

Summer Session Is Back

Classrooms, lecture halls and corridors around the Institute came alive again on Monday with the beginning of Summer Session 1972.

Some 3,400 students and professional men and women will be studying here this summer. Regular undergraduate and graduate students are offered a selection of subjects which are also taught during the fall and spring terms, while the professionals are offered one-and two-week courses in specialized fields.

Summer Session enables students to broaden their professional training by supplementing their normal curriculum or to make up credit deficiencies with a minimum time penalty. A large number of the 2,100 students who remain on campus during the summer are graduate students conducting research for theses, but for several students the summer session is a regular term—they are enrolled in cooperative programs in mechanical engineering, electrical engineering or aeronautics and astronautics.

According to Professor James M. Austin, director of Summer Session, the Institute began offering a summer study program to students in the 1930's. This year more than 100 subjects are being taught, ranging from "Applied Elasticity" to "Design of a Waterborne Vehicle" or "Structure of American Law."

The Special Summer Programs—a series of short, intensive classes

(Continued on page 7)



Kathleen Barrett of the Information Center with Evelyn E. Lian, and Safwan A. Bengelloun, the new student staff, (left to right) Nancy D. Olson,

—Photo by Sheldon Lowenthal

Information Center to Expand Operation to Evenings, Holidays

Beginning July 1, the Information Center in Room 7-111 will operate during evening hours and on weekends and holidays—including the long Independence Day weekend.

The desk near the main entrance in the lobby will be replaced by the extended hours in the Information Center. The men who have operated the desk, which was installed 'temporarily' during World War II, will be reassigned to other posts in Physical Plant.

According to Miss Mary L. Morrissey, administrative assistant for information, students

will staff the additional hours in the Information Center. "We have been planning to make this change for more than a year now," she said.

The four students who will staff the Information Center are Inez D. Hope, a junior in electrical engineering from New York City; Evelyn E. Lian, a junior in architecture from Hong Kong; Nancy D. Olson, a Wellesley freshman in art history from Springfield, Virginia; and Safwan A. Bengelloun, a junior in architecture from Rabat, Morocco. Miss Kathleen Barrett of the In-

formation Center will coordinate the student effort.

"We hope it will have two main benefits," Miss Morrissey said.

(Continued on page 6)

Responsibilities Redefined for 6 Interdepartmental Labs

The following statement was issued by the Office of the President and Chancellor on Tuesday, June 13.

Given the number, variety, and research volume of MIT's inter-

Weisskopf Wins Prize in Paris

Dr. Victor F. Weisskopf, Institute Professor and head of the Department of Physics, was awarded the Cino-Del Duca International Award for "a message of modern humanism in arts and sciences" at ceremonies in Paris on Thursday, June 8.

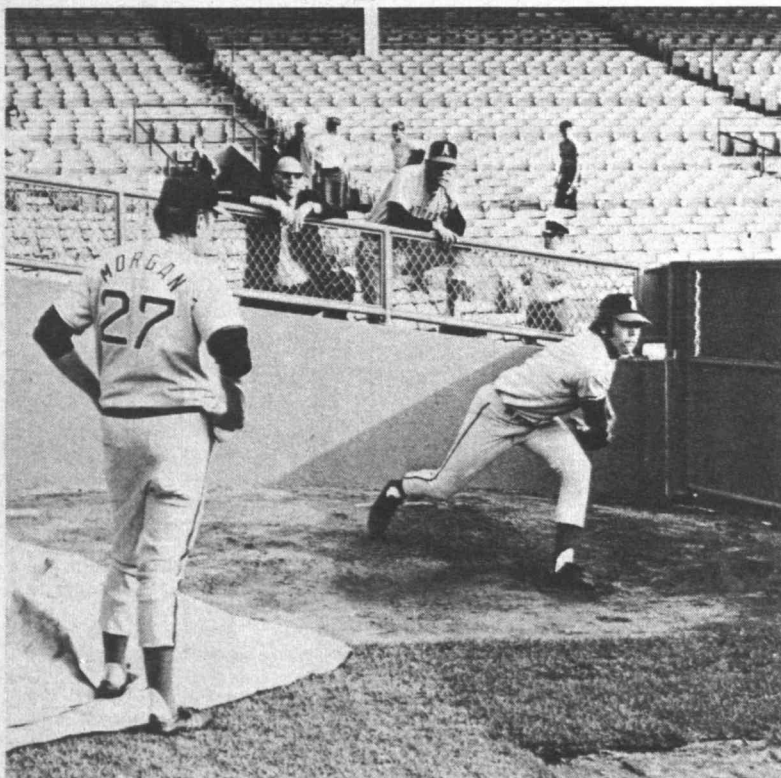
Dr. Weisskopf is the first American to receive the award, which was established in 1969 by Mrs. Cino-Del Duca in remembrance of her husband. Del Duca was known throughout France for his vast publishing empire, which includes such publications as *Paris Jour* and *Modes de Paris*.

While in Paris to receive the Cino-Del Duca award, Dr. Weisskopf presented a lecture at the American Embassy on Monday, June 12.

Established in 1969, the award includes a 150,000 franc, or about \$30,000, grant for research. Previous recipients are: Konrad Lorenz, Austrian zoologist, and author of "On Aggression;" the widely known French playwright Jean Anouilh; and Italian author Ignazio Silone.

(continued on page 2)

Angels Give Dopfel Tryout at Fenway



Al Dopfel, '72, works out in Fenway Park under the watchful eyes of Angels pitching coach Tom Morgan (27), head scout John Streza and manager Del Rice.

—Photo by Sheldon Lowenthal

The nearly empty stands at Fenway Park were comforting to Al Dopfel in his first appearance there as a participant rather than a spectator.

The 6-0, 175-pound Brockton native had seen plenty of games from the bleachers, but on Friday, June 9, sitting on the short fence in front of the left field box seats dressed in the uniform of the California Angels, he was excited and nervous.

Only one week before, Dopfel, a record-breaking pitcher for MIT and the most valuable player in the Greater Boston League, had received his bachelor's degree from the Institute. A few days later the Angels had selected him in the third round of the major league players' draft, making him one of the top 60 amateur players in the country. Now the Angels, in town last weekend for a series with the Red Sox, were giving him a workout with the team and some VIP treatment.

"There's a whole new perspective from down here," Dopfel

said, watching the Red Sox take batting practice. "You notice the little things first. The balls take true bounces, even in the outfield." He paused as a well-hit line drive soared over the left field wall, a pitcher's nightmare at Fenway. "That thing is awfully close," he said with a smile.

As Tech Talk went to press Al Dopfel had not signed with the Angels.

"I have a pretty good idea of what I want," Dopfel said from his home in Brockton, "but it will probably take a while to work out the details."

Dopfel said that he expects to be sent to the Angels' Double A farm club in Tidewater, Louisiana, after he signs, but plans to stay at home until his contract is ready.

When the visiting Angels took the field, Dopfel headed for the bullpen with Angel head scout John Streza and pitching coach Tom Morgan.

(Continued on page 6)

departmental laboratories and Dr. Hill's great familiarity with the problems of these labs, it seems appropriate to transfer the administrative responsibility for the following laboratories from the Provost's office to that of the Vice President for Research:

Center for Materials Science and Engineering
Center for Space Research
Francis Bitter National Magnet Laboratory
Laboratory for Nuclear Science
Research Laboratory of Electronics
Spectroscopy Laboratory

In addition MIT's part of the responsibility for the direction of the Cambridge Electron Accelerator, which is managed jointly with Harvard, will also be transferred to the Vice President for Research.

Responsibility for research policy remains, as heretofore, a joint responsibility of the Provost and the Vice President for Research under the general guidance of the President and Chancellor.

In order to assist the Vice President for Research in these new responsibilities, Dr. Vera Kistiakowsky, Senior Research Scientist in the Department of Physics, will devote part of her time to administrative duties in these research areas.

Relatively Speaking

If you heard a man say he was receiving gravity waves that nobody else has been able to detect and that these waves were coming from the center of the galaxy, and if, further, a good half of the people present agreed with him, while not a few were in fact building or operating complicated detectors so that they too could receive these waves, what would you conclude? You would conclude you were in the midst of a meeting of relativists.

Which is where, in fact, we were on Monday last. The fourth "Cambridge" Conference on Relativity, a marvel of organized overview, attracted better than 150 people to hear virtually all of the world's gravitational experimentalists tell where the state of their art is at. The Conference, which has been held in various places but retains the rubric "Cambridge" because the first one took place in this fair city in 1968, was sponsored this time out by MIT, Boston College, Boston University, Brandeis, Harvard and Tufts, and it got under way at 9 a.m. sharp in room 54-100 of the Green Building. Conference chairman Jack Jaffe, research associate in the Department of Earth and Planetary Sciences, ran his illustrious charges through their turns with the urbanity and velocity of a practiced ringmaster. All told 22 papers were delivered in the course of the day, the scheduled 23rd--by the Soviet scientist, Vladimir Braginsky--having failed to materialize as promised.

We got under way a bit less sharply ourselves, arriving midway through the morning session as Robert Vessot, of the Smithsonian Astrophysical Observatory was describing a scheme to send an extremely stable clock aloft in a probe rocket. The probe, he said, would go into free fall after 212 seconds of powered flight, allowing about a three and one-half hour trip up and back through the earth's gravitational field. During this time the probe's clock and a monitoring clock on the ground would be compared, allowing the experiment to map the gravity field and test the equations of special relativity to a high degree of accuracy. The probe will be tracked from Bermuda. Vessot concluded: "We'll just have to put up with the hardships of Bermuda."

We were particularly interested to hear the remarks of Robert Dicke, of Princeton University, whom we had admired for some time as being one of those not afraid to tackle the giants of science. Professor Dicke, with his student Carl Brans, proposed some years back a theory of relativity, generally known now as the Brans-Dicke theory, that is at variance with Einstein's theory. Our understanding of this matter is relative at best, to put no finer point upon it, but we gather that Professor Dicke, while not saying that Einstein was wrong, does believe he was not entirely right either.

Professor Dicke discussed some of his experiments to determine the oblateness of the sun, no mean feat in itself, particularly since there are those who don't think it is. The measurements, however, are extremely tricky and Dicke has devised a disc that occults most of the sun while allowing readings of its outer edges. While no one disputes his findings here, we learned later, there is some difference of opinion about the analysis of them. If the sun is oblate it would have what is called by those who know, a quadrupole moment (an egg, we were told by a

friendly bystander, has a quadrupole moment), while if it is spherical it would have no moments at all.

All of this is of some scientific moment because the distribution of mass in the sun would have discernible effect on the orbit of Mercury, the perihelion of which advances 43 seconds of arc per century. Einstein's theory showed that there should be a relativistic effect on Mercury's orbit of 43.03 second of arc, and this has been taken as one of the main experimental supports of general relativity. According to Brans-Dicke, the advance should be somewhat less, 39 seconds of arc. If the sun turned out to be oblate, 4 seconds of Mercury's advance would be accounted for by that alone, leaving an agreeable Brans-Dicke remainder of 39.

The afternoon session of the conference was generally given over to experiments searching for gravity waves, most of which are either not yet operational or so recently begun that hard results are not yet available. The man who has detected gravitational radiation is Professor Joe Weber, of the University of Maryland, who first reported the reception of gravity waves at 1661 Hz in 1969 and that their source seemed to be the galactic center. He reported on work in progress, saying that he was still getting coincidental events with two detectors, one at the University of Maryland and another at Argonne National Laboratory. He reported that some of these had been recorded in a way "untouched by human hands", as some of his critics had demanded, by means of tape, and that the events could be seen whether two detectors were a thousand kilometers apart or whether they were two meters apart in the same room.

After the speaking was done, we asked Dr. Jaffe for an interpretation. "No one is worried about gravity waves, per se," he told us briskly. "They're predicted by theory. The problem is whether what Weber has detected is gravitational radiation. If the source of radiation is in fact the galactic center, and the radiation is simply streaming out in all directions, you can calculate that the amount of energy needed to account for the observations is the equivalent to the annihilation of about a thousand solar masses a year, and this has seemed too big by an order of magnitude or so. Recently Charles Misner at the University of Maryland proposed that the gravitational radiation could all be going out in the plane of the galaxy, which, since the earth is almost right in the plane, would get around the power difficulty. The reason no one else has similar results may well be that Weber began so much earlier and has a large head start. Now that others are beginning to look for gravitational radiation, and more sophisticated equipment is being built, we may get confirmation one way or the other."

We asked Dr. Jaffe how he had managed to get so many papers through in a single day. "Well, I knew what each of the speakers was going to talk about and they agreed to be brief, so I allotted them ten minutes or fifteen. I used a stopwatch and a kitchen timer. I do think 22 papers in one day is pretty good. Although it should have been 23. I suppose Braginsky's paper will arrive tomorrow when it won't do us any good." We mentioned something about time-dilation and frames of reference, and seeing our way before us, wended it forthwith.

Christensen Appointed New Development Foundation Secretary

Jack W. Christensen of Marshfield has been appointed Secretary of MIT Development Foundation, Inc. Announcement



Mr. Christensen.

of the appointment was made by Mr. Richard S. Morse, President of the non-profit corporation recently formed by MIT to effect useful applications of technology. As a staff member of MIT's Industrial Liaison Program, and its Director for the past five years, Mr. Christensen is well acquainted with the Institute's faculty and research staff. Mr. Morse indicated that this knowledge of MIT's research activities and experience in relating the Institute's technological developments to industry are important assets for the MIT Development Foundation.

Mr. Christensen received the SB degree in electrical engineering from MIT in 1958 following which he was commissioned in the United States Air Force. After assignments at various US and European bases as a pilot in the Strategic Air Command, he returned to the Institute in 1967.

MIT Development Foundation, Inc., is taking an important role in assisting formation and growth of

technology-based enterprises--spin-off companies--which will serve as a conduit for results of academic research. The Foundation will also sponsor research and engage in a variety of educational programs related to the development of new enterprises. Offices of the corporation are maintained in the Sloan Building.

New Silver Club Members

The Silver Club, an organization of women who have been employed at the Institute for 25 years or more, welcomed seven new members at their annual Spring dinner meeting last month.

Five of the new members have worked at MIT for at least 25 years. They are: Joyce Harman, a DSR staff member at Project MAC who has also worked at Lincoln Laboratory; Mrs. Mary M. Kelly, an exempt employee in the Admissions Office; Mrs. Alice Viano, a senior secretary in the Department of Civil Engineering who has also worked at the Radiation Laboratory and later the Research Laboratory of Electronics; Mrs. Mary E. White, a secretary in the Laboratory for Nuclear Science; and Mrs. Jeri Whitman, a staff recruiter in the Personnel Office at Draper Laboratory who also worked in the Radiation Laboratory.

Admitted to associate membership for at least 20 years service at the Institute were: Mrs. Mary E. Leonard, an administrative assistant at Draper Laboratory; and Anna Corrigan, a map plotter in the Department of Meteorology.

Miss Harman, Mrs. Viano, Mrs. Leonard and Miss Corrigan all are retiring at the end of June.

The new members were welcomed into the club and presented the traditional Silver Club pin by Priscilla Mead of the membership committee. In addition, they each will receive an MIT chair as a gift from the Institute.

Medical Service Urges Caution with Mercury

The Medical Department's Environmental Medical Service (EMS) reminds members of the community that improper use of mercury can be very harmful.

Mercury is used most commonly in thermometers and barometers because it expands and contracts in regular degrees when subjected to temperature changes. It is also used in manometers and as a component in many intermetallic compounds.

Richard Chamberlain, industrial hygiene officer at EMS, says, "When liquid mercury is spilled on the floor and not picked up immediately, it fractures into extremely small particles. This increases the mercury's surface area and it may vaporize faster than it is ventilated from the room."

When the EMS receives a report of mercury spillage, the staff must determine the existence of a health hazard. If the air shows a significant concentration of mercury, urine specimens are collected from the exposed personnel, and if elevated levels of mercury are found, the person will be referred to a physician for further evaluation.

Mr. Chamberlain describes another harmful use of mercury: "When amalgamated with other metals, mercury produces an attractive, silvery shine. At times students have amalgamated pennies--thus producing a shiny new coin that could be extremely hazardous if it were to fall into the hands of a small child."

Another warning directed at students--never take mercury into the dormitories. The EMS reports several cases in which mercury was spilled on rugs and furniture in a student's room, creating a definite health hazard. Using a vacuum to clean up a mercury spill doesn't help--the parts of the vacuum cleaner may become so impregnated with particles of mercury that each successive use of the machine fills the room with harmful mercury vapors.

EMS and Physical Plant recently completed a project which measured the amount of mercury in the Institute's waste water to determine a pollution factor. It was

found that the level of mercury in the water discharge was well below pollution levels and within the limits of mercury considered safe for drinking water.

There are three basic things to remember when handling mercury: clean up all spills immediately (refer to EMS bulletin entitled "Hazard and Handling of Metallic Mercury"); do not take mercury home or into dormitories for any reason; do not use mercury to amalgamate coins or other materials.

Any questions regarding the use of mercury should be directed to the Environmental Medical Service on Ext. 2596.

Weisskopf Receives Award

(Continued from page 1)

Dr. Weisskopf is known for his theoretical work in structure of the atomic nucleus. A naturalized US citizen, he was born in Vienna, Austria, in 1908. He received the Ph.D. degree from the University of Gottingen, Germany, in 1931, and worked with such distinguished physicists as Schroedinger, Pauli and Bohr.

After coming to the US in 1937, Dr. Weisskopf was on the faculty at the University of Rochester until 1943 when he joined the Manhattan Project at Los Alamos, New Mexico, where he worked on development of the atomic bomb. He came to MIT in 1945 as associate professor and was appointed full professor in 1946.

In 1960 Dr. Weisskopf became Director-General of the European Center of Nuclear Research (CERN) in Geneva, Switzerland. In addition to his administrative duties, he was also the science director and headed a research establishment that operated the world's second most powerful atom smasher.

Dr. Weisskopf returned to the Institute in 1966 as Institute Professor. He was appointed head of the Department of Physics in 1967.

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Please address all news and comment to the editorial office, Room 5-111, Ext. 3277.

Apollo Gear Gets Test in Unique Plane

On May 25th a modified F-8 using Apollo guidance and navigation equipment from MIT's Draper Laboratory was flown for the first time. It was the first plane to fly without cables or rods, with, in fact, no mechanical linkage between the pilot's control rod and peddles and the actuators on the wings and tail. Instead, the plane, named the "Digital Fly-By-Wire" was outfitted with thin wires carrying only electrical signals.

Piloting the plane was Gary Krier of the NASA Flight Research Center at Edwards, California. In a very real sense, the copilot of the plane was a digital computer system and Apollo guidance and navigation equipment designed and programmed at Draper Laboratory.

The Apollo computer, with its extreme reliability, was at the heart of the system. As the pilot depressed one of his peddles, for example, sensors detected the change in the peddle and sent a signal to the onboard computer. The computer program then sent out the correct signals to the proper hydraulically operated devices to change the angle of the flaps and rudder on the tail and wing surfaces.

Along with the computer on the plane were the Apollo gyroscopes and accelerometers, which measure how fast the plane



The Digital-Fly-By-Wire being prepared for a test flight.

changes direction and also the forces on the plane caused by acceleration. If the pilot chooses, he can use the fly-by-wire system not only in place of the mechanical linkage, but to actually help him keep the plane on a smooth, even course.

At the press of a button, the pilot can call on the computer to help maintain the course he chooses. For example, if the pilot wants to make a turn at a specific angle, and he hits some turbulence, the sensors aboard the plane will inform the computer that the plane has been forced from the direction

the pilot wishes and the computer program, in turn, will then send the appropriate signals to the hydraulic system.

According to Philip Felleman, manager of Draper Lab's contribution to the fly-by-wire program, one of the potential advantages of using digital fly-by-wire systems in commercial and military aircraft is the great weight savings that could result from removing the cables and rods needed to carry the pilot's commands in present airplanes. That could amount to many hundreds of pounds in a very large plane.

High School Student Studies Apollo With Draper Lab Help

"Five seconds to the lunar surface. Four, three, two, one. . . We crashed."

Apollo 17? No, just Fred Barker during a trial lunar landing in Draper Laboratory's lunar module (LM) simulator.

Fred Barker is an 18 year old high school student looking forward to a career in astronomy. Eventually he wants to observe the universe from either a lunar or earth orbiting laboratory.

Fred has developed an intense interest in the techniques of space flight as a way of preparing for his future in space.

"I'm thinking in terms of going into NASA," Fred said climbing out of the simulator. He has been familiarizing himself with the latest modifications of the LM's guidance and navigation system. Draper Lab designed and developed the guidance and navigation system for the Apollo program and continues to update the computer programs for subsequent flights.

The Draper Lab simulation, of course, is much more sophisticated. It uses a mock up of the Apollo lunar and command module linked with computers which completely duplicate the

Fred first contacted MIT to get information on the guidance system for a computer project he was working on at his high school. Russel Larson of Draper Lab sent Fred some guidance equations. Mr. Larson didn't actually think Fred would understand them but, he said, "I was surprised." Fred was soon asking for more information.

Fred's high school computer project was to write a program which would simulate lunar landing. The program which Fred and four other students from Natick High School set up gave the "pilot" his altitude, rate of change of altitude, percent of fuel left and the time into the maneuver. The students used a teletypewriter as their link with the computer.

The Draper Lab simulation, of course, is much more sophisticated. It uses a mock up of the Apollo lunar and command module linked with computers which completely duplicate the



Fred Barker.

instrument readout of an actual lunar landing.

For more than a year now Draper has given Fred time with the simulator to help him learn the programs. Fred says he comes to Draper Lab "To see if I can do it."

In August Fred will graduate from high school and he plans to go on to study astronomy in college. "Watch out, though, by 1979, I'm going to be in space," he said, "and you'd better believe it."

The weight saving potential is also causing designers to look closely at the digital fly-by-wire system for use in the space shuttle. And just as important is the capability of a digital computer to provide flight control over the entire spectrum of flight conditions the shuttle would experience in returning from space to land on a runway.

Major contributors to the success of the program at Draper Lab were Albert Engel, Robert Bairnsfather, George Silver, Max Adams, Terry McAteer, Nate Smith, and Richard Sheridan.

New Dining Hours Are Announced

The Institute Dining Services has announced the summer hours for dining halls on campus.

Breakfast will be served Monday through Friday from 7:15am to 10am in Lodbell Dining Hall in the Student Center. Walker Memorial Dining Hall will serve a continental breakfast—juice, doughnuts and coffee—from 9:30am to 11am Monday through Friday.

Both Lodbell and Walker will serve lunch from 11am to 2pm Monday through Friday. Only Lodbell will offer dinner service during the week from 5pm to 7pm.

Weekend meals will be served only in 20 Chimneys in the Student Center with breakfast from 7:15am to 10am, lunch from 11am to 2pm, and dinner from 5pm to 7pm.

All other dining halls will remain closed until September.

Whealler Receives Fellowship

John Anson Whealler, Jr., of Atlanta, Georgia, has been named recipient of the Schlumberger Foundation Fellowship in the MIT Department of Electrical Engineering for the academic year 1972-73.

The Schlumberger Foundation, a non-profit organization established in 1954 by the Schlumberger Well Surveying Corporation, now a subsidiary of Schlumberger, Ltd. of New York City, established the fellowship at MIT in 1955 and has continued it each year since then.

It is awarded annually to an outstanding student planning to study for the master's degree in electrical engineering and provides tuition plus a stipend to the student.

A graduate of Druid Hills High School in Atlanta, in 1968, Mr. Whealler entered MIT as an undergraduate in the fall of 1968 and graduated June 2 with an S.B. degree in electrical engineering.

His special field of interest is the design, development and application of electronic systems.

Mr. Whealler has been elected to Eta Kappa Nu and Tau Beta Pi, honorary engineering societies, and was a National Merit Scholar during his freshman year. He has been actively involved in the production of the MIT yearbook, *Technique*, during each of his undergraduate years. He is a member of Alpha Tau Omega fraternity. During his senior year, Mr. Whealler was a member of the radio society station WIMX. In the fall of 1970, Mr. Whealler assisted in the Clean Air Car Race by compiling statistical information on emissions.

Mr. Whealler will begin his graduate study at MIT in September. His long-term goal is to work in the design and development of electronic systems.

Recycling Urged

MIT Physical Plant and MIT Ecology Action urge all members of the community to recycle Tech Talk and other newspapers after they have been read. For information about recycling, call Ecology Action at ext. 7922.

Education Bill Could Bring Federal Money

The House of Representatives gave final Congressional approval last week to legislation which would set principles of federal aid that could have a major impact on colleges and universities.

If the general aid provision of the bill is funded to its maximum, MIT could receive up to \$1.5 million, according to Paul Cusick, vice president for business and fiscal relations. Most observers, however, feel that it is unlikely that the bill will be funded fully, at least in the near future.

Although the bill has been best known for its condition which would curb school bussing to desegregate schools, it would also provide virtually every institution of higher education with federal money that the schools could use as they wished.

The legislation would make it national policy that every college

student who could not afford the cost of his education would get some financial help from the government. The bill would also take federal financial assistance away from any graduate school or public undergraduate college that discriminated against women in its admission policies.

Under the provisions of the bill colleges could receive a maximum of \$1 billion a year in grants to be used at the schools' discretion. Forty-five percent of the money would be apportioned among schools on the basis of the number of students attending each school who receive federal student aid. Another 45 percent would be allocated on the basis of the amount of federal student aid money each school receives. The remaining 10 percent would be based on the number of graduate students at each school.

The legislation also provides grants of \$300 a year for each veteran enrolled and additional grants of \$150 for each veteran in a special remedial program. The additional income to MIT would be negligible under this provision of the bill, according to Mr. Cusick.

A broad new program of federal scholarships would also be created under the bill. If enough money is ever appropriated, every college student in the country would be entitled to an annual grant of \$1,400, less the amount he and his family could be expected to contribute toward his education. The Office of Education would develop a formula determining the family contribution.

If the appropriation is lower, the entitlement will be proportionally reduced. In no case could a student get a grant for more than 60 per-

cent of what is needed to attend a particular institution.

The bill would continue the present scholarships, direct federal loans and work-study stipends for three years. A student receiving a scholarship, called an educational opportunity grant, could receive a maximum of \$1,500 a year. Half time as well as full time students could receive work-study grants under the legislation. A student receiving a direct loan under the National Defense Education Act could get no more than a total of \$2,500 for the first two years of college.

The legislation continues for three years the present program under which the government guarantees repayment of bank loans to students and pays the interest on loans to needy students. A student could obtain a loan of up to \$2,500 a year but not more than

\$7,500 over four years. A new agency, called the National Student Loan Marketing Association, would be created to buy obligations from lending institutions and sell these obligations on the open market, thus stimulating new capital for the loans.

Public colleges and universities and all graduate schools receiving federal aid would be prohibited from discriminating against women in their admission policies.

An exception would be made for military academies and the few public schools that have a tradition of enrolling only students of one sex. Private undergraduate colleges could continue to discriminate in admissions. No discrimination would be permitted in other areas, such as employment practices.

THE INSTITUTE CALENDAR

June 14 through June 23

Seminars and Lectures

Thursday, June 15

The System 7
J. Carey Thomas, IBM Sensor Based Systems Center. Information Processing Center Seminar. 11am, Rm 39-530.

Tuesday, June 20

Route Network Improvement in Air Transportation Schedule Planning*
Dr. Yupo Chan, civil engineering. Flight Transportation Lab Seminar. 4pm, Rm 33-419. Coffee, 3:30pm, Rm 33-411A.

Wednesday, June 21

Catabolite Repression in Antibiotic Biosynthesis
Dr. Edward Katz, Dept of Microbiology, Georgetown University. General and Applied Microbiology Seminar sponsored by Dept of Nutrition and Food Science. 4pm, Rm 16-134.

Women's Forum

Women's Forum**
Every Monday, 12n, Rm 10-105.

MIT Club Notes

Classical Guitar Society**
Concert guitarist Hugh Geoghegan is available for private instruction for intermediate and advanced students. Call Vo Ta Han, 661-0297.

Baker House SPAZ Jogging Club**
Daily, 10:45pm, Baker 2nd Floor West.

Hobby Shop**
Open weekdays, 10am-4:30pm, duPont Gym basement. Fees: students \$6/term, community \$10/term. Call X4343.

Tiddlywinks Association*
Every Monday, 8-11:15pm, Student Center Rm 491.

Soaring Association**
First and third Mondays every month. 7:30pm, Student Center Rm 473.

Classical Guitar Society**
Special summer lessons for beginners, group and private. Mondays and Tuesdays. Call Vo Ta Han, 661-0297.

Judo Club**
Every Monday, Wednesday, Friday, 5pm; every Saturday, 1pm. duPont Gym Exercise Rm. Beginners welcome.

Outing Club*
Every Monday, Thursday, 5pm, Student Center Rm 473.

MIT/DL Duplicate Bridge Club**
Every Tuesday, 6pm, Lobdell.

Fencing Club**
Every Tuesday, 6-9pm, duPont Fencing Rm.

Glee Club**
Every Tuesday, Wednesday, Thursday, 5-6:30pm, Kresge. New members, especially tenors, welcome. Call Cyril Draffin, 247-8691.

Scuba Club
Air compressor hours, Tuesdays and Thursdays, 3-5pm, Alumni Pool.

Rugby Club
Summer rugby. Every Tuesday and Thursday, 5pm, Briggs Field.

Urban Vehicle Design Competition
Volunteer meetings. Every Wednesday, 3pm, Rm E40-250.

Nautical Association**
Basic Sailing Shore School, repeated every Wednesday throughout the summer, 5:15pm, Sailing Pavilion. Non-members welcome.

Table Tennis Club***
Practice session, every Wednesday, 7:30-10:30pm, T-Club Lounge, duPont.

Science Fiction Society*
Every Friday, 5pm, Student Center Rm 421.

Student Homophile League*
Meeting and mixer meets Fridays, 7:30pm, Mission Church, 33 Bowdoin St., Boston. For gay help (anonymous) at MIT, call the student gay tutor, 492-7871 anytime.

ACBL Duplicate Bridge*†
Bridge Club. Every Saturday, 1:30pm, Student Center Rm 473. Members, free; non-members, 75 cents.

Chess Club**
Every Saturday and Sunday, 1:30-5:30pm, Student Center Rm 491.

Social Events

Muddy Charles Pub**
Join your friends at the Muddy Charles Pub, 110 Walker, daily 11:30am-7:30pm. Call X2158.

Friday Afternoon Club**
Music, conversation and all the cold draft Budweiser you can drink. Every Friday, 5:30pm, Ashdown basement Games Rm. Admission: men \$1, women 50 cents. Must be over 21.

119 Honored at Annual Retirement Dinner

Several hundred members of the community gathered at a banquet held in Walker Memorial last Tuesday to honor 119 employees, faculty and staff members who will retire on July 1.

Following a social hour and dinner, Chancellor Paul E. Gray, master of ceremonies, told the gathering that the 119 retirees represent a total of 2,063 years of service to MIT. In keeping with the banquet's jovial atmosphere, he talked about retirement: "A friend of mine recently retired, and his wife, commenting on his new state, characterized it as twice as much husband on half as much income."

President Jerome B. Wiesner also addressed the group, saying, "This is always a very touching and sad occasion that comes at the culmination of a very warm,

pleasant Commencement and Alumni Week, and to be saying good-bye to so many old friends is something one does with great sadness."

Each of the retirees received a special certificate, signed by Dr. Wiesner, in recognition and appreciation for their years of "faithful service with MIT." While reading the names of the 119 retirees, Dr. Wiesner pointed out that Arthur B. White of the Purchasing Office "holds the record this year—he's been at MIT for 50 years."

After a warm round of applause for the retirees, Dr. Wiesner said, "We hope your paths bring you back to the Institute very, very frequently."

Those honored at the banquet are:

- Arthur J. Abbott, Lincoln Laboratory, nine years.
- Catherine V. Ahearn, Division of Sponsored Research Headquarters, 29 years.
- Raoul Auclair, Draper Laboratory, six years.
- John L. Ayer, Special Assistant for Grounds, Physical Plant, 38 years.
- Robert B. Barr, Lincoln Laboratory, 20 years.
- Joseph Beauvais, Physical Plant, 12 years.
- Robert W. Bellefontaine, Draper Laboratory, 13 years.
- Alan C. Bemis, Senior Research Associate, Meteorology, 33 years.
- Domenica Bergazzi, Dining Service, 23 years.
- Agnes Blackhurst, Endicott House, nine years.
- Rodney N. Blake, Lincoln Laboratory, 30 years.
- Arthur J. Bolduc, Lincoln Laboratory, 20 years.
- George P. Bonney, Lincoln Laboratory, 11 years.
- Eileen E. Borland, Libraries, 29 years.
- Patrick J. Brosnan, Housing Service, 11 years.
- Gertrude Carey, Physical Plant, eight years.
- Manuel F. Carreiro, Physical Plant, 23 years.
- Robert P. Cavileer, Division of Sponsored Research, Mechanical Engineering, 32 years.
- Charles D. Collins, Physical Plant, 27 years.
- Richard Collins, Administrative Staff, Physical Plant, 26 years.
- John E. Connors, Lincoln Laboratory, 15 years.
- Anna K. Corrigan, Meteorology, 24 years.
- Jean Cotton, Credit Union, nine years.
- Joseph Cowles, Physical Plant, four years.
- George L. Crockett, Physical Plant, two years.
- Katherine R. Curley, Physical Plant, 12 years.
- Walter Deagle, Physical Plant, 20 years.
- John C. DiFronzo, Physical Plant, four years.



Looking for one name in a field of 119 retirement certificates takes a great deal of scrutiny, as shown by these retirees.

—Photos by Sheldon Lowenthal

- Olive E. DiLorenzi, Medical Department, 15 years.
- George L. Dodge, Lincoln Laboratory, 16 years.
- Theodore Doiron, Physical Plant, 16 years.
- Martha Dunn, Comptroller's Office, 16 years.
- Ralph Emery, Physical Plant, 21 years.
- Robley D. Evans, Professor of Physics, 38 years.
- Joseph E. Ewers, Division of Sponsored Research, Lincoln Laboratory, 16 years.
- Harold W. Fairbairn, Professor of Geology, 35 years.
- Morris Fama, Draper Laboratory, ten years.
- John Ferry, Lincoln Laboratory, ten years.
- Peter Filzow, Faculty Club, 20 years.
- Antonio Finocchio, Draper Laboratory, 12 years.
- Margaret Glendenning, Biology, 12 years.
- Anthony J. Golden, Campus Patrol, 14 years.
- Thomas Grace, Physical Plant, three years.
- Edward L. Greenwood, Center for Materials Science and Engineering, 13 years.
- Curtis C. Guild, Physical Plant, 16 years.
- Everett E. Hagen, Director of the Center for International Studies, Professor of Economics and Political Science, 19 years.
- Peter J. Harrington, Graphic Arts, ten years.
- Francis S. Harrow, Aerophysics, 24 years.
- Albert C. Harvey, Physics, 20 years.
- Albert O. Harvey, Research Laboratory of Electronics, nine years.
- Harold J. Heyland, Physical Plant, 11 years.
- Wardwell Holman, Neurosciences Research Program, 20 years.



Thaddeus Kowilcik (left), Catherine Ahearn, holding glasses of champagne before dinner.

Movies

Summer Entertainment Series. Saturday, June 17, 7:30pm and 9:30pm, Rm 10-250. Tickets 50 cents. Must show ID.

Petite Wife and Eight Beauties*
These Students' Club. Saturday, June 17, 7:30pm (Eight Beauties) and 9:15pm (The Petite Wife), Kresge. Tickets: \$2, members \$1.50, children \$1. Call Ray, 354-2789.

Yasuda and Low (1963)**
Kurosawa Retrospective. Sunday, June 18, 8pm, Rm 10-250. Tickets 50 cents. Must show ID.

Music Society. Monday, June 19, 8:30pm, Rm 10-250. Tickets \$1.

Music

Concert of Summer Music*
Program of vocal chamber music including Bach's *Coffee Cantata*. Tuesday, June 20, 8pm, Kresge. Free admission.

Dance

International Folk Dance Club*
International folk dancing. Every Sunday, 7:30-11pm, Sala Puerto Rico (exceptions to be posted).

Modern Dance Technique Class**
Elementary/Intermediate. Every Monday, Wednesday, Friday, 5:15pm. Every Sunday, 1pm. McCormick Gym.

International Folk Dance Club*
International folk dancing. Every Tuesday, 7:30-11pm, Student Center Rm 407.

International Folk Dance Club*
International folk dancing. Every Tuesday, 8-11pm, Rm 10-105. Call dorm X0888 or X5453.

International Folk Dance Club*
International folk dancing. Every Thursday, 7:30-10pm, duPont T-Club Lounge.

Friday Afternoon Dance Break*
International folk dancing on the Kresge Oval, every Friday (weather permitting), 12:30-1:30pm.

Exhibitions

Retrospect II—from William Barton Rogers to Karl Taylor Compton*
Collection of historical portraits, busts and photographs depicting the first 11 presidents of MIT, early scientific and engineering achievements as well as portrayals of everyday life from 1861-1941. Sponsored by the Committee for Institute Memorabilia. Hayden Gallery.

Autographed Music Scores
Exhibition of autographed musical scores in honor of Klaus Liepmann and the Choral Society. Music Library (Rm 14E-109) through the summer.

Hart Nautical Museum*
Exhibits include "Naval Undersea Research and Development Center," and "The Art of Rigging." Bldg 5 first floor.

Religious Services and Activities

The Chapel is open for private meditation from 7am to 11pm every day.

Roman Catholic Mass*
Every Sunday, 10:30am, Chapel.

Hillel Religious Services*
Monday-Friday, 8am, Rm 7-102; Fridays, 7:30pm, Chapel; Saturdays, 9:30am, Chapel.

Divine Light Mission*
Discourses on the direct experience of Truth given by Guru Maharaj Ji. Every Monday, Wednesday, Friday, 7:30pm, Rm 4-145. Call 369-1603 (Concord).

Ananda Marga Yoga Society*
Group meditations. Every Tuesday, 5pm, Rm 14E-303. For information, call X3664.

Latter Day Saints Student Association**
Religious seminars. Every Tuesday, 8am, Student Center Rm 473.

Christian Bible Discussion Groups*
Every Wednesday, 12:30pm, Rm 4-343; every Thursday, 12:30pm, Rm 20B-222. Call Prof. Schimmel, X6739, or Ralph Burgess, X2415.

Islamic Society Prayers*
Every Friday, 1pm, Kresge Rehearsal Rm B.

Islamic Society Discussion*
Isha prayers followed by discussion of various aspects of the Islamic way of life. Every Friday, 7:30pm, Student Center Rm 473. Coffee and doughnuts served.

Free Draft Counselling*
Hillel, 312 Memorial Drive, X2982. Call or visit 10am-5pm.

Announcements

Senior Fulbright-Hays Fellowships
Deadline date for applications is July 1. Contact Dean Harold Hazen, Foreign Study Office, Rm 10-303, X5243.

Society of Sigma Xi
Membership certificates for those initiated this year have been received. Please collect certificates from Professor Garg, Rm 3-453, X6234.

*Open to the Public
**Open to the MIT Community Only
***Open to Members Only
†Freshmen encouraged to attend

Send notices for June 21 through June 30 to the Calendar Editor, Room 5-111, Ext. 3279, by noon Friday, June 16.

Horen, Bursar's Office, 13 years.
Sam D. Humphrey, Lincoln Laboratory, 18 years.
Ed A. Humphrey, Institute Committee, seven years.
Everett Johnson, Division of Sponsored Research, Neurosciences Research Program, eight years.
Joseph, Housing Service, nine years.
Joyce, Physical Plant, three years.
E. Jubinville, Lincoln Laboratory, 11 years.
Kavanaugh, Physical Plant, 21 years.
Kelly, Nutrition and Food Science, five years.
Gy Kepes, Institute Professor, Director of Center for Advanced Studies, 26 years.
Klingenhagen, Dewey Librarian, 37 years.
Korobko, Dining Service, six years.
Leach, Technical Instructor, Mechanical Engineering, 26 years.
Lent, Professor of Mechanical Engineering, 34 years.
E. Leonard, Draper Laboratory, 21 years.
M. Leonard, Mechanical Engineering, 22 years.
J. Leonard, Lincoln Laboratory, 13 years.
Liepmann, Director of Music, Professor of Music and Humanities, 13 years.
C. Lovgren, Physical Plant, 12 years.
Rick MacDonal, Physical Plant, 13 years.
F. MacNeil, Lincoln Laboratory, 20 years.
McGrath, Physical Plant, 15 years.
V. McKenna, Physical Plant, 20 years.
A. McLeish, Physical Plant, 27 years.
C. McLemore, Campus Patrol, 15 years.



Mr. and Mrs. Arthur B. White talk with Mrs. Ruth Campbell (seated left) and Virginia Luongo (seated right).



Gertrude M. Tracey and Ada Schecter enjoy a

Ignatius McQuaid, Physical Plant, 19 years.
Peter V. Malone, Physical Plant, three years.
Lena Manning, Physical Plant, 13 years.
John H. Mason, Jr., Physical Plant, 22 years.
Florence R. Mathes, Bursar's Office, 29 years.
Henry A. Matthews, Physical Plant, two years.
Salvatore Megna, Physical Plant, 42 years.
Georgiana Moroney, Dining Service, five years.
Henry Morss, Jr., Administrative Officer, Earth and Planetary Sciences, 11 years.
Grover A. Murray, Lincoln Laboratory, 21 years.
Arthur T. Newell, Division of Sponsored Research, Lincoln Laboratory, 19 years.
Doris O'Neill, Comptroller's Office, 31 years.
Esther Pope, Registrar's Office, 14 years.
Thomas P. Quinlan, Physical Plant, seven years.
Anne Reinstein, Alumni Association, 11 years.
Edward Roberts, Physical Plant, four years.
Ralph A. Sayers, Assistant Director of Research Laboratory of Electronics, 29 years.
Leo V. Scanlan, Physical Plant, three years.
Elwood W. Schafer, Division of Sponsored Research, Administrative Officer of Center for Materials Science and Engineering, 11 years.
Ada Schecter, Development Office, ten years.
Anne A. Shannon, Physical Plant, 16 years.

George M. Sharp, Division of Sponsored Research Guard, 18 years.
Albert F. Sise, Associate Director, Office of Personnel Relations, 30 years.
Everett E. Smith, Housing Service, ten years.
Anthony Sordillo, Physical Plant, three years.
Vern Y. Steeves, Physical Plant, 28 years.
W. Allen Stuart, Division of Sponsored Research, Lincoln Laboratory, 21 years.
Samuel E. Thompson, Sr., Draper Laboratory, 18 years.
Gertrude M. Tracey, Bursar's Office, 13 years.
Herbert H. Uhlig, Professor of Metallurgy, 26 years.
Agnes Upton, Faculty Club, 15 years.
Alice K. Viano, Civil Engineering, 15 years.
Marie Warnock, Physical Plant, 16 years.
Peter Warren, Physical Plant, nine years.
Myrtle J. Wentzell, Physical Plant, four years.
Arthur B. White, Purchasing, Manager of Office of Laboratory Supplies, 50 years.
Joseph M. White, Lincoln Laboratory, six years.
Ernest Whiteway, Physical Plant, eight years.
G. Edward Wiggins, Draper Laboratory, 24 years.
Robert S. Woodbury, Professor of the History of Technology, 43 years.
Evelyn B. Yates, Administrative Staff, Alumni Placement Office, 30 years.
Patrick Youtz, Division of Sponsored Research, Lincoln Laboratory, 28 years.



The picture of the archer, above, is one of more than a dozen appearing in a picture story entitled "18 Hours with MIT Athletics," in the June issue of *Technology Review*, out this week. Athletics was also recently featured in a story in the *Christian Science Monitor* which cited MIT as first in the nation in the number of intercollegiate sports and general athletic participation on campus. —Photo by Owen Franken

300 Counselors Begin Training for August Centrex Installation

Counselor training sessions began this week to acquaint more than 300 department and laboratory representatives with the upcoming installation of the Centrex telephone system.

Following the two-hour orientation session, the counselors will return to their areas to explain the new system to all members of the community.

The conversion to Centrex will take place at 2am August 12 at MIT and the Draper Laboratory. Planning and preparing for the conversion has been in process for more than five years in conjunction with New England Telephone.

A major change in using the new system is that all internal extensions, both on campus and at Draper, will be five digits. Though this will necessitate a number of changes at Draper, few campus extensions will be changed.

MIT's new telephone number will be 253-1000; the Draper Lab will have 258-1000. The system will enable outside callers to reach extensions directly by call 253-1234, for example, rather than having to go through the switchboard. New consoles will replace the switchboards. The operators will remain, however, to direct calls coming in on 253-1000.

Another important function of the operators will be transferring incoming calls from one extension to another. Centrex will improve the existing system. Rather than flashing the operator, as is now done, it will be necessary only to depress the switch-hook once, thus activating a ringing signal to the operator.

When calling between extensions at the Institute, it will be necessary to dial five digits x3-1234, for example, instead of the present four, or in some cases at Draper, three. It will also be necessary to use an access code, or tie-line, when calling between the Institute and Draper.

All the existing tie-lines, to such places as Lincoln Laboratory, Woods Hole Oceanographic Institution, and Wellesley College, will be retained. All will have new access codes.

In order to ease the accommodation to Centrex, new telephone directories will be issued before the switchover date. Also, the Telecommunications Office has prepared postcards which Institute personnel may send to those with

whom they communicate by telephone, informing them of the new numbers. These cards will be issued through the department or laboratory counselors.

In addition to the Institute and Draper, there will also be new data lines, numbers 258-6000 through 258-8999. Dialing a data line extension within the Institute will require the prefix 8 before the extension number.

Under Centrex there will be five types of service. Class A, or unrestricted, service will allow users to dial directly anywhere inside or outside the system.

Class B, or toll-denied, service will enable users to dial local calls directly. Long distance calls may be made by dialing 190.

Class C, or message unit and toll-denied, telephones will require users to dial 190 to place a long distance call. Local message unit calls cannot be dialed.

Class D, or manual, service phones will be used primarily in elevators. They have no dials, but reach the MIT operator automatically.

Class E, or fully restricted, telephones will be used mainly for data lines and in public places, such as the Building 7 Lobby. They will be able to call within the system but can not dial out of the Institute or receive outside calls.

Dialing beyond the range of a telephone will result in a very rapid busy signal—120 interruptions per minute.

MIT Research Center to Get \$2 Million Grant from NSF

The National Science Foundation has announced a grant totalling \$2,220,000 for MIT's Center for Materials Science and Engineering.

The Center, headed by Professor Nicholas J. Grant, investigates the basic properties of solids and liquids under varying temperature, pressure and other conditions.

Information gained through this research serves as a base upon which other investigators may develop new uses for common materials, uses for newly synthesized materials and improvements in technology.

The Center is one of 12 Materials Research Laboratories to receive a grant from the National Science Foundation. The Materials Research Laboratories were established originally as Interdis-

ciplinary Laboratories in 1960 by the Advances Research Projects Agency (ARPA). Now funded primarily by the National Science Foundation, a portion of the support during this year has been provided by ARPA and the Atomic Energy Commission.

Research at the laboratories constitutes a nationwide interdisciplinary attack on materials problems by nearly 400 faculty members, 100 post doctoral associates and approximately 550 graduate students. Scientists focusing their efforts on materials research include physicists, chemists, metallurgists, engineers, mathematicians, geologists and biologists. The total research conducted at the laboratories makes up about two-thirds of the Federally funded academic effort in the materials research.

Fenway Workout Caps Big Week for Dopfel

(Continued from page 1)

After Dopfel warmed up, Morgan went to work, changing his stance, his arm motion and his grip on the ball. When he was satisfied, he stood back and watched while Dopfel threw pitch after pitch with the same easy motion.

In a few minutes a small crowd had gathered. They were mainly Angel players with a few park attendants, laughing and joking as they watched. One who didn't laugh was Del Rice, the Angel's manager, who leaned over the fence behind Dopfel, watching as intently as Morgan.

After 15 minutes of hard throwing, the workout was over. Dopfel was sent to the dressing room for a rub-down and a shower before coming back to watch the game, while Morgan, Rice and Streza huddled in the bullpen to discuss what they had seen.

The first paying customers were

Marksmanship Course Offered

The Pistol and Rifle Club has announced the beginning of a five-week course in basic pistol marksmanship.

Beginning on Thursday, June 22, the course will be offered for five consecutive Thursdays from 6:30 to 8:30pm in the duPont Pistol Range. A fee of \$10 is charged to cover pistols, ammunition and targets.

Anyone interested in signing up should call George Sechen on Ext. 8250 or Range Master Thomas McLennan on Ext. 3296.

filtering into the stands as Dopfel walked towards the dugout. Game time was still an hour and a half away and the fans were more interested in Carl Yastrzemski's return to the Boston lineup than in a 22-year-old rookie on the field for the first time. Dopfel couldn't have cared less.

"This is the biggest thrill I've ever had," he said. "Even if I never make it, never play big league ball, it will all have been worth it."

Information Center Hours to Lengthen Starting July 1

(Continued from page 1)

"By bringing students in as an integral part of the Information Center, we think we can develop better resources for answering their own informational needs. Also, the students will become more aware of vast array of information people seek from the Institute.

"By keeping the Information Center open in the evenings we will be able to respond to more general inquiries from the public. For example, there is always an ample supply of publications available for visitors to browse through. This kind of service wasn't possible before.

New hours in the Information Center will be, Monday through Friday 9am to 9pm, weekends and holidays 10am to 9pm. The general information extension will be 4795; while the previous extension, 4741,

will be reserved for calls to Physical Plant services. As is now the case, problems other than Physical Plant should be referred to Campus Patrol, Ext. 2996 and emergencies to 100.

The mail pick-up at the main entrance will also be eliminated. Employees who normally leave mail there may deposit it in Institute collection boxes near the lobby in Building 7 or Building 5. US mail can be put into the Institute boxes or into the US mailbox near the elevator in Building 7.

Telegrams and special delivery mail which arrives after hours will be held in the lobby of the Ford Building. Addressees will be notified by telephone and may either pick up the wire or letter or wait until the following day's regular mail delivery.



A young girl encounters a bead curtain during her tour of "Dialogue for the Senses," an exhibition designed and constructed by artists from the Institute's Center for Advanced Visual Studies. Designed for unsighted persons, the exhibition is on display at the Wadsworth Atheneum in Hartford, Connecticut, throughout the summer. Several tactile displays are included in the exhibition—a small cylindrical tub filled with inflated rubber gloves; a large column covered with fur; a tank of water with several objects suspended over it; an entire wall covered with natural materials such as sand, dirt and smooth wood; a walkway between serpentine walls; and thermal columns.



Boston Pops Conductor Arthur Fiedler dons a red beret given to him by Parke Appel, president of the Class of 1922, during Tech Night at the Pops on Sunday, June 4. Mr. Fiedler was made an honorary member of the Class of 1922, which had returned to the Institute for a 50-year reunion. —Photo by John Mattill

MIT Brailleboss Prints First Novel

MIT's Brailleboss has completed what many frustrated writers aim for without success, its first novel.

Of course, the Brailleboss, which works with a computer program to translate English into the abbreviated form of Braille known as grade II Braille, had a great deal of help, including a novel that was already published, and skilled people to type the novel into the machine.

The first novel translated by the Brailleboss into braille is a story about a blind man called "In Darkness," and was originally written by Roger Bourgeon in French. It was translated into English and has now been translated into Braille. The 182 page novel was printed out into 258 pages of Braille.

MIT's Sensory Aids Evaluation and Development Center worked on the novel under a contract from the Library of Congress to emboss

the Braille version of the book. According to George Dalrymple, acting director of the Center, producing a Braille book allowed the Center to learn more about how to use the translation program, Dotsys III, they have developed in conjunction with Mitre Corporation, which has so far been used only to translate short documents, while producing something that will also be useful.

It took Evelyn Welch, then the secretary at the Center but who has since moved to Draper Lab, about 20 hours to type the entire novel into the teletypewriter, which is connected by telephone lines to a computer at Interactive Data Systems in Waltham. Every 10-15 pages of ink print were proofread and then translated by the computer program and printed out in Braille. Each printout was then proofread by a blind editor to

check for any mistakes.

After all corrections were made, the entire translated novel was embossed in Braille, in about nine hours. Additional copies of the book can be produced by taking the Brailleboss machine off the computer and having it respond to a punched paper tape that was produced while the book was being printed in Braille the first time.

Nine hours to emboss each copy is a long time, but the method could be used to produce two or three copies, says Dalrymple. The production of additional copies with any practicality requires the use of a Braille press. A machine called a stereotype punches the raised points of each braille cell into soft zinc plates, which, in turn, are used to emboss Braille characters into heavy paper sheets.

The paper tape produced by the MIT-Brailleboss can be used to direct the automated stereotypes. So, with the help of a computer program, an operator unskilled in the intricacies of Braille can type standard English with some instructions to the computer, and obtain Braille printout and a tape that can direct a Braille press in which unlimited copies of the book can be printed.

Applications Due

Applications for advanced degrees to be received in September 1972 must be returned to the Registrar by June 30.

Sloan Group to Distribute Resume Book

A committee of students at the Sloan School of Management, known as the Sloan Resume Service, is compiling and printing a resume book to be distributed to various companies throughout the US during the 1972-73 academic year.

Sloan School students, as well as those in other departments who have taken courses in management, may submit their resumes. A nominal handling fee will be charged for non-Sloan students.

All resumes must be submitted to the Sloan Resume Service by early September. Anyone interested in including a resume should write to the committee, Room E52-480, as soon as possible. Be sure to include a summer address.

3,400 Attend Summer Term

(Continued from page 1)

on timely scientific, technical and management topics—are designed for professional men and women who want to keep abreast of developments in their fields.

Established 23 years ago, the Special Summer Programs include more than 40 courses this year such as "How Plastics Break," "World-Wide Trends in Welding Technology" and "Physical Aspects of Nuclear Medicine."

More than 1,300 professional men and women are expected to attend the series of one-and two-week courses.

The summer term began on Monday and will run for ten weeks, ending on August 24. Tuition for regular students is comparable to that during the regular school year and tuition for the special programs, usually paid by the employee's firm, averages about \$350 for a one-week course.

Technology Review Reports

Survey Shows Success for Managers

"If your objective is high earnings, continue your education through the graduate level. Best of all, young man, go into management."

This advice to a student at the Institute can be extrapolated from "Where Are They Now, and How Are They Doing?," an article reporting the results of a survey of MIT graduates in the current issue of *Technology Review*.

The survey was conducted by a research team at the Sloan School of Management headed by Edgar H. Schein, professor of organizational psychology and management, and Lotte Bailyn, associate professor of organizational psychology and management with financial assistance from the Carnegie Commission on Higher Education.

Professors Schein and Bailyn sent questionnaires to 2,227 MIT alumni in the Classes of 1951, 1955 and 1959; 61 percent replied. The principal findings:

"During the 1950's--and undoubtedly since then, as well--there is an increasing tendency for MIT graduates to continue their education at the graduate level; graduates in science are most

likely to do so, those in management least likely.

"Fifteen and 20 years after graduating from MIT, over half the alumni are in some form of management. The Class of 1959, however, still had relatively few managers, but Professor Schein and his associates speculate that many of the technologists among them may well move into management as their careers develop.

"Fewer MIT alumni in recent classes are choosing careers in business, and more are entering science, computer applications, education and government. Our data reveal a clear trend among MIT graduates away from employment in the private, profit-making sector toward nonprofit institutions--laboratories and universities--and local or federal government.

"Income varies with length of time out of school: 22 percent of the Classes of 1951 and 1955 are making over \$30,000 a year, and 26 percent have salaries between \$15,000 and \$20,000; but 26 percent of the Class of 1959 are still earning less than \$15,000, only four percent over \$30,000.

"Income varies with occupation. Presidents are the highest paid, with consultants, general managers, architects, technical managers, business staff, engineers and scientists following in declining order. Professors are near the bottom of the income ladder.

"Income also varies with amount of education. Among technical managers, engineers and scientists, higher income is associated with higher degrees. But the effect of occupation is stronger than the effect of education; managers with bachelor's degrees outearn even doctoral-level scientists and engineers.

"Income does not correlate closely with the graduates' own sense of their success. Science graduates, who are near the bottom of the income scale, are high in perceived success and particularly in job satisfaction.

"Twenty percent of the alumni surveyed gave their MIT education top rating in terms of its overall contribution to their success in work, and another 30 percent rated their MIT experience at four on a five-point scale. Only 17 percent

put their college experience at one or 2 on this scale."

Purpose of the survey was to obtain basic information about the careers of MIT alumni, their attitudes toward their education, and their suggestions for how the Institute and similar institutions might better serve their graduates in the future.

In this regard, Professors Schein and Bailyn suggest "an important issue" for MIT: "It is this: alumni still employed as engineers a decade or more out of school (about one-fifth of our sample) appear to be alienated from their work; they see themselves as less successful and less able and are less satisfied with their field and jobs, than other graduates in our sample. Future research might well focus on how MIT can help resolve these frustrations by providing either opportunities for technical up-dating or training for career transitions."

Marc S. Gerstein and H. Dany Siler, graduate students, collaborated with Professors Schein and Bailyn in analyzing and reporting the data published in *Technology Review*.

CLASSIFIED ADS

The Student Furniture Exchange at 25 Windsor Street will buy used furniture from anyone in the community. Following the motto "We buy cheap and sell cheap," the Exchange welcomes all kinds of inexpensive household items. Run by volunteer Technology Matrons, the Exchange is open from 10am to 2pm on Tuesdays and Thursdays.

For Sale, Etc.

Sgl bed, \$15; sm blue bkcase, \$5. Lois, X1782.

Lady Kenmore port dishwasher; Regency WT-4 AM/SW radio, 4-band, exc cond; Eico HFT-90 FM-mpx tuner, stereo, gd cond; tonneau for '65 MG Midget, nvr used; 4 screw-on type cam filters, 49mm, red 25A, green XI, 85B, Polarizer, reas prices. X2241.

GE refrig, gd work cond; painted brkfst tbl, 3 chrs; 40x27" DR tbl. X2710.

Furn; AR stereo sys; typwr. X5271.

Oriental 3x6' throw rug, red bkgrnd, gd cond, \$6. Steve, X2292.

Infant equip: seat, \$4; bassinet, \$6; crib, \$18; walker, \$2; high chr, \$12. X5326 Linc.

Sealy queen sz bed, 1 1/2 yrs old, was \$250, now \$80; Singer port sew mach, \$45; 3 7.00x14 tires, \$5 ea; Dan sofa, \$15; iron; bkcase, sm cab, brick & bd bkcase. Call 492-5645.

Fisher 400 stereo recvr w/walnut cab, \$120 or w/2 XP-5 spkrs in walnut encs, \$175. Michael, X7622 Linc.

Lg couch, gd cond, 15 yrs old, \$30; Hide-a-bed w/new colorful cvr, \$20; 9x12' green wool rug, v gd cond, \$60; old expensive end tbl, v gd cond, \$15. Phil, X7010.

Silver nickels, \$2.50/roll. Art Beals, X5149.

Red cobra platform sandals, sz 6 1/2 B, new, were \$28, now \$10. Rosanne, X422 Linc.

Coldspt 14,000 BTU air cond, \$125; olive gr 11x15' & 9x11' rugs, yr old, \$75 & \$60. X6610.

Fisher X-101-D stereo amp, exc cond, 30wpc, in walnut cab, \$90; Eric St-100 sol st stereo tuner, exc cond, \$30; both for \$110. X6763.

Tent, 10x12', integral floor, zip doors fr & rear, nylon screens, Int'l alum frame, canopy, hvy duty canvas, was \$140, exc cond, \$80. Roy, X6105.

Champion plugs, 6, new, UN012Y, replaces AC-46N, \$3. X6415.

Hoosier fam size tent, base 10x14', v gd cond, \$90. X3740 or 5075.

Hospital bed, new cond, manual control, \$250 new, asking \$75. Jeanne, X414 Linc.

Fedders 7,500 BTU air cond, 2 yrs old, best offer. X3319.

Refrig in gd working cond. Mary, X4547.

Records, 78s, all collector's items, shows, classicals, new cond; Wanted: Metronome. Dores, X3531.

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 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. 3270 or mailed to Room 5-105. The deadline is noon Friday.

Coffee tbl, \$10; end tbls, \$10; wh shag scatter rugs, \$5 ea; Polaroid 220 camera w/flash, \$40; Northland 190cm w/cubcos, \$35; man's ski boots, -10, \$25. Rich, X520 Draper 11.

Sears 6,000 BTU air cond. Grant Emrick, X6275.

Twin bed, exc cond, \$30. Judi, X3148.

English coach type doll carriage w/blt-in music box, \$10. Ed, X3993.

Suitcases, 2, lg & sm, gd cond. Chester Janiak, X3451.

Dbl bed w/spring, matt, \$40; solid rubber bench, \$70; Ampex cassette recdr, \$60; Hoover Electrolux, \$30; Olivetti typwrtr, \$25; new European clothes; hshold items. X3118.

Maple dresser, \$10; wrought iron tel tbl, \$5; pole lamp, \$10; sm plant stand, \$5. Debby, X5434.

Pr 14" Chevy wheels, used snows, gd tubes, \$10. Melhorn, X5359 Linc.

Knight stereo, \$40. Call 787-5658.

Moving, must sell almost new walnut BR furn, Englander matt, Hutches dressers. Karni, X1763.

Kodak 35mm Carousel 850 slide proj w/zoom lens & carry case, \$100 or best. James Vary, X7195.

Camel 2-man nylon mtn tent, 5'x7'x40", used once, \$15. Guy, X5597 Linc.

Elec comb, new, \$12.50; sm 3-dwr desk, \$5; new Remington elec knife, \$5; Tensor lamp, \$3. Milton Labin, X6680.

AR-4X spkrs, exc cond, \$70. Bob Sohvil, X7457.

Must sell mod LR, BR, den sets, w/lg desk & chr, exc cond, 2 TVs, girl's 3-spd bike. Rich, X6835.

AR-4X spkrs, exc cond, \$70. Bob Sohvil, X7457.

Dbl bed, \$50; grn couch, \$70; desk, \$10; pole lamp, \$10; DR tbl & 4 chrs, \$25; chest, \$15; 23" b/w TV, \$30; all in gd cond; '65 VW bug, exc mech cond, \$400. Frances, X7836.

Den set, 2 pc, \$20 ea. Joyce, X4427.

Oil tank for domestic ht system, 275 gal, free. William Ince, X5561 Linc.

Admiral refrig, exc cond, 24"x57"x25", lk new, \$80; Scott compact Stereo w/FM tuner, Garrard trntbl, S14 spkrs, v gd cond, \$220; other hshold items. Marcelo, X6786.

Eico 3070 Cortina stereo amp, \$45; Concord MkIII stereo tpd, \$80; Wollensak 6150 stereo deck, new, \$155; Dynaco gear PAT-4 & stereo 120 amp, \$140, all clean and exc cond. Aldrich, X5360.

Mod wh formica desk or tbl tp 36"x80", \$35; wl Rya rug, or&br, \$70; contemp lmps, paintings, \$7.50 up; scatter rugs. 491-7011.

Free: vintage 1954 Dumond b/w 23" console TV. Cynthia, X2054.

Maytag washer, avocado, nrly new, mod A206; Hoover hair dryer. Call 773-6522 evgs.

Bureau, \$8; Dominion hairdryer, lk new, \$6; ski boots, \$5. X7042.

Vehicles

'40 Buick super 8, orig cond, radio, clock, 2-tone, orig 61K, superior run cond, any offer over \$1200. Laura, X7747.

'59 VW sunrf, basically sound but nds help, \$150; transaxle from '63 VW, \$35. Lloyd, X7518 Linc.

'60 Chevy wgn, best offer. Mike Sapuppo, X2479.

'63 VW, new br & muff, rebtl eng, R, body fair, \$200. Paul, X4004.

'65 Mustang convert, V-8, gd cond, \$600; '71 VW convert, AM/FM, warranty, perf cond, \$2000. Elsie, X7986.

'65 VW sqbk wgn, recent ovrl, gd work cond, nds front body work, \$125. Larry, X1960.

'65 VW, white, gd tires & batt, \$495. X2204.

'65 VW sunrf, newly rebtl eng, gd body, \$550; '60 Corvair, runs. Call 661-8136.

'66 Mustang, 2 dr hdtop, 51K, new auto trans, brakes & batt, \$600 or best. Bruno, X4433.

'66 Mustang, tan, 70K, 6 cyl auto trans, \$500. Alan, X6737.

'67 Mustang convert, 8 cyl, auto, pwr st & br, 38K, \$950. Hans, X1834.

'67 VW sedan, spr sticker, std, gd tires, green w/bl int, 45K, orig owner, gd cond, new exh sys, R&H, \$995 or best. Colin, X2007.

'68 Chevy Nova 2-dr, exc cond. X6164.

'69 Mustang, std, grn, exc cond, \$1200. X2209.

'69 VW, auto, AM/FM, exc cond, \$1250 or best. Akalin, X2961 or Dorm X9904.

'70 Opel GT, red/bl int, 1.9 liter, 4-spd, exc cond, must sell. X4239.

'70 VW bus, 7 pass, low mi, exc cond, Michelin tires w/unused spare, fog lgts, sway bar, R, hmde bed avail, \$1800. X5370 Linc.

'70 VW, exc mech cond, R&H, 25K, snows, \$1450. David Bulter, X7677.

'70 Ply Duster, std. X5744.

'71 Duster, 6 cyl, auto, R&H, orig owner, 14K, lving country, must sell, best offer. Costas, X4242.

VW dunebuggy, street machine, \$700 or best. Tom Emberly, X559 Draper 7.

'70 Kawasaki Mach III, 500cc, exc cond, w/helmets, best over \$650. X1726.

'70 Honda CL 450, lots new, \$725. Jim, X474 Linc.

Alcort super sailfish, 13', wd hull, exc cond, \$170. X5262.

Alum 14' boat. Andy, X383 Linc.

Adv Cub Scow 12' car-toppable fiberglass sailboat w/alum mast, stainless rigging, dacron sail, self rescuing, fast, 2 yrs old, \$550. X6306.

Thunderbird 26' racing-cruising sloop, sleeps 4, compet class, MORC, comp w/trlr, \$3500. Tolly Stone, X4637.

Housing

Andover, choice 1/4 acre level lot, pt apple orchard, 12 trees standing, exc loc, \$15,000. X6285.

Apt, 15 min fm MIT, mod, 2 BR, AC, ww carpet, bal, free park, nr pub trans, \$200, occup July 15. X284 Draper 7.

Camb house nds sum people w/opt for fall, min age 22, \$80/mo, 4 now nd 2 more, avail now, nr Cent/Harv Sq. Call 354-5989.

Camb, sum sublet, 7/1-8/30, fully furn, 3 BR, nr Harv Sq, \$220/mo. X7769.

Camb, sublet w/opt, 1 BR in renov 4-BR apt, dish, \$80/mo. Mike, 868-1275 evgs.

Camb sublet w/opt, 5th fl furn apt, 1 BR, K, LR, B, air cond, Mass Ave nr Harv Sq, avail 7/1, \$165/mo. Nanette, X4861.

Camb sublet, 5 BR, air cond, dish, Cent Sq, avail immed, \$475. Jerry, X2540.

Camb, sum sublet w/opt, 2 person apt, avail now, nr MIT, \$190/mo. X3106.

Chelmsford, 2 BR apt, unfurn, air cond, carpet, lg elec K, pking nrby, \$185/mo. X7485.

Needham, 10 1/2 rm house, 5 BR, 2 1/2 B, playrm, garage, yard, \$425/mo incl appliances, lving entry. X2220.

Gd income property in Newton w/2 apts. Paul Garren, X3526 evgs.

Som, nr Union Sq, 1 BR unfurn apt, yard, avail 6/1, \$135/mo. Rich, X4946 or 4852.

Som, 5 lux rms, 1st fl, priv entrance, patio, nr Porter Sq, avail 7/1, \$250. Wood, X7439 Linc.

Stoneham, 3 1/2 rm apt, all or pt of July w/opt to renew in Aug, 20-min drive to MIT. Jeff, X3243.

Subsidized sum sublet, own rm in lg apt, N Camb, \$65 + util, avail 6/20. Ron, 547-6358.

Walth-Bel line, 4 BR hse, LR, DR, K, 1 1/2 B, 2 car gar, fin bsmt, 1/3 acre yd, comp furn, avail 9/72-6/73. X2994.

Westgate sublet, effic apt, July-Aug, furn, \$131/mo. Call 547-3238 morns.

Winch, furn house, 9/1/72-8/31/73, \$475/mo. X582 Draper 7.

Bride's Hill Rd, Fremont, NH, 34.5 acres, approx 200' front, standing timber. John Stevens, X5247.

Wht Mtn vac home, Aug free for ski seas rental, 4 BR, all elec, mod furn hse, frpl, view, swim, conv to Rumney ski. X7759.

Animals

Free kittens, wide variety from which to choose. Larry, X5358.

Free, 3 healthy grey & wh kittens to kind people. Jerry, X4400.

German shepherd puppies, purebred, no papers, \$75. X4523.

Puppy, 9 mos old, obedient, frisky, affec, spayed, w/shots. Chuck, X6650.

Free: hamsters. X6710.

Home nded for abandoned yel/wh young male cat, v attract personality. X2260.

Puppies, 6, 8 mos old, spayed fem shepherd. Earle Blanchard, X322 Draper.

Free: 1/2 Siamese kittens, m and f, litter trained. Dick, X5430 Linc.

Free guinea pig w/cage to gd home. X321 Linc.

Wanted

Heath oscilloscope med OM-3 instr manual, pwr transformer for same. Jim, X1610.

Woman's 24" 3-spd bicycle, hand brakes. Joe, X3448.

Info on housing/rmmate nr U of Penn, Phila, for male grad student, Sept. George Claffen, X1876.

Fem rmmates, friendly, resp for own BRs in 3 BR Cent Sq apt, for sum or yr, furn or unfurn, conv loc, \$65/mo. Call 354-3349 evgs or morns.

Stud serv for pocket chihuahua. Ken, X2422.

Daily ride, MIT-Lex via Rte 2, drop off at Walth-Spr St. exit & nr Concord Ave exit, time flex, wl share exp. Elsie, X7987.

Food freezer, not huge-not tiny. Christie, X5689.

Rmmate for 1 BR in 4 BR apt nr Cent Sq, 5 min to MIT, \$72.50/mo, ww carpet, central ht, mod. X5763.

Fem rmmate for apt betwn Harv & Cent Sq, own rm, \$68.75 + utils. Peggy, X6220.

Bicycle for less than \$25, about 26", pref girl's. Eva, X1618.

Ride to Buffalo, Toronto or vicinity, 7/4 wkend. Peggy, X6337.

Fem rmmate, own rm in 3 BR, 2 B mod air cond apt, conven to Harv Sq & MIT, free pking, \$100 incl gas. Rhonda, X7271.

Rmmates nded for sum, apt betwn Harv & MIT off Mass Ave, own rm, air cond, ww carpet, panel, mod K, gd people, gd landlord, Sept opt, \$200 for summer. Call 876-2098.

Fem or cpl to share spacious Porter Sq apt w/mother & girls ages 11 & 6. Dorothy, X2054.

Fem rmmate for roomy 2 flr Som apt, own air cond BR, wash/dry, dish, sunprch, share w/3 girls, \$100 incl all util & ht, avail immed. Gail, X1707.

Furn or unfurn home, 3-4 BR, w/in commute of MIT, for yr begin 8/1, resp cpl w/4 well behaved children. X6885.

Miscellaneous

Wl do general or thesis typing on IBM selectric. Margie, X5625.

Summer T-groups, day & evg. Tequod, X6683, 6678.

Free math tutoring at Harv, 2nd grade level, immed. Fred, X2540.

Exp teacher will tutor German, all levels, during sum. X4771.

Will do any typing, esp tech. X2054.

Floors sanded & refinished professionally. Denny, X5606.

Have VW bus will travel, need moving help? \$5/hr, \$5 min. Kenny, 661-9648.

Positions Available

Sr. Accounting Clerk IV or Accounting Asst. V will reconcile statements from vendors; will reconcile Cash Check suspense; answer questions from various departments regarding statements and other accounting matters. Experience in accounting or purchasing field necessary.

Secretary IV bilingual in Spanish and English, will work for MIT professor and advisor to the government of Puerto Rico. Knowledge of Puerto Rico especially helpful in preparation of material, locating information, making travel arrangements, and acting as liaison between many visitors. 40 hour work week, good skills necessary.

Secretary III and IV needed for jobs in administrative and research groups in education-oriented department. Knowledge of office procedures; good typing for some technical manuscripts; much contact with students and staff.

Part-Time Secretary IV for professor in academic department. Type drafts and final versions of technical proposals, reports, manuscripts, class materials. Some accounting and purchasing responsibilities. Approx. 20 hour work week.

Biweekly, ext. 4251

Technician C (Ind. Hyg.) \$3.21-\$3.57/hr. Envir. Med. Svc. Courses in chemistry, algebra, geometry or similar technical experience desirable. Advanced technical school training desirable, but not required. Drafting or mechanical drawing experience desirable. Assist in routine industrial hygiene inspections and field studies. Conduct regular laboratory hood surveys. Responsible for laboratory housekeeping. Related work as required. (C72-39)

Hourly, ext. 4268