Leder, National Institute of Health. Biology Colloquium. 4:30pm, Rm 6-120. Coffee 4pm, Rm 56-520.

Wednesday, May 1

Electrophoretic Light Scattering – Wilfred B. Veldkamp, G. Nuclear Engineering Doctoral Seminar. 2pm, Rm 24-117.

Use of Response Matrix in Kinetics Problems – C. Almeida, G. Nuclear Engineering Doctoral Seminar. 3pm, Rm NW12-222.

The Rift Valley of the Mid-Atlantic Ridge: Preliminary Results from Bathyscaphe Dives – Dr. Jean Francheteau, Centre Oceanologique de Bretagne, earth & planetary sciences. Earth & Planetary Sciences Seminar. 4pm, Rm 54-100. Tea 3:30pm, Rm 54-923.

Safety Probability Analysis and Design Evaluation for the GCFR Demo Plant – P. Delaquil, G. Nuclear Engineering Doctoral Seminar 4pm, Rm NW12-222.

The American Jewish Community After the October War* – Marshall Sklare, sociology, Brandeis University. Israeli-American Forum. 8:30pm, Stu Ctr West Lge.

Thursday, May 2

Paper Cutting Noise-Source Identification in Newspaper Folding Machines* – Jeffrey Fredberg, Cambridge Collaborative. Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Design and Construction of a Dual-Rotor Induction Motor* – J. Stetkar, G. Electric Power Systems Engineering Laboratory Seminar Series. 4pm, Rm 10-280.

Friday, May 3

The Gelation of Liquified Natural Gas with Methanol and Water – L. Shanes, G. Chemical Engineering Doctoral Seminar. 2pm, Rm 39-500.

Synthesis of Methane – S. Senkan, G. Chemical Engineering Doctoral Seminar. 3pm, Rm 39-500.

Nuclear Reactor Safety Studies – Methodology and Results – Saul Levine, Reactor Safety Study Project Staff Director, US Atomic Energy Commission. Mechanical Engineering Seminar. 3pm, Rm 3-133. Coffee 4pm, Rm 1-114.

Vibrations in Amorphous Systems* – Michael F. Thorpe, Yale University. Materials Science Colloquium. 4pm, Rm 9-150. Refreshments 3:30pm.

Community Meetings

Nominations Committee** - All undergraduates invited to attend hearings for the following committees: Equal Opportunity, IAP Policy, MIT-Wellesley Exchange. Wed, Apr 24, 7:30pm, Stu Ctr Rm 400. Info, x3-2696.

Today's Women** — Discussion group sponsored by Technology Wives Organization. Dr. Mary Howell, pediatrician, child psychologist, Harvard Medical School, will discuss families and careers. Thurs, Apr 25, 8pm, Stu Ctr West Lge.

Preprofessional Advising & Education Office – Dr. Ralph Obler, UCLA Medical School, will speak to interested students. Fri, Apr 26, 12n, Rm 10-193.

Women's Forum* - Continuation of March 25 discussion and planning session for next year. Mon, Apr 29, 12n, Rm 10-105.

National Day of Humiliation, Fasting and Prayer* – Sponsored by United Christian Fellowship & Campus Crusade for Christ. Tues, Apr 30: Community Service, 12n, Chapel. God's Purposes for His People – Dr. Richard Lovelace, Gordon Conwell Theological Seminar. 8pm, Chapel.

Honorary Matrons' Spring Luncheon*** - Wed, May 1, Stu Ctr Mezzanine Lge. Sherry and juice 12:15pm, luncheon 1pm.

Student Committee on Educational Policy & Academic Projects Staff* – Wed, May 1, 7:30pm, Stu Ctr Rm 473.

Grievance Committee* - Sun, May 5, 6pm, Stu Ctr Rm 401.

MIT Club Notes and Meetings

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

Chinese Choral Society** - Sun, 3pm, Stu Ctr Rm 473.

Goju Karate Club* - Beginners join class first week of each month. Meetings Mon, Thurs, 7-9pm, 4th fl Stu Ctr. Terry or Dick, 440-9631.

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

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

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

MIT Ballroom Dance Club** — For anyone who enjoys ballroom dancing or would like to learn. Instruction provided. Wed, Apr 24, 7:30pm, Sala. Info, Carl Sharon or Pete Travis, 536-1300.

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

MIT-Harvard AAU Water Polo Team* - Competition with local teams and in tournaments in NY, Virginia and Canada. If interested, attend biweekly practices, Mon & Wed, 5pm, Alumni Pool.

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

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

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

MIT Scuba Club** - Compressor hours: Mon, Fri, 4-6pm, Alumni Pool. Members: Pool Session Wed, May 1, 8-10pm, Alumni Pool.

Scuba Club*** - Election of officers, films on hand. Wed, Apr 24, 8pm, Stu Ctr West Lge. Refreshments.

MIT Tiddlywinks Association* - Meetings Wed, 8-11pm, Stu Ctr Rm 491. New members always welcome.

MITV News - The student operated television news organization tapes its weekly program Thurs, 8pm, CAES B&W studio, Rm

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

Rugby Club** - Practices Tues, Thurs, 5pm; games Sat, 1:30pm, Briggs Field.

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

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

Technique* - Yearbook staff meetings Sat, 11:30am till late afternoon, Stu Ctr Rm 451. New staffers & responsible critics welcome.

Undergraduate Physics Community** - Social hour for physics students and faculty. Wed, 5pm, Rm 6-209 (Physics Lge). Refreshments.

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

White Water Club** - Pool session. Tues, Apr 23, 8-10pm, Alumni

Women's Gymnastics Club* - Mon-Fri, 4-6pm, duPont Gym. Info, Ursula, x3-5954.

Zero Population Growth* - Meeting, with election of officers. Thurs, Apr 25, 5pm, Stu Ctr Rm 002.

Wellesley Events

You Can't Take it With You - Wellesley College Theatre production by Kaufman and Hart, directed by Paul Barstow. Fri, Apr 26 & Sun, Apr 28, 8pm; Sat, Apr 27, 7:30pm; Alumnae Hall Auditorium.

The Claude Lorrain Album* - Sixty drawings from the collection owned by Norton Simon, Inc. Museum of Art. Through Sat, June 8, Wellesley College Museum, Jewett Arts Center. Hours: Mon-Fri, 8:30am-5pm; Sat, 8:30am-12n, 1-5pm; Sun, 2-5pm.

Social Events

What Makes Mormons Tick? - Simple presentation of whats, whys, hows of the Mormon Church. Informal discussion, refreshments. Thurs, Apr 25, 7:30pm, Stu Ctr Mezzanine Lge. Drop in & take a

Gay Dance* - Come and celebrate spring at the Student Homophile League's dance, Fri, Apr 26, 9pm, Walker Mem. Admission \$1.25, \$1 if you bring a flower, Free beer for first 100 people. Everyone welcome, gays and straights, men & women.

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

Pot Luck Coffeehouse* - Fri & Sat, 8:30pm-12m, Stu Ctr Mezzanine Lge, sponsored by Stu Ctr Committee. Live music, free coffee, cider, donuts. Come & listen. If you want to perform call Ernest Perevoski, x9610 Dorm, for audition.

Friday Afternoon Club** - Music, conversation, condiments, all the cold draft beer you can drink. Fri, 6pm, Ashdown bsmnt. Admission: \$1 men, 50 cents women, Must be 18 or over.

Movies

Rheological Behavior of Fluids; Cavitation - Fluid Mechanics Film. Thurs, Apr 25, 4pm, Rm 33-419.

O Pagador de Promessas - Humanities Film. Thurs, Apr 25, 4:30pm, Rm 14N-0615.

Media: This is Marshall McLuhan; "A" - BEL Spring Film Series. Thurs, Apr 25, 5pm, Projection Rm off 10-400. Coffee.

Media: This is Marshall McLuhan; "A" - BEL Spring Film Series. Fri, Apr 26, 12n, Projection Rm off 10-400. Coffee.

Spanish Earth - Humanities Film. Fri, Apr 26, 2pm, Rm 14N-0615.

Radical Cinema: Cuba Va- Science Action Coordinating Committee. Fri, Apr 26, 6:45pm, Stu Ctr Rm 407. Admission \$1.

The Ritual - Film Society. Fri, Apr 26, 7:30pm, 9:30pm, Rm 6-120. Admission \$1.

Seven Days in May - Midnite Movie Series. Fri, Apr 26, 12m, Sala. Free admission & popcorn, MIT or Wellesley ID required. Bring

A Funny Thing Happened on the Way to the Forum - LSC. Sat, Apr 27, 7:30pm, 10pm, Rm 26-100. Admission 50 cents, ID

Kuche Daage* - SANGAM. Indian movie with subtitles. Sun, Apr 28, 3:30pm, Rm 26-100. Admission 50 cents with ID. Refreshments

African Queen - LSC. Sun, Apr 28, 7:30pm, 9:30pm, Rm 10-250. Admission 50 cents.

Waves in Fluids; Generation and Propagation of Sound - Fluid Mechanics Films. Tues, Apr 30, 4pm, Rm 33-419.

Triumph of the Will - Humanities Film. Wed, May 1, 7pm, Rm 10-250.

Waves in Fluids; Generation and Propagation of Sound - Fluid Mechanics Films. Thurs, May 2, 4pm, Rm 33-419.

Computer Aesthetics: Computer Animation; Experiments in Motion Graphics; Permutations. BEL Spring Film Series. Thurs, May 2, 5pm, Projection Rm off 10-400. Coffee.

Zebriskie Point - Humanities Film. Thurs, May 2, 7pm, Rm 10-250.

Computer Aesthetics: Computer Animation; Experiments in Motion Graphics; Permutations. BEL Spring Film Series. Fri, May 3, 12n, Projection Rm off 10-400. Coffee.

Radical Cinema: Come Back to Africa - Science Action Coordinating Committee. Fri, May 3, 6:45pm, Stu Ctr Rm 407. Admission 50 cents.

The Seventh Seal - Humanities Film. Fri, May 3, 7pm, Rm 10-250.

Innocent Sorcerrers - Film Society. Fri, May 3, 7:30pm, 9:30pm, Rm 6-120. Admission \$1.

First Circle - LSC. Fri, May 3, 7:30pm, 10pm, Kresge Auditorium. Admission 50 cents, ID required.

Reefer Madness - Midnite Movie Series. Fri, May 3, 12m, Sala. Free popcorn & admission, MIT or Wellesley ID required. Bring blanket.

Cops and Robbers - LSC. Sat, May 4, 7:30pm, 10pm, Rm 26-100. Admission 50 cents, ID required.

Samurai Banners* - Japanese Student Association. Sun, May 5, 7:30pm, Rm 26-100. Admission 50 cents.

Fearless Vampire Killers-or-Pardon Me, Your Teeth are in My Neck - LSC. Sun, May 5, 8pm, Rm 10-250. Admission 50 cents.

Music

Noon Hour Concert* - Martin Pearlman, harpsichord. Works by Scarlatti & Bach. Thurs, Apr 25, 12n, Chapel. Free.

MIT Glee Club* - Concert with Mt. Holyoke Concert Choir. Pieces by Bach, Haydn, Mozart. John Oliver, conductor. Sun, Apr 28, 3pm, Kresge Auditorium. Free.

Chamber Music Society Concert* - Marcus Thompson, director. Program includes works by Sammartini, Bach, Bartok, Mozart. Sponsored by Music Section, Mon, Apr 29, 8pm, Chapel. Free.

Clavichord: Lecture-Recital* - Bernard Brauchli. Program of Renaissance music. Sponsored by Music Section. Thurs, May 2, 12n,

MIT Choral Society* - John Oliver, conducting. Program includes Bruckner, Hindemith, Schubert. Tickets: \$3 reserved, \$2 general admission, \$1 MIT students. Sun, May 5, 3pm, Kresge Auditorium.

Theatre and Shows

Pygmalion* - George Bernard Shaw's romance will be presented by MIT Dramashop. Apr 25-27, May 3 & 4, 8:30pm, Kresge Little Theatre. Tickets \$2.50 in Bldg 10 Lobby; reservations, x3-4720.

Black Bread and Onions* - A dramatic rendering into English of Yiddish folktales, featuring Martin Bard, Sholom Aleichem, Peretz, and others. Sun, Apr 28, 7pm, Stu Ctr Mezzanine Lge. Reception following performance. Free.

Dance

Folk Dance Club* - International, Sun, 7:30-11pm Sala. Balkan, Tues, 7:30-11pm, Stu Ctr Rm 491. Israeli, Thurs, 7:15-10:15pm, T Club Lge, duPont. Afternoon Dance Break, Fri, 12:30-1:30pm, Kresge Oval.

Exhibitions

Interventions in Landscape* - Major exhibition of artists' work in the environment, sponsored by the MIT Committee on the Visual Arts. More than 15 artists, including Robert Smithson, Patricia Johanson, Charles Simonds, Alice Aycock, Nancy Holt, Robert Morris and Richard Serra. Public preview Fri, Apr 12, 8pm, Hayden Gallery. Exhibit through Sat, May 11, Hours: Mon-Sat, 10am-4pm, Tues 6-9pm; Sun & holidays, 12n-4pm.

Music Library Exhibit - Chinese musical instruments.

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

Athletics

Wednesday, April 24 - V&F Tennis. Dartmouth, 4pm. Saturday, April 27 - V Baseball. Coast Guard, 2 games, 1pm. V Lacrosse, Trinity, 2pm. JV/F Lacrosse. St. George's, 2pm. Lt Crew. Geiger

Cup, Columbia, Cornell, Coast Guard, F-9:45am, JV-10:30am, V-11:15am. MV Sailing Lark. WV Sailing Gerry Reed Trophy. Monday, April 29 – JV/F Baseball. Northeastern, 4pm. Wednesday, May 3 - JV/F Baseball. Emerson, 4pm. F Lt Crew. Tabor, 4pm. JV/F Lacrosse, Milton Academy, 3pm. W Tennis Simmons, 3:30pm. Thursday, May 2 - F Tennis, Books School, 3:30pm. V Tennis Brandeis, 4pm. Saturday, May 4 - V Baseball. Brandeis, 2pm. Hvy Crew. Cochrane Cup, Dartmouth, Wisconsin, F-10:30am, JV-11:15am, V-12n. V Lacrosse. Springfield, 2pm.

Religious Services and Activities

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

Baha'i Discussion Group of MIT* - Informal discussions for people who would like to know about the Baha'i faith. Tues, 8pm, Rm 1-136.

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

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

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

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

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

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

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

Protestant Worship Services* - Sun, 11am, Chapel.

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

Tech Catholic Community Programs* - Wrestling with Prayer: Lenten services led by Fr. MacNevin, with a free, simple supper; Thurs, Feb 28-April 11. Ecumenical Bible Study: Tues, Feb 26-April 30, 12n-1pm, 2nd fl seminar rm, Religious Counselors

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

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

Westgate Bible Study* - Covering Revelations, last book of New Testament. Wed, 8pm, Westgate apt 1202. Info, 494-8778.

Announcements

Foreign Students - If you are travelling outside the US during the summer, please come see Ellen, Foreign Student Office, Rm 3-107, before May 1 for your DSP-66 or I-20.

Paper - Will be collected for recycling anywhere in and around MIT. If you are cleaning out files, saving newspapers or computer material, etc, call 723-4699 or 494-0284 to have it picked up. Thanks!

Final Examinations - All students should obtain an examination schedule from the Information Ctr, Rm 7-111. Examinations not listed or a conflict in examinations must be reported to the schedules officer by Fri, Apr 26.

4.051 Creative Photography I Lottery - Sign up at the Photo Lab, Rm W31-310, from Wed, May 1-Wed, May 8. Names of winners will be posted, Fri, May 10.

Summer Session - Registration material for the 1974 regular Summer Session will be available beginning Wed, Apr 17, Registrar's Office, Rm E19-335. Forms must be filled in and returned to the Registrar's Office by Wed, May 8.

Dining Service

Dining Specials: Thursday, April 25 - Lunch: Hawaiian Holiday-Polynesian chicken almond. Dinner: beef burgandy over rice. Friday, April 26 - Lunch: fish & chips. Dinner: baked stuffed flounder with tomato sauce. Monday, April 29 - Lunch: manicotti with Italian sauce. Dinner: salisbury steak. Tuesday, April 30 - Lunch: corned beef brisket. Dinner: beef stew over rice. Wednesday, May 1 - Lunch: swanky franks. Dinner: shrimp & halibut mariner.

Placement Interviews

The following companies will be interviewing Thurs, April 25-Mon, April 29. Those interested may sign up in the Career Planning and Placement Office, Mon-Fri, 9am-4pm, Rm 10-140, x3-4733.

Thursday, April 25 - General Resistance, Inc. Monday, April 29 -Stanford Research Institute.

*Open to the public

*Open to the MIT community only

***Open to members only

Send notices for May 1 through May 12 to the Calendar Editor, Room 5-111, Ext. 3-3279, before noon Friday, April 26.

Baltimore Receives Award from Science Academy

An MIT virologist received an award Monday night (April 22) from the National Academy of Sciences for his research into the relation between viruses and cancer.

Dr. David Baltimore, the American Cancer Society Professor of Microbiology at MIT, is one of five persons honored for outstanding scientific achievement.

Dr. Baltimore, 36, received the US Steel Foundation Award in Molecular Biology. The award, a gold medal and an honorarium of \$5,000, is presented for recent



Professor Baltimore

notable discovery by a young scientist in molecular biology.

In the award citation, the Academy recognized Dr. Baltimore "as a distinguished leader in virus research who, by his discoveries on the reproduction and enzymology of RNA viruses, has greatly advanced the science of molecular biology."

The awards were presented at the headquarters of the National Academy of Sciences in Washington

Professor Baltimore's most important scientific contribution is the discovery of reverse transcriptase, an enzyme which catalyzes RNA-directed synthesis of DNA, in purified preparations of RNA tumor viruses. This discovery in 1970 suggests that the mechanism for replicating RNA tumor viruses involves DNA, which is the substance dominating normal cellular processes, and it provides a tool for studying the relation between viruses and can-

Dr. Baltimore, who heads the virology research group at MIT's Center for Cancer Research, holds career support from the American Cancer Society for his study of the growth of viruses which either cause cancer or provide models for understanding cancer-causing viruses. In 1973, the Society announced that it would provide \$1,159,000 toward Dr. Baltimore's support for the rest of his cancer research career of approximately 30 years.

Dr. Baltimore received the first Gustav Stern Award in Virology in 1970. In 1971 he was awarded the Warren Triennial Prize from the Massachusetts General Hospital and the Eli Lilly and Co. Award in Microbiology and Immunology.

He has been editor of the Journal of Virology since 1969 and of the Journal of Molecular Biology since 1971. Dr. Baltimore served on the National Science Foundation Advisory Panel for Genetic Biology from 1969 to 1972, the Cancer Research Center Review Committee of the National Institutes of Health from 1971 to 1973 and presently serves on the Cancer Special Program Advisory Committee of the National Institutes of Health.

Others receiving awards were:
Lyman Spitzer, Jr., Young Professor of Astronomy and Observatory at Princeton University,
Phillip Eisenberg, president of
Hydronautics, Inc., in Laurel,
Md., Renato Dulbecco, assistant
director of research at the Imperial Cancer Research Fund,
London, and G. Evelyn Hutchinson, Sterling Professor of Zoology
Emeritus at Yale University.

'76 Class Ring Orders Due

Class rings, ranging in size from "miniature" to "jumbo heavy," may be ordered by members of the Class of 1976 in the lobby of Building 10 between the hours of 10 and 4, April 30-May 2.

A deposit of \$15 will be required by a representative of Balfour Jewelry, who will be on hand to display the various styles and finishes of rings. Price is dependent on the weight of gold selected and the amount of engraving for a student's name.

According to Joseph T. Tavormina, chairman of this year's ring committee, delivery is expected in the early fall.



Harpsichordist Maryse Carlin

Harpsichordist to Perform in Chapel Concert Monday

Harpsichordist Maryse Carlin will appear as guest artist with the MIT Chamber Music Society under the direction of Professor Marcus Thompson in a concert in the MIT Chapel at 8pm Monday, April 29.

Mrs. Carlin, who recently performed with Professor Thompson, a violist, at a Young Concert Artists recital in New York City, will play the Brandenburg Concerto No. 5.

The Chamber Music Society will also offer Sammartini's Concerto Grosso, Opus 11, No. 4 in D minor, the first two movements of Bartok's String Quartet No. 2 and Mozart's Divertimento in F major, K. 138. The concert, sponsored by the MIT Music Section, will be open to the public free of charge.

Of Professor Thompson's recent New York concert, New York Times critic Raymond Ericson said: "Six years have passed since Marcus Thompson made his viola debut here under the sponsorship of Young Concert Artists. They have obviously been years of growth, for in his recital in the Hunter College Playhouse on Monday night, again under the same sponsorship, he played with the authority of a mature artist. He combined vigor and sensitivity, rhythmic power and tonal color, attesting to the complete inter"Playing the viola d'amore, Mr. Thompson presented two striking pieces from the early 18th century by Attilio Ariosti"... Mr. Thompson, perfectly at home on the forerunner of his present instrument, played brilliantly, filling out the score with suavely handled ornamentation."

Mr. Ericson added: "A highly lyrical, almost impressionistic work by Vincent Persichetti, 'Infanta Marina—Reflections on a Poem by Wallace Stevens, for Viola and Piano,' was superbly played by the violist and Seth Carlin (pianist). The two ended the program with a handsome performance of Brahm's Sonata in F minor (Op. 120, No. 1), sometimes rhapsodic, sometimes subtly colored and textured."

TWO Offers Scholarship

The Technology Wives Organization (TWO) is seeking applications for its scholarship program for the 1974-75 academic year.

The program provides a cash grant to a student wife to further her education in college, technical or vocational school at any level. Last year a \$600 scholarship was given to Linda Napier for study at Cambridge Junior College.

Scholarship applications are available from Rita Moore, 10 Marlboro Rd., Lexington, 02173, telephone 862-1039. Deadline for filing applications is April 27.

5 Women Poets To Read Works

Poet Denise Levertov will be featured in a two day festival of five women poets reading from their work, Tuesday, April 30 and Thursday, May 2 at MIT.

The readings are co-sponsored by the Department of Humanities and the Council for the Arts.

On Tuesday evening at 8pm in Rm. 14E-304, Ellen Bass, Celia Gilbert and Sam Stamper will read. Ms. Bass is co-editor of No More Masks, "An Anthology of Poems by Women," published recently by Doubleday.

Ms. Gilbert is poetry editor of The Boston Phoenix and Sam Stamper is a young, black woman attending Northeastern Law School.

On Thursday at 8pm in the Mezzanine Lounge of the Student Center, Ms. Levertov will read with Miriam Palmer, author of a volume of poetry, Mothers and Daughters. Ms. Levertov has published several volumes of poetry including To Stay Alive and Relearning the Alphabet.

Radio Antennas Make Precise Measurements

radio antennas are aimed at these radio sources, and by comparing the times at which the radio waves arrive at the different antennas, the scientists can determine the positions of the antennas using triangulation. Differences in the wave arrival times are measured within a ten-billionth of a second using atomic hydrogen clocks—the most stable clocks available.

Some of the earth measurements accomplished by the scientists are remarkable. Using an antenna at the Haystack Observatory in Westford, Mass., with another antenna operated by Cal Tech's Jet Propulsion Laboratory in California, the scientists have repeatedly measured the width of the United States within ten inches. The scientists have also measured the directional relationship of the antennas, enabling them to determine how the earth wobbles as it spins through space.

They have even detected "earth tides"—the rise and fall of solid earth under the influence of the sun and moon—of about six inches.

Involved in the earth measurements were professor of geophysics and physics Irwin I. Shapiro, Douglas S. Robertson, Curtis A. Knight, and Professor Counselman of MIT, Haystack Observatory scientists Allan E.E. Rogers, Hans F. Hinteregger, Southard Lippincott, and Alan R. Whitney, with Thomas A. Clark of NASA's Goddard Space Flight Center and Arthur E. Niell and Donald J. Spitzmesser of the Jet Propulsion Laboratory.

According to Professor Counselman, the scientists hope soon to increase their accuracy tenfold to enable them to measure directly the infinitesimal drift of the continents.

nents.

Such precise measurements constitute important information to earth scientists formulating theories about earth structure and also to mapmakers seeking precise measurements of earth distances. They also may have an important role in earthquake prediction. The Haystack and MIT scientists are beginning work under a grant from the US Geological Survey aimed at the development of a truck-mounted antenna to measure crustal movements in potential earthquake zones. Such precision measurements may enable scientists to detect the slight displacements of the earth's crust which are believed to precede an earthquake.

Besides using radio waves from astronomical sources to measure earthbound antenna positions, the scientists have also used radio waves from spacecraft to determine the spacecraft positions.

In cooperation with NASA, MIT and Haystack scientists used VLBI to track the astronaut-driven Lunar Rover across the face of the moon during Apollo 16, and were able to determine the Rover's distance and direction from the landed Lunar Module at all times with an error less than 30 yards. They compared their VLBI results with the position of the Rover calculated from the Rover's on-board odometer and compass.

The MIT and Haystack scientists are also using VLBI to measure the distances and directions between the five radio transmitters left on the moon by Apollo astronauts, and to measure the way the moon wobbles around, in order to improve lunar maps and to learn about the structure of the moon.

There is a postal workers' strike in Canada. Please do not send mail to Canada until the strike is ended.

VLBI Probes Galactic Water Vapor Masers

(Continued from page 1)

VLBI consists of using two or more widely separated powerful radio telescopes to measure emissions from a single astronomical source. When the signals are superimposed, interference patterns are created that allow the size and shape of the source to be determined. These patterns occur because the radio signals arrive at the radio detectors at slightly different times and angles.

Professor Burke and his colleagues used radio antennas at Haystack Radio Observatory, the Naval Research Laboratory at Maryland Point, Md., and the National Radio Astronomy Observatory at Greenbank, W.Va., for their measurements.

After careful studies of a number of galactic water vapor clouds at a wavelength of 1.35 centimeters, the MIT scientists concluded that the sources are, indeed, closely related to the formation of certain types of stars.

In previous research, Professor

Burke and his colleagues have postulated that the sources may be related to star formation.

In examining the emissions of young stars themselves, Professor Burke and his associates found that one-tenth of the very young stars had associated water vapor masers. They also discovered that the masers were found most frequently in regions of the galaxy associated with star formation. The MIT scientists also found that the number of water vapor masers found in the sky was comparable to what might be expected if they herald the birth of stars.

Long term studies of the size, motion, and changes in the water vapor masers led Professor Burke to believe that the so-called "hot spot" model of their structure—proposed by astronomers at Cal Tech, Cornell, and Harvard—seems to have the most validity. This model postulates that, although the entire region of a water vapor maser is radiating, the water vapor cloud is actually amplifying radiation from a hot spot in its middle.

Because the positions of the masers appear to be relatively stable, Professor Burke said they might be used as position references in the sky and to calibrate VLBI equipment to be used in other experiments. He said that his data indicates the feasibility of a joint Russian-American satellite with a radio antenna on board which would act as one antenna of a VLBI system. The other antenna could be any one of a number of earth-based antennas suitable for the job. The satellite could use the galactic water vapor systems as calibrators of the equipment.

Now that VLBI techniques have been confirmed by studies of the strong, well-defined water maser signals at the shorter wavelengths, said Professor Burke, the time has come to study quasars, those more elusive radio sources in space that have long intrigued astronomers. Using the same short wavelengths, Professor Burke hopes to be able to penetrate the depths of quasars and to obtain more precise information on what they really are.

Page 8, Tech Talk, April 24, 1974

Ingenuity Is Key in Freshman Physics Contest

Could you make a motor using only two paper clips, a pair of thumb tacks, a short piece of wire, a couple of light-weight magnets and a sewing needle?

Those were the materials used by Ward Harriman, a freshman from (591 West Sherman St.) from Lebanon, Ore., who won a contest organized by two professors at MIT for a first-year class in physics.

Mr. Harriman's tiny motor, dwarfed by its cigaret pack-size wooden base, operates at 10,000 revolutions per minute, by far the fastest of some 60 motors that made it to the testing bench for the contest.

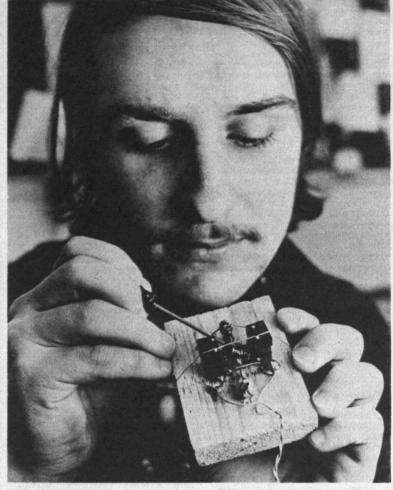
Subject 8.02, taught by Associate Professors Michael S. Feld and Wit Busza, deals with electricity, magnetism and light.

"We decided to have the contest," Professor Feld said, "as a way of making the course fun for students, as a way of having a practical illustration of fundamental laws."

There are 600 students in the course. Nearly all took a crack at building a motor, but many found the task more difficult than expected. Mr. Harriman's winning motor, for example, was the fifth version he constructed.

He used the sewing needle as the shaft of the motor and soldered two thumb tacks at right angles to the shaft, their points opposite each other. The tacks became the armature of the motor.

For a commutator Mr. Harri-



Ten-thousand revolutions per minute. That's the operating speed of the tiny motor made by Ward Harriman for Subject 8.02.

man used the two magnets, which are the flexible kind commonly used by the telephone company to fasten junction boxes to metal desks

"I cut the magnets in half and used them doubled up," Mr. Harriman said. "I knew that would increase the magnetic field and thereby the torque, and hopefully the speed."

The revolutions per minute were measured with a portable strobe light. The rapidly flashing strobe is capable of making the whirling armature appear to be stopped. When "stop action" is achieved the reading on the strobe is the revolutions per minute of the motor.

'Sidewalk Labs' to Bring Science Closer

The average citizen gets to watch space launches on television or read about medical research, but he seldom gets a chance to play with scientific apparatus himself or to exercise his own scientific curiosity about the world.

A recent meeting of scientisteducators at MIT aimed at doing something about this isolation of laymen from active, hands-on scientific inquiry.

Under auspices of MIT's Council for the Arts, science communicators and representatives of science education centers around the country met at MIT to discuss new ways of developing community science programs.

The 20 participants assessed traditional educational programs, sponsored by nature centers, science museums, amateur science clubs, and teacher training

12 noon

1:00 pm

2:45 pm 3:00 pm

12 noon

1:00 pm

2:45 pm

3:00 pm

12 noon

1:00 pm

2:45 pm

3:00 pm

12 noon

1:00 pm

2:45 pm

3:00 pm

8:00 pm

12 noon

1:00 pm

2:45 pm

3:00 pm

12 noon

1:00 pm

2:45 pm

3:00 pm

12 noon

1:00 pm

2:45 pm

3:00 pm

Each Saturday

Each Sunday

Each Monday

Each Tuesday

Each Wednesday

Each Thursday

Each Friday

centers, and also explored new approaches to making science available to citizens.

Among these new approaches are community-based science laboratories or workshops, akin to the community art centers in operation across the country.

The seminar's agenda included discussions of several such programs around the country by representatives of the programs, as well as open discussions on methods of organizing and financing community science programs.

According to the chairman of the seminar, Philip Morrison, Institute Professor and professor of physics "In the seminar, we emphasized programs that involve both adults and students in using materials as well as symbols and images as they explore the sciences for themselves."

Among the participants in the seminar were James Butler, Communications Director for the American Association for the Advancement of Science; Jeanne Faulkner, director of the Harlem Cultural Center; Dr. Frank Oppenheimer, director of the Exploratorium in San Francisco; Michael Spock, director of the Children's Museum of Boston; and Richard Stephens, program manager of the National Science Foundation Program for the Public Understanding of Science.

Marksmanship

A five week course in basic pistol marksmanship will be offered by the MIT Pistol and Rifle Club beginning Thursday, May 2. Those interested call Thomas P. McLennan at x3-3296 after 3pm.

Interventions in Landscape April 12 to May 11, 1974 MIT Hayden Gallery Film and Video Schedule

Nancy Holt's Zeroing In (video, 28 min.) Don Burgy's April 21, 1973 (video, 30 m

Don Burgy's April 21, 1973 (video, 30 min.) Robert Morgan's Amalgam (film, 5 min.) Nancy Holt and Robert Smithson's Swamp (film, 20 min.)

Charles Simonds' Birth, Landscape — Body — Dwelling and Dwellings (film, 21 min.)
Robert Smithson's Spiral Jetty (film, 30 min.)
Robert Morgan's Amalgam (film, 5 min.)
Walter de Maria's Hard Core (film, 30 min.)

Charles Simonds' Birth, Landscape — Body — Dwelling and Dwellings (film, 21 min.) Walter de Maria's Hard Core (film, 30 min.) Robert Morgan's Amalgam (film, 5 min.) Don Burgy's April 21, 1973 (video, 30 min.)

Nancy Holt's Locating No. 2 (video, 14 min.) and Walking Around in Circles (video, 15 min.)

Don Burgy's April 21, 1973 (video, 30 min.)

Robert Morgan's Amalgam (film, 5 min.)

Nancy Holt and Robert Smithson's Swamp (film, 20 min.)

Robert Smithson's Spiral Jetty (film, 30 min.)

Nancy Holt and Robert Smithson's Swamp (film, 20 min.)
Charles Simonds' Birth, Landscape — Body — Dwelling and Dwellings (film, 21 min.)
Robert Morgan's Amalgam (film, 5 min.)
Don Burgy's April 21, 1973 (video, 30 min.)

Nancy Holt's Zeroing In (video, 28 min.)
Don Burgy's April 21, 1973 (video, 30 min.)
Robert Morgan's Amalgam (film, 5 min.)
Robert Smithson's Spiral Jetty (film, 30 min.)

Nancy Holt's Locating No. 2 (video, 14 min.) and Walking Around in Circles (video, 15 min.)
Don Burgy's April 21, 1973 (video, 30 min.)
Robert Morgan's Amalgam (film, 5 min.)
Nancy Holt and Robert Smithson's Swamp (film, 20 min.)

MIT Takes 'Guts' Frisbee Championship

> "MIT Beats Notre Dame"

In what? Calculus? Not at all.

An MIT team has finally bested that paragon of collegiate athletic virtuosity, Notre Dame, on a playing field.

At least that is the word brought back to MIT by John R. Kirkland, the Institute's premier frisbee thrower, from the national "Guts" championships held in Ann Arbor, Mich.

Kirkland, a senior from Orlando, Fla., reports that MIT's three-man team won the collegiate division, topping Notre Dame in the finals of the competition.

As Kirkland explained the game, the teams stand 15 yards apart with the players hurling frisbees at each other, trying to make their opponents miss or drop the throws.

"The lower limit on gut throws is 60 miles per hour," he said, "and that's 90 feet a second. With the teams 45 feet apart, that means that the most time you have to react and catch the frisbee coming at you is one-half second."

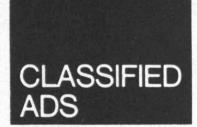
Kirkland, who bills himself as the world's ambidextrous frisbee champion, has been giving exhibitions with a recent MIT graduate, Douglas M. McCrae of Melrose.

Kirkland sees frisbee competition becoming an Olympic and collegiate sport and is doing what he can to move it in these directions.

Heywood Hale Broun, the CBS sportscaster, recently did a segment on Kirkland and frisbee playing on the network's Saturday evening news program. The sequence was filmed in MIT's Great Court

MITV News Documentary

MITV News has produced its first documentary "Welcome to the Complex Plane," highlighting events at the Institute during last weekend's Kaleidoscope activities. The 30 minute documentary will be shown continuously, noon to 2pm, Thursday, April 25, in Room 9-150. The documentary will not pre-empt MITV's regular weekly news show in the Building 7 Lobby, 9am to 3pm, Friday.



Ads are limited to one per person per issue and may not be repeated in successive issues. All ads must be accompanied by full name and Institute extension. Only Institute extensions may be listed. Members of the community who have no extensions may submit ads by coming in person to the Tech Talk office, Room 5-111, and presenting Institute identification. Ads may be telephoned to Ext 3-3270 or mailed to room 5-105. Please submit all ads before noon, Friday, April 26.

For Sale, Etc.

Unicycle, \$25; 3 spd bike w/lite, bskt, \$35; 5 gal jar terrarium, \$25; barbell set, \$10; lg mirror, \$5. Michael, x9628

Sony TC8 8 trk crtrdg rcrdr, \$50; GE 12" b&w tv, \$20; assort Pentax filters & acces, \$1.25/ea. Kathy, x7725 Linc.

Wht shoes, f sz 5, b nw, nvr worn, were \$20, now \$15. Lee, x3-1782.

Used f 3 spd bike, \$15. Maria, 876-9635.

Used wd sandbox w/out sand, about 4 sq' x 1' hi. Tony, x3-5717.

CM-911 stereo power amp, 140-140 W RMS/ch at 8 ohms, 190-190 W RMS/ch at 4 ohms, less .2% distort, sgnl/noise 93 DB, orig \$540, now \$299. Dave, 267-8187, aft 8pm.

OHM-C Idspkrs, 2, list \$300, \$175 or best. Call, 864-3468.

Miracord 50H Mark II trntbl, 1½ yrs, recent fac srvc, \$130. Mark, 723-2986.

Graves USA Ski Patrol 195 cm skis, Miller sz 11 boots, Look Nevada bndgs, poles, best. Bob or Bruce, 547-1221.

Compact stereo, fair cond, orig \$200, \$75. Guy, x8681 Dorm.

VW Continental tire for beetle, 5.50x15, used less 50 mi, \$15. Dave, x3-3708.

Full sz regrig, gd cond, \$35. Call, 254-4017.

Conv sofa, full sz, \$50. Prof Mahoney, Call, 864-0616.

Whis, 2, BMW 2002, w/snows mtd, \$25 or best; Nikon F camera w/case, f1.7, 58 mm lens Aetna f2.8, 135 mm & f5.6, 200 mm lenses, Gossen Lunasix mtr, exc cond, best. Jack Frailey,

BF Goodrich DR70x13 Life Saver radials, 4, only 5 K. Joan, x7511 Linc.

Running shoes, sz 9, exc cond. Chet, x8-4509 Draper.

M Peugeot UO-8 10 spd bike, bl, 23" frame, perf cond; Pioneer hdphone adapter. David, x3-4157.

Martin D12-20 12 str guitar & soft case, 7 yrs, perf, \$450 firm. Joe, x3-7572.

Moving to Calif, must sell 9x12 carpet; 5x7 rug; chrs; bkshlvs; refrig; desk; loft & other sm items. Jeanne, 492-3155.

Cabin cruiser, 20' fbrglas w/canopy top, slps 2, 80 hp eng, Sunoco trlr & elec winch, \$1,700. Larry, x8-4603 Draper.

Gdyr snows, 185/70 SR13, for Capri, 1 seas, (2/1), \$65. x5325 Linc.

Schwinn girls 3 spd bike, 2 yrs, exc cond, make offer; also want cheap microscope, only lo & hi power neces. Robert, x3-3230.

Wool rug w/pad, cream, 12x12, \$140; wool rya rug w/pad, prpl hued, 8x11, \$125; qn matt & box spr, xtra firm, lk nw, \$120. Jerry, 262-2543.

Portacrib, \$10. x3-3145.

VW hydraulic jack, \$20; framed abstract print, \$17; elec heater, \$10; wd desk, \$45; solid st tv, \$80; bureau, \$35. Ken, x3-6162.

Violin, exc cond, about \$400. Bob, 262-6929, evgs.

LR set, 3 pc: sofa conv to sgl bed, 2 chrs; coffee & 2 rnd tbls; 9x12 red rug; K set w/4 chrs; old refpig, gd cond; full sz bed w/nw matt, box spr. x8-1166 Draper.

BSR 8 trk player/rcrdr, gd cond, \$30. Jim. 247-8764, lve msg.

Hedstrom tw sz convert carriage/ stroller, gd cond, \$35. Dick, x3-2186.

Wilson T-3000 tennis rckt, 4 5/8 M, used once, \$35. Lloyd, x3-2285.

Mahog wd cut to any dimensions, lowest prices, great for making spkr sys. Dennis, 254-4017.

B nw Champion spark plugs, 6, J-10Y, \$2. Larry, x3-4614.

Solid mpl sgl bed & matt, \$25; vac clnr, \$10; toaster, broiler, corn popper, \$2/ea; percolator & acces, \$1; radio, rcrds, planters, 10-50 cents; alum crutches, \$10; wd crutches, \$5. call, 643-6224.

Tckt, 1, MET Opera, "Rosencavalier," Apr 26, 8pm, center balc, \$5.50. Call, 661-3226.

Garrard SL95B, Shure M91E wint base, dust cover, \$75. Greg, 492-6983.

Tires, Sears belted, 2/ea H78x14 & H70x14, v little use, \$12/ea. George, x3-2398.

Panasonic amfm stereo & cassette, \$98; Garrard trntbl 40 B, mag crtrdg, \$40. Saed, x9258 Dorm.

Aquarium, 20 gal, fully equip w/mtl hood, gro-lux lite, ext & int filter, plants, fish, most supplies, \$60; numerous beaut hee plants. x8-1183 Draper.

(Continued on page 10)

Tech Talk, April 24, 1974, Page 9

(Continued from page 9)

Classical guitar, wide neck, nylon str, \$50 or best. Call, 494-8987.

Nikon type A focusing screens, 2, \$12/ea. Philip, x3-1545.

Camb garage sale, Sat, Apr 27, many interesting items, plants, antiques. Prado, x7896 Linc.

Mamiya/Sekor 500 DTL, w/50 mm f2 lens, case, UV filter, 7 mos, all for \$147. Call, 494-0338.

Nikkormat camers & 3 lenses, 135 mm, 28 mm, 55 mm, Micro-Nikkor, exc cond; Ziess camera, incl xtra 135 mm lens; both \$70. Call, 492-8563.

TV's: Ig screen thin port, exc cond, \$25; big clunky remote control, fair cond, \$10. Jeff, 868-4490.

Lg selection hseplants, prpl passion, lemon geranium, strawberry begonia, etc, Wed, 12-2, Rm 13-3078; also: beaut purebred Ger Shep nds cntry home.

Mikado rcrvr, 14 W RMS/ch, nw \$140, \$80; Weathers man trntbl, \$30; Roberts stereo, port rcrdr w/preamp outputs, wl last forever, \$40; Wollensak 6150 deck w/3 heads, 2 mtrs, \$90. Len Sherman, x3-3161.

Free: washing mach, nds fix, u haul, Dedham. L. Bannister, x3-6138.

Tape deck hackers; famous make mdl 40 info avail, elec & mech adjustments, PC layouts, manuals, schematics, etc. Boris, x3-2589.

Used tires: (1) G78x15, \$5; (1) J78x15, \$10; 2 stud snows, H78x15, \$40; all on Caddy whls; (1) Michelin 185-380/15x, \$5. Ray, x7573 Linc.

Upright piano, gd cond, tone & action, attrac antique style bench, u move 1st fl. \$150: ac. 6300 BTU Amana, 1 seas, \$159; 3 rugs: 9x12 blk, gold, moss grn, \$49; 9x12 oriental, \$29; 4x6 org, \$16. Marni, x3-4396.

Harmony banjo, 5 str, w/free intro lesson, \$45; TEAC 1230 tape deck, reas. Jim, 646-6724.

Boys 24" Raleigh bike, 3 spd, gd cond, \$30, Call. 266-0702.

Minolta STR101/f:1.4/case, lk nw, \$185; 135/f:2.8 Rokkor, \$70; 35/f:2.8 Tamron, \$45; angle finder V, \$20. Aldrich, x3-5360.

Canon FD 135 mm f/3.5 Tele lens w/case, hood & f & 6 cvrs, lks b nw, used 3x, was \$150, \$90; blond wd chest 6 drwrs, w/dust cvrs, exc cond, \$30; 2 leath bike seats, b nw, \$5 ea. Barry, x3-5358.

Realistic STA-45B 70 W solid st SM rcrvr, exc cond, \$70; baby carriage, \$25; 3 pc crnr sofa, \$40; formica top tbl, \$14; etc. x3-2686.

Elec mimeograph mach, AB Dick 525, 5 yrs, \$100. x3-2282.

Stereo amp, \$50; mono tuner, \$20; 12" spkr sys 1; KLH 4, \$60; KLH 10, \$35; 12 str elec, \$40; color tv, as is, \$30; nego. Ernest, x9610 Dorm.

Market cart, yel, fits 4 bags groc, \$5. x3-2281.

Panasonic 8 trk tape rerdr, as nw. Call, 776-7253.

Brn sofabed, \$30. Steve, x3-6893.

exc cond, ask \$60. x3-2689.

Mtl outdoor easel w/palette holder, \$15 or best. B. Clark, x3-4603.

Petri 35 mm camera w/soft leath case,

F White Stag solid red tank suit, sz 40,

b nw. Erna, 237-2466.

Comp Beethoven Str Quartets, (Fine Arts Str), 9 rcrd set, b nw, \$13. Serge,

Chest drwrs, \$55; crib & matt, set w/chest, \$50; tog \$100; dbl bed, matt, 2 nite tbls, \$50; lg beaut design bkcse \$50; wl rugs: (2) 69x32, \$10 ea; (2) 24x46, \$5/ea; GE shoe polish, \$8; sm bkcse, \$5. Call, 494-9336.

Columbia racing bike, 10 spd, yr old, 23½", auxiliary brake lvrs, exc cond, \$75. Rick Mishkin, 536-5174, evgs.

Solid cherrywd 4 poster dbl bed, US Koylon foam matt & box spr. Joe Martori, x3-4876.

Vehicles

'61 Chevy Impala, gd cond, \$200 or best, Mark, x3-6030.

'62 Ford Gal 500, v gd cond, gd body, ac, \$100. Arnold Phillips, x3-3161, lve

'63 Chevy Bel Air, 85 K, gd motor, nds tires & muff, \$100. Tom Anderson, x8-1357 Draper.

'64 Peugeot 4 dr sed, sunrf, nw tires & batt, superb set snows, 25 mpg, runs well but nds work, \$350. Call, 491-2126.

'65 VW bug, everything works, camouflaged, boat rack for canoe or pram, runs gd, \$225. x3-5274.

'66 Chevy, radio, xtra snows, could use body/paint work, best. Call, 738-8624.

'66 Mustang, 6 cyl, std, mech fine, body dents, nw starter, batt & water pump, gd run cond, \$150. Herman,

'66 Falcon, V8, p st, auto, gd 2nd car, nds work, \$150. John, x5764 Linc.

'66 Toronado, v gd cond, \$550 or best. Aram, x184 Linc.

'67 Alfa Romeo Duetto, 28 mpg, 50 K, \$1,300. Paul, x8-1302 Draper.

'67 Volvo, exc cond, nw tires, auto, 2

dr, best. x3-5265.

'67 Dodge Dart, 6 cyl, auto, 83 K, gd cond but nds work, \$125. x8-1325 Draper.

'67 Ply, 60 K, ac, 4 gd tires & snows, exc cond, must sell, lving cntry, \$550 or best. Call, 494-8446.

'67 Volvo 144S, radials, exc cond, \$950. x3-2935.

'68 VW type 3 sqbk wgn, v gd cond, carefully maintained, sticker, \$1,095. Call, 774-8907.

'68 VW fstbk, dark grn, amfm, nw tires, only 58 K, exc mech & gd body cond, 24-28 mpg, slg ownr, \$900. Jim, x7694 Linc.

'69 Austin-Healy Sprite, 31 K, 35 mpg, gd run cond, \$750 or best. Ken,

'69 Dodge Coronet, V8, auto, \$625. Ron, x7274 Linc.

70 Ford, 4 dr. 6 cvl. auto, exc cond. best. Bill, x8-3305 Draper.

'70 Renault 16, gd cond, front whl drive, 2 nw tires. Toni, 783-0731.

'71 Toyota Corolla, auto, 46 K, owner moving to France, must sell, \$1,400. Pascal, x3-3854.

'71 VW Super Beetle, exc cond, snows, ask \$1,600, interested in bike trade. Chuck, 181-56-294 Haystack.

'67 Dodge van, 127" whl base, '69 8 cyl 318 eng w/36 K, nw trans & clutch. steady maint, exc mech cond, \$750.

Housing

Arl, 13 rm hse for rent, 8 BR, 2 K, 2 B, 4 frpl, nr bus, lg yd. Marilyn, x3-4112.

Back Bay, stu w/BR alcove, bay wndw, ww, frpl, sun, nwly renovated, v cln, safe, 5 min T, 15 min walk MIT pkg avail, \$220 incl util. Call, 266-8133.

Bos, sum sub w/opt, lg 2 BR, Comm & Mass Ave, sunny, lg LR, mod K, DR, tile B, 2 blks T, 15 min MIT, \$290. Call, 266-3099.

Burl, lg contemp 3 BR w/3 full fl, front-t-bk LR & master BR, DR, Indry, 1½ B, bsmnt playrm, toolrm, storage, gar, Indscpd, hi 30's. x7234 Linc.

Camb, sum sub w/opt, 3 BR, 10 min walk MIT, \$270. Ron Newman, x3-3728, Ive msg.

Camb-Som line nr Inman Sq. 2 BR, ac, ww, d&d, sum sub w/opt avail 6/1, \$250. Jim, x3-6084.

Camb, Mass Ave, unfurn BR apt, BR,

LR, K, B, study, 5 min walk MIT, sub w/opt, \$155 incl h & util. Vonne, x3-6723.

Camb, sum sub, sgl rm, K, cheap. Call, 547-2667, aft 6pm.

Camb, Cent Sq nr MIT, sum sub w/opt, 4 BR, LR, K, 2 B, carpeted, avail 6/1, \$310 incl h. Call, 547-6918, aft 6.

Camb, Tang Hall, 2 BR, sub, 1 BR avail now or 5/30, other 7/1, rent nego. Call. 494-0357.

Camb, bet Harv & Cent Sq, sub 6/1 w/Sept opt, 31/2 BR, huge K, porch, LR, furn, \$316. Eric, x3-7458.

Chelsea, exc loc, Prattville-Wdlwn area, BR, patio yd, no pets, sec dept & ref, \$150 + util. Angelo, x5760 Linc.

Som, nr Porter Sq, 2 BR, MIT affil, w, ac, dw, nr T, carpools to sch, avail 6/1, \$250 incl h. Call, 628-4454.

Som, 2 BR, sum sub, furn, nr T, \$195 nego. Call, 628-0838 evgs.

Som, 2 BR in priv hse, lg K, LR, porch, sunny, qt area, nr bus, \$190. Call,

Som, 5 rm apt, 3rd fl, bus line, handy MIT, no pets. Call for info, 666-2554. Wtrtwn, 2nd fl nw hse, 6 rms, 3 BR, Used enlarger & other darkrm equip mod K, 2 B, all elec, ac, ww, disp, garage, frpl, \$350. Call, 924-4140.

Winchester, lovely brick home, gd loc, 8 rms, 4 BR, 2½ B, lg lot w/garden & patio, low 50's by owner. Bertha,

Summer rms in TEP frat, rms for 1-4 m or f, common areas, K, Indry, 15 min 3 to T. \$65-\$120. Mark, 262-5090.

WI trade London apt for Bos area apt, 6 mos, July-Dec. Betsy, x3-3706.

Menemsha, Martha's Vineyard, cottage for 3, avail 1st 2 wks June, \$100/wk. Alice, x3-4897.

Mtntop lot w/magnificent 3 way view. Eidelweiss, 4 seas vac cmnty, nr Conway, NH, pool, tennis, play area, ski, owner wl finance. Call, 646-7258.

Animals

Free: adorable playful kittens, 6 wks; f org & wht cat. Mark, x3-7836.

Scottish terrier, pedigree, 10 wks, \$185. x3-2335.

Kittens free to gd home, also yr old albino f cat. x3-5230.

Cat: v affect marmalade Tommy, 8 mos, unfixed, used to apt, nds nw home. Nancy, 876-9428.

V tame parakeet & big cage, \$30. x9628 Dorm.

Toy poodle, yr old, wht, AKC, frndly, gd w/chlrn, no rm left w/6 kids, St Bernard, orig \$250, \$100 or best.

Lost and Found

Found: pr wire-rim glasses, 1 st fl Bldg 8 men's rm, pick up Rm 8-135.

Lost: yel hopsack sports jckt. Duncan,

Carpools

Riders/drivers for carpool, Wilmington area. Dave, x3-2748.

Wanted

Sum sub, own lg BR, LR, K, etc, off Cent Sq, \$65. Mark, 492-1398.

End tbls, 2, pref mahog. Linda, x3-4669.

BR apt in Camb, pref in priv home, in gd cond, w/priv B, K, pkg, rent nego. Andi, x3-2701.

MIT m for pleasant furn rm Cent Sq, avail now thru Aug w/ Sept opt, \$86. Call, 868-8895.

F rmmate, mod 2 BR Camb apt, own rm, lg LR & DR, ac, disp, lg closets, storage space, pkg, nr T. Call, 354-5018, evgs.

Person to drive van to Madison, Wisc, nr end May, exp paid. Charles Read, x3-2526.

VW van capable of 20 K, anytime now to July. x3-7646.

Gd used drum set, thinking in \$200 range. Joel, x3-7905. or '56 Ford Crown Victoria

Skyliner, (glass top), or any leads, wl pay \$25 reward. Mac, x3-7273. Camb off Brattle St. own BR in 5 BR

hse, exc loc, beaut furn, 11/2B, avail 6/1, \$115. Bajoria, x3-5239. Child bike for 5 yr old, nothing fancy, gd bike to learn on. Michelle, x3-6121.

F rmmate, own BR, 2 pools, ac, pkg, June-Sept. min walk BC & MTA, \$155. Gail, x3-5374.

Dehumidifier & elec food mixer, tbl mdl; also for sale: wht leath Pappagallo shoes, 9M, b nw, orig \$28, \$6. x8-2577 Draper.

Own rm in 4 BR apt, sum sub, semi-furn, 2 wndws, Harv St nr Tech Sq, 5 min MIT, \$60 incl h & hot wtr. Chip, 547-6446.

Matt, bed frames, desks, chrs, for sm poor priv sch in NH, dorm fire wiped out all, also art supplies, books, bedding crtns, Joan, x3-7053, 9-5.

People, 2, share Ryder van to Cleveland, Ohio, approx 6/1. Neil, 876-1593. F rmmate, own BR in lux 2 BR apt, LR, mod safe bldg, ww, dw, Indry,

pkg, priv yd, 5 min Harv Sq, avail 5/1, \$170. Ellen, x3-3795. F rmmate, 25+, own BR in 2 BR apt bet Harv & Cent Sq, bk yd, qt nbrhd. avail 7/1, \$118.50 incl util. Romy,

Rmmates, hee in suburbs w/cats, fishes, lots of music, nd people to share trips, sun, friends, cheap at \$90-\$110. Larry, x3-6888.

x8-1211 Draper.

for amateur photog. Paul, x3-6716.

Apt space for 2-3 f, 9/1, reas access to MIT, any under \$100 considered. Sue, x8865 Dorm.

Sgl person or cpl for BR in lg mod 3 BR apt, Arl, nr T, incl pkg, LR, DR, mod K, bkyrd, basmnt, avail 6/1, \$80/1, \$120/cpl. Doron, x3-7457.

Pre-'71 Bos or NY subway maps, or any subway maps from other cities. Don, x3-5095.

Miscellaneous

WI type theses, term papers, exc typing skills & exp. Cathy, x3-3306.

Cpl wl hse-sit sum '74 &/or '74-'75 sch yr, references avail. Melinda, x3-6256.

Prof tutoring by psychologist, emphasis on scholarship & development or self motivation, grades 4-12. David Singer, 354-0115.

Positions Available

This list includes all non-academic jobs currently available on the MIT campus. Duplicate lists are posted each Tuesday preceding Tech Talk publication date on the Women's kiosk in Building 7, outside the Office of Minority Affairs, 10-211, and in the Personnel Office E19-239, on the day of Tech Talk publication, Personnel interviewers will refer any qualified applicants on all biweekly jobs Grades I-IV as soon as possible after their receipt in Personnel. Employees at the Institute should continue to contact their Personnel Officers to apply for positions for which they feel they qualify.

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

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

3-4278 Dick Higham Pat Williams 3-1594 Claudia Liebesny 3-1595 (secretary - Dixie Chin)

New applicants should call the Person-

nel Office on extension 3-4251.

Systems Analyst - Administrative Staff in new Resource/Alumni Data Systems group in Resource Planning will take on responsibility for existing computer systems and develop new applications for the Alumni Fund, Alumni Association, and Resource Development. Must have experience with university alumni data processing services. Knowledge of PL/1 desirable. 74-329-A (4/17).

Programmer | Analyst - Administrative Staff in new Resource/Alumni Data Systems group in Resource Planning will take on responsibility for existing PL/1 computer systems and develop and program new applications for the Alumni Fund, Alumni Association, and Resource Development. Must have experience with university alumni data processing systems. Three to four years PL/1 pressential. 74-330-A. (4/17). programming

Administrative Staff - Special Events Director for the MIT Alumni Association will organize, coordinate, and promote alumni convocations in major cities throughout the U.S. Individual imagination, organizational with abilities, leadership and interpersonal skills required. MIT degree or knowlof the Institute is desirable. 74-349-A (4/24).

Administrative Staff - Associate Director of the Alumni Fund will be responsible for Staff support to alumni boards and committees engaged in the annual solicitation programs. Duties require extensive interaction with senior alumni and corporation executives throughout the country, at MIT. Individual must be an alumnus/alumna of MIT. Position entails a moderate amount of travel. 74-347-R (4/24).

Administrative Staff - Assistant to the Director of the Alumni Fund will be responsible for all internal adminis-tration of Alumni Fund activities; coordinate programs and field activities of three Associate Directors and one Assistant Director; establish and administer systems for all phases of the volunteer Alumni Fund organization. An alumnus/alumna of MIT is preferred, but not essential. 74-348-A

Facilities Data Manager - Administrative Staff in the Planning Office will maintain, store, and retrieve all data related to MIT's Physical facilities. Collect and distribute data, maintain communications among the numerous users of the facilities data. Minimum 2 year degree in Math or in a technical field required. Knowledge of computers helpful, ability to work with details and to learn keypunching important. 74-342-R (4/24).

Technical Instructor - Academic Staff in Chemistry must have knowledge and

demonstrated experience with chemical theory and practice and will instruct and direct students in all aspects of teaching laboratory. Synthesize, purify and analyze reagents, prepare solutions for classes. Minimum BS in Chemistry (related experience may be substituted), minimum 5 years working experience required. 74-344-A (4/24).

ficer for Project MAC will be responsible for all financial functions: perform cost studies; monitor contract accounts; handle allocations and invoice payments; authorize travel reimbursment; supervise all payroll functions; prepare and monitor budgets. BS in accounting preferred, 74-336-R (4/24). DSR Staff Scientist in the Neuro-

DSR Administrative Staff-Fiscal Of-

sciences Research Program will participate in the planning of work sessions and conferences on the advances of neruoscience. Competency may be in molecular and cellular neurobiology; in neurology, neurophysiology, neuro-anatomy, and other aspects of brain science. Individual must have a record of research experience, accomplishment, and productivity sufficient to qualify as an expert capable of critical evaluation of scientific literature, capability for creative conceptualization and theoretical work. Individual must spend full time in theoretical work for the duration of the appointment, usually one year. Ph.D. preferred. 74-346-R (4/24).

Marketing Director - Administrative Staff at the MIT Press must have experience and skills in some or all of the following areas: direct mail, scientific/technical, international, research and planning, trade and library relations. Innovation, creativity, adaptability for goals; ability to work as part of a publishing team in a university environment. Please submit resume with educational background; accompanying letter must describe in detail marketing methods and achievements. 74-313-R (4/17).

DSR Staff in Nutrition and Food Sciences will coordinate the specialized analytical services of the department; advise and assist in the development and application of analytical methods and manage the mass spectrometry laboratory. BS or MS in Chemistry or related field and experience in operating a mass spectrometer required. 74-302-R (4/10).

Associate Director - Administrative Staff for the Council for the Arts at will be responsible for the Council's major programs; work on public relations; fund-raising, new releases; act as liaison between MIT and area art groups. Background in the arts, writing skills, ability to plan and coordinate complex programs are desirable. 74-301-R (4/10).

DSR Staff in the Laboratory for Nuclear Science will participate in fundamental particle research at major accelerators and in data analysis. Candidate must have Ph.D. in high energy physics or a related field with experience in scintillation counter and spark chamber techniques and familiarity with large computer data analysis. 74-220-A (3/13); 74-221-A (3/13).

Administrative Staff - General Manager of the MIT Food Services will be responsible for all phases of the campus services. Will reorganize the department; develop and implement policies and procedures; perform financial planning; oversee the administration and supervise staff. Minimum, 5 years experience in college or university food services management, ability to deal with the academic community important. Degree in the food services field preferred; innovation, creativity

required. 74-75-A (1/30).

DSR Staff - Curriculum Developer at the Artificial Intelligence Lab will develop and write new mathematical curriculum material in the Logo language for elementary school use. The job will often require working outside normal office hours. Academic qualifications in developmental psychology and mathematics, demonstrated experience in teaching computer programming to children required. Position available 5/74. 74-153-R (2/20).

Assistant Director - Administrative Staff in the Development Office will direct developmental support of MIT's senior officers and Resource Development Staff. Participate in developing funding goals; write background briefs, memoranda, proposals, ad hoc statements; direct funding projects. Minimum 3 years formal experience in development required, preferably in a university environment. Professional individual, tactful, imaginative, skilled in writing is needed. 74-327-A (4/17).

DSR Staff in the Laboratory for Nuclear Science will participate in fundamental particle research at major accelerators and in data analysis. Candidate must have a Ph.D. with a minimum of two years experience in high energy physics. Detailed knowledge of bubble chamber techniques is essential 74-222-A (3/13); 74-233-A (3/13).

Page 10, Tech Talk, April 24, 1974

DSR Staff Physicist in the National Magnet Laboratory will conduct original research in experimental solid state and low temperature physics with emphasis on the magnetic fields. Ph.D. in physics or related area and 3 years postdoctoral laboratory experience in magnetism and low temperature physics required. Familiarity with cryogenic and electronic instrumentation desired. Position available after 10/1/74. 74-130-A (2/13).

Assistant Dean of the Graduate School Academic Staff will supervise the procedures; perform financial planning. Will be concerned with recruitment, financial aid as well as academic and personal counseling of all minority graduate students. Work with department and administrative representatives in developing and supervising projects designed for such students. Candidate should have a background in graduate study and/or administrative experience dealing with problems of graduate education. The position also involves travel to other academic institutions for recruiting minority students and developing educational programs. 74-190-R (3/6).

Journals Department Manager – Administrative Staff at the MIT Press will be responsible for budgets and fiscal control of the department; for daily management and supervision of staff. Will make decisions concerning production of journal subscription; act as liaison with promotion/advertising and production departments concerning implementation of policy. 2-3 years experience with journals and administrative skills required. 74-280-R (4/3).

Staff Recruiter (Admin. Staff) will report to the Employment Offier; will be responsible for coordination of search for well-qualified persons to fill non-academic staff positions. Particular emphasis will be given to assisting laboratories, centers, and departments in fulfilling Affirmative Action Plans with respect to research staff openings. Person will work closely with Personnel Officers and departments in defining description of positions and qualifications required. Frequent travel will be expected; experience in Personnel and/or recruiting required. Technical background with degree in Engineering or Science preferred. Please submit resume. 73-643-A

Assistant Writer/Researcher — Administrative Staff in Resource Planning will assist two staff writers in the preparation of proposals to individuals, corporations, and foundations, and of other fund-raising statements, brochures, newsletters, and supportive materials. Involves compiling and organizing a wide variety of information often obtained through interviews and discussions with members of the faculty and administration, sometimes accompanying a staff writer. Candidate must be a college graduate and have demonstrated writing and research skills. Knowledge of MIT helpful but not essential. 74-277-A (4/3).

DSR Staff in the Center for Space Research will analyze and interpret plasma data from satellite borne plasma experiments. Recent Ph.D. in space plasma physics or related area required. Candidate should have had direct experience with the analysis and interpretation of experimental results related to the interplanetary plasma. 73-1184-A (11/14).

Assistant Auditor – Administrative Staff in the Audit Division will perform EDP internal auditing, reviews of the systems development effort, evaluate internal controls, and post-audits of computer systems. Will develop audit programs, questionnaires, write and present reports. Must have four years of working experience in EDP, a degree in Accounting, knowledge of COBOL or PL/1, and public accounting experience. 74-150-A (2/20).

DSR Staff in the Energy Lab will design, build, and operate a high performance combustion facility for fluid mechanics and materials research directed toward the development of electrodes for a high power energy conversion device. Will also handle the instrumentation of a shook tunnel driven MHD generator. Ph.D. and minimum 5 years experience in experiment and engineering hardware. Interest and ability in dealing with MIT, local and US research and engineering communities desired. 73-47-A (1/23).

DSR Staff in the Cell Culture Facility will handle all aspects of tissue culture and animal virology; grow animal cells; infect cells with viruses. BA or MS degree required; minimum of one year experience in tissue culture and animal virology highly desirable. Experience in microbiology will be considered. 74-258-A (3/27).

DSR Staff Systems Programmer at Project MAC will perform system analysis and system programming on a research version of Multics operating system. SM or EE degree required; 2-3 years programming experience in the supervision of some advanced operating system required. Ability to contribute to research and work with

students important. 73-1234-R (11/14).

Applications Programmer – Administrative Staff in the Office of Administrative Information Services will translate detail program specifications into computer code; test codes and documents program for operational use; review specifications; develop program flow charts; test and debug programs; perform other duties as assigned. Minimum 2 years experience in Business applications programming required. 74-278-R; 74-279-R (4/3).

DSR Staff Member in Research Laboratory of Electronics will conduct experimental determination of sound pressure in the fluid of the inner ear. Recent Ph.D. in EE with background in physiological experimentation and acoustics. Knowledge of the auditory system, particularly the inner ear, is required. 74-120-A (2/20).

Systems Analyst – Administrative Staff in the Office of Administrative Information System will develop under direct supervision, solutions to business problems; prepare, design, and program specifications for new programs and for modifications to existing systems. Applicants should have business and administrative experience, analytical ability and familiarity with computers. 74-196-R (3/6).

Programming Analyst for the MIT Information Processing Center must have experience and knowledge of large-scale time-sharing computer systems. PL/I and FORTRAN language. Documentation and communication skills are necessary qualifications. The User Services Group requires an individual who understands and is responsive to the needs of the Center's users.

User Assistance – assisting users by providing programming information and debugging help and tracking down special problems.

User Information — Instruction documentation and conducting seminars, workshops, and short courses. 74-178 (2/27).

Project Manager-Administrative Staff in the Office of Administrative Information Systems will develop major systems from feasibility study to operational status. Prepare budget, develop and execute test plan, prepare or supervise preparation of program and data specifications. Minimum 2-3 years business data processing experience with supervisory background required. 74-340-R (4/24).

Night Manager – Exempt will be responsible for overseeing the operation of the Wallace Observatory (Earth and Planetary Science) and assisting observers, primarily at night. Train new observers in the operation of the telescopes, the computer control system and the auxiliary instruments. Familiarity with optical observatory operations and astronomy is highly desirable; experience and facility in handling mechanical and optical instruments, some electronic experience preferred. Ability to make decisions and assume responsibilities important. 3-11pm, 5 day/week. 73-1357-A (1/16).

Engineering Assistant – Exempt Staff for the National Magnet Laboratory will arrange and perform the day-to-day experiments in medical electronics. Work with cryogenic detectors; familiarity with low-frequency electronics required. Will often work with animal and human subjects, including hospital patients. Candidate must be available for occasional night and weekend work. 74-241-A (3/20).

Secretary IV or Senior Secretary V for Vice President in the office of the President and Chancellor will handle a variety of duties in a very busy office. Arrange and coordinate complicated appointment and meeting schedules; maintain communications among many people and offices of the Institute. typing shorthand ent organizational skills and command of language are essential; ability to anticipate, recognize and organize priorities and work as part of a team, resourcefulness for handling complex situations, discretion, tact, and good judgment important. 37½ hour work week. 74-343-R (4/24).

Secretary IV or Senior Secretary V will handle general secretarial duties for a Vice President's office. Compose and type correspondence; prepare drafts of papers; interact with MIT's administrative and academic departments and offices and organizations outside the Institute. Excellent typing essential; ability to organize, knowledge of the Institute desirable. Occasional overtime necessary. 74-322-R (4/17).

Senior Secretary V to the Vice President, Administration and Personnel will handle standard secretarial duties in the office responsible for student, employee, and faculty service functions. Deal with a variety of Institute offices in matters relating to Affirmative Action, financial aid, placement, admissions, planning, personnel; research information and follow up on details. Excellent typing and transcribing skills, ability to coordinate areas and to deal effectively with sensi-

tive material and situations required. Institute experience preferred. 37½ hour work week; 9-5:30. 74-296-R (4/10).

Secretary IV to the Institute Secretary for Foundations will be responsible for budget accounting, file maintenance; research in reference materials, maintain communications and smooth relations with top level offices of the Institute. Excellent secretarial skills, ability to organize and to use discretion required. Knowledge of MIT desirable. 74-332-R (4/24).

Secretary IV in the Career Planning and Placement Office will type correspondence, make appointments and travel arrangements for the director; assist in explaining procedures to students and alumni who use the office; take down job descriptions given by companies. Excellent typing and dictaphone skills required. Maturity, tact, ability to work on own important, 74-331-R (4/24).

Secretary IV or Senior Secretary V for the Council for the Arts Staff and the Special Assistant to the President for the Arts will coordinate office activities; do considerable typing. Excellent typing and organizational skills required; ability to work against deadlines essential; shorthand and knowledge of MIT are desirable, 37½ hour work week; 9-5:30, 74-300-R (4/10).

Secretary IV in the office of the Institute Secretary for Charitable Trusts will monitor the office budget; arrange appointment schedules and travel; type correspondence and proposals from dictaphone and handwritten copy; set up and maintain files; act as liaison between the office and other sources inside and outside MIT. May occasionally conduct research on charitable trusts and foundations. Excellent skills, organizational ability, professionalism essential. Previous experience required, 74-293-R (4/10).

Secretary IV in Mechanical Engineering will type correspondence, technical reports, proposals, monitor research accounts; set up and maintain files; may also assist with graduate office functions. Excellent typing (technical typist preferred); shorthand desirable; ability to organize and establish priorities required. 74-305-R (4/10).

Secretary IV to the Administrative Officer of Chemical Engineering will handle general secretarial duties; maintain contract, grant, personnel records; assist with a variety of head-quarter's functions. Good typing, shorthand, dictaphone and organizational skills required. Maturity, tact, ability to anticipate problems desirable. May occasionally work overtime. 74-306-R (4/10).

Secretary IV in Medical will handle secretarial duties for the Psychiatry Service's Admin. Assistant and two doctors; transcirbe patient case histories; maintain accurate records and schedules. Excellent typing required; maturity, ability to work under pressure, and to deal with patients important. 37½ hour work week. 74-320-R (4/17).

Secretary IV in Mechanical Engineering will handle general secretarial duties necessary for the smooth function of this office. Type technical reports, proposals, papers, class notes; answer routine correspondence; maintain files. Previous secretarial experience, excellent typing skills required; experience in technical typing, shorthand desirable; ability to establish priorities important. 74-229-R (11/14).

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

Secretary IV in the Center for Advanced Engineering Study will handle all general secretarial duties for the manager of video operations. Monitor office accounts and handle billing; maintain office records; coordinate schedule of recording and editing sessions; answer questions regarding video services. Ability to work with figures, bookkeeping background helpful; accurate typing and organizational skills required. 74-270-R (4/3).

Secretary IV in the Harvard-MIT Program in Health Sciences and Technology will handle secretarial duties for the Executive and Business Officers. Assist in the preparation of proposals and budgets; transcribe and type correspondence; conduct occasional library research; maintain program files and student records. Excellent typing (including technical); some editorial and accounting experience and familiarity with library research techniques desirable. Maturity, organizational ability important. 40 hour work week. 74-274-A (4/3).

Secretary IV in the Dean for Student Affairs Office will type correspondence, maintain busy appointment schedule for a Dean. Will work with other secretaries in performing general office functions. Excellent typing skills required. Ability to establish priorities

and to work in a busy office required. Maturity, tact and sensitivity to students and faculty is essential. 74-275-R (4/3).

Secretary III-IV to the Electrical Engineering Executive Officer will handle general secretarial duties dealing with administrative matters. Type faculty and staff appointments; maintain personnel file and management records in an on-line computer system. Accurate typing, dictaphone or shorthand required; ability to work independently, willingness to learn the use of a computer system for records important. 74-284-R (4/3).

Secretary III-IV in Aeronautics and Astronautics will handle general secretarial duties for several faculty members. Good typing needed for class notes, correspondence, technical papers. Previous office experience, knowledge of English grammar important. 74-308-R (4/17).

Secretary III in Earth and Planetary Sciences will assist with general secretarial duties for a professor and research group and handle all office duties for another staff member. Excellent typking needed for heavy typing load (technical typing helpful), will compose some correspondence, arrange committee meetings. Ability to handle details essential. 74-321-A (4/17).

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

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

Secretary III — Temporary in Cambridge Project will perform on-line typing of documentation of programs, program routines, manuals, reports, etc., from rough drafts. Will also do some transcribing. Good typing required; familiarity with on-line work (Multics) important. Job ends 6/30/74. 74-168-R (2/27).

Secretary III will work with an Industrial Liaison Officer in providing services to approximately 15 companies; research briefings, institute publication distribution, schedule symposia travel, handle general secretarial duties. Good typing, dictaphone, shorthand or speedwriting skills necessary. Previous experience or schooling helpful. 74-214-R (3/20).

Secretary III in Civil Engineering will handle all general office duties for a professor and a research associate. Good, accurate typing needed for proposals, class notes, correspondence, research reports. Ability to proofread own work important. 74-292-A (4/10).

Administrative Assistant V in the Office of Sponsored Programs will work with the Subcontract Administrator in the preparation, review and processing of subcontracts and consulting agreements. Five years office experience, good typing skills required. Ability to work independently, organizational skills, mature judgment, administrative ability necessary. Knowledge of MIT accounting and/or purchasing systems desirable. 74-334-A (4/24).

Administrative Assistant V in Aeronautics and Astronautics will monitor all accounts; supervise office personnel and coordinate work as necessary; assist in budget preparation; prepare and process staff appointments; serve as liaison between the laboratory and the Institute and outside community. Familiarity with the Institute and its accounting procedures desirable; previous secretarial experience required. Ability to make independent judgments, poise, tact and discretion important. 74-298-R (4/10).

Administrative Assistant V in Architecture will handle a wide range of administrative and secretarial duties necessary to the success of a large HEW grant. Prepare budget reports, monitor accounts; purchase equipment and supplies; assist with personnel allocations. Compose and type correspondence; handle other clerical aspects of the project. Good administrative and secretarial skills required; ability to work independently and to organize essential: knowledge of MIT accounting procedures helpful. Some experience or background with social researchers and their terminology is of value. 35 or 40 hour work week. 74-297-R (4/10).

Editorial Assistant V at the MIT Press Editorial Department will edit manuscripts; establish relationships with authors; be responsible for proofs. Experienced book editor with a degree in math or science required. Graduate study desirable. 74-317-R (4/17).

Technical Assistant in the Develop-

ment Office will be involved in fundraising activities. Analyze and process various types of information relating to philanthropic foundations; maintain central records; identify and write evaluations of prospects; coordinate the work of an assistant. Accurate typing, excellent organizational skills, ability to establish priorities and work with deadlines essential. 74-328-A (4/17).

Senior Clerk III will take and process orders at Graphic Arts. Price and schedule Xerox work, handle requisition details. Knowledge of reproduction processes helpful; previous customer service experience desired. 74-286-R (4/10).

Technical Statistical Typist III in the Research Laboratory of Electronics will type and proofread technical proposals, correspondence, and budget material; maintain files. Excellent typing and command of the English language required. 74-287-R (4/10).

Senior Clerk III in the Research Laboratory of Electronics will type purchase orders, correspondence; maintain office files. Ability to work with figures; accurate typing required. 74-319-R (4/17).

Senior Clerk III in the Sloan School of Management will maintain accounts, handle faculty travel arrangements, monitor requisitions, perform a variety of other clerical duties. Ability to work with detail, organize own work, and work in a busy office essential. Previous office experience, accurate typing required. 74-314-R (4/17).

Senior Clerk II in the Student Accounts Office will maintain accounting records of students supported by government and industry, and assist in the accounting controls of the SAR system. Individual must be able to compose own correspondence and work well with administrators and students. Good typing and knowledge of accounting required. 74-310-R (4/17).

Senior Library Assistant IV will assist the Lindgren Librarian in all aspects of library work: circulation; catalog card changes; bindery collection; record maintenance; typing book orders, lists and letters. Library experience, college background, accurate typing required. Knowledge of German and Russian helpful. Winter hours: 8:30-4:30; summer hours: 95. 74-303-R (4/10).

Senior Library Assistant IV will handle the acquisition of current serials for the MIT Libraries. Process serials; anotate invoices; assist with claims investigation; compose and type own correspondence. Previous library experience essential; office experience desirable; knowledge of foreign languages valuable. Ability to work with details important. 74-290-R (4/10).

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

Kitchen Man will wash pots, pans, small and large scale equipment at Baker House. Sweep and mop floors; empty trash; perform general cleaning. Must be willing to work an irregular schedule if necessary. Hours generally 10am-7pm Mon-Fri. 74-318-R (4/17).

Kitchen Man at the Faculty Club will sweep, mop kitchen floor; empty trash; wash pots and pans; clean serving table, range and broiler; strain grease in fryers. Steady work record desirable; experience in kitchen helpful. 4:00 pm-12:00 pm, Mon-Fri; some weekends. 74-285-R (4/10).

Dishwasher at the Faculty Club will wash dishes, glassware and silverware; clean dish machine and dish-table; set up dishroom; replace clean dishes in pantry. Steady work record desired; some experience helpful. Mon-Fri. 12:00-9:00pm; some weekends, 74-203-R (3/13).

Campus Patrolwoman/Patrolman Minimum 10 years experience required in all phases of law enforcement to include knowledge of court procedures and case preparation, investigation of criminal and other complaints and reporting on same. Rotating shift/40 hour work week. 74-94-A (2/6).

The following positions have been filled since the last issue of *Tech Talk* and are no longer available:

74-246-R	Secretary III-IV
74-288-R	Sr Clerk III
74-295-R	Libr Gen Asst II
74-227-R	Rctr Oprtr Trainee IV
74-261-R	Sr Clerk III
74-326-R	Tech Asst-Acad Staf
74-297-R	Admin Asst V
73-1227-R	Tech B
74-126-R	Med Tech-DSR
74-238-R	Secretary III
74-215-A	Sr Clerk III
74-265-R	Syst Prog

The following positions are on HOLD pending final decision:

74-16-R Sr Clerk III 74-204-R Acct Clerk III

50 Young Executives Named to Sloan Fellows Program

Fifty executives from industry, government and education have been selected as 1974-75 Alfred P. Sloan Fellows by MIT's Sloan School of Management for a 12month program leading to a Master of Science in management.

The group includes the largest number of women-five-ever to participate in the nation's oldest executive development program. One of the women, Carolyn S.P. Nanfeldt, a financial analyst in General Motors Corp.'s New York treasurer's office, is the first woman ever nominated for the program by US industry.

The other women are:

Simone Stephens, assistant to the executive officer of the Public Health Service, US Department of Health, Education and Welfare, Washington, D.C.

Revathy M. Sriram of Colony, Madras, India, manager of the computer department of Binny, Ltd.

Maureen A.C. Stefanini, supervisor of student teachers at Worcester State College, Worcester, Mass.

Mary C. Zulalian, administrator of The Ecology Institute, Wellesley,

Fellows are nominated by their own organizations and selected by the Sloan School. The Program, in existence since 1931, was created by Alfred P. Sloan of General Motors, for whom the Sloan School is named, and Professor Erwin H. Schell of MIT, a pioneer in the teaching of management to engineering graduates.

Associate Dean Peter P. Gil of the Sloan School, director of the Program, said those selected "represent an increasingly wide and rich variety of backgrounds."

In addition to US industry, the Fellows come from several sectors of the federal government, including, for the first time in the Program's history, the US Treasury, the Department of Transportation and the Department of Agriculture.

'We welcome a representation from the senior levels of US administration, and senior university officers from Worcester State College and from MIT.

"A small number of the entering class will represent the private sector and the public sector abroad: Brazil, India, Indonesia, Japan, the United Kingdom, and Norway.

"These young executives with 10 to 15 years of practical experience constitute a dynamic and demanding student group," Dean Gil continued. "They come to MIT at midcareer, still young enough to learn, but old enough to relate their studies to the tough, practical needs of the organizations that sponsor them.

"The investment in the future contributions to their organizations is a wise, long-term investment in managerial resources."

The names, titles and affiliations of the persons selected for the Alfred P. Sloan Fellows class of 1974-75 are as follows:

Rolf D. Anderson of Hines, Ore.; Project Coordinator, Burns Ranger District, Malheur National Forest, Burns, Ore., US Dept. of Agriculture.

Fernando Barata de Araujo of Rio de Janeiro, Brazil; Financial Assistant, Economic Coordination; Editora de Guias LTB S/A; Rio de Janeiro, Brazil.

Frank J. Bellafato of Carmel, N.Y.; Superintendent-Body Shop, GM Assembly Division, General Motors Corporation, North Tarrytown, N.Y.

Neil J. Boyer of Hinsdale, Ill.; Attorney, Pullman Incorporated, Chicago.

Richard E. Brackeen of Littleton, Col.; Program Manager, New Program Development, Martin Marietta Corporation, Denver.

George W. Cherry of Reston, Va.; Deputy Associate Administrator (Programs), Office of Aeronautics and Space Technology, National Aeronautics and Space Administration, Washington, D.C.

Dale L. Compton of Cupertino, Calif.; Chief, Space Science Division, Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Cal.

Phillip M. Condit of Mercer Island, Wash.; 727 Marketing Manager, The Boeing Co., Seattle.

Robert M. Edelman of Auburn, Wash.; Senior Engineering Manager, SRAM Branch, The Boeing Co., Seattle.

Peter D. Fenner of Tiberton, Calif.; Information Systems Operations Manager, Western Electric Co., Inc., San Francisco.

Allan M. Friedman of Dayton, Ohio; Manager, Airframe Engineering, Aeronautical Systems Division, US Air Force, Wright-Patterson Air Force Base, Ohio.

Kenneth L. Garrett of Encino, Calif.; Sales Manager, Sales Department, American Telephone and Telegraph Co., Los Angeles

Edward H. Getchell of Carlisle, Mass.; Manager, Electronic Design Department, Signatron, Inc., Lexington, Mass

Don S. Gull of Darien, Conn.; Assistant Treasurer, Columbia Broadcasting System, Inc., New York, N.Y.

Jerry M. Hedges of Houston, Texas; Manager-Western Operations, Continental Oil Co., Houston, Texas.

Henning U. Hverven of Hosle, Norway; Distribution Manager, A/S Norske Esso, Oslo, Norway

Michael Higginbottom of Sherborne, Dorset, England; Assistant Master, Head of Careers, Sherborne School, Sherborne, Dorset, England.

Thomas G. Jefferson of Detroit, Mich.; General Supervisor-Information Systems, Chevrolet Motor Division, General Motors Corp., Detroit.

Edward C. Johnson of Huntsville, Ala.: Program Manager, Radar Division, US Army Advanced Ballistic Missile Defense Agency, Huntsville, Ala.

Nobuhiro Katano of Chiba Prefecture. Japan; Senior Assistant Manager, Planning Section, Tokyo Administrative Department, The Tokai Bank, Limited.

Gordon D. Kirk of Duncan, Okla.; Refinery Manager, Manufacturing and Engineering Department, Sun Oil Co., Philadelphia, Penn.

Edward W. Kissel of Marysville, Ohio; Superintendent, Marysville Plant, the Goodyear Tire and Rubber Co., Marysville, Ohio.

Thomas J. Lazear of Huntington Beach. Calif.; Manager, Information Systems, Fluor Corp., Los Angeles.

David E. Lev of Swampscott, Mass.; Manager, Advanced Air Traffic Management Systems Program Office, Aeronautical Programs Division, US Department of Transportation, Cambridge,

John D. Madsen of Scituate, Mass.: Construction Management, George Madsen Construction Co., Inc., Scituate Harbor, Mass.

John J. Mahoney of Byfield, Mass.; Director of Electronic Systems, Avco Systems Division, Avco Corp., Wilmington,

Armen Der Marderosian of Needham. Mass.; Manager, Contractual Relations, Eastern Division Electronic Systems Group, GTE Sylvania Inc., Needham,

Kevin F. McGlynn of Yorktown Heights, N.Y.; Assistant Vice President, Branch Processing, First National City Bank, New

Joseph R. Miller of the Bronx, N.Y.; Assistant Vice President, Miscellaneous Operations, First National City Bank, New

BPW Schedules Elephant Sale

MIT members of the Cambridge Business and Professional Women's Club will hold a White Elephant Sale Tuesday, April 30, from 10am to 2pm in the Bush Room (Rm.

Donations of merchandise other than clothing may be made to Julia McLellan, Rm.

Proceeds of the sale will benefit the Club's Olive Libitz Memorial Scholarship Fund, honoring the late member of the MIT accounting staff. A scholarship is awarded annually to a young woman graduating from a Cambridge high school, who plans to continue her education.

Raymond D. Mintz of Silver Spring, Md.; Staff Assistant, Office of Regulations and Rulings, US Customs Service, Department of the Treasury, Washington, D.C.

Itsuo Murakami of Urawa-shi, Japan; Senior Assistant Manager, Accounting Division, the Dai-Ichi Kangyo Bank Ltd., Tokyo, Japan.

John T. Murray of Mt. Clemens, Mich.; Senior Research Engineer, Computer Science Department, GM Research Laboratories, General Motors Corp., Warren,

Johannes Musu of East Java, Indonesia; Deputy Director, Training Center, Indonesian Petroleum Institute: Diakarta, In-

Robert A. Prescott of Salt Lake City, Utah: Operations Superintendent, Kennecott Copper Corp., Salt Lake City, Utah.

Brian P. Quinn of Dayton, Ohio; Research Engineer, Aerospace Research Laboratories, US Air Force, Wright-Patterson Air Force Base, Ohio.

Baljit S. Sethi of New York, N.Y.: Man-Advertising-Public Relations: ager, Syms, Inc.; New York, N.Y.

James E. Soos of Eatontown, N.J.; Chief, Plans Division, O & M Directorate, Joint Tactical Communications TAC) Office, Ft. Monmouth, N.J.

Richard A. Sorenson of Winchester. Mass.; Executive Assistant, Operations, MIT, Cambridge, Mass.

William R. Thompson of Hackensack, N.J.; Eastern Region Manager, Customer Engineering, I.B.M., Harrison, N.Y.

Joseph H. Vipperman of Somerville, N.J.; Administrative Assistant to the President, American Electric Power Service Corp., New York, N.Y.

Kay R. Whitmore of Fairport, N.Y.; Assistant Manager, Film Manufacturing Organization, Eastman Kodak Co.: Rochester, N.Y.

Terrance E. Wirta of Plano, Texas; Regional Manager-Sales; Martin Marietta Aluminum Sales, Inc.; Dallas, Texas.

Gerald M. Wrout of Camarillo, Calif .: F-14 Program Manager, Naval Missile Center, Point Mugu, Calif.

Masayasu Yamagata of Tokyo, Japan; Senior Assistant Manager, Management Science Group, Planning and Coordination Division, The Mistubishi Bank Ltd., Tokyo, Japan.

Robert W. Mann Appointed to Whitaker Professorship

(Continued from page 1) gift to MIT for construction of a new building, completed in 1965, to house work in the life sciences. The building is named in honor of Mr. Whitaker and Mrs. Helen F. Whitaker, his wife. The Whitaker Bldg. is now occupied jointly by the Department of Biology and the Department of Nutrition and Food Science.

In addition, Mr. Whitaker took a major interest in the founding of the MIT-Harvard Joint Program in Health Science and Technology now underway in collaboration with the Harvard Medical School and was the first contributor to the endowment for the Joint Program.

In addition to his service as a Life Member of the MIT Corporation, Mr. Whitaker has been equally active on the Corporation's Visiting Committees in Biology, in Nutrition and Food Science, and for the MIT Medical Department.

Professor Mann received the SB, the SM and the ScD degrees in 1950, 1951 and 1957, respectively, all from MIT. He was appointed assistant professor of mechanical engineering in 1953, became associate professor in 1958 and full professor in 1963. From 1970 to 1972, he held the Kenneth J. Germeshausen Professorship at MIT.

Professor Mann's distinguished career has had two main foci. During his early years he worked on internal power systems for missiles and in related research on solid propellants and turbomachinery. He also made significant early contributions in the formative years of the development of computer-aided design.

Since about 1960, Professor Mann has directed his activities towards biomedical engineering, in particular to the development and application of rehabilitation technology. He has become internationally known for work in sensory aids for the blind, including computer-based rapid Braille production, for work in navigationassistance devices for the blind, and for work on advanced prostheses, for example hip joints and artificial limbs. He was a co-developer of the so-called Boston Arm which uses faint bioelectrical signals from residual muscle tissue to operate a forearm pros-

As an educator, Professor Mann has a reputation as a contributor to design education and to innovations in the teaching of biomedical engineering. He headed the Systems and Design Division of the Mechanical Engineering Department from 1957 to 1967. Throughout his career, he has worked closely with students and has supervised 166 graduate and undergraduate theses during the past 20 years.

As chairman of the steering committee of the Health Sciences and Technology Program in biomaterials science he organized, and has served since Jan. 1, 1972, as Principal Investigator of the interdisciplinary Program Project Grant in Biomaterials Science from the National Institutes of Health. In September of 1972, Professor Mann became a member of the executive committee of the MIT-Harvard Program in Health Sciences and Technology.

Professor Mann belongs to numerous professional societies and has been the recipient of several important awards. He is a member of the National Academy of Engineering, the Institute of Medicine of the National Academy of Science, Sigma Xi, Pi Tau Sigma, and Tau Beta Pi, and a Fellow of the American Academy of Arts and Sciences. He also is a Senior Member of the Institute of Electrical and Electronic Engineers, a charter member of the Biomedical Engineering Society and a member of the American Association for the Advancement of Science, the American Society of Engineering Education and the American Society of Mechanical Engineers.

He received the Alfred P. Sloan Award for Outstanding Performance in 1957, the Talbert Abrams Photogrammetry Award in 1962, and a citation for Sensory Aids for the Blind from the Associated Blind of Massachusetts in 1969.

Professor Mann is married to the former Margaret Florencourt (MIT '46 Electrical Engineering) and they make their home in Lexington, Mass.

Science Fair Open Saturday

Acupuncture, astrophotography and alternative energy sources will be among the projects presented Friday and Saturday, April 26 and 27, at the 25th annual Massachusetts State Science Fair at MIT's Rockwell Cage.

One-hundred-seventy students in Grades 9-12 will exhibit projects. They represent 66 public, private and parochial schools. All of the students were winners in regional fairs during March and early April.

Judging will occur Friday. The fair will be open to the public Saturday, April 27, from noon to 3pm. The fair is sponsored by MIT and the Boston Globe.

Engineers Study Heat Flow to Emergency Coolant

(Continued from page 1)

similar to water at the high temperatures found in a nuclear reactor.

The engineers use this apparatus to study how heat would flow from the fuel rods to the emergency coolant after a blowdown. After heating the tube, the engineers pump nitrogen through it, and as the tube cools, they measure how heat flows from tube wall to nitrogen. Thus, they can determine the point after blowdown at which emergency cooling water would begin to "wet" the fuel rods and extract heat from them.

According to Professor Griffith, who has been in charge of the blowdown experiments:

"We believe that the period after an accident until the cooling water ceases to function effectively as a coolant is much longer than the AEC calculates. In other words, the mixture of water and steam that occupies the space around the fuel rods after an accident does a much better

job of extracting heat than anyone has

"The AEC specifies that an Emergency Core Cooling System must blast emergency cooling water into the core immediately upon the loss of pressure. When this happens, because cooling water is still flashing into steam and escaping through the broken pipe, we believe emergency cooling water will tend to be ejected also, without accomplishing much cooling.

"It may be more effective to wait to turn on the Emergency Core Cooling System until blowdown has finished-about 20 seconds-and then flood the reactor with the emergency coolant. In being superconservative in its specifications, the AEC is in reality not being as conservative as it thinks-in terms of what really happens in the nuclear core. We stress that the AEC is still operating well within safety limits in all its assumptions."

Professors Griffith and Rohsenow also

contend that their experiments with the electrically heated, nitrogen-cooled tube show that the AEC may be much more conservative than it thinks in terms of heat transfer coefficients after the Emergency Core Cooling System has been turned on.

Says Professor Rohsenow:

"Our data indicate that there may be up to five times better heat transfer between the heated fuel rods and the emergency coolant after a blowdown than the AEC allows for. If these figures are accurate emergency cooling water would do a much better job of cooling than is now calculated. The AEC could allow reactors to operate at higher temperatures without fear of fuel rods reaching their melting temperatures in the event of an accident.

"Higher operating temperatures mean that nuclear power plants could be more economically operated and produce more power for their size."