

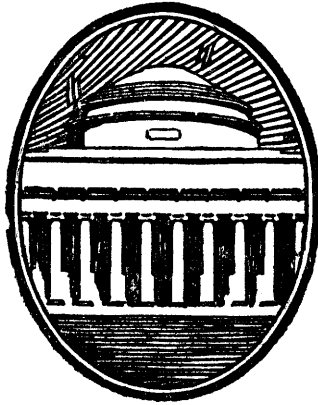
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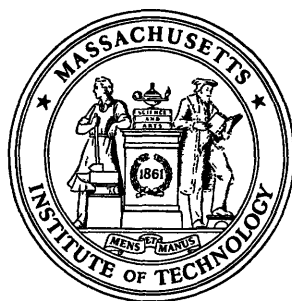
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OF TECHNOLOGY
BULLETIN

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1948-1949

VOLUME 85



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REPORT OF THE PRESIDENT

TO THE MEMBERS OF THE CORPORATION:

THE M. I. T. Mid-Century Convocation last spring was the event of transcending importance during the year. Imaginatively conceived and superbly carried through, it achieved in its total effect an illumination and grace that made it a memorable and moving experience for all who were present. Mr. Churchill's presence alone made the occasion a resplendent and historic event, but in addition the panels and the other addresses, including Mr. Stassen's statesmanly speech, carried the program to an intellectual pitch that made it, as one observer remarked, one of the most important educational events of our generation.

In addition to the world-wide radio and television audience who heard Mr. Churchill, the 14,000 who could be seated in the hall in which he and President Stassen spoke represented but a fraction of the number who sought seats. The seating capacity for the panels (6,000) was likewise quite inadequate to care for all who wished to attend. To cite only one example, hundreds had to be turned away from the panel discussion on "Science, Materialism, and the Human Spirit." The response to all the events of the three-day program provided convincing evidence of the enthusiasm of educated people for authoritative discussions of contemporary problems, and of the opportunities and obligations of our educational institutions to plan and carry through such meetings. The scale of our Convocation was so great that only occasional conferences of its kind are practical, but simpler variations of it represent an extension of formal education which is a proper and useful function of the college and university. I hope that the Massachusetts Institute of Technology can continue to sponsor an increasing number of meetings which bring together the scholar and the public

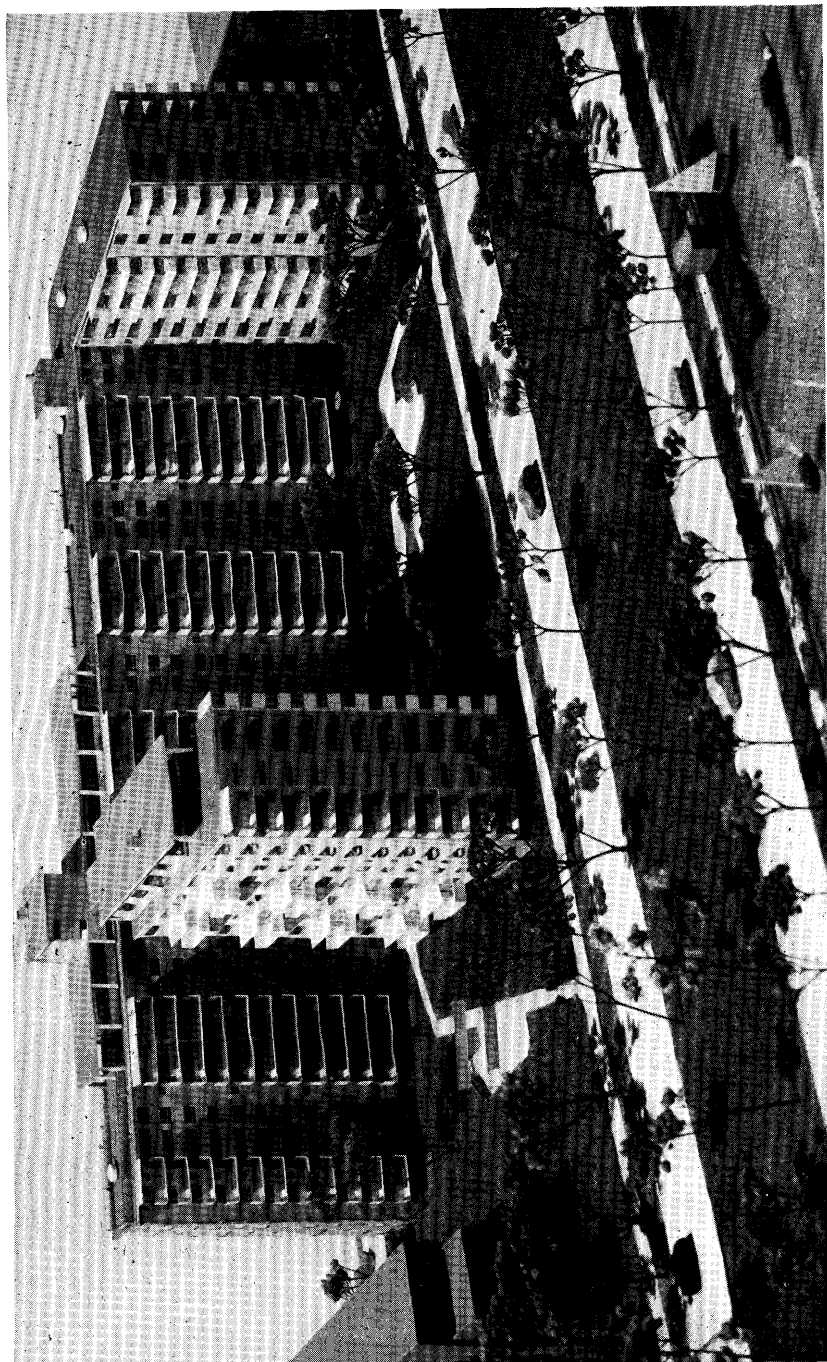
and which afford opportunities for representatives from education, public life, industry, and other fields to come together for comprehensive discussions of current problems, both technical and general.

IMPLICATIONS OF THE MID-CENTURY CONVOCATION

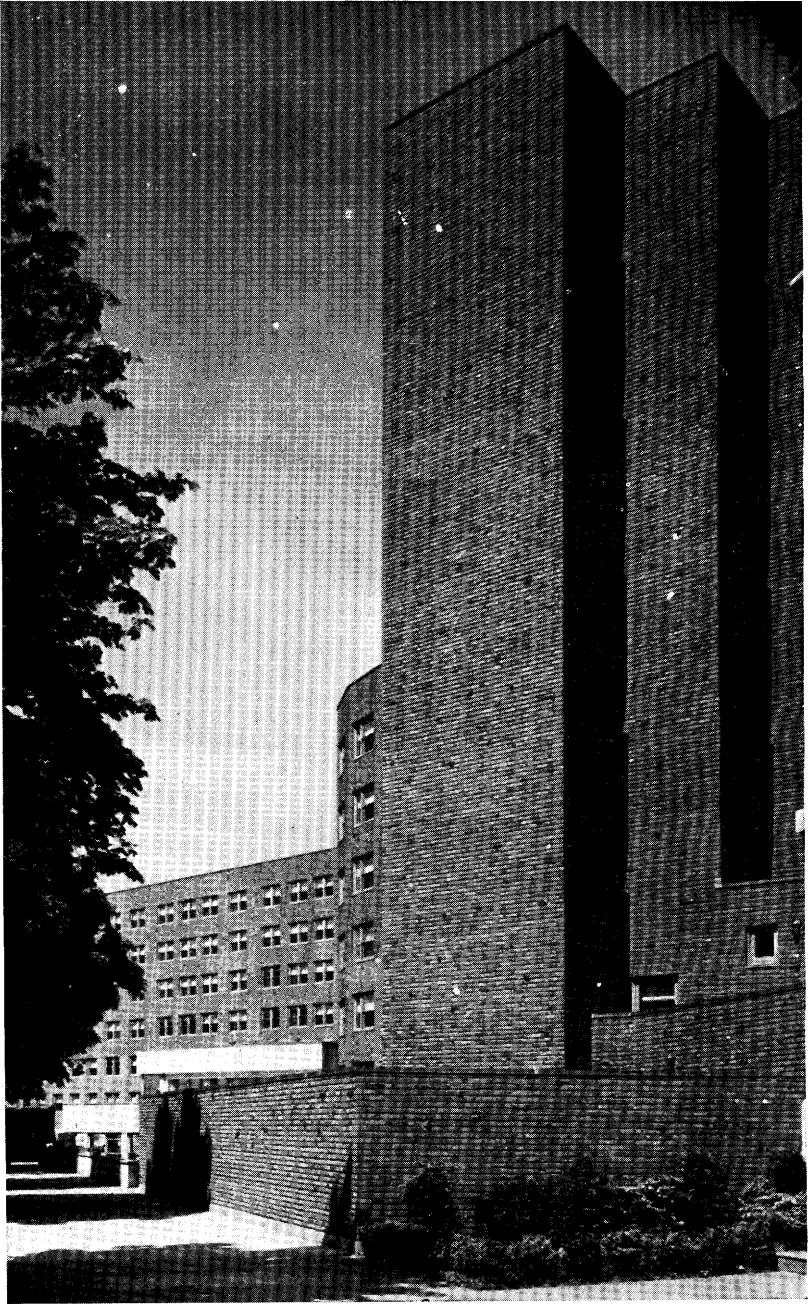
The Convocation prompts many other observations pertinent to education and to our objectives at the Institute. As preface to this annual report, let me mention only two.

1. During the past half century, specialization has been an outstanding characteristic of scholarship and professional activity. The tactics and strategy of intellectual advance have required specialization, and specialization has moved from one triumph to another. The tactics and strategy of the second half century will require a specialism equally strong but tempered by less isolationism among scholars and more linkages between fields of scholarship. We know that in science the boundaries between sciences are becoming less and less definable and that overlapping sciences, such as biochemistry and geophysics, reflect in their vigorous growth the interdependence of specialized investigations. We find, too, that in our university organization we must devise new organizational methods, such as interdepartmental laboratories and programs, in order to provide an integrated approach to fields such as nuclear science, international relations, electronics, and public administration. In his authoritative study, *The Universities of Europe in the Middle Ages*, Rashdall concluded that the true university is "a place where the different branches of knowledge are brought into contact and harmonious combination with one another." Our goal today is to achieve this harmonious combination and intercommunication.

Similarly, we need better linkages between science and the humanities, with the object of fusing the two into a broad humanism that rests upon both science and the liberal arts and



EASTGATE APARTMENTS



THE NEW DORMITORY

that does not weaken either. We need a bifocal vision to thread our way among the problems of modern society.

If we can achieve such intellectual integration, the basis of the conflict between general and specialized education will have been removed. In fact, we have long passed the stage where there can be any legitimate debate over the competing effectiveness of specialized and general education. Both are essential. General education alone can result in superficiality and dilettantism; specialization alone, in narrowness and social myopia. To achieve a working partnership, however, requires an end to narrow jurisdictional differences in education. President Baxter at our Commencement exercises last June spoke eloquently of the need for flinging more two-way bridges between the liberal arts and the sciences. The colleges must bring about this two-way traffic if they are to educate men who can, as specialists, bend specialism to the broad needs of our society.

2. My second observation prompted by the Convocation is that education, if it is to serve a free society, must not only train men who can do the complex, specialized work of society; it must also cultivate in these men a reverence for the dignity of the individual. Someone has said that democracy is most effective when it tries to make all its citizens aristocrats. It might also be said that education in a democracy is most effective when it strengthens the aristocratic virtues of personal dignity, self-reliance, and self-understanding.

Men with these qualities resist all forms of statism and Stalinist totalitarianism that regiment and depreciate the individual. Men with these qualities are also more immune to fear and frustration. President Bixler suggested at the Convocation that our chief peril is a loss of faith in the power of mind to solve society's problems and a consequent tendency to pick scapegoats — as, for example, blaming science for society's ills. The education that helps men avoid these aberrations

must possess a synthesis of the general and the specialistic that brings, within the limits of our knowledge, the whole of life into view.

In our educational program at the Institute these considerations have great influence, and the Mid-Century Convocation served to point up and extend this influence. The fact that an institute of technology held a convocation that enquired so widely and deeply into the social problems of the mid-century is evidence of a vigorous humanism that recognizes the interdependence, unity, and social value of all useful learning.

THE YEAR IN REVIEW

The Development Program. Last November over 300 members of the Committee on Financing Development ("CFD") met at the Institute and formally launched the organizational work of the campaign to raise \$20,000,000 for the Institute. Under the leadership of our fellow members, Alfred P. Sloan, Jr., '95, and Marshall B. Dalton, '15, Honorary Chairman and Chairman, respectively, of the CFD, the organizational and planning work for this great effort has been largely completed. Solicitation on a national basis will be intensively carried out this fall by the 700 members of the CFD and other alumni, with special gift prospects taking priority. Next spring there will follow a general solicitation of the entire M. I. T. alumni body.

At the Alumni Dinner last June, Mr. Dalton reported the first fruits of the campaign. Led by Mr. Sloan's princely gift of \$1,000,000 for a Metal Processing Laboratory, friends, corporations, and alumni had contributed or pledged from January 1, 1948, to June 11, 1949, \$5,100,000 to the Development Program.

None of us has any illusion about the difficulties and immense effort required to raise so large a sum as \$20,000,000, but I share Mr. Dalton's informed optimism that the amount will ultimately be obtained. This optimism is constantly reinforced

by visits with alumni in all parts of the country. Not only do they express confidence in the objectives and plan of the campaign; they also indicate that the work of the CFD has resulted in our alumni being far better informed about the Institute and, of equal importance, about one another. I am sure that the efforts of the CFD, quite aside from increasing the Institute's resources, will have subsidiary benefits of lasting value to the Institute.

In the weeks ahead we must concentrate on obtaining very large gifts from individuals; these are essential if we are to reach our goal.

Industrial Liaison Office. Grants-in-aid from industrial corporations are being actively sought by the CFD Committee on Business Corporations (Robert T. Haslam, '11, Chairman), and already approximately \$2,500,000 of such grants have been obtained. The greater part of this amount has come through corporate grants of \$250,000 spread over five years. Companies making these substantial grants do so under an arrangement whereby the Institute undertakes to keep the companies systematically informed about research and educational activities at M. I. T. which are important to the business of the companies.

To insure that the Institute's obligations under these industrial grants are fully carried out, we have established an Industrial Liaison Office. The office is directly responsible to the President, and its policies and activities have been carefully studied by a committee representing the faculty and administration.

The objectives and opportunities of the Industrial Liaison Office have been summarized as follows in a memorandum from the President to the Faculty:

"Large industries realize that their leadership tomorrow must stem from an awareness and understanding of the new scientific knowledge and techniques of today. For any one industry the fact applies not to one research field alone but

increasingly to all the sciences and fields of engineering. . . .

"This situation, I believe, presents M.I.T. with a superlative opportunity for widened service to the industrial community. The Institute conducts a research program of such vitality and diversification that we may truly claim a unique position. There is no more logical institution than this to which industry should be able to turn for information. I hope we may accept this challenge, and by our own devices see to it that the significance and potentialities of our active researches are made more readily evident to industry than has been the case in the past."

The Educational Program. During the year numerous refinements were made in the Institute's educational program. Upon recommendation of the Faculty, the Corporation approved a new program of graduate study in engineering leading to a new professional degree intermediate between the master of science and the doctorate. This degree carries the title of the field in which the recipient majored, i.e., *Metallurgical Engineer*, and while the professional degree awarded for post-college activity has not been uncommon in America, only two or three institutions award it to denote completion of a graduate program taken in residence and extending beyond the master's degree. More important than the degree is the program, and here the objective is to provide a broader graduate training for those students who wish to become not research specialists but engineers or executives with wide responsibilities calling for engineering judgment. Already both students and employers have responded favorably to this new program and in 1949-1950 we may have as many as 134 graduate students involved in the program.

This past spring the Faculty approved a new type of cooperative undergraduate program for the Departments of Mechanical and Aeronautical Engineering (Courses II-B and XVI-B). By a rearrangement of the undergraduate schedule, these new cooperative courses provide a six-month period of

practical experience in an industrial plant or a research laboratory prior to the beginning of the senior year.

I mention these new cooperative courses to call attention to the variety and extent of cooperative study at the Institute and to the close relationship between our educational activities and industry. Courses II-B and XVI-B are variants of the long-established and highly successful Electrical Engineering Cooperative Course (VI-A), a five-year program for which the S.B. and S.M. degrees are awarded together. In this program students have about 70 weeks of practical experience in a particular industry in addition to their academic work at the Institute.

A third variant of the cooperative program is the School of Chemical Engineering Practice and the more recently established Oak Ridge Engineering Practice School, which follows the same pattern. In the School of Chemical Engineering Practice, students who have completed four years of undergraduate study spend five months at three field stations. While at these stations the students are under the direct instruction of two members of the Institute staff, and since their time is devoted wholly to education by means of plant investigations and tests on industrial equipment, they receive no compensation from the companies as do the students in the other cooperative programs. Recently a Practice School program for seniors, discontinued during the war, has been reactivated.

The founding of the Oak Ridge Engineering Practice School was reported to the Corporation a year ago, and I am glad to report that it has proved its value in providing students, drawn from Mechanical, Chemical, and Electrical Engineering, a better understanding of industrial engineering problems associated with atomic energy.

While each of these patterns of cooperative education has its special objective and philosophy, they all seek in common to provide a background of reality for professional study, to apply

theory to practice, and to develop engineering judgment along with the capacity to deal with people.

Other Developments. Of the many other notable educational activities and advances described by our Department Heads and Laboratory Directors in their separate reports, I can cite here only a few. The Department of Chemistry has initiated a course of study and research leading to the degree of Doctor of Philosophy in Analytical Chemistry, placing this branch of Chemistry parallel with Inorganic, Organic, and Physical Chemistry as a course of study for graduate students. This program results both from an increasing demand for men trained in Analytical Chemistry and from the exceptional qualifications of our staff members in this field. The growing interest in Biology at the Institute is emphasized by the increasing demand on the part of students in other Courses for work in Biophysics and Biochemistry, and by the growing number of postdoctoral medical fellows who wish to be associated with the Department. Until we are able to build the projected biology building, the Department is severely restricted in accepting additional graduate or postdoctoral men.

In June, the Sloan Fellowship Program for Executive Development was reinstituted, under a generous subvention from the Alfred P. Sloan Foundation, Inc. Conducted jointly by the Department of Business and Engineering Administration and the Department of Economics and Social Science, this important program brings to the Institute for 12 months of advanced study a carefully selected group of junior executives who have an engineering background and a record of tested competence in industrial management. The program has earned a high reputation in industry for its success in aiding young executives to gain greater administrative proficiency and breadth.

During the year the Department of Metallurgy, together with the Department of Mechanical Engineering, has con-

tinued the development of its Metal Processing program planned to bring into fruitful liaison the designer who must employ metal in a machine or structure and the metallurgist who is a specialist in metals. This program, as well as the whole broad field of metal fabrication, is assured of its fullest development at the Institute by Mr. Sloan's gift, reported above, of \$1,000,000 for a Metal Processing Laboratory. Architectural plans are now being drawn for this building, which will be located on the south side of Vassar Street, adjacent to the Guggenheim Aeronautical Laboratory.

Looking back over the year, I am impressed by the thoroughgoing consideration which has been and continues to be given to the effectiveness of our undergraduate program, including the quality of our curriculum, our teaching, and our environment.

The Committee on Educational Survey, appointed three years ago by the Faculty, has completed its study, and plans to report to the Faculty this fall. Without anticipating the conclusions of the committee, I can report now that it has conducted its studies in a manner that has stimulated the educational planning of the entire institution and that has already brought lasting benefits through the interchange of ideas which has been promoted throughout the Faculty.

Combined Plan. Two colleges, Pomona at Claremont, California, and Wesleyan at Middletown, Connecticut, were added during the year to the list joining M. I. T. in the plan for combined liberal arts and technological study. This brings the total number of liberal arts colleges participating in the plan to 14. This fall, 62 students entered the Institute from these colleges.

Summer Session. Steps were taken during the year to restudy the objectives and opportunities of our summer program. As a result, Walter H. Gale, Associate Professor of Aeronautical Engineering, was appointed Director of the Sum-

mer Session, with the responsibility of administering our usual summer school activities and of developing additional programs. Our plan is to increase the number of conferences, seminars, and special programs, but to accomplish this without imposing an undue burden on the Institute staff. We plan, for example, to invite teachers from other institutions to offer special courses and seminars.

As a part of this growing summer program, we initiated last July a summer school for teachers of science in high and preparatory schools. Under a grant from the Westinghouse Educational Foundation, we were able to offer 50 fellowships covering tuition and living. These were in great demand. The object of this school, which is financed for five years by the Foundation, is to afford teachers of science an opportunity to bring themselves up to date in the basic sciences and to observe research and other educational activities as carried out at the Institute.

Improvements in Facilities and Environment. To provide the proper facilities to permit our staff and students to do their most effective work, the Institute during the past year has had the largest building program in its history, save for the initial building of the new plant in Cambridge. The Charles Hayden Memorial Library has been going up on schedule and that part of the library building which is to house the humanities departments was occupied in early August. The remaining part of the library should be occupied in the late autumn. Not only will this new library provide a great central collection in the professional fields to which the Institute is devoted; it will also provide the arrangements and the materials which will greatly stimulate our humanities program and will contribute toward our objective of providing a broader educational base.

Still another important facility has been completed and is now undergoing tests. This is the Supersonic Wind Tunnel, erected with funds provided by the United States Navy and

designed to test aircraft and missile models at supersonic speeds ranging from 1,000 miles per hour to 3,000 miles per hour and at pressures ranging from one-third normal atmospheric pressure to three times atmospheric pressure. These characteristics make this tunnel one of the most versatile of supersonic tunnels built in the United States.

Another pioneering research facility started during the year is the 12,000,000 electron volt electrostatic generator for our Laboratory for Nuclear Science and Engineering. This generator will be used to bombard the nuclei of atoms and for studying the biological effects of high-energy radiation on living and nonliving matter. Such studies may include the effects of radiation in sterilizing foods and other material and in the treatment of malignancies.

During the summer, construction was begun on the Hydrodynamics Laboratory. For twenty years the Institute has been planning and hoping for this kind of facility, and it is a great stimulus to our Departments of Civil Engineering and Naval Architecture that we will soon have this laboratory available. The laboratory includes a towing tank for our Department of Naval Architecture, a project first proposed in 1895.

In July, 1948, Mrs. Matthew Astor Wilks presented to the Institute the Round Hill estate of her late brother, Colonel Edward H. R. Green. This estate of 277 acres on the west shore of Buzzards Bay, near New Bedford, includes a large stone mansion, several smaller dwellings, and a number of miscellaneous buildings. We envisage many important uses for this estate. If funds become available to recondition the mansion, it could be used effectively for scientific meetings and conferences and for a variety of educational and student activities. The great house and its environs would provide an ideal location for our annual freshman camp. We have already reconditioned a number of the smaller buildings which are being used for a meteorological research project, and altogether living

facilities for some twenty people are provided. One large house has been turned over to the Technology Christian Association to be used by student groups for week-end outings throughout the year. During the summer, Faculty members have also used this house extensively, along with the fine beach which is on the estate.

The further development of this estate is one of our immediate objectives, and it is our hope that funds can be obtained to make it an important center of scientific activity.

During the year, construction was begun on a large apartment house on the most easterly part of the Institute's river frontage. This apartment house, to be known as "Eastgate," is being financed by the New England Mutual Life Insurance Company and is built from designs developed by the Institute's own School of Architecture and Planning. It provides a thousand rooms grouped into 261 apartments, all with a fine view of the river and with cross ventilation. In the rental of these apartments, veterans and members of the M. I. T. staff will have priority. This new housing development will contribute toward a more integrated and better rounded community at the Institute and certainly it will provide ideal accommodations for a large number of our staff members who wish to live close to the Institute.

Of long-term importance in the improvement of our campus was the purchase last month of the "Tech Block," the building on Massachusetts Avenue opposite the Rogers Building. With the exception of the State Armory at the corner of Massachusetts Avenue and Vassar Street and the Technology Store, the Institute now owns all the frontage opposite our main educational buildings on Massachusetts Avenue.

While improving our facilities, we have made encouraging progress in providing a better environment for our staff. Perhaps the most significant move of this sort was the salary adjustment put into effect last autumn. In "take-home" pay,

the salary scale at M. I. T., while not yet high enough, places us in an excellent competitive position with the leading institutions of the country.

STUDENT LIFE

One of the striking aspects of student life at Technology is the high degree of responsibility accepted by our students for the conduct of their own affairs. With the hearty encouragement of the Office of the Dean of Students, even greater responsibilities have been assumed by the students, especially in matters of discipline, the government of fraternities and other housing units, and the improvement of our living environment. One aspect of this achievement was given national recognition during the year when the M. I. T. Interfraternity Conference was awarded the National Interfraternity Conference Trophy for contributing most to the life of its parent institution.

This past year over 2,200 undergraduates, or 60 per cent of the undergraduate student body, participated in intercollegiate and intramural sports. During the past two years we have been able greatly to extend our athletic facilities by the addition of nearly 400,000 feet of playing space on the West Campus, by the erection of the Rockwell Cage, by the renovation of the Walker Memorial Gymnasium, by the addition of eight new tennis courts provided by the Alumni Fund, by the provision of a new baseball diamond and new lights for field illumination for evening sports practice, and by the provision of a full-time athletic director and additional coaches.

Another example of the healthy condition of our student life at the Institute is the development of closer student-faculty relations and the creation of better opportunities for the two groups to work together for common educational goals. For many years our Student-Faculty Committee served mostly as a mechanism for handling student complaints. In the last two years, this committee has turned its attention to a constructive consideration of educational problems, and we now find our-

selves in the interesting and happy situation of having students actively working with the Faculty in the interests of our teaching program. During the past year, the Student-Faculty Committee sponsored a series of open forums on the art of teaching, which were well attended both by students and by staff. At the opening of school this fall, this same committee sponsored a series of lectures for new instructors on the techniques of teaching.

Sometime ago the Student-Faculty Committee proposed to the Institute that we set aside a pleasant and comfortably furnished room where students and faculty members can come together informally, and I am glad to report that we have been able to provide the space to make this room available.

The most significant improvement in our student environment during the year was the completion of the New Dormitory, now housing over 350 students. I hope that the fresh and forward-looking design of this great new housing unit has set the standard for additional dormitories at the Institute, all designed to promote friendly and responsible community living. We need additional living facilities to take care of at least a thousand more students on the Institute's campus, and the fulfillment of this need should have high priority in the months ahead. We need especially to replace the temporary barracks, now housing over 400 students.

Last spring we reorganized our dormitory and restaurant management under a Director of Housing and Dining Facilities. Frank M. Baldwin, who was appointed to this new post, will supervise our increasing facilities for student housing and dining services, to assure effective centralized direction. These services are now valued at over \$5,000,000, and have an annual operating budget of more than \$1,500,000. His duties include administration of all undergraduate dormitories, the Senior House, Walker Memorial, the Graduate House, and the Women's Dormitory, as well as our housing project for married students, Westgate and Westgate West. Broad policy relating to all

housing will be determined by an Advisory Committee, which replaces the former Dormitory Board and which includes the Dean of Students, the Dean of the Graduate School, the Treasurer and Assistant Treasurer, and two members of the Faculty.

ADMINISTRATIVE CHANGES

During the year a new senior administrative post was created carrying the title of "Provost." The Provost is an academic officer who shares with the President and the Deans the administrative direction of the Institute's program. His primary concern is the administration and coordination of educational and research activities which do not fall within the jurisdiction of any single School. He thus has cognizance over the interdepartmental laboratories and the research projects of the Division of Industrial Cooperation. At its meeting in March, the Corporation of the Institute elected to this new post Professor Julius A. Stratton of the Department of Physics. Professor Stratton's background both in electrical engineering and in physics, his brilliant direction of the Research Laboratory of Electronics, and his membership on the Committee on Educational Survey have provided him with an extraordinarily rich background for his new responsibilities. I am personally delighted and reassured to have him as an administrative colleague and to have available his wise and judicial counsel in discharging my own duties as president.

At the same time that the Office of Provost was established a new body, the Academic Council, was created, to be responsible for the executive coordination of the Institute's educational activities and for the administration of educational policy as determined by the Faculty. This Council includes the Deans of Engineering, Science, Architecture, Humanities, Students, and the Graduate School, the Chairman of the Faculty, the Executive Vice-President, the President (Chairman), and the Provost (Vice-Chairman).

ACADEMIC FREEDOM

Last spring a formal statement of policy was issued reaffirming freedom of teaching and investigation at the Institute. This statement also reaffirmed the Institute's unequivocal opposition to communism and to any external control of the teacher which requires him to distort his research or teaching in accord with any "party line" or dictates from without his own mind.

Other educational institutions and groups, notably the Educational Policies Commission of the National Educational Association, subsequently took similar positions supporting the freedom of the scholar and declaring that membership in the Communist Party disqualifies teachers because it "involves adherence to doctrines and discipline completely inconsistent with the principles of freedom on which American education depends."

STATISTICS OF THE YEAR

Finances. The year 1948-1949 ended with an excess of expense of \$231,736 on operations totaling \$23,000,000. This deficit resulted directly from the salary increase which went into effect during the year; it was felt that this increase was so essential that we could properly incur a deficit this year. The increase in tuition (from \$700 to \$800 per academic year) which was announced a year ago took effect with the opening of school in September and will go part way in helping the Institute to balance its budget. As the M. I. T. Development Program moves forward, the additional funds it will make possible will help not only in providing better facilities for education and for student living at the Institute but also will aid in stabilizing the Institute's finances. One of the most heartening parts of the current trend in gifts to the Institute is the steady increase in support from industrial corporations. Nearly a quarter of all the gifts (see below) received by the Institute last year came from industrial companies.

The Institute's endowment and other funds now have a total book value of \$47,200,000, invested in securities with a market value of \$50,200,000. Plant assets stand at \$22,200,000, about \$2,600,000 above last year. The yield on investments based on book values increased somewhat over the previous year with the allocation to funds at the rate of 4 per cent.

The volume of sponsored research was \$15,473,000, compared to \$13,300,000 in the previous year and \$9,825,000 in 1946-1947. The following comparative percentage distribution of the major elements of income and expense shows the marked effects of the sponsored research on the Institute's fiscal operations. Of special significance is the low percentage of our total expenditures now required for General Administrative expense and Plant Operation:

DISTRIBUTION OF MAJOR ELEMENTS OF INCOME AND EXPENSE
1939-1940, 1947-1948, 1948-1949

INCOME			
	<i>Per cent</i>		
	1939-1940	1947-1948	1948-1949
Tuition.....	48	20	16
Investments.....	32	6	6
Gifts and Other Funds.....	7	8	9
Research Contracts: For Direct Expense...	3	55	58
For Indirect Expense .	0	5	6
Dormitories, Dining Services.....	10	6	5
	<u>100</u>	<u>100</u>	<u>100</u>

EXPENSE			
	<i>Per cent</i>		
	1939-1940	1947-1948	1948-1949
Academic.....	61	24	21
General Administrative.....	13	7	8
Plant Operation.....	10	6	6
Research Contracts: Direct.....	3	55	58
Medical and Other.....	4	2	2
Dormitories, Dining Services.....	9	6	5
	<u>100</u>	<u>100</u>	<u>100</u>

The total gifts received each year since 1940 are shown in the following table:

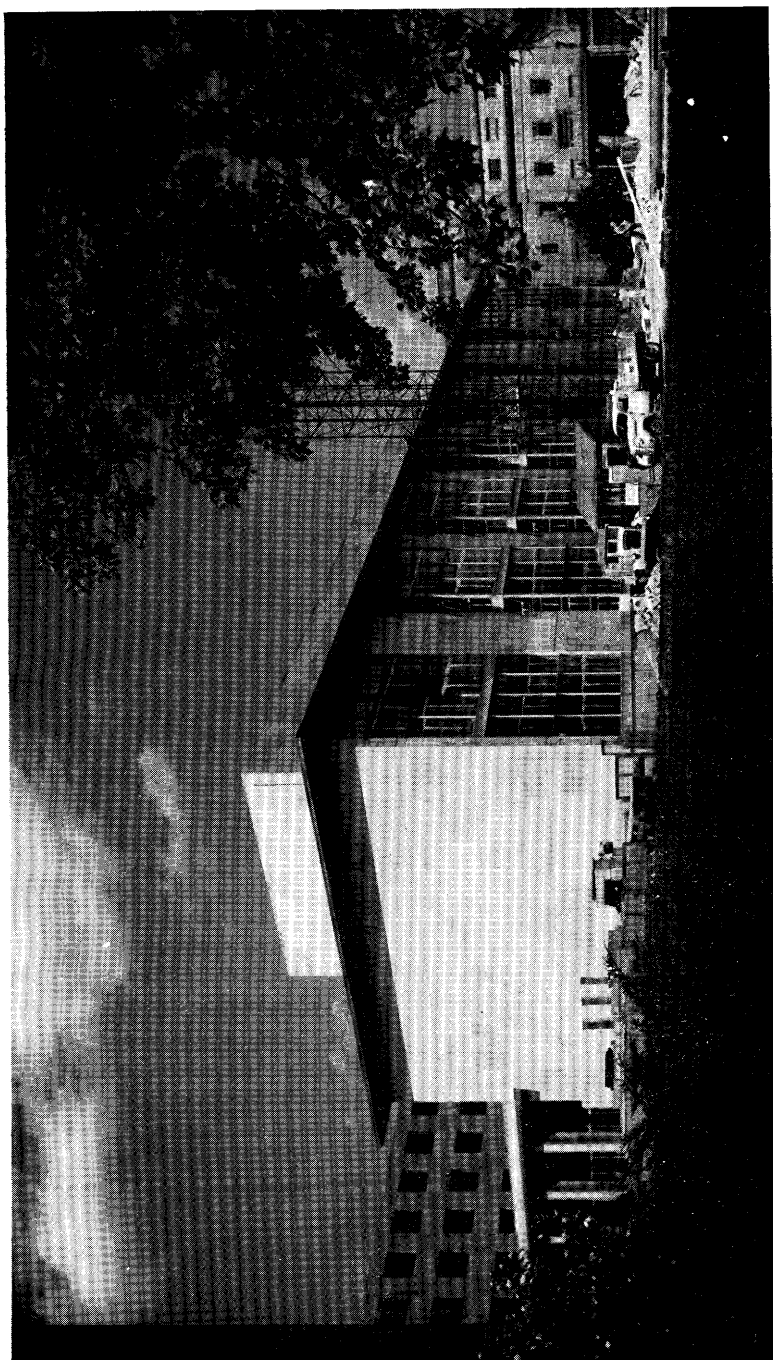
	<i>Capital Additions</i>	<i>Total Gifts</i>
1940-1941.....	\$ 511,949	\$ 888,180
1941-1942.....	534,316	926,897
1942-1943.....	616,702	884,268
1943-1944.....	1,132,835	1,367,507
1944-1945.....	1,245,911	1,736,892
1945-1946.....	2,042,533	2,549,969
1946-1947.....	1,945,297	2,382,681
1947-1948.....	1,381,329	2,191,822
1948-1949.....	1,900,737	2,536,802

The total of gifts shown above for 1948-1949 does not include the pledges to the Development Program received during the year.

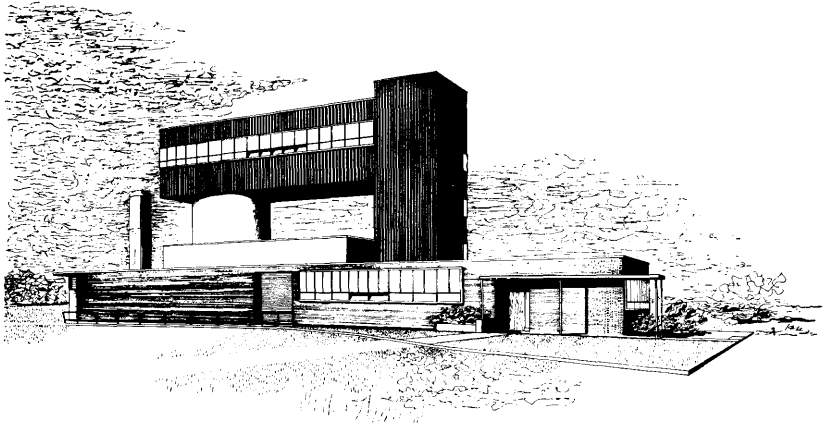
Contributions to the Alumni Fund totaled \$152,502 from 9,963 alumni. This makes the total giving to M. I. T. through the Alumni Fund during its nine-year life \$1,209,639.

Enrollment. The total student body reached 5,433 in 1948-1949, compared with 5,662 in 1947-1948. The estimated enrollment for 1949-1950 is 5,400. Forty-eight per cent of last year's total were veterans, as compared to 54 per cent the previous year. Twenty-two per cent were married, the same ratio as in 1947-1948. Sixty-eight women were enrolled. A total of 233 American colleges and universities and 93 foreign institutions were represented. Foreign students numbered 382 and these students represented 60 foreign countries. Notable is the fact that the Institute had the highest percentage of foreign students of any college in the country. They comprised 7.1 per cent of our student body.

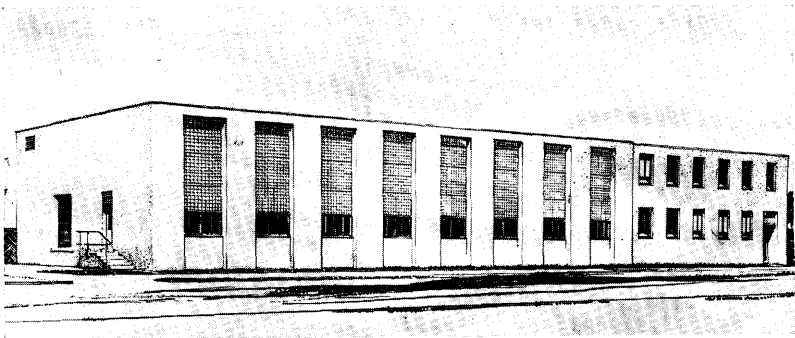
The Institute, following the general trend throughout the country, has experienced a decrease in the total number of applications for admission to the freshman class. The quality of the class just admitted, however, is apparently fully as good as in previous years and we still have a good degree of selectivity. The number of applications for the Graduate School is still on the increase.



CHARLES HAYDEN MEMORIAL LIBRARY



TWELVE M.E.V. ELECTROSTATIC GENERATOR



HYDRODYNAMICS LABORATORY

ENROLLMENT AT M. I. T.

	<i>Freshman</i>	<i>Total Undergraduate</i>	<i>Total Graduate*</i>	<i>Total</i>
1935-1936.....	561	2,018	522	2,540
1940-1941.....	605	2,379	759	3,138
1945-1946.....	703	1,160	378	1,538
1946-1947.....	907	3,811	1,361	5,172
1947-1948.....	884	4,138	1,524	5,662
1948-1949.....	819	3,831	1,602	5,433
1949-1950 (est).....	725	3,750	1,650	5,400

* A large part of the enrollment in the Graduate School is on a part-time basis. For example, of the 1,602 graduate students in 1948-1949, 36 per cent were enrolled on a part-time student basis and were members of the academic staff.

Student Aid. The demands on the undergraduate scholarship funds and the Technology Loan Fund were greater this year than in 1947-1948 because of changes in general financial conditions and fewer students studying under the G.I. Bill. There were 394 undergraduate scholarships granted, totaling \$89,914. Ninety-eight students received loans totaling \$46,600. The total number of loans and scholarships was 463 and the total amount was \$136,514. Some undergraduates held both scholarships and loans. Eighty-seven men received loans as of June, 1949, bringing the cumulative total from 2,729 (June, 1948) to 2,816 men. This group of 87 men were loaned \$61,050, bringing the cumulative total loaned from \$1,980,610 (June, 1948) to \$2,041,660 (June, 1949).

Total graduate scholarships and fellowships for 1947-1948 amounted to \$176,880 and these scholarships and fellowships were granted to 233 recipients. This compares with a total of \$142,702 distributed to 196 recipients in 1947-1948. This change was accounted for in large measure by the increase in the total number of industrial fellowships and a greater use of the funds available for graduate scholarships and fellowships. The number of fellowships sponsored by industrial companies totaled 85, with an aggregate stipend of \$144,480.

The Student Employment Bureau placed 458 students in part-time jobs in 1948-1949, as compared with 391 in 1947-1948.

The 1948-1949 group earned \$98,657 as compared with \$75,507 earned by the 1947-1948 group.

CHANGES IN PERSONNEL

The Corporation ranks have been changed only by reason of term expirations during the past year. The Special Term Membership of George A. Sloan and the five-year Alumni Terms of Harold B. Harvey, Dr. W. Jason Mixter, and Ellis W. Brewster terminated in June. Donald F. Carpenter has been elected to Life Membership, John M. Hancock to Special Term Membership, and Rudolf F. Haffenreffer, Robert T. Haslam, George J. Leness, and Luis deFlorez to Alumni Term Membership. C. Adrian Sawyer, Jr., replaces C. George Dandrow as President of the Alumni Association.

Our emeritus ranks were depleted during the past year by the deaths of Professors Edward E. Bugbee, Tenney L. Davis, Jesse J. Eames, Harry M. Goodwin, and Lybrand P. Smith. There were no deaths in the active Faculty ranks.

Retirements for age included Professor Warren J. Mead, Head of the Department of Geology; Irving H. Cowdrey, Associate Professor in Mechanical Engineering; Gerhard Dietrichson, Associate Professor in Chemistry; and Harlan T. Stetson, Director of Cosmic Terrestrial Research and Guest of The Institute since 1936.

Professor Mead, who has headed the Department of Geology since 1934, will continue as Lecturer during the ensuing year. He has been replaced by Professor Robert R. Shrock as Acting Head of the department. Professor Cowdrey has been a member of the Mechanical Engineering staff since 1905 and Professor Dietrichson a member of the Chemistry staff since 1925. The latter will continue his association with the Institute as a Lecturer during the coming year.

Resignations have been accepted from Emeritus Professors Robert G. Caldwell, Frank L. Hitchcock, and Charles H. Porter,

who have been serving as Lecturers; from Professors Kenneth Holbert, Ernest C. Holtzworth, Everett E. Mann, Dean Peabody, Jr., and Hsue-Shen Tsien; from Associate Professors John C. Bolton and J. Warren Horton; from Assistant Professors Robert G. Breckenridge, Donald B. Broughton, Bernard Chertow, Louis F. Coffin, Jr., James V. D. Eppes, Edmond P. Garvey, Mason Haire, Harry Majors, Jr., C. Arthur W. Peterson, F. Everett Reed, Robert L. Rooker, Alexander M. Smith, III, James M. Thurston, William T. Turrall, and Albert E. Whittaker.

Promotions to the rank of Professor were as follows: Samuel C. Collins, Gyorgy Kepes, Norman Levinson, Major Thomas U. Lineham, Charles A. Myers, and Eric Reissner.

The following were promoted to the rank of Associate Professor: Sanborn C. Brown, Lieutenant Colonel Burton B. Bruce, James W. Daily, Martin Deutsch, Lieutenant Colonel John W. Fitzpatrick, Major James E. Foster, Joseph Kaye, Harold S. Mickley, Elting E. Morison, Robert C. Seamans, Jr., Milton C. Shaw, John C. Sheehan, Major Jack W. Streeton, and George E. Valley, Jr.

The following were promoted to the rank of Assistant Professor: Dominic Amara, William C. Bauer, John M. Biggs, Norman C. Dahl, Wilbur B. Davenport, David A. Dudley, Thomas F. Jones, Jr., Thomas W. Lambe, John G. Linvill, William K. Linvill, W. Farnsworth Loomis, Kevin A. Lynch, Samuel J. Mason, J. Judson Mealy, George C. Newton, Jr., George P. Shultz, Maurice E. Shank, David A. Trageser, Kenneth R. Wadleigh, Michael Witunski, and Theodore Wood, Jr.

New Faculty appointments included the following: Captain Guy Chadwick, Professor in Naval Architecture; Professor Rolf Eliassen, Civil Engineering; and Captain James M. Farrin, Professor in Naval Architecture; Visiting Professors Carl B. Allendoerfer in Mathematics and Yu-Shiu Ku in Electrical Engineering; Associate Professors John T. Howard in City and

Regional Planning, Max F. Millikan in Economics, James W. Perry in Modern Languages, and William A. Wilson in Mechanical Engineering; Assistant Professors Martin A. Abkowitz and Gibbs W. Sherrill in Naval Architecture, Captain Philip B. Anderson, Captain William Bell, III, Captain Lyman R. Blake, and Lieutenant Colonel John R. Thompson in Military Science and Tactics; Donald E. Boynton in Chemical Engineering; Philip L. deBruyn and Harry Udin in Metallurgy; Nicholas Grossman in Mechanical Engineering; Melvin A. Herlin in Physics; William M. Pease in Electrical Engineering; Robert Solow in Economics; and George W. Whitehead in Mathematics. Charles A. Powel was appointed Research Associate in Electrical Engineering and member of the Faculty.

Major administrative changes have been covered in an earlier section of this report. Upon the appointment of Julius A. Stratton as Provost, Albert G. Hill, Professor of Physics, was appointed Director of the Research Laboratory of Electronics and Jerome B. Wiesner was appointed Associate Director. Mark J. Dondero was appointed to the newly created post of Safety Engineer. Donald P. Severance is now Secretary-Treasurer of the Alumni Association, and he has been replaced as Assistant Registrar by Robert E. Hewes. Thomas L. Hilton has succeeded James L. Phillips as Assistant to the Dean of Students; John I. Mattill has been appointed Assistant Director of the News Service; Robert F. Nelson, Jr., Assistant to the Registrar; Arthur L. Bryant, Assistant to the Director of Admissions, and Philip A. Stoddard, Assistant to the Superintendent of Buildings and Power.

CONCLUSION

Much of the period covered by this report occurred before my formal inauguration as President, but at the suggestion of Dr. Karl T. Compton, my predecessor and continuing Chief, I have covered the whole year and reported for him as Chairman

of the Corporation as well as in my capacity as President. Dr. Compton's policies, his generous support, and his wise guidance have strengthened my hand at every turn, and I acknowledge with deep appreciation the opportunity to work in concert with him in the administration of this great institution.

One of the pronounced characteristics of M. I. T. is the unity of action made possible by the harmonious combination of Faculty members, officers of administration, members of the Corporation, students, and alumni, which constitute our corporate body. This spirit of cooperation, combined with the superlative quality of our staff and students and the strength of this Corporation, underlies all the progress and forward-looking activities of the past year.

Respectfully submitted,

JAMES R. KILLIAN, JR.

President

October 3, 1949

ADMINISTRATIVE OFFICERS

DEAN OF STUDENTS

During the past year we have neared the completion of certain projects intended to create for our students an environment more conducive to desirable habits of work and recreation.

We still believe that the influences of residence, dining halls, friendships, athletics, other extra-curricular activity, and a very high degree of autonomy in student government are of real importance in our educational scheme.

The educational opportunities of M. I. T. must include stimuli and experience outside of our professional courses. We are primarily an undergraduate college and our students, even those in our graduate school, need the influences of experience in group living and group activity that will develop qualities of self-reliance, cooperation and individual discipline, and group responsibility. Our academic program provides these opportunities in large measure. Our extracurricular opportunities and the environment in which our students live have greatly improved in recent months. There are, however, many additional facilities needed, and several changes in the patterns of our student life must be made to help us fulfill our objectives.

Student Life and Activities

The general pattern of our student government has continued without any major change. There have been, however, several minor improvements in administrative procedures and organizational relationships. The relations between the Treasurer of the Institute Committee and the Athletic Association in the handling of approximately \$50,000 allocated by the Institute for student activities have been greatly improved. There has been a steady growth of favorable opinion about the relationship of the Director of Athletics to the Athletic Association.

The Student-Faculty Committee has developed new strength under its cochairmen, Irving B. Wood and Professor John T. Rule. As part of its program this last year the Committee arranged public forums on such subjects as "Are There Too Many Quizzes?"

Approximately 70 per cent of the undergraduates were active in at least one extracurricular organization and slightly more than 50 per cent were in two or more activities. These figures were obtained from a study of each student's activity record which is now recorded periodically on the Dean's cards by the permanent secretary of the Walker Memorial Committee.

The Student Public Relations Committee has inaugurated a program of visiting preparatory schools in an effort to interest students in M. I. T. Indications are that these commendable efforts, although limited, have met with considerable success. Likewise, the Judicial Committee has broadened its scope after revising its constitution to give the Committee more freedom of action. The Walker Memorial Committee has sponsored a series of seminars for student publicity chairmen and also a contest in an effort to improve the quality of their promotional efforts.

Our student publications have experienced no major change and have maintained their traditional high level of responsibility. One factor contributing to this situation has been the regular weekly conferences of the editors of *The Tech* with the President. At the beginning of the second semester the President authorized *The Tech* to print the official Calendar of Events and to distribute the paper to all members of the Faculty. These extra subscriptions purchased by the Institute helped to solve a major financial problem of *The Tech* and provided means for better communication for all members of the community. *The Technique* has experienced serious financial difficulty and will undoubtedly be forced to make drastic changes in policy if it is to continue as an annual record of student life.

During the second semester approximately 500 students participated in the Convocation-Inauguration Program as ushers, guides and aides under the direction of a strong student committee.

The M. I. T. Foreign Student Summer Project continued into its second year involving many students and a majority of our fraternities in cooperative enterprise. The number of foreign students invited for the summer increased from 62 to 78, representing 22 countries.

The chief additions to our physical facilities which have

added greatly to the enrichment of undergraduate student life were:

1. The completion of the New Dormitory.
2. The improvement of several acres of our playing fields.
3. The completion of the new John A. Rockwell Athletic Cage which was dedicated a year ago.
4. The building of a new regulation baseball field.
5. The addition of a new sandwich-bar and lounge in the Graduate House.
6. The improvement of athletic facilities including the cleaning and renovation of the Walker Memorial gymnasium and related locker rooms, and the increase of lighting of the playing fields.
7. The furnishing of the lobby of Building 10 for use as a center for the promotion of student activities.
8. The enlargement of the Hobby Shop.

Housing. More dormitory facilities for our students continues to be one of our primary needs. During this past year we housed approximately 500 students in the temporary barracks. Experience proved that such large numbers could not live advantageously in this building.

The accompanying table lists the distribution of our students for the spring term by residence and indicates the need for new dormitories:

<i>Tabulation 1</i>	<i>Number</i>	<i>Per Cent</i>
Dormitories (including Women's Dormitory) .	737	13.6
Barracks	550	10.1
Graduate House	452	8.3
Student Houses (including Lenox Club and Pegis Club)	64	1.2
Westgate and Westgate West	270	5.0
Fraternity houses (including Alpha Club and fraternity members living outside house) . . .	861	15.8
Rooming houses or at home	2,519	46.0

There appears to have been no decrease in pressure for rentals in the Westgate community. One thousand one hundred six of our students were married.

In the spring term Mr. Frank M. Baldwin was appointed Director of Housing and Dining Facilities. The former Dormitory Board was discontinued, and a new Advisory Committee

on Housing and Dining Facilities was created. On this Committee are the Dean of Students and Dean of the Graduate School, the Treasurer and Assistant Treasurer, and two members of the Faculty.

Fraternities. Eight hundred sixty-one students lived in fraternity houses during the year. The wise and punctual operation of the Judicial Committee of the Interfraternity Council in satisfactorily settling three cases of misconduct involving fraternity members greatly assisted the Office of the Dean of Students. A large majority of the fraternity houses remaining open during the summer planned to house foreign students as their guests. An alumni Interfraternity Council was organized primarily to consult with the Dean of Students on matters pertaining to future housing developments. This body became a permanent organization, replacing the similar group which had dissolved during the war years.

The M. I. T. Interfraternity Conference was awarded the National Interfraternity Conference Trophy for contributing most to the life of its parent institution. The award was thoroughly deserved.

Freshmen Assemblies and Advisory Program. These programs, instituted last year, continued with some improvement. Three assemblies were held in the fall term at which members of the freshman class had an opportunity to hear officers of the Administration and Faculty and student leaders.

The Advisory Program succeeded in providing for freshmen a broader contact with Faculty members than we have had heretofore, but there is still need for an improvement in this endeavor. With several notable exceptions our failures to establish a friendly relationship between a new student and his Faculty Advisor seemed to be rooted equally in lack of interest in both Faculty and freshman. We have provided the machinery for consultation, but we should not become unnecessarily paternalistic in the development of this program.

Freshman Athletic Program. The Freshman Athletic Program which caused considerable discussion a year ago appears now to be favorably accepted by all students. Only three students who were otherwise in good standing failed to complete their athletic requirements before the end of their sophomore year.

Slightly more than 400 freshmen (roughly half) elected course instruction in Athletics in preference to voluntary participation on the freshman intercollegiate squads. Class instruction was offered in the following elective courses: softball, tennis, soccer, sailing, and beginning swimming in the fall; beginning and advanced swimming, basketball, squash, badminton, and volleyball during the winter season; softball, baseball, tennis, golf, beginning swimming, Red Cross Life Saving, and sailing in the spring season. The swimming courses proved to be the most popular.

The courses and methods of instruction and administration were somewhat limited because of lack of adequate centralized facilities. Most courses, especially swimming and sailing, have attained a fairly high level and students appear exceptionally enthusiastic. Enthusiasm is spotty in other courses, which suggests the dire need for more adequate indoor gymnasium areas and locker and shower rooms.

Musical Clubs. In former years it was often difficult for the musical clubs to find other groups with which to arrange combined programs, but this year they have tried to arrange a schedule including all the outstanding New England clubs that now wish to combine efforts. The number of concerts has increased from four or five a year to more than twice that number. The expansion of musical activities included the founding of an additional glee club open to both freshmen and sophomores, "The Tech Singers," the organization of an M. I. T. concert band, the formation of a mixed chorus, and the organization of a choir for the Baccalaureate service.

The Senior Glee Club held concerts with Connecticut College for Women and also the Radcliffe Choral Society, with whom they had not sung for ten years. A combined concert with Smith was the first on record. The M. I. T. Symphony Orchestra gave two concerts in Cambridge and two outside in combination with the Wellesley and Mt. Holyoke orchestras.

The new Concert Band, under the direction of Mr. John D. Corley, Jr., had an auspicious start when it was called upon to play for the inauguration of President Killian and once during the Convocation program. The overture to the Tech Show, which was played by the Techtonians, was accepted by Mr. Fiedler and was performed by the Boston Pops Orchestra under his direction during Tech Night at the Pops.

As in previous years the All Tech Sing was successful in regard to attendance and audience participation and showed definite improvement in the quality of songs selected by the performers. Attendance of all musical activities has been steadily increasing. The greatest immediate need seems to be for individual practice rooms and satisfactory rehearsal quarters for the band and orchestra.

Non-professional Discussion Program. A continuing problem here is that of providing a cultural background to supplement the highly specialized scientific and engineering education. As a contribution to the solution of this problem our office has encouraged informal discussions of nonprofessional subjects among the students. To aid the fraternities, dormitories and other groups in planning these discussions we have maintained a listing of the members of the Faculty with summaries of the subjects on which each would like to lead discussions. The program is slow in developing but it is our hope that in the near future a larger number of students will find these discussions provocative and informative.

Hobby Shop. The improved facilities and new equipment of the Hobby Shop now provide an excellent extracurricular activity for a very large group of students and some Faculty and alumni members. The average daily attendance has been 16 and night attendance 13. The average monthly attendance during the four winter months was 467.

Freshman Camp. For the third time Freshman Camp was held at Camp Wonderland, Sharon, Massachusetts. The camp was filled by 536 freshmen, and the weekend orientation was very successful.

Athletics. The academic year 1948-1949 was the first full year of operation of the Athletic Board, charged by the President with responsibility for policy-making in athletics. The principles and factors from which policies stem are the encouragement of athletic activity by a maximum percentage of the student body, the full participation of the students in management of their athletic program, the provision of a wide variety of sports making maximum use of available facilities, the securing of competition commensurate with the abilities of M. I. T. teams, and the provision of good coaching to all who wish to participate in sports. All of the groups represented on

the Athletic Board — the student Athletic Association, the Alumni, the Athletic Director and his staff, the Faculty and the Administration — heartily endorse these principles and objectives.

During the year 1948–1949 the athletic program has made progress. Some facilities have been improved and enlarged, and by better scheduling and operation more use has been made of other existing facilities. The percentage of student participation in some sports has increased. The scheduled intercollegiate competition has been brought to a point near the optimum. The student Athletic Association has maintained its strength and independence while becoming more effective through its close association with the Athletic Director's office. Improvement of the athletic program in the future depends largely on the addition of new facilities and improvement of the existing ones.

The Athletic Department staff now includes 25 men of which 13 are part-time coaches, participating only during the season of the sport they direct. The full-time staff is inadequate for the proper direction of our Freshmen Athletic Program, our intramural and our varsity and freshman intercollegiate schedules.

During the year the Department supervised the programs of 17 varsity and freshman intercollegiate sports, involving 815 undergraduates in 268 contests. In addition, the Director and coaches handled eight intramural sports involving 2,447 students (55 per cent duplication) or 1,345 different students in 686 contests in the fall and spring terms and 76 contests in the summer term.

Approximately 25 per cent of the students from each residential unit competed on intramural teams. One thousand seven hundred and fifty-two undergraduates, or 48 per cent of our undergraduate student body, participated in either intercollegiate or intramural sports programs. If the Freshman Athletic Program enrollment is included, the total figure for the past year is 60 per cent, which is a slight increase over last year. During the year a grand total of 10,164 scheduled athletic competitive opportunities were afforded to the total of 3,667 undergraduates, or an average of 2.77 contests per student. This figure would undoubtedly rank quite high in comparison to colleges of comparable size.

Veteran Enrollment. As suggested in last year's report, the number of veterans (those using the government benefits under P.L. 16 and P.L. 346) showed a decrease. With the graduation of the Class of 1950 and the expiration of "eligible time" granted to veterans by the Veterans Administration, it is expected that by the fall of 1950 the number of undergraduates under the sponsorship of the Veterans Administration will be substantially reduced.

The comparative number of veterans is given in the following table:

<i>Tabulation 2</i>	<i>Veterans Enrolled under P.L. 16 or 346 and their Percentage of Total Registration</i>	
	<i>1947-1948</i>	<i>1948-1949</i>
Fall Term.....	3,023 (54%)	2,406 (44%)
Spring Term.....	2,809 (53%)	2,380 (47%)
Summer Term.....	1,027 (48%)	663 (33%)

Disqualifications

The number of students disqualified for scholastic reasons during 1948-1949 compared with 1947-1948 is set forth in Tabulation 3.

<i>Tabulation 3</i>							
<i>Undergraduate Registration</i>	<i>Academic Year</i>	<i>Scholastic Action</i>	<i>Year</i>				<i>Total</i>
			1	2	3	4	
4,138	1947-48	Total disqualifications	63	76	67	25	231
3,831	1948-49	Total disqualifications	63	58	56	21	198

It is practically impossible to form any significant conclusion from the above statistics. The 1947-1948 total includes the disqualifications for the accelerated three terms, whereas the 1948-1949 figure is for the normal two-term year. Furthermore, there were marked differences in age and background of the students of the two years. In the future, statistics on more homogeneous groups may yield an indication of the efficacy of the increased efforts on the part of the Dean's Office and Medical Department in the field of student counseling. It is felt in this office that the failures of many students can be averted by foresighted and frank discussions of student problems.

Student Aid

Distribution of student aid to undergraduates during 1948-1949 compared with 1947-1948 is set forth in Tabulation 4.

<i>Tabulation 4</i>	<i>1948-1949</i>		<i>1947-1948</i>	
	<i>Number</i>	<i>Award</i>	<i>Number</i>	<i>Award</i>
Freshman Scholarships.....	183	\$50,637.50	135	\$33,675
Other Undergraduate Scholarships	211	39,276.00	189	33,805
Total Scholarships.....	394	\$89,913.50	324	\$67,480
Undergraduate Loans.....	98	46,600.00	69	35,305
Total Aid to Undergraduates.....	463*	\$136,513.50	370*	\$102,785

*Allowing for individuals receiving both scholarship and loan

The tabulation includes only grants from the Institute's undergraduate scholarship endowment. As in past years foundations and trusts have made gifts for scholarships to undergraduates. During 1948-1949 approximately \$33,000

<i>Tabulation 5</i>	<i>At June 30, 1949</i>	<i>At June 30, 1948</i>	<i>Net Changes During 1948-1949</i>	
<i>Items of Outgo</i>				
Number of Men Receiving Loans.....	2,816	2,729	up	87
Total Amount Loaned.....	\$2,041,660	\$1,980,610	up	\$61,050
Average Per Capita Loan.....	\$725	\$726	down	\$1
<i>Items of Income</i>				
Number of Men Whose Indebtedness Has Been Completely Discharged.....	2,144	2,060	up	84
Principal Repayments in Advance.....	\$576,818	\$563,131	up	\$13,687
Other Principal Repayments.....	\$1,104,274	\$1,057,205	up	\$7,069
Total Principal Repayments.....	<u>\$1,681,092</u>	<u>\$1,620,336</u>	up	<u>\$60,756</u>
Total Principal Matured, Considering "Advance Repayments" as Matured When Paid.....	\$1,713,284	\$1,652,187	up	\$61,097
<i>Collection Ratio, i.e., Percentage of Total Maturities Paid.....</i>	98.1	98.1	...	
Matured Principal in Arrears.....	\$24,968	\$25,846	down	\$878
Actual "Written Off" Accounts.....	<u>\$7,224</u>	<u>\$6,005</u>	up	<u>\$1,219</u>
Total Maturities Unpaid.....	<u>\$32,192</u>	<u>\$31,851</u>	up	<u>\$341</u>
Percentage "Written Off" to Total Loans.....	0.35	0.30	up	0.05
Percentage Matured Loans in Arrears plus Amount Written off to Total Loans.....	1.58	1.61	down	0.03
Interest Received.....	\$225,796	\$219,462	up	\$6,334
Times Interest Received to Matured Loans in Arrears plus Amount "Written Off".....	7.0	6.9	up	0.1
<i>Notes Outstanding.....</i>	<u>\$353,344</u>	<u>\$354,269</u>	down	<u>\$925</u>

was contributed from several organizations. The James C. Melvin Trust granted \$9,800 to help 29 undergraduates; the Foundry Educational Foundation gave \$10,400 for scholarships to a total of 16 students; the Teagle Foundation, Inc. of New York contributed \$7,750 for scholarships for 12 students; and the Steel Founders' Society aided three students to the extent of \$4,500. The Consolidated Vultee Aircraft made its final grant of \$500 to one student.

From both graduate and undergraduate students the Loan Fund Board received 149 applications during 1948-1949 and acted favorably upon 134, or 90 per cent, \$61,050 being loaned. For 1947-1948 the corresponding figures were: 104, 93, 89 per cent, and \$48,800.

The cumulative record of the Fund from its establishment in 1930 up to June 1949 appears in Tabulation 5.

The Student Employment Bureau of the Technology Christian Association placed a total of 458 individuals, who earned \$98,657.24. During the previous year, 391 individuals were placed earning \$75,507.

Conclusion

Last year's report described ten additional facilities and services for our community which I felt were necessary to improve the general welfare of the student body. Many of these items have since received attention and are described briefly in the preceding paragraphs. Others are being considered. There are still needs which continue to be pressing and there are other necessities which have arisen since this same time last year. The most immediate of these are the following:

- a) A new gymnasium and crew house.
- b) A new auditorium and little theatre.
- c) Additional playing fields, tennis courts and campus on the Westgate site.
- d) The further improvement of student recreational facilities in Walker Memorial.
- e) The establishment of a room and related library in the main buildings which will serve as a center for the religious life and interests of our students and Faculty.
- f) The development under student initiative of stronger

programs of extracurricular music, lectures, Faculty-student forums and communications.

g) The development of stronger student-Faculty relations in discussion of nonprofessional interests in the Humanities in order to supplement our highly specialized curriculum.

h) A new Student Union building on the West Campus.

i) Completion of the loaming and seeding of unfinished areas of the West Campus.

Probably the most outstanding need at the present is the new living facilities for from 1,000 to 1,500 students on land now occupied by Westgate West housing projects. This is not included in the list above since the first step in its development has already been taken: the Alumni Interfraternity Conference Advisory Committee and Faculty members of our School of Architecture are now studying tentative plans for the project. It is significant to note in closing that even with the addition of the New Dormitory the Institute housing facilities cannot accommodate the constantly increasing number of students who wish to live on the campus. During the fall term 1949-1950 we shall be forced to house approximately 450 students in the inadequate temporary barracks, Building 22.

EVERETT MOORE BAKER

DEAN OF THE GRADUATE SCHOOL

One year ago this report sounded a warning that the annual increase in size of the Graduate School of recent years should not be permitted to continue unchecked. For the academic year 1948-1949 (including the summer of 1948) there were 1,540 applicants for admission; 594 places were created by graduations; 618 new students were admitted. By July 1, 1949, the date of termination of this report, there were in hand already 1,615 applications for admission; 474 vacancies created by graduation (with an unknown number to be added in September 1949); and already more than 700 new students had been admitted for the academic year 1949-1950. The growth of the school is not as rapid as the above figures might suggest however. It is being held substantially to size, although the actual registration numbers next year will not be known until, the census by the Registrar has been completed.

The method adopted by the Graduate School with the approval of the Faculty Committee on Stabilization of Enrollment for computing realistically its magnitude assumes that size is indicated not by a head-count of students, since one half of the graduate students at one time or another hold some sub-faculty academic appointment in teaching or research service, or are registered as special students for less than a full program. Many are enrolled for one subject only, while employed; others are at a stage of independent research where temporarily no Faculty supervision is required; others are engaged in writing up research results.

Instead of head-count, the following equivalents are used in computing effective size:

Full-time Graduate Student	= 100% load
Full-time Staff Student	= 33% load
Half-time Staff	= 60% load
One-third-time Staff	= 80% load
Registered for one subject only	= no computable extra load
Registered for thesis only	= take the load of the category of appointment above

The actual load upon the Faculty in terms of teaching and guidance services to which 1,600 graduate students are entitled is, under current distribution of staff appointments, equivalent to that which would be imposed by 1,100 full-time students. This is the size at which the Graduate School is being held at present. It was the effective size of the school in November, 1948 and it is believed that readjustments, graduations, and natural shrinkages will produce an effective enrollment for 1949-1950 of similar proportions.

Applications from foreign students have fallen off in number, affected adversely by dollar export restrictions. However, the ratio of foreign applicants to foreign students admitted in 1948-1949 was more than 3 to 1, as compared with a 2 to 1 ratio for our own nationals. There were in attendance 121 graduate students from 33 foreign countries.

To the degree structure there have been added new degrees in engineering, to serve as terminal degrees for those who wish to study under guidance beyond the extent expected for a Masterate but without the especial attention to creative research which characterizes the requirements for a Doctorate. These

new Engineer degrees have the designation which is most logical, namely Aeronautical Engineer, Chemical Engineer, etc., but this designation has been adopted with the full realization that the degrees are not the same as those similarly designated as "Professional Degrees" which are awarded to alumni of certain schools and to others in professional practice. Nevertheless, it is our considered opinion that in association with other reputable engineering schools and departments of universities, the designation of the degree which recognizes a total of at least six years of planned scientific and engineering study in course will come to be interpreted in the light of the institution which awards the degree, and of the performance of its alumni, the degree recipients.

The purpose of the Engineer degree is to make available a program of study broader in its content of cognate and ancillary subjects than is possible in the specialization which characterizes a program of a Master of Science. To this end, at least two years of study beyond a Baccalaureate will be expected for the new degree, including a demonstration of the student's ability to draw upon factual resources in the solving of broad engineering problems by passing a comprehensive examination, by completing a comprehensive problem, or by a thesis of broad implications. The methods of determining that candidates for the Engineer degrees have gained a breadth of understanding and a wealth of resources for the practice of their chosen professions are left to the several departments of instruction. In accord with the philosophy of the Graduate School at the Institute, it is of chief importance to gain a Faculty consensus upon the objective, while the methods of attaining that objective are varied to fit the aptitudes and preparation of the individual students.

Industrially sponsored fellowships for graduate students who show the greatest scholarly and scientific attainments have been of great assistance to these young scholars. For the academic year 1948-1949 there were available 85 such fellowships paying \$144,480.

In addition to the above sum, \$63,850 designated for graduate scholarship aid was appropriated from accumulated income of invested funds, making a total of \$208,330 available from all sources.

After relinquishments, cancellations, and other adjustments, the net amount of scholarship assistance awarded was \$176,880.50 to 233 recipients. The difference between the total funds available and the lesser amount awarded in the past twelve months does not mean that we have more scholarship funds than are needed. The fields in which industrial fellowship awards may be made are specified; certain of these fields are more substantially provided for than are others, and it is often advisable to postpone certain awards until another year. It is entirely probable that performance in the summer session of 1949 will indicate worthy recipients of awards in September from funds of 1948-1949 that have thus been conserved.

Additional fellowship funds are needed especially in the following fields: Acoustics, Aeronautical Engineering, Quantitative Biology, Business and Engineering Administration, Electrical Engineering, Mechanical Engineering, Meteorology, and in unrestricted fields.

During the twelve months succeeding July 1, 1948, twelve new fellowships were endowed by the following sponsors: Airborne Instruments Laboratory, Inc., Aluminum Company of America, American Brake Shoe Company, Armstrong Cork Company, Carbide and Carbon Chemicals Corporation, Celotex Corporation, Elastic Colloid Research Corporation (R. S. Crawford Graduate Research Fellowship), Foundry Educational Foundation, Indiana Steel Products Company, Y. W. Lee, New England Textile Foundation, and Timken Roller Bearing Company.

During the year understandings were reached with the sponsors of the Richard C. Du Pont Memorial Fellowship in Aeronautical Engineering, whereby the income from gifts already received which had been designated for a Postdoctoral Fellowship in Aeronautical Engineering will be used in 1949-1950 for two predoctoral fellowships in the same field. From this same gift a social meeting room in the Department of Aeronautical Engineering has been newly furnished and decorated, which adds appreciably to the facilities available to graduate students for small professional meetings.

The Institute is especially appreciative of assistance to its research in rubber technology rendered by the Elastic Colloid Research Corporation through the loan of heavy machinery

and laboratory apparatus comprising complete facilities for systematic investigations in this field.

The Institute is equally grateful to the numerous sponsors who have renewed their gifts for 1948-1949 in support of previously established graduate fellowships, usually with a financial recognition of the increase in tuition.

During the past twelve months there were conferred 647 advanced degrees, as follows: Doctor of Philosophy, 91; Doctor of Science, 68; Electrical Engineer, 1; Naval Engineer, 37; Master of Science, 426; Master in Architecture and Master in City Planning, 24.

The number of Army, Navy and Air Force officers in residence in the Graduate School as of June 1, 1949 was 184.

JOHN W. M. BUNKER

REGISTRAR

The total registration of 5,433 was a decrease of 229 or four per cent from the postwar peak last year of 5,662. The Graduate School continued its growth reaching a total registration of 1,602. The Freshman Class again decreased, indicating a smaller undergraduate school in the future unless the normal attrition is more than balanced by the admission of a larger number of transfers from other colleges.

The number of degrees awarded continues far in excess of the prewar average, and war deficits have been more than made up as shown in the table on page 45.

It is interesting to note that in the four years since the war the number of degrees awarded has more than balanced the four-year war deficit by an excess of 1,158 Bachelors, or two classes of Bachelors; 274 Masters, or one extra class of Masters; 33 Doctors, or about half a class.

With the present size of the Graduate School the advanced degrees are being awarded at twice the prewar rate. The magnitude of the problem to provide the research staff and facilities required for the instructional program at the graduate level is well demonstrated by the fact that in 1949 there were 509 Masters' Theses and 166 Doctors' Theses, or 675 researches completed by graduate students.

Number of Degrees Awarded 1942-1949
(M. P. H. omitted)

<i>Year</i>	<i>Number of Degrees</i>			<i>Increase or Decrease from</i>		
	<i>Bachelors</i>	<i>Masters*</i>	<i>Doctors</i>	<i>Bachelors</i>	<i>Masters</i>	<i>Doctors</i>
1939-1941 <i>Average</i>	502	269	69	—	—	—
1942	547	181	61	+ 45	- 88	- 8
1943	482	203	43	- 20	- 66	- 26
1944	404	155	42	- 98	- 114	- 27
1945	260	128	24	- 242	- 141	- 45
		<i>Total Deficit During War . . .</i>				
1946	486	294	40	- 315	- 409	- 106
1947	943	491	80	+ 441	+ 222	+ 11
1948	1,187	465	129	+ 685	+ 196	+ 60
1949	865	509	166	+ 363	+ 240	+ 97
		<i>Total Excess Post-War . . .</i>				
				+ 1,473	+ 683	+ 139
		<i>Total Net Excess Above .</i>				
				<i>the Pre-War Average . . .</i>	+ 1,158	+ 274 + 33

* Includes 40 Engineering Degrees.

The statistics for the year 1948-1949 and the summary statistics for the preceding years follow (pages 46-66).

JOSEPH C. MACKINNON

**STATISTICS ON
REGISTRATION AND DEGREES**

REPORT OF THE REGISTRAR FOR THE YEAR 1948-1949

All statistics on registration and staff for this year are as of November 1, 1948.

Statistics on registration and staff for previous years are as of November 1, with the following exceptions: 1943-1944 as of August 2, 1943; 1944-1945 as of November 27, 1944; 1945-1946 as of July 30, 1945.

**TABLE 1. REGISTRATION OF STUDENTS
SINCE THE FOUNDATION OF THE INSTITUTE***

Year	Number of Students	Year	Number of Students	Year	Number of Students
1865-66	72	1893-94	1,157	1921-22	3,505
1866-67	137	1894-95	1,183	1922-23	3,180
1867-68	167	1895-96	1,187	1923-24	2,949
1868-69	172	1896-97	1,198	1924-25	2,938
1869-70	206	1897-98	1,198	1925-26	2,813
1870-71	224	1898-99	1,171	1926-27	2,671
1871-72	261	1899-00	1,178	1927-28	2,712
1872-73	348	1900-01	1,277	1928-29	2,868
1873-74	276	1901-02	1,415	1929-30	3,066
1874-75	248	1902-03	1,608	1930-31	3,209
1875-76	255	1903-04	1,528	1931-32	3,188
1876-77	215	1904-05	1,561	1932-33	2,831
1877-78	194	1905-06	1,466	1933-34	2,606
1878-79	188	1906-07	1,397	1934-35	2,507
1879-80	203	1907-08	1,415	1935-36	2,540
1880-81	253	1908-09	1,461	1936-37	2,793
1881-82	302	1909-10	1,479	1937-38	2,966
1882-83	368	1910-11	1,506	1938-39	3,093
1883-84	443	1911-12	1,559	1939-40	3,100
1884-85	579	1912-13	1,611	1940-41	3,138
1885-86	609	1913-14	1,685	1941-42	3,055
1886-87	637	1914-15	1,816	1942-43	3,048
1887-88	720	1915-16	1,900	1943-44	1,579
1888-89	827	1916-17	1,957	1944-45	1,198
1889-90	909	1917-18	1,698	1945-46	1,538
1890-91	937	1918-19	1,819	1946-47	5,172
1891-92	1,011	1919-20	3,078	1947-48	5,662
1892-93	1,060	1920-21	3,436	1948-49	5,433

*From 1943-46 Army and Navy Students omitted. See Table 3-B in reports for 1943-46.

TABLE 2. THE CORPS OF INSTRUCTORS

	'36	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	'48
Faculty Members of the Staff . . .	244	267	273	282	285	292	313	319	317	330	379	398	413
Professors	78	87	90	98	99	95	97	97	107	113	110	118	124
Associate Professors	87	89	98	89	92	99	104	108	105	103	128	131	131
Assistant Professors	70	76	72	83	83	86	98	99	92	101	125	137	133
Ex-Officio	6	5	6	7	7	7	8	9	10	10	11	11	10
Professors Emeriti (Lecturers) . . .	—	—	—	—	—	—	—	—	—	—	—	—	14
Instructors	3	3	3	3	3	2	3	3	—	—	—	—	—
Technical Instructors	—	—	—	—	—	1	1	1	1	1	1	—	—
Research Associates	—	7	4	2	1	2	2	2	2	2	2	—	—
Library Fellows	—	—	—	—	—	—	—	—	—	—	2	1	1
Other Members of the Staff . . .	291	331	368	401	396	395	370	306	222	252	694	846	824
Instructors	97	101	97	99	91	101	100	97	70	82	119	154	142
Technical Instructors	—	—	—	—	—	6	7	8	6	8	14	17	15
Administrative Assistant	—	—	—	—	—	—	—	—	—	—	1	—	—
Teaching Assistants	—	—	—	—	—	—	—	1	—	—	—	—	—
Teaching Fellows	51	52	52	52	55	52	60	52	8	18	74	77	72
Fellows in Applied Math	—	—	—	—	—	—	—	—	—	—	4	3	—
Assistants	64	69	79	78	85	87	75	49	44	47	127	137	116
Lecturers	19	29	28	31	31	17	18	16	7	7	11	10	13
Research Consultant	—	—	—	—	—	—	—	1	—	—	—	—	—
Research Associates	31	22	25	36	35	47	34	23	33	39	151	176	155
Research Assistants	24	42	72	90	91	84	64	59	54	51	193	272	311
Research Fellows	5	16	15	15	8	—	—	—	—	—	—	—	—
National Research Council Fellows . . .	—	—	—	—	—	1	—	—	—	—	—	—	—
Staff Members (D. I. C.)	—	—	—	—	—	—	12	—	—	—	—	—	—
Total	535	598	641	683	681	687	683	625	539	582	1073	1244	1237
Other Members of the Faculty . . .	31	28	28	28	32	37	40	39	44	52	60	67	50
Professors: Emeriti (not Lecturers)* . .	29	27	27	27	31	36	39	38	43	51	59	66	49
Non-Resident	2	1	1	1	1	1	1	1	1	1	1	1	1

Beginning* 1948-49

ADMINISTRATIVE OFFICERS

TABLE 3. CLASSIFICATION OF STUDENTS BY COURSES AND YEARS

COURSE NAME AND NUMBER	1946-47							1947-48							1948-49						
	YEAR							YEAR							YEAR						
	I	2	3	4	G	Total		I	2	3	4	G	Total		I	2	3	4	G	Total	
Aeronautical Engineering XVI	104	83	74	54	110	425		78	53	74	58	83	346		58	52	52	47	95	394	
Architecture IV-B	34	34	22	16	41	128		34	29	33	11	14	135		27	41	33	29	17	147	
Architecture (IV-A) Fifth Year						8							11				22			22	
Biology																					
Quantitative VII	11	11	10	5	24	61		7	22	7	13	32	81		5	14	19	3	29	70	
Physical VII-A				3	2	5				2		1	4			2		2		7	
Building Engineering and Construction XVII	15	15	24	9	7	70		11	24	23	27	13	98		12	31	32	25	11	111	
Business and Engineering Administration XV	64	160	104	130	32	490		53	106	192	167	38	550		47	95	111	160	36	449	
Chemical Engineering X	140	158	123	105	137	603		140	117	140	127	111	635		124	114	128	72	154	548	
Chemical Engineering Practice X-A, X-B					32	32						58	58					14	54	118	
Chemistry V	40	39	30	22	141	272		33	45	35	33	146	292		33	34	41	34	138	280	
City Planning IV-B**									4	4		2	35			2	7	2	24	35	
Civil Engineering I	42	36	32	37	62	209		51	45	55	20	49	220		47	53	62	47	49	258	
Economics and Engineering XIV																					
Economics and Engineering XIV	1	2	1			4		6	35	21	7	7	69		1	28	42	14	2	85	
Economics and Natural Science																					
Electrical Engineering VI	222	242	192	139	201	996		214	190	211	212	259	1,086		190	158	134	143	1	898	
Electrical Engineering (Cooperative) VI-A																					
Food Technology XX, XX-A	1	5	6	7	10	29		4	11	11	7	8	41		7	10	12	11	19	59	
General Engineering IX-B						32				24	27		51				22	35		57	
General Sciences IX-A				1		3							6								
Geology XII				1	17	27			3	12	4	1	18			4	14	5	24	4	
Group Psychology	4	5	1		13	13							15						4	4	
Industrial Economics					16	16						26	26						40	40	
Marine Transportation XIII-C					13	13			9	7	2		22			4	8			24	
Marine Transportation (XIII-C) Fifth Year	2		8	3		4						5	5							7	
Mathematics XVIII	5	9	15	7	69	105		9	26	13	15	53	116		16	13	23	7	78	137	
Mechanical Engineering II	110	177	160	155	109	711		132	178	156	146	135	747		124	130	193	117	127	691	
Torpedo Engineering (in Mech. Eng. Dept.)						7						2	2								
Metallurgy III	12	14	18	19	62	125		4	40	23	15	63	145		9	38	41	19	85	192	
Ceramics (in Metallurgy Department)					10	10						10	10						11	11	
Meteorology XIX	1	2	4	10	29	46			4	5	5	32	46		8	6	9	10	33	66	
Naval Architecture and Marine Eng. XIII	18	13	5	23	9	68		21	10	13	7	7	58		14	18	12	10	7	61	
Naval Construction and Engineering XIII-A§				50	28	78						101	101						98	98	
Physics VIII	81	58	54	34	166	393		80	80	54	58	187	459		89	78	73	49	180	409	
Sanitary Engineering XI					14	14						14	14						16	16	
Total	907	1,063	950	891*	1,361	5,172		884	1,040	1,161	1,053*	1,524	5,662		819	939	1,130	943*	1,602	5,433	

* These totals include fifth year in Architecture IV-A and Marine Transportation XIII-C.

** Prior to February 1947 included in Architecture.

§ Beginning 1945-46 last two years of Three Year Program students classified as Graduate Year. Beginning 1947-48 all XIII-A classified as Graduate Year.

TABLE 4-A CLASSIFICATION OF STUDENTS BY COURSES, OPTIONS AND YEARS

COURSE			YEAR										TOTAL	COURSE NUMBER
No.	NAME	OPTION	1		2		3		4		G			
			Opt.	Tot.	Opt.	Tot.	Opt.	Tot.	Opt.	Tot.	Opt.	Tot.		
I	Civil Engineering Army Engineer	1. Power Manufacturing 2. Materials Design 3. Automotive Engineering 3. Textile Technology	—	47	—	53	—	62	—	47	39	49	258	I
II	Mechanical Engineering		—	124	—	130	—	193	—	117	119	127	691	II
III	Metallurgy Ceramics	1. Metallurgy 2. Mineral Engineering	1	9	—	38	—	36	—	14	78	96	203	III
IV-A	Architecture Fifth Year		2	27	—	41	—	33	—	29	11	17	169	IV-A
IV-B	City Planning		—	—	—	2	—	7	—	2	—	24	35	IV-B
V	Chemistry		—	33	—	34	—	41	—	34	—	138	280	V
VI	Electrical Engineering	1. Electric Power 3. Electronic Communications 4. Radar (Navy) 5. Guided Missiles	1	190	—	158	—	134	—	143	264	273	898	VI
VI-A	Electrical Engineering — Coöperative		—	49	—	46	—	46	—	18	—	—	—	VI-A
VII	Quantitative Biology		3	5	—	14	—	19	—	3	—	44	153	VII
VII-A	Physical Biology		4	89	—	78	—	73	—	2	—	29	70	VII-A
VIII	Physics		5	124	—	114	—	128	—	49	—	180	469	VIII
IX-A	General Science		—	—	—	—	—	22	—	3	—	—	7	IX-A
IX-B	Chemical Engineering		—	—	—	—	—	—	—	35	—	105	57	IX-B
X	Chemical Engineering Practice — Graduate		—	—	—	—	—	—	—	72	—	54	54	X
X-A	Chemical Engineering Practice — Undergraduate		—	—	—	—	—	—	—	14	—	16	14	X-A
X-B	Sanitary Engineering		—	—	—	—	—	—	—	—	—	16	16	X-B
XI	Geology		—	—	—	—	—	—	—	5	—	24	61	XI
XII	Naval Architecture and Marine Engineering		—	4	—	18	—	14	—	10	—	7	61	XII
XIII	Naval Construction and Engineering		—	14	—	18	—	12	—	—	—	98	98	XIII
*XIII-A	Marine Transportation		—	4	—	8	—	12	—	7	—	—	—	*XIII-A
XIII-C	Fifth Year		—	—	—	—	—	—	—	—	—	—	31	XIII-C
XIV	Economics and Engineering	1. Human Relations 2. Industrial Economics	1	1	—	28	—	13	—	7	—	—	127	XIV
XV	Business and Engineering	A. Physical Sciences B. Chemical Sciences	2	41	—	77	—	92	—	136	—	36	449	XV
XVI	Aeronautical Engineering		A	6	—	52	—	52	—	47	—	95	304	XVI
XVII	Building Engineering and Construction	1. Heavy Construction 2. Light Construction	B	58	—	31	—	26	—	18	—	11	111	XVII
XVIII	Mathematics		1	12	—	—	—	32	—	25	—	—	137	XVIII
XIX	Meteorology		2	16	—	13	—	23	—	7	—	78	137	XVIII
XX	Food Technology		—	8	—	6	—	9	—	10	—	33	66	XIX
XX-A	Food Technology		—	7	—	10	—	12	—	9	—	14	52	XX
XX-A	Economics and Natural Science		—	—	—	—	—	—	—	2	—	5	7	XX-A
	Group Psychology		—	—	—	—	—	—	—	—	—	1	1	XX-A
Total			—	819	—	939	—	1,130	—	943	—	1,602	5,433	Total

* First Year, 33. Second Year, 28. Third Year, 37.

† This total includes fifth year in Architecture and Marine Transportation.

‡ Fourth year, second term.

\$ 40 Ind. Econ.
2 Econ. & Eng.

TABLE 4-B
CLASSIFICATION OF SPECIAL STUDENTS BY COURSES AND YEARS
(Included in Table 4-A)

COURSE	YEAR					TOTAL	COURSE
	I	2	3	4	G		
I Civil Engineering	—	—	—	1	—	1	I
II Mechanical Engineering	—	2	—	3	18	23	II
III Metallurgy	—	—	4	1	7	13	III
IV-A Architecture	—	—	—	—	2	6	IV-A
IV-B City Planning	—	1	1	—	1	3	IV-B
V Chemistry	—	2	2	3	5	12	V
VI Electrical Engineering	—	3	2	5	57	67	VI
VII Quantitative Biology	—	3	—	—	10	14	VII
VIII Physics	1	—	2	2	15	20	VIII
X Chemical Engineering	1	—	—	—	6	7	X
XII Geology	—	—	1	2	3	6	XII
XIV Economics and Engineering	—	—	1	—	—	1	XIV
XV Business and Engineering Administration	—	1	1	—	4	6	XV
XVI Aeronautical Engineering	—	—	—	—	27	27	XVI
XVII Building Engineering and Construction	—	—	2	—	—	2	XVII
XVIII Mathematics	3	—	1	1	27	32	XVIII
XIX Meteorology	1	—	3	5	4	13	XIX
XX Food Technology	—	—	—	—	5	5	XX
Industrial Economics	—	—	—	—	3	3	Ind. Econ.
Total	6	12	24	24	195	261	Total

TABLE 4-C
CLASSIFICATION OF FORMER STUDENTS WHO RETURNED THIS YEAR*
(Included in Table 4-A)

COURSE	YEAR					TOTAL	COURSE
	I	2	3	4	G		
I Civil Engineering	2	1	4	—	1	8	I
II Mechanical Engineering	4	10	3	6	3	26	II
III Metallurgy	2	1	—	—	5	8	III
IV-A Architecture	—	1	—	—	—	1	IV-A
V Chemistry	1	2	1	2	—	6	V
VI Electrical Engineering	5	13	6	3	7	34	VI
VII Quantitative Biology	—	3	2	—	—	5	VII
VIII Physics	—	3	1	2	1	7	VIII
IX-A General Science	—	—	1	—	—	1	IX-A
IX-B General Engineering	—	—	2	1	—	3	IX-B
X Chemical Engineering	2	7	9	5	6	29	X
XII Geology	—	1	2	1	1	5	XII
XIII Naval Architecture and Marine Engineering	—	1	—	1	3	5	XIII
XIII-A Naval Construction and Engineering	—	—	—	—	4	4	XIII-A
XIV Economics and Engineering	—	3	1	1	—	5	XIV
XV Business and Engineering Administration	3	6	6	6	—	21	XV
XVI Aeronautical Engineering	2	2	2	—	2	8	XVI
XVII Building Engineering and Construction	2	2	4	—	1	9	XVII
XVIII Mathematics	2	2	2	—	3	9	XVIII
XIX Meteorology	—	—	1	—	5	6	XIX
XX-A Food Technology	—	—	—	—	1	1	XX-A
Industrial Economics	—	—	—	—	3	3	Ind. Econ.
Total	25	58	47	28	47	205	Total

* Excludes 57 special students.

TABLE 5. CLASSIFICATION OF STUDENTS BY COURSES SINCE 1941

	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47	1947-48	1948-49
<i>Engineering Courses</i> <i>Total</i>	1,836	1,861	1,276	976	1,225	4,092	4,398	4,094
Aeronautical Engineering XVI	147	169	199	136	208	425	346	304
Building Engineering and Construction XVII.	14	16	9	11	15	70	111	111
Business and Engineering Administration XV	205	177	68	61	73	490	556	449
Chemical Engineering X, X-A, X-B, X-C	348	360	278	185	220	695	693	611
Civil Engineering I	71	72	72	62	63	209	220	258
†Economics and Engineering XIV	—	—	—	—	—	4	69	87
Electrical Engineering VI, VI-A	256	287	237	218	303	1,091	1,215	1,051
General Engineering IX-B	36	38	20	10	12	32	51	57
Mechanical Engineering II, II-A	345	330	200	139	178	718	749	691
Metallurgy III	125	88	40	36	31	135	155	203
†Meteorology XIX	110	141	19	15	12	46	46	66
Naval Architecture and Marine Eng. XIII, XIII-C	125	115	52	25	26	85	85	92
Naval Construction and Engineering XIII-A	46	62	79	75	81	78	101	98
Sanitary Engineering XI	8	6	3	3	3	14	14	16
<i>Science Courses</i> <i>Total</i>	427	341	265	187	269	895	1,037	1,090
§Biology and Public Health VII, VII-A, VII-B, VII-T	81	79	42	13	21	66	85	77
**Food Technology XX, XX-A	—	—	—	—	4	29	41	59
Chemistry V	151	112	95	77	108	272	292	280
General Science IX-A	21	12	3	1	3	3	6	7
Geology XII	27	13	6	3	4	27	38	61
Mathematics XVIII	27	22	19	20	36	105	116	137
Physics VIII	120	103	100	73	93	393	459	469
<i>Architecture Courses</i> <i>Total</i>	92	77	30	30	40	156	179	204
Architecture IV-A	92	77	30	30	40	156	144	169
*City Planning IV-B	—	—	—	—	—	—	35	35
<i>Economics and Eng. or Natural Science, Industrial Economics, and Group Psychology</i> <i>Total</i>	13	15	8	5	4	29	48	45
<i>Unclassified</i> <i>Total</i>	60	39	—	—	—	—	—	—
†First Year (not including Course IV) <i>Total</i>	627	715	—	—	—	—	—	—
Grand Total	3,955	3,948	1,579	1,198	1,538	5,172	5,662	5,433

* Prior to February 1947 included in Architecture.

† From September 1940 to November 1942, First Year Students not required to designate choice of course except for Course IV.

‡ June 1941, Meteorology, formerly included in Aeronautical Engineering, changed to Course XIV. September 1946, Meteorology changed to Course XIX, Economics and Engineering Course XIV started.

§ June 1944, Public Health discontinued. ** Prior to July 1945, included in Biology and Public Health. From July 1945 to September 1946, Course VII-B, September 1946, changed to Course XX.

TABLE 6
GEOGRAPHICAL CLASSIFICATION OF STUDENTS SINCE 1944

UNITED STATES	1944	1945	1946	1947	1948
<i>North Atlantic</i> Total	694	951	3,441	3,837	3,633
Connecticut	48	53	194	213	199
Maine	6	8	36	44	43
Massachusetts	319	450	1,569	1,817	1,710
New Hampshire	10	8	43	54	51
New Jersey	47	72	300	337	311
New York	198	276	936	1,000	981
Pennsylvania	46	62	300	285	262
Rhode Island	16	21	46	57	53
Vermont	4	1	17	21	23
<i>South Atlantic</i> Total	63	92	341	351	343
Delaware	4	4	16	17	14
District of Columbia	21	26	72	57	50
Florida	7	11	53	54	66
Georgia	2	4	17	14	15
Maryland	14	18	65	79	68
North Carolina	1	3	26	29	26
South Carolina	5	3	16	19	12
Virginia	4	17	51	56	63
West Virginia	5	6	25	26	29
<i>South Central</i> Total	35	44	196	210	194
Alabama	2	6	22	21	15
Arkansas	3	2	16	19	15
Kentucky	3	3	18	17	25
Louisiana	4	7	24	26	29
Mississippi	5	5	11	12	10
Tennessee	3	7	32	41	36
Texas	15	14	73	74	64
<i>North Central</i> Total	123	151	664	675	641
Illinois	31	45	181	189	175
Indiana	6	7	25	31	37
Iowa	2	2	16	21	20
Kansas	4	7	22	21	17
Michigan	13	16	79	83	88
Minnesota	11	10	40	41	31
Missouri	19	23	75	68	61
Nebraska	3	3	16	19	18
North Dakota	2	2	8	8	5
Ohio	26	24	158	144	136
South Dakota	—	—	5	4	2
Wisconsin	6	12	39	46	51
<i>Western</i> Total	41	56	258	276	282
Arizona	—	2	4	8	6
California	14	21	95	95	97
Colorado	2	1	17	21	22
Idaho	—	—	9	6	7
Montana	2	1	6	7	10
Nevada	—	1	4	3	4
New Mexico	—	1	10	11	7
Oklahoma	8	7	29	34	39
Oregon	3	4	20	25	22
Utah	4	2	8	13	13
Washington	7	12	54	49	50
Wyoming	1	4	2	4	5
<i>Territories and Dependencies</i> Total	10	7	13	11	20
Alaska	—	1	—	1	2
Canal Zone	—	—	—	—	3
Hawaii	2	1	7	7	9
Puerto Rico	8	5	6	3	6
Total for United States	966	1,301	4,913	5,360	5,113

(Continued on page 53)

TABLE 6 — (Continued)

FOREIGN COUNTRIES	1944	1945	1946	1947	1948
Total	232	237	259	302	320
Africa	—	—	—	1	—
Argentina	12	5	8	7	8
Australia	—	—	—	4	2
Belgian Congo	—	1	1	—	—
Belgium	—	—	—	1	1
Bolivia	1	1	—	—	1
Brazil	15	11	9	10	12
British Honduras	—	—	1	—	—
British West Indies	1	2	3	2	1
Canada	9	10	53	57	60
Chile	3	3	2	1	1
China	82	69	24	30	22
Colombia	5	3	3	6	6
Costa Rica	—	1	1	—	—
Cuba	10	12	17	20	16
Cyprus	—	—	1	1	1
Czechoslovakia	1	—	—	2	2
Denmark	—	—	2	—	1
Dominican Republic	1	—	—	1	1
Ecuador	1	1	—	1	1
Egypt	1	1	1	3	6
England	—	—	7	8	13
Finland	—	—	—	2	2
France	—	2	5	14	10
French West Indies	—	—	1	1	1
Greece	—	—	—	4	6
Guatemala	3	4	2	1	4
Honduras	—	2	1	2	2
Hungary	—	—	—	2	—
Iceland	2	5	5	2	4
India	21	27	13	25	27
Iran	2	4	—	—	—
Iraq	1	9	4	5	3
Israel	—	1	1	3	2
Italy	—	—	2	2	3
Korea	—	—	—	—	1
Lebanon	1	1	2	—	—
Libya	—	—	1	—	—
Luxembourg	—	—	—	—	1
Malaya	—	—	—	—	1
Mexico	10	9	10	9	11
Morocco	—	—	—	1	—
Netherlands East Indies	—	—	—	3	3
Netherlands West Indies	—	—	—	1	1
Netherlands	1	1	2	1	2
Newfoundland	—	—	1	—	—
New Zealand	—	—	—	—	2
Nicaragua	—	—	—	—	1
Norway	—	1	22	26	33
Panama	4	5	5	2	2
Peru	10	13	10	9	5
Philippines	—	—	7	6	11
Poland	—	2	1	—	—
Portugal	—	—	1	2	2
Rhodesia	—	—	1	—	—
Salvador	1	—	2	2	2
Scotland	—	—	1	—	—
South Africa	—	—	—	1	—
Spain	—	—	1	2	4
Straits Settlements	—	1	—	—	—
Sweden	—	—	2	4	3
Switzerland	—	—	2	4	2
Turkey	18	15	11	8	6
Union of South Africa	2	5	4	2	3
Uruguay	1	2	1	1	3
Venezuela	13	8	4	—	1
Yugoslavia	—	—	—	—	—
Grand Total, United States and Foreign	1,198	1,538	5,172	5,662	5,433

TABLE 7. NEW STUDENTS ENTERING FROM OTHER COLLEGES AS CANDIDATES FOR DEGREES

Class Joined at the Institute	Years Spent at College				Total
	One	Two	Three	Four or more	
First Year	18	3	2	3	26
Second Year	25	47	6	8	86
Third Year	9	67	24	37	137
Fourth Year	1	—	2	2	5
Graduate Year	—	—	108	283	391
Total	53	117	142	333	645

TABLE 8
WOMEN STUDENTS CLASSIFIED BY COURSES AND YEARS

Course	Year					Total
	I	2	3	4	G	
II Mechanical Engineering . . .	—	2	—	1	—	3
IV-A Architecture	—	2	4	1	3	10
IV-B City Planning	—	—	—	—	2	2
V Chemistry	—	1	—	3	7	11
VI Electrical Engineering	—	—	—	—	2	2
VII Quantitative Biology	—	—	—	1	6	7
VIII Physics	4	—	—	1	7	12
X Chemical Engineering	—	—	1	—	—	1
XII Geology	1	1	—	—	1	3
XIV Economics and Engineering . .	—	1	—	—	—	1
XVI Aeronautical Engineering . .	—	—	—	1	—	1
XVII Building Engineering and Con- struction	—	—	1	—	—	1
XVIII Mathematics	2	—	—	—	6	8
XIX Meteorology	—	—	—	—	1	1
XX Food Technology	—	1	1	—	2	4
Industrial Economics	—	—	—	—	1	1
Total	7	8	7	8	38	68

TABLE 9
OLD AND NEW STUDENTS

Year	1943-44	1944-45	1945-46	1946-47	1947-48	1948-49
Students registered at end of last academic year (including specials)	855	500	653	2,762	4,118	3,663
Students who have previously attended the Institute but were not registered at end of last academic year (including specials)	37	98	62	1,242	261	262
New students who entered by examination	190	118	313	460	530	501
New students who entered without examination	351	266	336	241	294	261
New students who entered from other colleges as candidates for degrees	124	179	136	406	396	645
New students (specials, not candidates for degrees)	22	37	38	61	63	101
Total	1,579	1,198	1,538	5,172	5,662	5,433

TABLE 10. LIST OF AMERICAN COLLEGES AND UNIVERSITIES
WITH NUMBER OF GRADUATES ATTENDING THE INSTITUTE

College	College	College
Alabama Polytechnic Inst. 3	Iowa State College of Agri- culture and Mechanic Arts . . . 10	Radcliffe College 2
Alabama, University of 1	Iowa State Teachers College . . 2	Rennselaer Polytechnic Inst. 24
Albion College 1	Johns Hopkins University . . . 5	Rice Institute 5
Alfred University 6	Johnson C. Smith University . 1	Ripon College 2
American International College 1	Juanita College 1	Rochester, University of . . . 10
American University 1	Juilliard School of Music . . . 1	Rose Polytechnic Institute . . 4
Amherst College 5	Kansas State College of Agric. and Applied Science . 1	Rutgers University 4
Antioch College 3	Kansas, University of 5	Seattle University 1
Arizona, University of 5	Kent State University 1	St. Joseph's College 1
Arkansas, University of 3	Kentucky, University of 4	St. Lawrence University 3
Augustana College and Theological Seminary 1	Kenyon College 2	St. Michael's College 1
Ball State Teachers College . . . 1	Lafayette College 2	Simmons College 4
Bard College 1	LaSalle College 1	Smith College 4
Barnard College 1	Lawrence Institute of Tech. . . 1	Sophie Newcomb College . . . 1
Bates College 1	Lawrence University 1	South, University of the . . . 1
Beloit College 1	Lehigh University 10	South Calif., University of . . 3
Boston College 12	Lincoln Institute of Tech. . . . 1	South Carolina, University of . 2
Boston University 6	Louisiana State University . . . 11	South Dakota State School of Mines 2
Bowdoin College 6	Louisville, University of 2	South Dakota, University of . 1
Bridgewater College 1	Lowell Textile Institute 2	Southern Methodist Univ. . . 2
Brigham Young University . . . 2	Maine, University of 9	Southwestern College 1
Brooklyn College 8	Manhattan College 1	Southwest. Louisiana Inst. of Liberal and Tech. Learning . 1
Brooklyn Polytechnic Inst. . . . 8	Marquette University 1	Springfield College 1
Brown University 10	Marygrove College 1	Stanford University 9
Bryn Mawr College 2	Maryland, University of 3	State College of Washington . 1
Bucknell University 3	Massachusetts Inst. of Tech. 524	Stevens Inst. of Technology . 6
Buffalo, University of 3	Massachusetts, University of . 6	Susquehanna University . . . 1
California, University of at Berkeley 25	Miami University (Ohio) 7	Swarthmore College 7
California, University of at Los Angeles 1	Miami, University of 1	Syracuse University 2
California Inst. of Technology 15	Michigan College of Mining and Technology 2	Temple University 3
Calvin College 1	Michigan State College 8	Texas, University of 12
Carnegie Inst. of Technology 12	Michigan, University of 20	Texas Agric. and Mech. College 7
Case School of Applied Art . . . 5	Middlebury College 4	Texas College of Arts and Industries 1
Chicago, University of 9	Millsaps College 1	Texas Technological College . 4
Cincinnati, University of 4	Minnesota, University of 6	Toledo, University of 1
Ciadel, The 6	Mississippi State College 6	Trinity College 1
City College 1	Missouri School of Mines 4	Tri-State College 2
Clemson College 2	Missouri, University of 1	Tufts College 18
Colby College 6	Montana School of Mines 6	Tulane Univ. of Louisiana . . . 5
College of City of New York 28	Montana State College 5	Tulsa, University of 1
College of Wooster 2	Montana State University 2	Union College (N. Y.) 5
Colorado, University of 9	Morehouse College 1	U.S. Coast Guard Academy . 17
Columbia University (N.Y.) . . . 8	Mt. Holyoke College 1	U.S. Military Academy 23
Cooper Union 6	Nasson College 1	U.S. Naval Academy 132
Cornell University 16	Nebraska, University of 7	Utah State Agric. College . . . 2
Creighton University 1	Nevada, University of 2	Utah, University of 8
Dartmouth College 12	New Hampshire, University of . 3	Vanderbilt University 3
Davidson College 1	New Mexico, University of . . . 2	Vermont, University of 2
Davis and Elkins College 1	New York State College for Teachers 1	Villanova College 1
Dayton, University of 3	New York University 21	Virginia Military Institute . . 4
Delaware, University of 1	North Carolina State College . 7	Virginia Polytechnic Inst. . . 8
Denver, University of 2	North Carolina, University of . 4	Virginia, University of 4
Depauw University 3	North Dakota Agricultural College 1	Washington, University of . . 19
Dickinson College 1	North Dakota, University of . . 1	Washington-Jefferson Coll. . . 5
Drake University 1	Northeastern University 33	Washington-Lee University . . 2
Drexel Inst. of Technology . . . 6	Northern Illinois Coll. of Op. . 1	Washington University 4
Duke University 5	Northern Illinois State Teachers' College 1	Wayne University 1
Eastern Nazarene College 1	North Texas State College . . . 3	Webb Institute of Naval Arch. 10
Emmanuel College 3	Northwestern University 3	Wellesley College 4
Erskine College 1	Notre Dame, University of . . . 6	Wesleyan University 1
Florida, University of 5	Norwich University 2	West Virginia, University of . 3
Fordham University 1	Oberlin University 5	Whittier College 1
Franklin College 1	Ohio Northern University 1	William and Mary College . . 3
Franklin and Marshall Coll. . . . 2	Ohio State University 15	William Jewell College 2
Furman University 2	Ohio University 1	Williams College 7
George Washington Univ. 4	Ohio Wesleyan University 2	Wilson College 1
Georgetown University 2	Oklahoma, University of 6	Wisconsin, University of 9
Georgia School of Technology 19	Oklahoma Agric. and Mech. College 3	Worcester Polytechnic Inst. . 11
Good Counsel College 1	Oklahoma College for Women . 1	Wyoming, University of 1
Goucher College 1	Olivet College 1	Yale University 25
Grinnell College 1	Oregon State College 1	Total 1,796
Hamilton College 1	Pennsylvania State College . . 11	Number of American Colleges Represented 233
Hampton-Sydney College 1	Pennsylvania, University of . . 9	Number of Foreign Colleges Represented (not listed) 93
Hampton Institute 1	Pittsburgh, University of 5	Total 326
Harvard University 51	Pomona College 4	
Haverford College 3	Pratt Institute 1	
Holy Cross, College of the 3	Princeton University 13	
Howard College 2	Principia College 3	
Hunter College 1	Purdue University 17	
Idaho, University of 1	Queens College (N. Y.) 2	
Illinois University of Tech. 3		
Illinois, University of 23		
Indiana, University of 3		

TABLE 11
REGULAR STUDENTS FROM COLLEGES CLASSIFIED BY COURSES

COURSE	No Previous Degree			Graduates of Other Colleges					Graduates of M. I. T. Taking Graduate Work		
	Entered		Total	Entered			Total	S.B. Degree 1948	Other Graduates	Total	
	Nov. 1948	Pre-vious Years		Nov. 1948		Previous Years					
				Under-grad.	Grad.	Under-grad.					Grad.
Aeronautical Engineering XVI	17	5	22	—	27	—	14	41	16	11	27
Architecture IV-A	4	24	28	—	12	—	3	37	—	—	—
Biology VII, VII-A	1	1	2	—	3	—	8	11	5	5	10
Building Engineering and Construction XVII	9	6	15	2	5	3	2	12	2	2	4
Business and Engineering Administration XV	9	15	24	4	11	2	16	33	4	1	5
Chemical Engineering X, X-A	21	13	34	5	41	1	77	124	23	12	35
Chemistry V	12	9	21	—	26	—	88	114	6	13	19
City Planning IV-B	—	3	3	—	11	—	12	23	—	—	—
Civil Engineering I	16	18	34	2	28	4	15	49	2	4	6
Economics and Engineering XIV	—	—	—	—	—	—	—	—	1	1	2
Economics and Engineering XV	6	4	10	1	—	—	—	—	—	—	—
Economics and Natural Science	—	—	—	—	—	—	—	—	—	—	—
Electrical Engineering VI, VI-A	49	33	82	5	57	37	117	216	57	29	86
Food Technology XX, XX-A	2	1	3	—	3	1	3	7	4	4	8
General Engineering IX-B	5	6	11	—	—	1	—	1	—	—	—
General Science IX-A	—	1	1	—	—	—	—	—	—	—	—
Geology XII	1	—	1	1	9	—	7	17	1	4	5
Group Psychology	—	—	—	—	—	—	—	—	—	—	—
Industrial Economics	—	—	—	—	15	—	4	4	—	—	—
Mathematics XVIII	3	6	9	—	11	—	19	34	6	3	3
Mechanical Engineering II	38	26	64	1	37	3	42	83	15	15	30
Metallurgy III	4	5	9	1	23	1	48	72	3	14	17
Meteorology XIX	3	1	4	1	5	—	17	23	5	2	7
Naval Architecture and Marine Eng. XIII, XIII-C	9	6	15	2	2	1	6	6	—	4	4
Naval Construction and Engineering XIII-A	—	—	—	—	29	—	66	95	—	3	3
Physics VIII	13	7	20	—	29	—	87	116	17	32	49
Sanitary Engineering XI	—	—	—	—	7	—	6	13	3	—	3
Total	222	190	412	32	391	68	679	1,170	171	166	337

TABLE 12. NUMBER OF DEGREES AWARDED IN SEPTEMBER 1948, FEBRUARY 1949, AND JUNE 1949

Name of Course	S.B.			B.Arch. and B.C.P.			S.M.			M.Arch. and M.C.P.			Ph.D.			Sc.D.			Adv. Eng.			Total		
	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June
Aeronautical Engineering	19	1	48	—	—	—	8	6	26	—	—	—	—	—	—	3	—	—	30	7	74	30	7	74
Architecture	—	—	—	3	3	17	—	—	—	—	—	—	—	—	—	—	—	—	10	1	17	2	1	17
Biology	—	6	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	2	1	1	2	1	1
Building Eng. and Constr.	69	40	103	—	—	—	1	2	3	—	—	—	—	—	—	—	—	—	7	7	10	7	7	10
Business and Eng. Admin.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42	130	—	—	—
Ceramics	52	10	57	—	—	—	11	6	12	—	—	—	—	—	—	1	3	7	1	25	3	67	3	76
Chemical Engineering	—	—	12	—	—	—	8	1	30	—	—	—	—	—	—	4	9	—	—	67	42	21	4	65
Chemical Engineering Practice	6	4	22	—	—	—	3	1	3	—	—	—	—	—	—	—	—	—	—	8	14	14	14	38
Chemistry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Civil Engineering	12	8	39	1	1	1	1	2	21	—	—	—	12	9	—	—	—	—	—	21	14	9	4	65
Economics and Engineering	6	1	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Electrical Engineering	71	66	94	—	—	—	42	14	55	—	—	—	—	—	—	—	—	—	13	11	4	9	11	12
Food Technology	11	2	25	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—	6	2	—	—	—	—
General Engineering	—	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Science	4	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	114	80	1	114	80	156
Geology	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	5	11	11	5	25
Group Psychology	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Economics	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Marine Engineering	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Marine Transportation	—	2	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mathematics	1	4	—	—	—	—	—	4	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mechanical Engineering	52	5	97	—	—	—	21	8	31	—	—	—	—	—	—	—	—	—	1	4	17	1	4	17
Metalurgy	4	6	10	—	—	—	5	5	5	—	—	—	—	—	—	—	—	—	73	15	133	73	15	133
Meteorology	1	1	4	—	—	—	5	2	5	—	—	—	—	—	—	—	—	—	8	16	18	8	16	18
Naval Architecture	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Naval Arch. and Marine Eng.	2	—	9	—	—	—	5	2	1	—	—	—	—	—	—	—	—	—	2	2	11	2	2	11
Physics	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Physical Biology	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	37	—	46	—	—	—
Quantitative Biology	10	11	25	—	—	—	—	6	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sanitary Engineering	1	—	—	—	—	—	—	2	6	—	—	—	—	—	—	—	—	—	23	25	44	23	25	44
Textile Engineering	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Without Course Classification	—	—	—	—	—	—	3	2	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	327	172	595	4	4	18	109	66	251	15	3	6	29	22	40	15	22	31	499	389	979	499	389	979

TABLE 13 — (Continued)

DEGREES OF BACHELOR OF SCIENCE ACCORDING TO CLASS IN WHICH THEY WERE AWARDED

Class (Calendar Year)	Aeronautical Eng.	Architectural Eng.†	Architecture	Biology or Natural Hist. (Inc. VII-A)	Bldg. Eng. & Constr.	Business and Eng. Admin.	Chemical Eng.	Chemical Eng. Practice X-B	Chemistry	Civil Engineering	Economics and Engineering	Electrical Eng. (Inc. VI-A)	Electrochemical Engineering*	Food Technology	General Eng.	General Science or General Course	Geology	Mathematics	Mechanical Eng. (Inc. II-A)	Metallurgy**	Meteorology	Military Eng.	Mining Eng. and Metallurgy	Naval Arch. and Engineering	Physics	Sanitary Eng.	Total	Total by Decades
1910	—	—	10	4	—	—	16	—	12	46	—	49	5	—	—	—	—	—	64	—	—	—	17	6	1	15	232	2,663
1911	—	—	26	4	—	—	31	—	17	55	—	52	3	—	—	—	—	—	47	—	—	—	21	3	1	14	261	2,663
1912	—	—	19	2	—	—	37	—	12	38	—	43	8	—	—	—	—	—	55	—	—	—	20	4	1	15	269	2,663
1913	—	—	20	2	—	—	37	—	9	90	—	51	10	—	—	—	—	—	60	—	—	—	17	4	1	19	304	2,663
1914	—	—	20	2	—	—	35	—	23	49	—	42	14	—	—	—	—	—	69	—	—	—	5	5	3	12	289	2,663
1915	—	—	27	2	—	—	32	—	11	45	—	56	10	—	—	—	—	—	84	—	—	—	14	4	3	18	321	2,663
1916	—	—	37	2	—	—	32	—	18	49	—	45	10	—	—	—	—	—	63	—	—	—	14	4	3	17	345	2,663
1917	—	—	27	2	—	—	40	—	10	45	—	50	11	—	—	—	—	—	75	—	—	—	10	4	3	5	324	2,663
1918	—	—	85	2	—	—	43	—	18	45	—	50	6	—	—	—	—	—	66	—	—	—	7	7	4	9	300	2,663
1919	—	—	10	2	—	—	44	—	6	52	—	50	9	—	—	—	—	—	55	—	—	—	7	7	4	2	318	2,663
1920	—	—	19	2	—	—	48	—	9	58	—	75	15	—	—	—	—	—	138	—	—	—	13	12	2	2	318	2,663
1921	—	—	11	2	—	—	98	—	6	52	—	90	9	—	—	—	—	—	138	—	—	—	13	12	2	2	318	2,663
1922	—	—	42	2	—	—	98	—	9	58	—	75	15	—	—	—	—	—	138	—	—	—	13	12	2	2	318	2,663
1923	—	—	13	2	—	—	126	—	15	11	—	109	25	—	—	—	—	—	138	—	—	—	24	18	1	3	565	2,663
1924	—	—	18	2	—	—	73	—	16	64	—	78	16	—	—	—	—	—	106	—	—	—	27	16	8	7	637	2,663
1925	—	—	5	2	—	—	82	—	13	66	—	135	17	—	—	—	—	—	82	—	—	—	23	13	9	3	608	2,663
1926	—	—	9	2	—	—	57	—	19	57	—	110	9	—	—	—	—	—	98	—	—	—	19	11	3	1	557	2,663
1927	—	—	14	2	—	—	85	—	13	73	—	108	14	—	—	—	—	—	76	—	—	—	20	14	1	2	561	2,663
1928	—	—	15	2	—	—	95	—	19	72	—	121	8	—	—	—	—	—	72	—	—	—	20	14	1	2	571	2,663
1929	—	—	26	2	—	—	73	—	13	59	—	114	11	—	—	—	—	—	67	—	—	—	1	9	4	3	514	2,663
1930	—	—	20	2	—	—	38	—	7	59	—	84	10	—	—	—	—	—	64	—	—	—	11	5	4	3	471	2,663
1931	—	—	15	2	—	—	38	—	12	40	—	76	8	—	—	—	—	—	48	—	—	—	6	9	4	6	483	2,663
1932	—	—	16	2	—	—	32	—	10	49	—	83	6	—	—	—	—	—	70	—	—	—	12	13	7	2	496	2,663
1933	—	—	5	2	—	—	70	—	7	38	—	74	4	—	—	—	—	—	68	—	—	—	4	21	16	4	505	2,663
1934	—	—	16	2	—	—	38	—	15	38	—	86	8	—	—	—	—	—	86	—	—	—	14	13	14	2	471	2,663
1935	—	—	8	2	—	—	78	—	3	47	—	86	7	—	—	—	—	—	50	—	—	—	26	25	28	5	496	2,663
1936	—	—	27	2	—	—	48	—	15	35	—	82	7	—	—	—	—	—	45	—	—	—	14	14	19	1	401	2,663
1937	—	—	3	2	—	—	31	—	16	18	—	57	8	—	—	—	—	—	45	—	—	—	10	18	11	2	410	2,663
1938	—	—	3	2	—	—	63	—	20	23	—	68	5	—	—	—	—	—	47	—	—	—	19	19	17	1	380	2,663
1939	—	—	3	2	—	—	4	—	15	15	—	67	5	—	—	—	—	—	46	—	—	—	5	23	14	2	399	2,663
1940	—	—	2	2	—	—	51	—	9	22	—	62	4	—	—	—	—	—	40	—	—	—	5	23	14	2	399	2,663
1941	—	—	2	2	—	—	51	—	14	22	—	62	4	—	—	—	—	—	40	—	—	—	5	23	14	2	399	2,663
1942	—	—	2	2	—	—	53	—	12	23	—	67	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1943	—	—	2	2	—	—	59	—	12	23	—	73	2	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1944	—	—	2	2	—	—	54	—	8	28	—	79	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1945	—	—	2	2	—	—	60	—	8	28	—	79	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1946	—	—	2	2	—	—	60	—	8	28	—	79	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1947	—	—	2	2	—	—	60	—	8	28	—	79	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1948	—	—	2	2	—	—	60	—	8	28	—	79	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
1949	—	—	2	2	—	—	60	—	8	28	—	79	7	—	—	—	—	—	42	—	—	—	9	24	22	2	453	2,663
Total	88	172	865	356	215	2,429	2,234	251	1,025	12,501	23	3,965	301	20	643	265	96	117	4,012	209	47	5	880	735	535	264	22,993	

* Prior to 1909 this Course was designated as Option 3 (Electrochemistry) of Course VIII.

† Two received the degree in Naval Architecture, Course XIII-B, in 1916 and three in 1917.

** Prior to 1923 degrees were awarded in Architecture.

*** Prior to 1938 included in Mining Engineering and Metallurgy.

§ Includes only February and June degrees.

TABLE 14
DEGREES OF MASTER OF SCIENCE AWARDED

Class (Calendar Year)	Aeronautical Engineering	Architecture	Biol. & P. H. (Inc. VII-A)	Bldg. & Eng. Constr. XVII	Business and Eng. Admin.	Ceramics	Chemical Engineering	Chem. Eng. Practice X-A	Chemistry	Civil Engineering	Economics and Engineering or Natural Science	Electrical Eng. (Inc. VI-A)	Food Technology	Geology	Marine Engineering	Mathematics	Mech. Eng. (Inc. II-A)	Metallurgy	Meteorology	Naval Architecture	Naval Construction and Eng.	Petroleum Engineering	Physics	Sanitary Engineering	Without Course Classification	Total
1886																										1
1887																										1
1888																										
1889																										
1890																										
1891																										
1892																										
1893		1																								1
1894																										1
1895		1								1																3
1896		2								1																3
1897		2																								4
1898		1																								5
1899		1	1							1													1			3
1900																										
1901		2																2								4
1902		3																2								8
1903		5								3								1								12
1904		4								1		2						1								18
1905		9																								9
1906		3								1																15
1907		6																		2						12
1908		1								1		3														17
1909		6								1	2				1											19
1910		6								1	2															20
1911		5	2							2	2															20
1912		4	2							3	3															20
1913		4	1							1	1				1											19
1914		3	2							5	3															25
1915	1	4								2	1															27
1916	5	7	1							1	1															35
1917	4	3								1	3															30
1918	5	1	1							1	1															15
1919	2									3	4															15
1920										2	4															50
1921	3									6	2															17
1922	5									3	2															93
1923	10									6	32															126
1924	4									3	34															170
1925	5									6	41															146
1926	6									3	35															123
1927	9	1								5	20															25
1928	9									2	26															32
1929	5									5	14															43
1929	5									3	21															45
1930	3									7	22															53
1931	4	2								15	34															70
1932	5	5								25	33															88
1933	10									14	26															101
1934	7	5								16	19															111
1935	3	1								16	14															121
1936	5									7	30															131
1937	12	1								12	20															151
1938	13									11	28															161
1939	8	3								20	34															171
1940	9	1								16	37															181
1941	16	1								15	42															201
1942	9	2								12	23															211
1943	21	1								15	36															231
1944	22									3	7															241
1945	9	3								12																251
1946	47	1								29	2															261
1947	67	5								65	32															284
1948	40	4								31	39															313
*1949	32	1	9	19	1	3	18	31	4	23																438
Total	415	84	50	12	164	6	444	741	165	426	24	1,382	9	56	31	67	621	114	127	53	478	5	96	66	675	6,311

Total of degrees in discontinued courses, Architectural Engineering, Electrochemical Engineering, Fuel and Gas Engineering, General Science, Mining Engineering, Naval Construction (Foreign Students), and Railroad Operation (see 1940-41 Report) 126

Grand Total 6,437

*Includes only February and June degrees.

TABLE 15

DEGREES AWARDED IN ARCHITECTURE AND CITY PLANNING

Class (Calendar Year)	Bachelor in Architecture	†Bachelor in City Planning	Master in Architecture	Master in City Planning
1921	—	—	3	—
1922	—	—	2	—
1923	—	—	7	—
1924	—	—	8	—
1925	—	—	5	—
1926	—	—	9	—
1927	—	—	7	—
1928	—	—	6	—
1929	—	—	9	—
1930	—	—	7	—
1931	—	—	9	—
1932	11	—	5	—
1933	24	—	7	—
1934	27	—	—	—
1935	17	4	11	—
1936	14	4	4	2
1937	9	2	11	3
1938	19	1	3	3
1939	14	1	10	3
1940	11	2	21	7
1941	17	2	6	1
1942	15	1	4	4
1943	10	—	3	6
1944	8	—	2	3
1945	5	—	—	7
1946	7	—	2	8
1947	9	1	20	15
1948	11	3	14	13
*1949	20	2	—	9
Total . . .	248	23	195	84

* Includes only February and June degrees.

† From 1935 to 1944 Bachelor of Architecture in City Planning.

ADMINISTRATIVE OFFICERS

TABLE 16
DEGREES OF MASTER IN PUBLIC HEALTH AWARDED
(Discontinued after 1944)

Class (Calendar Year)	Number of Degrees Awarded		Total
	Prior to 1948	1948*	
1923	—	2	2
1926	—	1	1
1927	—	2	2
1929	—	1	1
1930	—	5	5
1931	—	4	4
1933	—	7	7
1934	—	4	4
1935	—	4	4
1937	—	6	6
1938	—	2	2
1939	—	6	6
1940	—	6	6
1941	3	6	9
1942	11	1	12
1943	10	10	20
1944	7	5	12
Total	31	72	103

*72 former recipients of the Certificate of Public Health were awarded the degree of Master in Public Health in June 1948 as of the class in which they received their Certificate of Public Health.

TABLE 17
DEGREES OF ADVANCED ENGINEERING AWARDED

Class (Calendar Year)	Naval Engineer	Electrical Engineer
1949	37	1

TABLE 18
DEGREES OF DOCTOR OF PHILOSOPHY AWARDED

Class (Calendar Year)	Biology	Chemistry	Electrical Engineering	Food Technology	Geology	Industrial Economics	Mathe- matics	Physics	Group Psychol- ogy	Total
1907	—	3	—	—	—	—	—	—	—	3
1908	—	3	—	—	—	—	—	—	—	3
1909	—	—	—	—	—	—	—	—	—	—
1910	—	1	—	—	1	—	—	—	—	2
1911	1	—	—	—	—	—	—	—	—	1
1912	—	3	—	—	3	—	—	—	—	6
1913	—	1	—	—	—	—	—	—	—	1
1914	—	2	—	—	—	—	—	—	—	2
1915	—	2	—	—	—	—	—	—	—	2
1916	—	1	—	—	1	—	—	1	—	3
1917	—	3	—	—	1	—	—	—	—	4
1918	—	3	—	—	1	—	—	—	—	4
1919	—	—	—	—	—	—	—	1	—	1
1920	—	4	—	—	1	—	—	—	—	5
1921	1	3	—	—	—	—	—	3	—	7
1922	—	4	—	—	1	—	—	—	—	5
1923	—	5	—	—	1	—	—	—	—	6
1924	2	10	—	—	—	—	—	2	—	14
1925	—	11	—	—	—	—	—	—	—	11
1926	—	2	—	—	2	—	—	—	—	4
1927	2	6	—	—	1	—	1	1	—	11
1928	1	5	—	—	1	—	1	—	—	8
1929	4	8	—	—	2	—	1	—	—	15
1930	—	5	—	—	2	—	3	—	—	10
1931	—	9	—	—	—	—	1	—	—	10
1932	1	12	—	—	—	—	1	2	—	16
1933	2	10	—	—	3	—	3	—	—	18
1934	2	10	—	—	2	—	2	1	—	17
1935	4	15	—	—	2	—	3	7	—	31
1936	—	15	—	—	—	—	3	12	—	30
1937	2	11	—	—	4	—	1	10	—	28
1938	2	12	—	—	2	—	4	7	—	27
1939	1	33	—	—	4	—	3	4	—	45
1940	3	19	—	—	5	—	4	5	—	36
1941	1	18	—	—	1	—	3	5	—	28
1942	1	19	—	—	5	—	1	8	—	34
1943	2	8	—	—	2	—	3	8	—	23
1944	2	12	—	—	—	1	—	9	—	24
1945	1	6	—	—	—	—	1	1	—	9
1946	2	5	—	1	—	4	4	1	—	17
1947	3	14	1	1	—	3	4	17	—	43
1948	3	27	—	—	5	1	8	34	5	83
*1949	1	22	—	2	4	2	4	24	3	62
Total	44	362	1	4	57	11	59	163	8	709

* Includes only February and June degrees.

TABLE 19. DEGREES OF DOCTOR OF SCIENCE AWARDED

Class (Cal- endar Year)	Aero. Eng.	Ceramics	Chem. Eng.	Chem- istry	Civil Eng.	Elec. Eng.	Electro- chem. Eng.	Food Tech- nology	Geology	Mathe- matics	Mech. Eng.	Metal- lurgy	Meteor- ology	Min. Eng.	Naval Arch.	Petro- leum Eng.	Physics	San. Eng.	Total
1911	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
1912	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1915	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	1
1916	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
1917	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1918	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1919	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1920	1	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	3
1921	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1922	1	—	—	1	—	1	—	—	1	—	—	—	—	—	—	—	—	—	3
1923	1	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	2	—	5
1924	—	—	2	—	—	1	—	—	1	—	—	1	—	—	—	—	1	—	6
1925	1	—	3	—	—	—	—	—	—	—	—	4	—	—	—	—	—	—	7
1926	—	—	1	1	1	1	1	—	—	—	—	2	—	—	—	—	—	—	9
1927	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	1	—	6
1928	1	—	5	—	1	2	—	—	—	—	—	1	—	—	1	—	—	—	10
1929	—	—	3	—	—	—	—	—	—	1	3	1	—	—	—	—	—	—	6
1930	—	—	9	—	—	6	—	—	—	—	—	1	—	—	—	—	—	—	20
1931	—	—	3	2	—	3	—	—	—	—	2	1	—	—	—	—	2	—	9
1932	—	—	5	—	1	3	—	—	—	1	—	6	—	1	—	—	—	—	14
1933	—	—	10	1	2	3	—	—	1	—	—	—	—	—	—	—	—	—	24
1934	—	—	3	—	—	2	1	—	1	2	3	1	1	—	—	—	1	1	13
1935	—	1	2	1	—	4	—	—	—	—	2	3	—	—	—	—	2	—	14
1936	2	1	12	—	—	1	—	—	—	2	2	—	—	—	—	1	1	—	24
1937	1	1	9	1	1	6	—	—	1	—	2	—	—	—	—	—	1	—	23
1938	—	1	12	—	2	7	—	—	—	—	2	—	—	—	—	—	5	—	38
1939	—	1	10	—	3	1	—	—	1	—	2	4	3	1	—	—	3	—	26
1940	2	2	12	—	3	1	—	—	1	—	2	8	—	1	—	—	4	1	29
1941	1	1	15	3	—	—	—	—	—	—	3	—	3	—	—	—	3	1	41
1942	1	2	14	—	2	—	—	—	—	—	1	3	1	—	—	—	2	—	26
1943	—	2	10	—	—	1	—	—	2	—	—	5	—	—	—	—	2	—	20
1944	—	—	4	—	—	1	—	—	—	—	1	—	—	—	—	—	1	—	15
1945	—	1	7	—	—	—	—	—	—	—	1	3	—	—	—	—	—	—	15
1946	1	—	11	—	3	—	—	—	1	—	2	11	2	—	—	—	1	—	23
1947	2	1	10	—	2	4	—	2	1	—	2	—	1	—	—	—	1	—	37
1948	3	1	10	—	3	3	—	—	1	—	4	9	9	—	—	—	3	—	46
*1949	—	3	16	—	6	6	—	—	—	—	7	8	4	—	—	—	1	2	53
Total	21	18	198	10	32	64	2	2	12	5	38	91	27	5	1	1	37	5	569

*Includes only February and June degrees.

ADMINISTRATIVE OFFICERS

TABLE 20
DEGREES OF DOCTOR OF PUBLIC HEALTH AWARDED
(Discontinued after 1944)

Class (Calendar Year)	Number
1924	1
1927	1
1928	1
1930	1
1939	1
1942	1
1944	3
Total	9

TABLE 21
DEGREES OF DOCTOR OF ENGINEERING AWARDED
(Discontinued after 1918)

Class (Calendar Year)	Electrical Engineering	Electrochemical Engineering	Total
1910	1	—	1
1914	1	—	1
1916	1	—	1
1917	—	1	1
Total	3	1	4

TABLE 22
SUMMARY OF DEGREES AWARDED (1868-1949)

Bachelor of Science	22,993
Bachelor in Architecture	248
Bachelor in City Planning	23
Master of Science	6,437
Master in Architecture	195
Master in City Planning	84
Master in Public Health (Discontinued after 1944)	103
Advanced Engineering	38
Doctor of Philosophy	709
Doctor of Science	569
Doctor of Public Health (Discontinued after 1944)	9
Doctor of Engineering (Discontinued after 1918)	4
Grand Total	31,412

DIRECTOR OF ADMISSIONS

As in previous years, this report covers the twelve-month period ending with the opening of the new academic year in September, 1949, which date marks the natural termination of the Admissions Office year.

Applications for admission to the freshman class compare with the preceding year as follows:

*First-Year Classes**

	<i>September 1948</i>	<i>September 1949</i>
Total Applications	3,434	2,834
Admissions Granted	1,076	1,086
Actual Registration	808	736
Registration as Per Cent of Admissions	75.0	67.8
Number of Secondary Schools Represented	510	470

* Exclusive of former students returning in the first year.

This is the second successive year in which first-year applications have decreased; the quality of the class is nevertheless believed to be fully as good as in earlier years.

A total of 1,273 persons applied for college transfer admission into the undergraduate school, of whom 608 permitted their preliminary applications to lapse or redated them for a later year. Of the remaining 665, a total of 434 were granted admission, including 62 under the Combined Plan of Study.

Two colleges, Pomona at Claremont, California, and Wesleyan at Middletown, Connecticut, have been added to the list participating in the Combined Plan of Study, raising the total to 14 institutions. The guidance conference initiated in April, 1948, for students interested in this plan, was omitted in 1949 because of the Mid-Century Convocation. Our present intent is to resume the conference next April and continue it on a biennial basis so that each student can attend at least once during his three college years.

During the past year preparations have been made for a more aggressive long-range program to attract able students. It is not generally realized that a college or university, however much sought after, has nevertheless a problem of recruiting as well as of selection. It follows that, even though applications

exceed the places available, positive effort is needed to attract students of exceptional qualifications. This need is particularly urgent here, because the popular idea of M. I. T. is largely based on conditions as they were 40 or 50 years ago. In consequence, many students of great promise are advised to go elsewhere by persons who have little knowledge of the Institute as it exists today.

The response to this situation involves two main lines of activity: closer contact with secondary schools, and wider distribution of informative literature. To carry out the former of these objectives Mr. Arthur L. Bryant has joined the Admissions Office staff on a full-time basis, and Mr. Nathaniel McL. Sage, Jr., on a full-time basis for the fall term only. Both will spend a large part of their time visiting secondary schools (both public and independent) and will keep in touch also with Honorary Secretaries in the corresponding areas. The other members of the Admissions Office staff will continue to make as many of these visits as possible, having regard to obligations here and to the desirability of maintaining contact also with alumni clubs.

In visiting schools the object is not to address large assemblies of students, nor is it necessarily to recruit a delegation of seniors for entry the following fall. We seek the longer term objective of mutual acquaintance between Institute officers and school personnel, and attach importance to group conferences with younger boys whose college plans are not yet definite and who have an active interest and ability in the fields represented at the Institute.

An interesting auxiliary project has developed during the past year. Upon the initiative of a student committee encouraged by Dean Baker, small delegations of undergraduates visited a number of New England preparatory schools. This practice is of the utmost value as a means of attracting good students. It has natural limitations, however; students can spare only limited time for visits, the plan applies mainly to nearby schools, and to boarding schools rather than to public schools. The project is a most desirable one, despite these limitations, and it is hoped that it can be further developed.

Looking toward the second objective, the Admissions Office has established a series of master lists for the distribution of such Institute publications as are used in whole or in part for

promotional or recruiting purposes. A noteworthy recent addition to this literature is the brochure, "Student Life at M. I. T.," which describes a side of Institute life little known to the public. The adequate distribution of this and other publications which supplement the catalogue is a matter of some complexity. We now have a series of lists aggregating about 25,000 names and addresses of schools, science teachers, guidance officers, Y. M. C. A. officials and others, set up on stencils to minimize clerical expense. There are also alumni lists which will be heavily utilized for the brochure mentioned above. Additional lists up to 125,000 in various categories are in hand, but not on stencils. These may be drawn upon as seems desirable, and to the extent that the added distribution expense is warranted. It is planned to utilize this organized schedule of lists for successive brochures and leaflets, so that people in contact with prospective students will be currently informed about many phases of the Institute's work.

Another addition to our promotional literature is the poster on freshman scholarships prepared by Dean Pitré and first used with conspicuous success in 1948-1949 for display on high school bulletin boards. Use of this is being continued.

Turning now from problems of recruiting to those of selection, the past summer has seen the completion of the main part of the study on "The Statistical Basis of Student Selection," undertaken by Professor George P. Wadsworth and Mr. Joseph G. Bryan in June, 1946, at the request of the Admissions Office. The object was to exploit to the utmost whatever predictive value could be shown to inhere in the various kinds of data collected about applicants for admission.

This study has been conducted with the utmost care and thoroughness, and represents a major contribution to the long-range welfare of the Institute. As a result we can now compute a "most probable first term rating" for each candidate for admission, which shows a correlation of about .60 with actual performance in the first term of the freshman year. The chief remaining problem is to make corrections for candidates from individual schools based on experience with these schools.

Special efforts have been made during the past year to keep the 250 Honorary Secretaries of the Institute currently informed about developments here, with particular reference to matters

that concern admission and scholarships. A number of detailed circular letters have been issued for this purpose. The Honorary Secretaries continue to perform a service of the greatest value and importance, by counseling prospective students and advising the Admissions Office concerning their qualifications.

B. ALDEN THRESHER

DIRECTOR OF LIBRARIES

The fiscal year of 1948-1949 in the M. I. T. library system has been more active and productive for the Institute generally than its predecessor, while for the library staff it has been tense and curiously exciting. Culmination of years of planning in ground-breaking ceremonies for the Charles Hayden Memorial Library on April 5, 1948 made the long anticipated new library seem almost within reach. The past year has concretely demonstrated that much time must elapse between the beginning of construction and the achievement of occupancy. Meanwhile the library has been engaged in two concurrent lines of activity, namely, the continuance of regular library service in a period of transition where the strength of the former operation has gone though its limitations remain, and the preparation physically, organizationally and intellectually for expanded and new responsibilities.

The evolution of a multimillion dollar library is an exhilarating and highly instructive process. As construction advanced, two-dimensional plans achieved three-dimensional reality in ways almost incomprehensible to the layman. Conferences beyond count or computation with architects and specialists of various types slowly reconciled concepts of construction and utilization. Detailed planning of areas, equipment, decor, and operations seemed almost endless. However well planned and equipped it may be, a new library of itself will solve few if any problems; indeed it is almost the perfect illustration of the definition that progress consists in replacing a set of old problems with a series of entirely new ones. The library organization cannot be transferred intact to a new location even if that were desirable, and consequently much time has been spent during the year in reorganizing and recasting routines, procedures, and methods, always with an eye to the future. There

is a good deal of similarity between some business and library techniques; special equipment designed for one will serve equally well for the other. As a single example, the adoption of a multiple order form much like a sales slip will result in a saving of about one-half man year. The library has borrowed liberally from current business practice to achieve immediate and even greater potential future operational economies.

All of the work incident to the planning and construction of the new library was quite apart from the provision of service to the Institute during the period under discussion. In 1948-1949 the library successfully met demands that were considerably greater in extent than those of the foregoing year.

Circulation, in the Central Library alone for example, increased over 7,000 volumes, a matter of some 17 per cent, with the largest gain in overnight books, a direct reflection of the tendency of the instructing staff to rely on materials placed on reserve. For the entire library, total circulation for one- and two-week books amounted to some 6,000 volumes more than the preceding year, and compared with the corresponding period 1944-1945 reveals the imposing circulation gain of 34,000 volumes. To continue the statistical picture, the instructing staff was responsible for 24 per cent of the circulation, graduate students 23 per cent, undergraduate students 35 per cent with the remaining 18 per cent divided among Alumni (2.1), Division of Industrial Cooperation (3.8), M. I. T. employees (4.0), the public (0.6), outside libraries (3.8), and miscellaneous (3.7).

While the distribution of circulation is an effective general index of the usefulness of the library, the intellectual activity of staff, graduate students and library users may be gauged fairly accurately by the extent of reference service. Over 8,500 telephone calls and 6,000 letters, in each case more than the preceding year, were required to meet reference demands. It was necessary to borrow 950 items from outside sources, 35 per cent more than last year, and only 46 requests as against 136 last year could not be filled. As a corollary, interlibrary loan, 1,040 items in 1947-1948, jumped this year to 4,253, of which more than half went to business and industrial firms. The nature of services offered to business and industry by the library has been frequently reviewed during the year as a possible concealed asset which should not be neglected. Beyond the bare statistics,

reference is intensely human with many amusing facets. A woolen mill in Lawrence wanted to know whether sheep perspire. Other typical inquiries of concern to individuals and organizations involved the temperature of interstellar space, where Benjamin Franklin was buried, the physical characteristics of alundum, processes for reclaiming leather, the physical properties of ivory, methods of obtaining foreign patents, and water levels in Canadian lakes.

The collections were augmented through the year by purchase, gifts, binding, theses, and serials by 17,673 volumes, an increase of about 5,000 volumes over the past year. Distribution between the Central and the branch libraries was in the proportion of two to one with more than 11,000 titles remaining in Central. The official count of the number of volumes in the M. I. T. Library as of June 30, 1949 is 435,154. Periodical subscriptions increased to a new high of 2,491.

Book budgets sufficed to meet most urgent current demands, although it is questionable whether adequate provision is being made to maintain and keep the collections abreast of the current output of technical publication. The humanities collections, moreover, are in urgent need of attention and will shortly require drastic overhauling, considerable replacement, and even more new material; space limitations which have handicapped previous efforts to build the collection will shortly cease to be an obstacle. A particular effort has been made to expend special book endowment funds for the purposes for which they were designated, and an equally determined attack was launched on the problem of weeding the collections and disposing of surplus duplicates and useless material. A large number of marketable duplicates were sold to other libraries. Some material is being prepared for shipment to the Philippines, and other sources for disposing of material that is potentially valuable but surplus to M. I. T. are being explored and exploited wherever possible. A goal, which may never be reached, is to discard one item for each new title accessioned.

The operations of processing, cataloguing, and binding are essential and, as they are largely carried out behind the scenes, are not always appreciated by the users of the library. The Catalogue Department completed more than 9,000 titles excluding editions or added numbers in series and typed over 52,000

library cards. Material in 22 languages was added to the catalogue. At the same time excellent progress has been registered in collecting and arranging serials and documents by that department. As the volumes moved toward the already overcrowded stacks, it has been a question in many cases whether the absolute point of saturation has not been reached. Temporary shelving, wooden boxes, and finally "floor storage" have been employed as ultimate expedients. Counting, stack reading and other time-consuming but necessary activities have been carried forward.

Effective over-all planning has necessitated a careful review of the operation of the seven branch libraries. Again the conclusions were that the branches are all operating as effectively as possible under the circumstances and that the system well justifies continuance and expansion. Space unfortunately precludes detailed presentation of branch library activities in this report, and all operations have been merged to present a picture of the library as a whole.

Two new branch libraries, one for Biology and another for Engineering and Naval Architecture, will be formally established in the fiscal year 1949-1950. The former has developed out of a manifest need of the Biology Department for branch library service and facilities and will be housed in quarters vacated by the Central Library in Building 10. The work of Mr. Harold Oatfield, former Library Fellow, together with the full cooperation of the Biology Department materially aided in planning the new facility. The second new branch Library will be formed from the present Dewey when the Dewey Library of Economics and Industrial Relations is moved to the Charles Hayden Memorial Library. The new Engineering and Naval Architecture Library will remain in Building 5, incorporating certain rare book collections formerly in the Naval Museum; additional facilities will be provided later. To meet urgent current demands the Dewey space was renovated, repainted and relighted early in 1949.

Librarians are highly conscious of their responsibilities and the professional literature reflects continuous attempts to improve library service. Most of these, however, are directed toward improving purely library functions or elaborating traditional concepts. It is increasingly evident that librarians

must take added cognizance of methods of consultation and study, and the reading habits of their users. In other words library operational analysis of user demand is a growing necessity. Through the cooperation of Professor Arthur A. Brown and his class in Operation Analysis, a beginning was made during the year to gather accurate, factual information compiled by nonlibrary professional analysts much in the same manner that a business, industry, or government operation would be studied. The initial experiment took place in the Eastman Library of Physics, Chemistry, and Mathematics. Here it was ascertained that some library dogma is actually inaccurate and misleading at least so far as M. I. T. is concerned. The scene of operations was then moved to the Central Library where a much larger sampling was undertaken. It is too early as yet to report the results, and it is hoped that a continuation of the studies will be possible. Enough data have been accumulated to justify further work.

The organization of the Friends of the M. I. T. Library continued, under the chairmanship of Mr. Ralph T. Walker '11, to maintain an active interest in the welfare and growth of the collections. Under existing circumstances large projects were deferred, but certain items that may be difficult to obtain in the future, including continuations of the *Enciclopedia Italiana* and the *Reports from the Scientific Expedition to the Northwestern Provinces of China under the Leadership of Dr. Sven Hedin*, together with other volumes of particular interest to the library were immediately procured. An example of the latter is the Folio Society publication, *The Earliest Chemical Industry*. The Friends also gave generous financial assistance to the publication of the *Library Annual* which will be described in another connection.

Other gifts to the Institute Library were received in profusion from individuals, learned societies, and organizations of all types. They ranged from single volumes and individual publications to collections and accumulations of several hundred volumes or pamphlets and added valuable material that could be procured in no other way. Detailed acknowledgement is impossible in a brief report as a single-spaced list of contributions occupies more than six typewritten pages. In cooperation with the Museum Committee and the Department of Naval

Architecture the library participated in discussions with Mr. Rudolf F. Haffenreffer '95 that resulted in the transfer on deposit from the Haffenreffer Family Foundation of the unique and valuable collection of Herreshoff plans of yachts and other craft, including models and documentation of various types. Further work on the Herreshoff collection will doubtless follow the pattern laid down for the Dard Hunter Paper Museum where in the current year listing and cataloguing were continued on a part-time basis under library auspices.

One of the most important gifts to the library during the year was neither a book nor a publication. Mr. Harry H. Young '91 has arranged to procure for installation in the new Charles Hayden Memorial Library Map Room a six-foot relief globe which is being built to order in England. It will be the only one of its type in the United States. As an adjunct to world orientation and a superb teaching and reference tool, the globe will be accorded a place of honor.

Another activity which will begin to be realized in the succeeding year is the assembly under the direction of the Dean of Humanities of a reading library designed to bring together in good trade editions books that a great many people have enjoyed over a period of time. The collection, named for a much-loved former professor, The Tubby Rogers Collection, is intended to encourage students to explore other than professional or required texts. Conceivably the result might be to stimulate a desire to build a personal library and realize the pleasure and solace that good books afford.

As reported last year, a Center for Scientific Aids to Learning, financed by a generous grant from the Carnegie Corporation, was established at the Institute under the general direction of an Advisory Committee of which the Director of Libraries is the Secretary. The exploration of the field has steadily progressed and its limits have been quite well defined in terms of present capabilities and other operations in effect outside the Institute. A temporary laboratory with basic equipment for operations and research in micro-documentation has been installed and a collection of obsolete and current microfilm equipment with particular attention to current European developments has been brought together. An extensive bibliography with documentary and informational files has been assembled

and has been used to answer a large number of inquiries relating to a large variety of subjects. Inquiries ranged from requests for specific details about micro-techniques, equipment, and operations to philosophic discussions on concepts, needed work, and the relationship of scientific aids to learning to many fields. Contributions have been made to programs directed by UNESCO, the Association of Research Libraries, the American Council of Learned Societies, to mention only a few. It has not yet been possible to begin a series of contemplated informational publications. Construction of a Sound Spectrograph, termed the Variscan, and related investigational activities were well advanced at the end of the year. The work of Dr. James W. Perry, Library Fellow, has continued under the auspices of the American Chemical Society. In the coming fiscal year his assignment to the program of the Center is visualized; moreover additional attention to the problems of mechanical selection, tabulation, and the organization of information occupies a position of high priority on the agenda. A series of detailed, investigative, and creative projects in these most promising fields has been planned with the cooperation of the Departments of Physics and Electrical Engineering.

As a small part of the Convocation and Inauguration the library prepared an exhibit of books, pamphlets, photographs, and memorabilia for display in the lobby of Building 10. The detailed and very successful arrangement of the lounge in which the material was displayed was undertaken by the Convocation Committee. An exhibit made available by the French Consulate of scientific books published in France since the war was arranged on the second floor balcony of Building 7 and despite the unfavorable location was well attended. The regular small exhibits, principally within the branch libraries, were continued and slightly expanded. The library exhibit program is intended primarily for the benefit of staff and students, but considerable favorable comment has been received from visitors who happened to see one or more examples. M. I. T. is a great attraction to visitors from all parts of the country and the world; the library has entertained its full quota.

The staff in this critical year although fully occupied at home has none the less found time to participate in outside

professional and scholarly activities. Meetings of such professional societies as the American Library Association, American Society for Engineering Education, Special Libraries Association and others have been well attended. In some cases papers have been read, and an appreciable quota of committee assignments and chairmanships has been allocated to library staff members.

Insofar as the publication program is concerned the year has been unusually productive. M. I. T. doctoral dissertations were listed for inclusion in the annual publication of the Association of Research Libraries. The *Brief Guide to Institute Libraries* and the *Handbook for New Students*, revised and brought up to date, were printed and issued as usual; both must be completely rewritten next year. The list of periodical publications by members of the staff and *The Technology Bookshelf* were completed on schedule, and an entirely new publication, the first *M. I. T. Library Annual, 1948* was issued. The *Library Annual* was designed to present not so much a library report but a more generous coverage of activities and projects going forward in the Institute Library. With articles by President Killian, the Dean of Humanities and others, the Annual assumed the form of an 84-page monograph which was distributed to Institute personnel, the Corporation, Friends of the M. I. T. Library, other libraries, and individuals in this country and abroad. The favorable reception accorded the publication in reviews and by correspondents has encouraged the library to consider publication of a second Annual to detail aspects of planning, constructing, and occupying the new Charles Hayden Memorial Library. The Friends of the Library have offered to sponsor a competition among the students to select typography and cover design for the next Annual and to award a suitable prize to the successful contestant.

Throughout the year the prospect of occupying the magnificent new Charles Hayden Memorial Library has overshadowed every operation and influenced every decision. The building is nearing completion; occupancy in the fall of 1949 will add another powerful unit to the imposing array of technical and educational facilities at the Institute.

VERNON D. TATE

DIVISION OF INDUSTRIAL COOPERATION

The operations of the Division and the character of the research performed show little change from the previous year.

While there was a decrease in the number of projects for both Government and Industry, due largely to their having reached a logical conclusion, there was a dollar increase on some of the larger programs which, with an increase of \$900,000 for new construction, accounts for the \$2,172,000 total increase in dollar volume.

The value of sponsored research as a training ground for graduate students and full-time D. I. C. employees has never been doubted by the Institute. Last year was the first year that this program began to bear fruit. This year, in the face of a somewhat discouraging market, there was great demand for people with this type of experience, and individuals who had demonstrated their ability to take responsible charge of groups were offered outstanding opportunities.

Fiscal Report for the Year Ending June 30, 1949

<i>Dollar Volume</i>	<i>Fiscal Years</i>	
	<i>1948-1949</i>	<i>1947-1948</i>
General Government.....	\$14,566,000*	\$12,387,000†
Industrial.....	907,000	914,000
<i>Total</i>	\$15,473,000	\$13,301,000

*Includes \$1,746,000 for new construction.

†Includes 845,000 for new construction.

<i>Active Projects</i>	<i>Number on July 1, 1948</i>	<i>Additions</i>	<i>Expirations</i>	<i>Number on June 30, 1949</i>
General Government	154	42	51	145
Industrial.....	77	24	31	70
<i>Total</i>	231	66	82	215

<i>Personnel</i>	<i>As of June 30, 1949</i>	<i>As of June 30, 1948</i>
D. I. C. Staff.....	535	526
D. I. C. Non-staff.....	879	858
M. I. T. Staff.....	469	433
	1,883	1,817

NATHANIEL McL. SAGE

ADVISER TO FOREIGN STUDENTS

Last year the Institute enrolled 382 students from 60 different foreign countries. They comprised 7.1 per cent of the total student body, the highest percentage of foreign students of any college in the country. Harvard University was second highest in percentage of foreign students to total enrollment with 5.3 per cent, and Columbia University third with 4.9 per cent. The Institute's foreign students were highly selected, and were a superior group academically and personally. They have contributed a great deal to the Institute's life and are helping to make it a truly international institution.

At the Institute, the Adviser to Foreign Students is a member of the Admissions Office. One of the reasons for this is that much of the "special handling" that a foreign student requires takes place before his actual registration for classes. The prestige of M. I. T. abroad is very high, and the Institute is the goal of many prospective engineers and scientists in countries all over the world. During the last year 1,981 foreign students wrote us making informal application for admission in September, 1949. Information and application materials were sent to these, and of them 681 made formal application, complete with academic records and recommendations. Of these 163 were granted admission to the Institute and 120 were actually registered, the others having cancelled for a variety of reasons, the most common of which was lack of United States dollars. The Adviser to Foreign Students is responsible for most of the correspondence with inquirers from abroad, passes on the admission of all foreign undergraduate students, and helps evaluate the credentials of foreign applicants to the Graduate School.

The remaining functions of the Adviser to Foreign Students have no particular connection with the Admissions Office, but are in the realm of counseling. It is, however, some advantage to know about a student and his scholastic and family background before his arrival in Cambridge. The Adviser's job is intended to supplement and not to replace the normal counseling officers of the Institute, such as deans, medical staff, and registration officers. Some problems are peculiar to foreign students, such as the necessity to maintain a certain legal status as defined by the kind of visa a United States consul abroad

has stamped on the student's passport. Much of the Adviser's time is spent in issuing the proper certificates to the Immigration and Naturalization Service, and in counseling the foreign student about how to get a "part-time" job and still be a "full-time" student. Many problems, such as housing and money and academic difficulties, are known to all students, but they are likely to be particularly acute with the student who comes from far away and has difficulty with the English language.

Since the end of World War II there has been a great increase all over the world of interest in American education. Last year over 27,000 foreign students were enrolled in institutions of higher learning in this country. Many colleges in recent years have recognized that these students, although a decided minority on their campuses, were a rather special and important minority. They have problems peculiar to themselves, and many problems common to all students are for them especially acute. They can make special contributions to the cultural and intellectual life of their college communities. Many of them will be influential leaders of their own countries in future years, and it is essential that they understand us as well as possible, and that they return home sympathetic to our standards and ideals.

A number of colleges have recognized the importance of this group of foreign students and their peculiar problems by appointing a member of the staff, or in some case a committee, to deal with them in a counseling capacity. This staff member may or may not have the title of Foreign Student Adviser, or something similar. This group of college administrators and teachers, after meeting for a number of years on an informal basis, formed themselves into the National Association of Foreign Student Advisers. N.A.F.S.A. was founded in April, 1948, and held its first annual meeting in Cleveland in March, 1949. The Institute's Adviser to Foreign Students has been on its Board of Directors since its inception, and for the current year is its Second Vice-President.

The present membership of N.A.F.S.A. comprises over 100 college members, including the leading institutions of higher learning in the United States, together with representatives of many government and philanthropic and industrial agencies concerned with foreign students. The organization

has already proved itself useful in helping to define problems and set up standard practices in dealing with foreign students. It has been able to deal with problems on a national scale as individuals could not have done.

PAUL M. CHALMERS

PLACEMENT OFFICER

Reports on alumni placement, which is under the direction of Mrs. James A. Yates, and student placement, which is under Professor Carlton E. Tucker, follow.

Student Placement. There were 248 interviews by company representatives for the classes of September, 1948, February, 1949, and June, 1949. There were not 248 different companies represented, because some companies interviewed more than one graduating class. Five hundred and twenty-seven companies who did not send interviewers asked to have interested and qualified students mail them resumés of their experience.

The demand for September and February graduates was excellent. There was a marked decline in offers to the class graduating in June. Of the June Bachelor's degree candidates, 57 per cent were employed as of graduation, which exactly equals the placement record in 1939. The demand for advanced degree candidates has not yet followed the trend shown by the Bachelor's degree candidates.

It is apparent that employment will be much more selective, and that graduating classes in the near future will have to meet a buyer's market.

Thanks to the completion of the Hayden Memorial Library, the Institute has been able to increase materially the space and adequacy of interview facilities, which for the past four years have been severely taxed.

Classes Graduating During 1948 - 1949

	<i>Individuals</i>	<i>Reported Placed</i>	<i>Per Cent</i>
Bachelors	1,077	717	67
Masters	451	368	82
Engineering Degree (Two-Year Graduate)	38	38	100
Doctors	159	128	80
Total	1,725	1,251	73

Alumni Placement. The relation between number of jobs, available men, and placements is shown in the following table:

	July, 1948-June, 1949	July, 1947-June, 1948
<i>Number of Jobs</i>	2,392	3,743
<i>Men Who Went on Available List</i> ...	1,059	1,080
<i>Men Who Came Off Available List</i> ...	609	935
<i>Placements</i>	184	187

During this past fiscal year, we heard of 2,392 openings, which is 1,351 fewer than were listed with us last year. As I pointed out in that report, however, last year's openings were so often requests for the impossible, or shopping expeditions on the part of employers, that I do not feel that the number of actual positions fell off by more than 500 during the entire year. It was April before we noticed any drop at all in the number of requests we were receiving. April, May, and June have been comparatively quiet, and I do not anticipate any increase in demand in the near future.

As you will notice, almost exactly the same number of men went on our available list this year as last year, but the circumstances were different. For the first time in five years (except for that period when thousands of men were being released from the Army and Navy), a large number of the men who got in touch with us were actually unemployed. We still received a great many letters or calls from men who wanted to improve their positions by making a change, but, on the whole, the tightening up of business has made men feel less free to go shopping for new openings.

Last year, 935 men went off our available list during the year because their desires had been satisfied by their employer or they had succeeded in obtaining new positions. This year, only 609 went off the list, which indicates that it is taking men much longer to relocate than was the case a year ago.

On the whole, the positions which were listed with this office during the year were very satisfactory. Not only did the openings that we heard about really exist but they were substantial positions that paid well. We had more opportunities to place men in executive positions within companies than we

usually do because the overage executives in many companies are retiring and making way for younger men as business operation becomes increasingly difficult. I see no reason why this condition should not continue to exist during the next two or three years.

A man over 40, who has average ability or average experience, is having, and will continue to have, considerable difficulty in relocating. The men of unusual ability or unusual experience between the ages of 35 and 50 have, at the present time, more excellent opportunities open to them than has been true in the past. This year we have placed as many men who graduated prior to 1942 as we have men who graduated after 1942. That is not usually the case.

The demand for junior electronics engineers has fallen off. However, there is still and for some time will continue to be some shortage of executive engineers or research engineers with good experience in the field of electronics. In all other categories of engineering, the demand has very definitely decreased.

Although business has leveled off, and I do not anticipate any enormous demand for manpower in the near future, the situation as a whole looks very healthy so far as M. I. T. graduates are concerned. Except where companies have liquidated or large government contracts have been canceled, there have been no general layoffs, and companies seem to have been most selective in choosing the men to be released. Most companies are also making definite efforts to help the young men that they do have to release. They are giving the men plenty of notice, being most cooperative about letting them have time off to go job hunting, and writing letters of recommendation and letters of introduction to help them in their efforts to find other positions. I have also noticed that companies have made every effort to call men back to work after releasing them, whenever an upturn in their business justified it.

NATHANIEL MCL. SAGE

PERSONNEL OFFICER

The summer of 1948 showed a substantial climb in the cost of living over the previous year. A comparative study of wages

and salaries at M. I. T. and a group of other organizations in the Boston area indicated that Technology's rate structure had fallen somewhat behind the others. Most of these had granted a "Third Round" increase. After careful consideration of these factors, and after a series of discussions with the three unions representing the employees, the Administration decided to grant an eight per cent increase to the dining service, laboratory, and maintenance employees, to be effective October 1. At the same time, a second review of office salaries was authorized, with the result that the majority of this group also received an increase.

During the 1948 negotiations, there was frank discussion between the representatives of the Institute and each of the negotiating committees of the three unions. The union leaders stated clearly the need of the employees for higher wages but they also studied with care the problems of the Institute. For example, both the Building Service Employees' Union, A. F. of L., representing the maintenance employees, and the M. I. T. Employees' Union, representing the laboratory employees, were willing to stiffen the sick leave policy to eliminate abuse.

From December on, several projects began to reduce the number of their laboratory personnel. The Radar School closed completely and some other small projects laid off all their employees. However, most of those laid off were offered jobs in other departments or projects. This was possible primarily because the project supervisors planned the layoffs well in advance, thus giving the Personnel Office several months to find vacancies. The M. I. T. Employees' Union also has been cooperative in the development of a sound seniority policy. At the Institute's request in the middle of the contract year, the Union amended the seniority clause to apply only to employees in the individual departments for the first two years of employment and thereafter on an Institute-wide basis; previously seniority has been Institute-wide after six months.

A handbook on policies and procedures was published for each of the three largest groups of employees: laboratory, maintenance, and office. The purpose of the booklets was to acquaint new employees with our practices. In addition, it has been helpful to many of the old employees and supervisors as indicated by a reduction in the number of questions on policy

submitted to the Personnel Office. Mr. Henry B. Kane's illustrations and his assistance with the format made the booklet very attractive.

The following statistics show the number of employees as of June 30, 1949, and the annual turnover rates:

	<i>Office</i>	<i>Laboratory</i>	<i>Building and Power</i>	<i>Dining Service</i>	<i>Dormitory Operations</i>	<i>Totals</i>
Number of Employees	658	804	264	78	85	1,889
Annual Turnover	41%	23%	8%	23%	8%	26%

The fiscal year started with 1,876 employees; the number rose to a peak of 1,933 in March 1949. The high turnover rate for office employees was largely due to the marriage of current employees and the hiring of student wives. Although the employment period of students' wives is short, many department heads state that their performance has in general been excellent.

There is still a shortage of well-trained secretaries and other office employees in the Boston area. Miss I. L. Tapley has filled most vacancies with competent girls within a reasonable length of time, however. With our present facilities, Miss Tapley has had to do practically all the interviewing. There were approximately four thousand applicants for jobs last year, and because on many days they came in large numbers, there was not sufficient time for satisfactory interviews. In the near future, another room will be added to the Personnel Office. This will make it possible to divide the interviewing between two or more members of the Personnel Office. Thus we shall be able to spend considerably more time with each applicant.

There has been a gradual tendency during the past few years to spread the base from which personnel policies are developed and put into effect. First the Personnel Board was established with members representing different Administrative Offices, next came the Classification Committee with representatives from different academic departments and research projects, and finally there has been an effort to contact all department heads and project supervisors on specific subjects such as the normal work schedule. In the future, we hope this participation by all departments and projects will continue to grow. It is important to effective employee relations where

high morale can be damaged by lack of uniformity in the application of some policies and where Institute commitments cross departmental lines.

R. COLIN MACLAURIN

MEDICAL DIRECTOR

Furnishing adequate medical care to the general population is one of the most pressing problems faced by the people of the United States. On the one hand are those who believe that compulsory insurance is the only workable plan; on the other hand are those who believe that the answer lies in experimenting with various plans especially adapted to local conditions in each case, and that from these various plans experience and information will be gained which can be applied generally. This department is an example of group medical care, supported financially from several different sources. These sources include direct charges to patients, to Blue Cross and Blue Shield, to the Veterans Administration, and to the insuring agency covering the Student Health Insurance plan. By far the greater portion of the cost, however, is borne by the Institute from general funds. The Medical Department is acutely concerned with the problem of how to furnish adequate and prompt treatment for illness and injury with a high degree of privacy and at a cost that is not prohibitive.

Because the department has grown rather rapidly since the war years, the main effort this year has been spent in completing the organization of the various services. As now organized there are eleven clinical services, besides the Infirmary, each with its own chief. These services are: Internal Medicine, Surgery, Psychiatry, Neurology, Occupational Medicine, Radiology, Clinical Pathology, Dental Service, Dermatology, Otolaryngology, and Ophthalmology. Of course, there is considerable overlapping of functions, but this is probably desirable in that it facilitates prompt consultation and treatment.

Although the Institute furnishes many basic services to the students free of charge, there still remains the possibility of serious illness or injuries that may be quite expensive. In order to protect the student of moderate means, an insurance plan was adopted as described in last year's report. The response

from the student body was most encouraging, in that 2,550 out of 5,433 students took the insurance the first semester of last year while 2,297 out of 5,034 took it for the second semester. The premium remains at eight dollars a semester for the coming year.

Because the staff members believe that health is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity, a large proportion of the department's efforts are preventive in nature.

The Occupational Medicine Service has grown more rapidly than any other part of the department, and now comprises a staff of nine persons, of whom four are full-time. Dr. Harriet L. Hardy has joined the Medical Department with the assignment of supervising the work of this service. Dr. Hardy has had invaluable experience, both in industrial medicine and in educational institutions, that has fitted her for this position. She has been physician to Radcliffe College, physician to the Massachusetts Division of Occupational Hygiene of Labor and Industry, and has spent one year at the University of California project of the Atomic Energy Commission at Los Alamos, New Mexico. In addition to her medical duties she has been appointed Advisor to women students.

Dr. Robert S. Grier was given a leave of absence to join the medical staff of the Los Alamos, New Mexico, project in February, 1949. His duties have been taken over by Dr. Albert O. Seeler.

The work of the Occupational Medicine Service is divided roughly into service and teaching activities with investigation as a visualized interest when possible.

Service includes use of chemical, physical, and engineering skills to make certain that the working environment is free of toxic levels of energies or materials known to produce biological damage. Rapid introduction of new materials of unknown toxic effects in research laboratories will be a large responsibility of the Occupational Medicine Service.

Miss Janet Walkley and Mr. Frederick J. Viles, Jr. contribute the chemical and engineering techniques. These include air sampling for materials such as carbon tetrachloride and mercury; analytic study of biological material for high levels of toxic material such as benzol. This work will greatly

expand in 1949–1950 as these workers give us more time and as Institute officials know more of the available services.

Medical checkups of all individuals employed in potentially harmful work, the time and character of such being divided by degree of hazard, or of those accidentally overexposed, are the province of the physicians in the Occupational Medicine Service. The magnitude of this work may be realized from consideration of the figure of 1,600 as a conservative estimate of the present number of D. I. C. employees. It is of course also planned to offer regular hazard protection to Institute students and staff. Interpretation of biological data collected for medical control and design of routine preventive medical measures are also service activities. At present Dr. Albert O. Seeler gives about one day a week in clinical study of workers exposed to certain toxic materials which are unusually hard to control. Dr. Ivan D. Frantz, Jr. handles clinical problems arising from exposure to ionizing radiation. Routine blood counts must still be done, and they are as yet the best available tool for early detection of the effect of ionizing radiation. Until a better sign of tissue damage is evolved, these counts must be interpreted patiently by clinicians. Mr. Samuel Levin, a trained full-time health physicist, provides, with two assistants and an electronics repair man, professional supervision of the physical monitoring at the Institute. In general, Institute levels are well below accepted tolerance figures, but occasional high energies are generated by the particle accelerating machines. The problem of accurate measurement of a neutron dose delivered to the body has not been finally resolved.

Additions in radiation protection at the Massachusetts Institute of Technology during 1948–1949 include:

1. A waste disposal system by which all radioactive solid and liquid wastes are routinely monitored and collected by Health Physics personnel;
2. Decontamination kits that contain the necessary chemicals and equipment to decontaminate a person's hands of radioactive material;
3. The use of finger ring film badges to measure radiation doses on the hands and fingers;
4. Finger ridge tests in which a wax impression of one's

finger tips gives additional information as to the finger radiation dose;

5. The periodic calibration of all survey instruments and pocket chambers issued by the Health Physics Department.

The teaching activities will begin gradually in the academic year 1949-1950 after careful study of the appropriate timing for introduction of the material of occupational toxicology and hygiene, and consultation with the faculty members concerned. The material to be presented will be developed by trial in the next few years. It will include basic data of clinical toxicology, chemical methods of detection of hazardous working conditions, pertinent means of engineering control, and knowledge of safety facts such as flash points of various materials.

Along with many other departments, the Medical Department has been active in the promotion of an increased interest in safety measures throughout the Institute. The Safety Council is closely allied to the department and makes particularly frequent use of the Occupational Medicine Service. In order to implement the Safety Council, a Safety Committee has been set up, consisting of 30 members with the Medical Director as chairman. Of this number some are representative of specific geographical areas of the Institute while the remainder represent the Institute at large. Both employees and staff are represented on the Committee in about equal proportions. It meets at monthly intervals throughout the year and discusses specific conditions that may be hazardous. In addition, lectures and demonstrations of safety matters are scheduled for these meetings. Through this committee any person employed at the Institute can get a hearing concerning any working condition or hazard that may come to his attention. If a particular hazard reported to a member of the Safety Committee can be corrected by that member, that is done. If not, the matter is reported to the Safety Engineer, who in turn makes use of whatever facility is appropriate. Through this organization it is hoped that fire and accident hazards can be minimized and some injuries prevented.

The visits to the general medical and surgical clinics were approximately the same in number as last year, but most of the special services were used much more extensively. This

was particularly true of the Otolaryngology, Dermatology, and Psychiatry services. Of the total visits, 30 per cent were made by employees and staff members and 70 per cent by students.

The Radiology service took a total of 9,684 X-rays, of which 7,305 were routine X-rays of the chest.

The Clinical Pathology service performed a total of 10,645 laboratory procedures, most of them being blood counts, blood sedimentation rates, and urinalyses. Persons working in potentially hazardous situations had 711 complete blood counts as a part of the Occupational Medicine program of supervision. Special laboratory procedures of a rather high degree of complexity amounted to 381 in number.

The number of visits to the different services follows:

Medicine.....	10,844
Surgery.....	10,978
Psychiatry and Neurology.....	1,853
Otolaryngology.....	770
Ophthalmology.....	1,116
Dermatology.....	955
Dental Service.....	4,055
Emergency Clinic.....	2,504
Physical Examination.....	3,582
Radiology (X-rays).....	9,684
Total.....	46,341

The Infirmary had fewer patient-days this year; there were 3,406 compared to 3,792 last year. The percentage of occupancy by employees and staff members, however, increased from 35 per cent last year to 40 per cent this year. There were four deaths among staff members and employees; none among the students. Only ten cases of contagious disease were diagnosed, six of them being chicken-pox, two German measles, one measles, and one mumps. Respiratory infections were very few in number and mild as well.

Several minor improvements have been effected in the Infirmary, and its equipment has been increased by the addition of a new operating room table and a phonograph and records for the use of the patients. A new rubber tile floor has greatly increased both the attractiveness of the Infirmary and its comfort for the nursing staff.

The demands on the Psychiatry Service have materially increased, not because of increased incidence of emotional

disorders, but due to an increased awareness on the part of the Institute personnel that such a service is available, together with the development of more confidence in the privacy and effectiveness of treatment. In order to step up the over-all efficiency of this service, Dr. Herbert I. Harris, formerly Chief Neuropsychiatrist for the New England Area of the Veterans Administration, has been appointed as a full-time psychiatrist to the department. His wide training and experience in private practice, Naval psychiatry, teaching, and administration will be a tremendous asset to the Institute. He is particularly interested in the relationship between education and psychiatry and plans to carry on research in this field in conjunction with his clinical work.

Much of whatever success the Medical Department has had in carrying out its program is due to the continued cooperation of the Faculty, student body, and employees. Constructive criticism has been and will remain the best means of improving the standard of medical care in the Institute.

DANA L. FARNSWORTH, M.D.

EXECUTIVE VICE PRESIDENT OF THE ALUMNI ASSOCIATION

As stated in its Constitution, the "object" of this Association is "to further the well-being of the Institute by fostering the interest of the Alumni in the Institute and in each other." Besides the regular meetings of the Alumni Council, the Mid-winter Meeting of the Association in February, and the customary Alumni Day ceremonies in June, the chief activities of 1948-1949 were:

1. In January, *The Technology Review* celebrated its fiftieth anniversary; and in May, in an issue which carried more editorial matter and advertising than the *Review* of a few years ago was accustomed to carry in a whole volume, the magazine dealt in appropriate fashion with the Convocation and Inauguration as triumphs unique in Institute annals. This May issue was sent to the *Review's* regular monthly list of 12,111 and also to 29,757 other Alumni and special friends of M. I. T.

2. Steps were initiated to prepare a synopsis of useful information pertaining to the planning and operation of five-year Class Reunions. This helpful document, which will embody the constructive suggestions of many Alumni expe-

rienced in the management of such affairs, will become available in draft form early in 1949-1950.

3. A total of 29 members of the Institute's Faculty and Administration, and officers of the Alumni Association, attended 77 meetings of 51 different M. I. T. Clubs, over 80 per cent of those active in North America. This accomplishment is especially worthy when one considers that most of these staff members faced extraordinary demands upon their time because of participation in the preparations for the Convocation and Inauguration. It should be further noted that the activities of the Institute's Committee on Financing Development, through meetings held for "screening" and other purposes throughout the country, contributed inestimable values in improving and strengthening the relations between the Institute and its Alumni.

4. During its Ninth Year (April 1, 1948 - March 31, 1949), 9,963 contributors gave \$152,502 to the Alumni Fund; and in that period other gifts to the Institute by or on behalf of Alumni totaled \$430,516. Thus the Alumni Fund Board was enabled to allocate, from its accumulated monies of this and past years, a grant of \$250,000 toward the construction of the Charles Hayden Memorial Library.

5. During 1948-1949, the Association suffered two grievous losses through the passing of Professors C. Frank Allen, '72, and Charles E. Locke, '96. Professor Allen was the last surviving member of the band of 23 graduates who met on the evening of March 17, 1875, in the Rogers Building on Boylston Street and organized the Alumni Association; and Professor Locke served for over 18 years as Secretary of the Association. Donald P. Severance, '38, was elected Secretary to succeed Professor Locke; and also Treasurer to succeed Ralph T. Jope, '28, who resigned in October to accept a full-time post as Assistant Executive Director of the Institute's Committee on Financing Development. Fortunately, however, Mr. Jope's new assignment was entered into with a proviso which permitted him to continue for the time being as Business Manager of the Review with particular emphasis upon its advertising.

H. E. LOBDELL

SCHOOL OF ENGINEERING

AERONAUTICAL ENGINEERING

The space available to the Department has been fully adequate since completion of the Naval Supersonic Laboratory. A portion of Building 23 has been released to the Civil Engineering Department and room 33-310 assigned to the Aeronautical Engineering Library. This room, which doubles the library space available, will be used primarily for bookstacks and filing cabinets. The accumulation of aeronautical publications is accelerating. There are already 15 filing cabinets of government reports with 1,250 more reports received this year, as well as 100 new books. Congestion in the existing sound-proofed room has been relieved and conditions for study much improved.

Pressure for admission to the Graduate School was not as great as in the immediate past, but the quota of 70 was filled without lowering admission standards. During the year, 11 graduate students were working for Doctor of Science degrees in this Department. In addition, there were six Doctor's degree candidates in Instrumentation not registered in any Department whose programs were supervised by this Department.

The Navy sent 17 student-officers, eight for aeronautical power plants and nine for fire control. The Air Force sent four student-officers for special work in airplane dynamics and fire control.

Twenty-nine Master of Science degrees were awarded in June, 1949, including eight for the Honors Course with the Bachelor of Science degree awarded simultaneously.

Last year's report mentioned the demand by prospective employers for our graduate students with advanced training in supersonic aerodynamics, dynamics of structures, automatic controls, jet propulsion, or other new and special topics. This was obviously a reflection of the heavy current development program of high-speed airplanes and guided missiles. While a graduate student who specialized in one such aspect of his professional field might be entirely acceptable to his first employer, narrow specialization is felt to be unsound. Outside of a research laboratory, a specialist is poorly equipped for pro-

motion to broader responsibilities involving engineering judgment.

Modern aircraft design is a synthesis from the current state of the art. A designer selects from the research work of specialists in all fields. In the future, the aeronautical engineer must, either by advanced academic training or by fortunate experience, raise himself to a higher level of professional competence than the prewar graduate and without loss of necessary breadth.

At the same time that the aeronautical industry has been pressing for men with advanced training, this industry has been going through a drastic slump in the production of aircraft and profits. Employment managers have been correspondingly harder to satisfy.

This year, visiting representatives of major firms and of government agencies exhibited considerable competition for the 29 students receiving Master's degrees. All who wanted jobs were promptly placed. For the 40 students receiving Bachelor's degrees, only 27 were promptly placed. The remaining 13 were hired but not at locations of their first choice.

Curriculum. The Department took three separate steps to adjust its curriculum to changing industrial conditions:

First, by authority of the Corporation it now offers a two-year graduate program for the degree of Aeronautical Engineer, designed to carry the student to a higher level of general professional competence in his field. The program is about one-half prescribed, to insure adequate breadth of knowledge of modern aerodynamics, structures, propulsion and controls. The balance of the program may be devoted by the student to his special area of interest, or to design.

Second, juniors of outstanding aptitude were invited as in the past to elect a special "Honors Course" with a fifth year of graduate study. Eight or ten juniors from a class of 50 are usually selected.

Third, sophomores were invited to spend six months in the engineering departments of several cooperating firms before their senior year. This period of employment on subprofessional work in industry is intended to supply a background of reality for professional studies of the senior year, and to afford an opportunity for the undergraduate and his potential employer to know each other well.

Students following this Cooperative Course make up for the time away from M. I. T. by going to summer school. The first group of cooperative students was selected this year; 19 out of a sophomore class of 50. They will be in step with their classmates as seniors in September 1950.

A meeting of the Visiting Committee in the spring term was devoted to an examination of the Department's program, first with reference to staff and facilities available and, second, with reference to the curriculum and the requirements of industry both for scientists (specialists) and for more broadly trained engineers.

Several new graduate subjects of instruction were offered for the first time this year. These include a comprehensive design course by Professors Otto C. Koppen and Rene H. Miller; a special treatment of aircraft power plants, with emphasis on problems due to installation in aircraft, by Professor Edward S. Taylor; a course on kinetics of gases and another on guided missiles by Professor H. Guyford Stever; and one on vector kinetics and gyroscopic instrument theory by Professor William R. Weems.

The undergraduate curriculum has not been altered in form but, as is frequently the case, content and emphasis have been changed to reflect new research results and industrial developments. For example, Professor Taylor's senior subject in aircraft power plants will now include the fundamental principles of both reciprocating engines and gas turbines; Professor Manfred Rauscher, in his introductory aerodynamics course, will revise the content to permit more discussion of sweptback wings.

Until this year, undergraduates in the Department took engineering drawing and the elements of machine design in the Mechanical Engineering Department. This year, Professor Frank K. Bentley took over these subjects. From all indications, this has been of great help in acquainting our students with aeronautical drafting conventions and the detail design of aircraft parts. It is hoped that an increased familiarity with detail design procedures will overcome the somewhat general reluctance of our students to start in the drafting room. Not only is detail design an apprenticeship to general design, but drafting is required by the majority of available junior engineering positions.

During the past year, Mr. Robert C. Lewis, an experienced engineer of the Division of Industrial Cooperation, offered an elective subject dealing with human factors in aircraft design such as oxygen supply, noise and vibration, control response, temperature, illumination, and acceleration. With the higher performance of modern airplanes, not only the comfort of the passengers but their very safety depends on preserving the efficiency of the pilots through attention in design to operating conditions.

Instrumentation. Instrumentation work under the general direction of Professor C. Stark Draper has continued at approximately the level described in the President's Report for 1948. Operations are carried out in two general sections: The Aircraft Instrument Laboratory (unclassified work) located in Building 33, and the Instrumentation Laboratory (classified work) located in the Hood Building.

Professor Walter McKay was in charge of the Aircraft Instrument Laboratory and instruction in instrument subjects. Professor Robert C. Seamans, Jr. has applied his recent research results in his subject on dynamic analysis and automatic control of aircraft. During the year, he presented two papers in that field to the Institute of the Aeronautical Sciences. Professor James E. Forbes of the Vibrations section acquired new equipment which has been incorporated into his laboratory teaching. Professor Dominic Amara took charge of laboratory subjects on fire control for student officers.

The dynamic analysis and control courses have been strengthened through the use of equipment developed here during past years which has now become available for teaching. The number of students enrolled for instrumentation work remained steady at about 85. The Instrumentation Section supervised the Master's thesis work of 27 students from this and other Departments and three Doctors' theses.

Research Associate Yao-Tzu Li continued his work on instrumentation for internal combustion engines. With Professor Draper as co-author he presented a paper on his new engine indicator at the winter meeting of the Institute of the Aeronautical Sciences. Rights to the indicator described in this paper have been assigned to the Research Corporation and the equipment is now being produced commercially. The work

leading to the development of the indicator has been continued into the field of optimizing control for power plants. A paper on such control by Professor C. Stark Draper, Dr. Yao-Tzu Li and Dr. Halcombe J. Laning, Jr. was presented before the American Society of Mechanical Engineers.

Classified research was continued on more precise automatic control of aircraft and ordnance equipment, using gyroscopic and accelerometer units. At present, ten projects are in progress for the Navy and the Air Force. Facilities in Cambridge include two floors in the Hood Building and three floors of the adjacent Whittemore Building. A two-story building available at Fort Heath, Winthrop, includes an air-conditioned laboratory for assembly and test. Completed and occupied during the past year at Bedford Airport are facilities for flight-test work and installation of experimental equipment. The main hangar provides for storage of aircraft and shops, laboratories, and offices. Aircraft based at Bedford for use in current work include one B-25, one B-26 and one B-29.

Professor Draper's direction of the Instrumentation Laboratory is in addition to his teaching and other departmental duties. Personnel assigned part-time to the Laboratory from the Department include Professors Robert C. Seamans, Jr., Yee J. Liu, Robert K. Mueller and Dominic Amara, as well as Messrs. Donald J. Atwood, William D. Green, David G. Hoag, Sidney Lees, Albert Madwed, Joseph E. Picardi, and Robert A. Summers. The Laboratory now has 77 D. I. C. staff members, 160 nonstaff members, and 57 engineers and draftsmen from the firm of Jackson and Moreland working under the supervision of laboratory personnel.

Formal records of the Laboratory's work have appeared in several volumes and reports, circulation of which is restricted to the armed services.

Wright Brothers Wind Tunnel. This facility, with its special staff under the supervision of Professors Shatswell Ober and Joseph Bicknell, was operated on a one-shift basis throughout the year on aerodynamic testing for the industry. Reports of 31 investigations were completed, ten for Grumman Aircraft Engineering Corporation, seven for Glenn L. Martin Company, five for Chance-Vought Aircraft, six for other aircraft firms, and three on nonaircraft tests.

Reduction in the number of new types of airplanes under development in the country caused some slackening in demand, and advantage of any free time was taken for staff research. It is expected that this trend will continue and studies are being made of possible alterations to modernize the tunnel. This tunnel has not been basically changed in equipment or methods for 11 years.

Student Wind Tunnel. The completion of the new Student Wind Tunnel was reported last year. It has proved to be a valuable educational tool. During the first term it was scheduled for intensive use by classes in aerodynamic measurements and during the second term it was used for student thesis investigations. In this way the Flutter Wind Tunnel and the Wright Brothers Wind Tunnel could be kept on their regular work.

Supersonic Laboratory. Ground was broken for this naval facility on June 14, 1947, and on June 9, 1949, the wind tunnel was run at twice the velocity of sound as a test of major equipment. Much of the special instrumentation and auxiliary apparatus remains to be installed and calibrated, but it is gratifying to the Department and to Professor John R. Markham, Professor in Charge, that the design operates as intended and that supersonic flow was demonstrated. The laboratory building was completed and equipped during the year. The tunnel should be ready for research before the end of the calendar year.

The Supersonic Laboratory is manned by four M. I. T. staff members, 36 D. I. C. staff members and 30 nonstaff employees, a total of 70. This personnel is engaged on Project Meteor for the Naval Bureau of Ordnance, which owns the facility and will control its research program.

Structural Dynamics. Modern high-speed airplanes and guided missiles require a new type of strength analysis based on the transient response of elastic structures to the effects of rough air, control forces, and other suddenly applied loads. Fundamental research to develop engineering methods for use of designers was supported by the Navy during the past year and funds available for next year will be greatly increased by the addition of Air Force support. One report was completed and four more are in preparation. Two professional papers and six Masters' theses were based on this work. The projects

were under the supervision of Professor Raymond L. Bisplinghoff, assisted by Messrs. Gabriel Isakson, Arthur L. Lang, Jr. and Dr. Theodore H. Pian of the staff of the Division of Industrial Cooperation.

The D. I. C. research group consists entirely of recent M. I. T. graduates with advanced training in structures and mechanics. It is planned to use this continuing program as an opportunity for experience in an important new field involving the application of electrical transient theory, the method of mode superposition (Rayleigh-Ritz method), minimum complementary energy combined with matrix procedures for the determination of influence coefficients and the use of the Fourier integral (admittance method) for a practical solution of the gust problem.

Structures Laboratory. This laboratory was used for regular instruction and also for several sponsored (unclassified) research projects. Its equipment was considerably augmented incident to the latter.

A comprehensive theoretical and experimental study of the deformation and stresses in complex wing structures with discontinuities was conducted for the Navy. Six Masters' theses resulted from this work. The work was supervised by Professor Bisplinghoff assisted by Mr. Lang of the D. I. C. staff.

A project for the Air Forces, on the effects of aerodynamic heating at high speeds, was handled jointly with the Mechanical Engineering Department. This Department's share of the work was supervised by Professor Joseph S. Newell. Material for the Master's thesis of two students resulted.

Aeroelasticity. The special courses on aeroelastic "flutter" inaugurated last year were elected by substantial numbers of students and will be continued. A new demonstration model wing now permits a showing of various aeroelastic phenomena, such as bending-torsion, aileron reversal and wing divergence. The development of a high sensitivity accelerometer using a tiny vacuum tube has been successfully accomplished. This device will, in the future, replace resistance-wire strain gauges as pick-up elements for experimental work.

Six fundamental (unclassified) research projects in this field were supported by the National Advisory Committee for Aeronautics, the Navy and the Air Force, and it is expected that

this support will continue. The program for the Navy contemplates the preparation of an engineering text in eight volumes entitled "Theoretical and Experimental Methods of Flutter Analysis." Two volumes have been completed.

Besides progress reports on the sponsored research projects, there resulted one professional paper, five Masters' theses (eight men), and one Doctor's thesis. The work of the research group was supervised by Professor Manfred Rauscher, assisted by Professors Rodney H. Smith, Holt Ashley and Robert L. Halfman, and Messrs. Lawrence E. Beckley, Sebron M. Haley, Jr., H. Clay Johnson, Jr., Robert C. Lewis, Martin D. Schwartz, Donald L. Wrisley and Garabed Zartarian of the D. I. C. staff.

Gas Turbine Laboratory. This laboratory is jointly staffed with the Mechanical Engineering Department and its operations will be reported by the latter.

Helicopter Research. The research program of Professor Rene H. Miller, reported last year, has been continued with Carnegie Fund support and with help from the excellent shop facilities of the Aeroelastic Laboratory. A model helicopter has been constructed with which to study blade bending, induced flow and control. It is hoped by free-flight tests to check theoretical control and stability predictions. One Master's thesis was based on this work.

Outside Activity. With the Department's encouragement, members of the staff were active in various capacities with professional societies, government technical committees, and as consultants to industry.

Professors C. Stark Draper, John R. Markham, Hsue S. Tsien and H. Guyford Stever served the Scientific Advisory Board of the Air Force, and Professor Markham served on the Board of Visitors of the Air Forces Institute of Technology. Professors Shatswell Ober and William R. Weems served the Research and Development Board of the National Military Establishment. Professors Edward S. Taylor, John R. Markham, Walter H. Gale, Rene H. Miller, Raymond L. Bisplinghoff, and Robert C. Seamans, Jr. served on technical subcommittees to plan research programs for the National Advisory Committee for Aeronautics. Professor Gale served on the Advisory Council of the Bureau of Aeronautics of the Navy. Mr. Lawrence E. Beckley of the D. I. C. staff, a reserv-

ist, was excused to serve a period of active duty in the Bureau of Aeronautics of the Navy. Professor Rene H. Miller presented a paper before the London meeting of the International Congress for Applied Mechanics. Professor Frank K. Bentley served on the Airport Fire Protection Committee of the National Fire Protection Association.

In recognition of services during the war, Professors C. Stark Draper and Jerome C. Hunsaker were awarded the Medal for Merit, and Professor H. Guyford Stever the Certificate of Merit. Professor Otto C. Koppen was elected Chairman of the Boston Section of the Institute of the Aeronautical Sciences, and Professor Yee J. Liu Chairman of the Boston Section of the Chinese Institute of Engineers. Professor Edward S. Taylor was elected a Fellow of the American Academy of Arts and Sciences. Professor Holt Ashley, as a reserve officer, lectured to Air Force units at Hanscome Air Force Base, Bedford. Professor Walter H. Gale was appointed Director of the Summer Session in addition to his departmental duties. Professor Joseph S. Newell served on the Column Research Council of the Engineering Foundation and on the Committee on Design of the American Society of Civil Engineers. He also was Secretary of the Faculty during the year.

JEROME C. HUNSAKER

BUILDING ENGINEERING AND CONSTRUCTION

The registration in the course has continued at a high level during the year, but added staff personnel has relieved the staff teaching loads to a considerable extent. Additional commitments occasioned by research activities, however, have tended to keep staff research loads at an abnormal level.

Plastics. The long-range program of research into the fundamental mechanical properties of plastics materials has continued into the fourth year of the five-year program originally set up under the sponsorship of the Plastics Materials Manufacturers Association. This work has continued under the direction of Professor Albert G. H. Dietz with the assistance of Mr. Walter J. Gailus, Research Associate, and Mr. Steven Yurenka and Mr. Earl E. Patterson, Research Assistants.

Principal emphasis has been upon the study of the system

of plastics based upon polymethyl methacrylate. A comprehensive series of tests of some thirteen different varieties of materials over a very wide range of rates of load and strain in tension, compression, bending, and torsion at temperatures ranging from room temperatures to elevated temperatures has been carried forward. This has been tied in with continuing work on the determination of molecular weights of the materials tested. In addition to the work on methyl methacrylate, a series has been started to determine the effect of orientation of molecules upon the basic mechanical properties of polystyrene. Currently under consideration is a program of research into the properties of thermosetting materials. The exact nature of this program is being studied at the present time.

Adhesives. A program of research into the behavior of adhesives under influences favoring deterioration has been continued under contract through the Division of Industrial Cooperation, with the Army Ordnance Department. This work has been continued under the direction of Professor Albert G. H. Dietz, and with the assistance of Mr. George M. Kavanagh, D. I. C. Staff Member, and Mr. Philip J. Closmann, Research Assistant in the Department.

A nondestructive ultrasonic method for measuring changes in mechanical properties of the adhesives as they deteriorate has been developed and shows considerable promise. Such a method, if successful, will very markedly simplify the problem of determining rates of deterioration and the relative importance of various deteriorating influences. With the growing use of engineering applications for adhesives, this problem assumes considerable importance.

Solar Heating. The program of research into the solar heating of housing has continued under the over-all direction of Professor Hoyt C. Hottel of the Department of Chemical Engineering, Professor Lawrence B. Anderson of the Department of Architecture, and Professor Albert G. H. Dietz of the Department of Building Engineering and Construction. During the past year a small solar laboratory was remodeled into a small house which was occupied by the family of a student in this department during the past winter. No conclusions respecting the performance of the house can be drawn upon the basis of a single heating season. However, the installation

operated according to expectation, and a great deal of information was collected which should be of material benefit in the design of such installations. The active work on the project has been carried on by Mr. Edmund L. Czapek, Research Associate in the Department of Architecture.

Masonry Materials. The research work in masonry materials has been under the direction of Professor James A. Murray with the assistance of Mr. Herman C. Fischer, Research Associate, and Mr. Donald W. Sabeau, Jr., Research Assistant. The projects have all been continued under the sponsorship of the National Lime Association.

The study of the effect of calcination upon the properties of quicklime has been continued. A small rotary kiln controlled for temperature, retention time and atmosphere has continued in use and the first series of burns of pure calcite have been completed. The surface area of the calcined material (by nitrogen adsorption), the porosity of the particles and the rate of reaction have been studied. This work has disclosed characteristics which will have important effects upon kiln operation.

The differential thermal analyzer was completed during the year and a considerable number of runs have been made which are pointing out some interesting characteristics in various raw limestones and their resulting commercial hydrates, and which have aided in a more reliable knowledge of the rates of carbonation of calcium and magnesium limes.

The flow characteristics of suspensions, which are related to the "workability" of cementitious mortars, have been studied initially and work during the year has consisted mainly of collation of existing data and the assembly of equipment.

Sheet Metal. The research on the properties of sheet metal shapes has been continued under a grant from Revere Copper and Brass, Inc. and was under the direction of Professor Walter C. Voss. Mr. Albert J. O'Neill, Research Associate in the Department, and Professor Irving H. Cowdrey of the Mechanical Engineering Department have carried on all of the tests. The work has been broadened to include aluminum, Monel and stainless steel to determine the effects of varying physical characteristics of these metals on the fundamental theory of irregular shapes acting as columns. This work has substan-

tiated the initial theory previously developed with the assistance of Professor Eric Reissner of the Department of Mathematics.

Staff Activities. Two texts, *Materials of Construction—Wood, Plastics and Fabrics* and *Engineering Laminates* have been published by Professor Albert G. H. Dietz. Other members of the staff of the Department and the Institute are making excellent progress in the remaining books of the Construction Series.

As a result of the research work conducted by Professor Howard R. Staley and Mr. Sidney H. Greenfeld, a paper on "The Surface Area of Quicklimes" has been published in Industrial Engineering Chemistry. Professor Albert G. H. Dietz presented papers before the Woodworking Division of the American Society of Mechanical Engineers and at the annual meeting of the Forest Products Research Society.

Staff members have continued their professional society activities on many committees. Professor Albert G. H. Dietz has continued his work with the American Society for Testing Materials as Chairman of Committee C-19 (Structural Sandwich Construction), as a member of the Administrative Committee on Papers and Publications and Committees D-7 (Wood), D-14 (Adhesives) and D-20 (Plastics). He has been appointed Chairman of the Plastics Education Committee of the Society of the Plastics Industry. His activities on the Subcommittee on Timber Structures of the Committee on Structures of the American Society of Civil Engineers have continued during the year.

Professor Howard R. Staley has continued his work with Committee C-7 (Lime) and C-15 (Masonry Units) of the American Society for Testing Materials and as a member of the New England Council. Professor James A. Murray is Chairman of the Subcommittee on Research of Committee C-7 (Lime) of the American Society for Testing Materials. Professor Walter C. Voss is Chairman of Committee C-7 (Lime), Chairman of Subcommittee on Admixtures of Committee C-12 (Masonry Mortars), member of Committee E-6 (Building Constructions), and Chairman of the Administrative Committee on Research; these committees are part of the American Society for Testing Materials. Professor Voss continued his chairman-

ship of the Committee on Building Codes of the American Institute of Architects, his membership on the Division of Research and Development and the Building Research Advisory Board of the National Research Council, and remained Trustee of the Revere Quality Institute.

Professor Howard R. Staley returned to his duties after a year's leave of absence and Professor Dean Peabody, Jr., terminated his connection with the Department after a year of part-time assistance. Professor Howard Simpson has assumed Professor Peabody's duties in the field of Structural Design. Mr. Donald W. Sabeau, Jr., resigned at the end of this year and will go into industry.

WALTER C. VOSS

BUSINESS AND ENGINEERING ADMINISTRATION

The relocation of the Department in the new Hayden Library Building, with accompanying opportunities for more intensive integration with the Division of Humanities, indicated the need for special attention to current departmental organization and procedures. Improvements must necessarily be in the nature of evolutionary advances in recurrent activities.

Improvements in Course Objective. Posing a hypothetical problem, the assumption was made that, in the departmental course, additional classroom and study hours could be extended to subjects of a nontechnical nature. Five alternatives for the direction of such expansion were outlined as a basis for general discussion: namely, in present business and economic subjects, in other social sciences, in general education, in political economy and government, and in administrative techniques.

Conclusions indicate that should widened curricular opportunities be afforded in the future, the thrust of the department would primarily lie in the combination of greater breadth in historical, social, and political awareness of administrative responsibilities, not overlooking the continuing importance of strong emphasis upon science and engineering.

Improvements in Course Organization. As wartime and postwar conditions inevitably introduced elements of distortion and imbalance into the departmental curriculum, a comparative analysis was made of the undergraduate and graduate subject

offerings grouped under the various departmental divisions of marketing, accounting, production, finance, law, personnel, and general administration. The study, as anticipated, revealed important opportunities for revision, addition, and deletion in subject content, as well as recommendations for changing emphasis in conformance with new industrial trends.

Improvements in Course Coordination. In the presentation of any curriculum of closely interrelated subjects, a degree of duplication in topical content will result. More serious, however, is the hazard that certain areas of management may be completely omitted through the assumption that coverage is provided elsewhere.

With this in mind, the teaching staff established a program of weekly departmental seminars under the chairmanship of Professor Thomas M. Hill in which the topical content of given subjects was described, discussed, and summated in sequence. Seventeen such seminars were conducted during the year and a list of recommendations presented and ratified for induction into the curriculum in forthcoming terms. The success of this program has justified its further development during the coming year.

Improvements in Teaching Methods. During the final months of the year the department collaborated with a Student-Faculty Committee in auditing student opinions regarding teaching procedures used by members of the teaching staff.

Data so obtained are organized and classified in such a manner that final reports to faculty members remain anonymous to all except the individual reported upon. Results of this survey are to be distributed to department members at the beginning of the 1949-1950 fall term.

Improvements in Thesis Techniques. Experiments in the newer techniques of organized group survey and research took place during the year. Five group theses on an undergraduate level were organized and to each group from four to eight students were assigned. Special arrangements enabled each student to be evaluated individually in terms of his contribution to the joint group effort.

Experience indicates that this procedure, while somewhat complicated in nature, provides educational opportunities not available through the singly or dually conducted thesis. It is

not intended that it will entirely replace other forms of thesis investigation, however.

Improvements in Industrial Contacts by Students. Methods of effecting even closer liaison with industry during the undergraduate program, without undue demands upon student time, were the subject of discussion at several departmental faculty meetings.

One resulting development was the extension of the senior plant visitation program to incorporate a week's sojourn to Cleveland, Ohio, during the midyear vacation when 42 students made intensive group studies of executive practices in eight manufacturing establishments. Each of such groups conducted an intensive five-day survey in a given plant, while composite viewpoints were obtained by means of evening seminars during the week. The reaction from both companies and students has proved so favorable that the program is to be repeated with an increased number of students participating.

Improvements in Departmental Service to Out-of-Course Students. The growing interest in administrative subjects shown by out-of-course students has led the department to give special attention to ways and means of implementing these relationships more effectively.

As a result, a special class section in Accounting was established enabling subject matter to be more sensitively related to student background. Also, a revision and amplification of notes issued in the subject 15.11 Introduction to Business Management, which is open only to enrollment from other departments, made available a 500-page body of textual data covering the gamut of administrative activities in a typical manufacturing establishment.

Improvements in Departmental Research Activities. This is the first year in which staff schedules have fully incorporated the annual half-term period to be devoted specifically to research or investigations leading to increased teaching power. Undertakings during these periods have varied widely in nature depending upon individual objectives and opportunities. It is still too early to measure results in any quantitative way, but it can now be stated that the program is clearly filling an important need in the provision of new teaching material closely attuned to rapidly changing industrial conditions and developments.

Considerable thought has been given to the organization of group research projects in administrative areas that might appropriately enlist the active interest of the departmental staff in whole or in greater part. Final decisions in this area have not been made.

Improvements in Student Placement. With the reversal of business trends, problems of senior and graduate placement assumed new importance. In order that seniors might be given special information concerning placement interviewing, they were invited to attend a discussion dealing with interviewing techniques of representatives of employing companies, showing the objectives, evaluative devices and bases for decisions used by such representatives.

Summer placement activities have also been reviewed in the light of the special value of experience thus provided. Following departmental discussions, a letter was issued to all underclassmen recommending individual planning of summer activities to the end that the broadest possible coverage of social experience, avocational pursuits, recreational opportunities, communal activities, and travel be obtained along with the gaining of industrial background.

Resumption of the Sloan Fellowship Program. As a result of a nationwide competition, ten recipients of Alfred P. Sloan Foundation fellowship grants were selected for a 12-month residence at Technology in a special program designed for the development of proficiency in higher administrative responsibilities in industry.

These Fellows — ranging in age from 31 to 37 — have an engineering background and a record of tested competence in managerial activities. Their program while at the Institute will include special seminars, field investigations, and widespread administrative contacts, in addition to an intensive round of administrative subjects now a part of the department graduate curriculum. The program is conducted jointly by this department and the Department of Economics and Social Science.

The Department wishes to express its appreciation to the many industries and officials who have cooperated directly in both undergraduate and graduate programs. In plant visits, seminars, lectures, discussions, and interviews, these intimate

contacts with American industry during the period of formalized learning have introduced an ingredient of practical realism that the classroom is unable to provide.

The Department also wishes to take this opportunity especially to express again its thanks to Howard D. Williams '11 and Newman M. Marsilius '17 for their most helpful gifts of unrestricted funds.

ERWIN H. SCHELL

CHEMICAL ENGINEERING

Teaching activities during the past year continued at the high postwar pace, with little reduction in student numbers. Twenty men received doctorate degrees during the fiscal year, a new high in the history of the Department. Two programs which had been dropped during the war were resumed and two new ones were initiated as outlined below.

Enrollment for the Graduate School of Chemical Engineering Practice decreased sufficiently to let us re-establish the undergraduate Chemical Engineering Practice School for seniors in their last term toward the Bachelor's degree.

The new Engineering Practice School at Oak Ridge got off to a fine start in July, 1948, with a group of eight graduate students. In February, 1949, a new group of 13, including three mechanical engineers, entered Oak Ridge for the second 22-week course at the station. The third group, which went down this summer, is smaller but we anticipate an enrollment of between 12 and 20 men twice a year for this program as it becomes better known among the graduate student body. Both the operating management at Oak Ridge and the returning students are enthusiastic over the result of this first year's operation of the Practice School. The problem of operating under the security requirements of an Atomic Energy Commission plant appears to be working out satisfactorily, and we hope that an increasing number of engineering students from other departments will enroll so that the Oak Ridge experiment can truly be an Engineering and not just a Chemical Engineering Practice School.

The subject in Industrial Chemistry Laboratory for undergraduates during the first term of their Senior year, which was

discontinued during the war, was reinstated last fall. A new and parallel subject called Unit Operations Laboratory was initiated at the same time, seniors being permitted to elect one or the other. These Laboratory subjects require more teaching effort than do equivalent classroom subjects, but the benefit to the students from work which puts more responsibility on them for planning, for decisions, for execution, and for reporting justifies the added burden. These subjects are an advantageous prelude to the Senior Thesis work of the following term.

A departmental Student-Faculty Committee, consisting of seven representatives of the junior, senior and graduate student groups and three faculty members, was organized last spring at the suggestion of the student professional society. The committee meets frequently for informal discussion of the numerous ideas which arise in the student body for improving the effectiveness of our educational methods. It sometimes uncovers misunderstandings between students and staff which are readily dispelled. In other instances changes are proposed which effect a decided improvement in teaching. Probably the most constructive results will be a better understanding and relationship between teacher and student.

In the spring of 1948 the Institute agreed to make an investigation and confidential report for the Atomic Energy Commission on a certain aspect of nuclear energy. The task enlisted the services of over 45 professional men throughout the summer, including physicists, metallurgists and several types of engineers. As director of the effort, which was known as the Lexington Project, I had unusual opportunity to observe the benefits derived from an enterprise which united outstanding men from various universities and from industry who had markedly differing professional backgrounds in a joint effort towards a common goal. About half of the group were M. I. T. staff members. The project was completed and the final report submitted by the end of the summer.

The research program on fluidization, involving the suspension of fine solids in up-flowing gas streams, continued at an active pace. A symposium devoted to this subject was held at M. I. T. last December under the sponsorship of the Division of Industrial and Engineering Chemistry of the American Chemical Society. The titles of the six papers which were

presented by this department indicate the nature of our current research interests in the field: "Characteristics of Fluidized Particles," "Gas and Solid Mixing in Fluidized Beds," "Heat Transfer Characteristics of Fluidized Beds," "Removal of Mists and Dusts from Air by Beds of Fluidized Solids," "Gasification of Carbon by Carbon Dioxide in a Fluidized Powder Bed," and "Reaction of Methane with Copper Oxide in a Fluidized Bed." Research of this type is probably the first essential to a more widespread utilization of the fluidized powder technique for gas-solid reactions in industry.

Local coefficients of heat transfer to steam flowing upward in an annulus were investigated for pressures ranging from 115 to 3,500 pounds per square inch, temperatures from 430 to 1,000°F, and temperature driving forces from 100 to 620°F. The results can be well correlated by conventional equations if all physical properties of the steam are evaluated at the arithmetic average film temperature. Previously no reliable data were available on heat transfer to steam under conditions of such high pressure and high temperature difference. Investigation of heat transfer and pressure drop characteristics for air flow in multitubular systems of short length to diameter ratio is well under way.

The phenomena of mass transfer between phases are encountered in a wide variety of forms in industrial processes, and much of the Department's research deals with this operation. Fluidization and many phases of combustion are examples. Other studies which are under active investigation are the factors governing the rate of solution of small particles in acid solution, as exemplified in preparing sulfite cooking liquors for pulp manufacture, and gas absorption with simultaneous chemical reaction in the liquid phase.

Continued investigations of the mechanism of mass transfer have made it increasingly apparent that fluid friction, heat transfer, and mass transfer between phases are basically one and the same thing and that, for purposes of engineering instruction, the three subjects may eventually become one. New data have been obtained on rates of vaporization of liquids from cylinders, spheres, and plane surfaces, and data on mass transfer to water in turbulent flow have extended the experimental variation of the Schmidt group one thousand fold.

Basic studies of the interactions resulting from simultaneous heat and mass transfer have been initiated. Many chemical engineering unit operations (humidification, drying, absorption, distillation) depend upon simultaneous heat and mass transfer. Although pure heat transfer, and to a lesser extent, pure mass transfer have been subjected to detailed study, up to now little work has been done on the base when both occur. The mathematical theory of this problem has been extended, and experimental work utilizing the Institute's new interferometer will shortly get under way.

Fundamental research on high-output combustion has continued in the Fuels Research Laboratory under the sponsorship of the Navy Bureau of Ordnance. Striking differences have been shown in the flameholding characteristics required for liquid fuel sprays in air and for gaseous fuel-air systems. Under joint sponsorship with the Bituminous Coal Research Corporation, research is progressing on the reactions of solid carbon with oxygen, carbon dioxide, and steam. Studies have been initiated on the propagation of flame in simple vortex flow systems.

In cooperation with members of the Chemistry Department, and sponsored by the Office of Naval Research, research on the properties of hydrogen peroxide has continued through a fourth year.

The research program on the polymerization of ethylene has disclosed that, instead of polymerization, direct reaction with the solvent was being obtained in many cases. Thus when the solvent is an alcohol with an active hydrogen one or more ethylenes can add to give higher alcohols, e.g., methyl alcohol can give normal propanol, normal amyl alcohol, etc. Ethyl alcohol gives a series of secondary and tertiary alcohols. Iso-propanol gives a series of tertiary alcohols which differ from each other by two carbon atoms to the molecule. Ethylene reacts in a similar manner with ketones and other organic compounds containing active hydrogen. The reaction appears to have possibilities of some importance.

The program on the use of solid adsorbents for the separation of hydrocarbons has continued, with the study being concentrated on the rate of exchange problem.

Research on new methods of isomerization, employing

thermal and ultrasonic stimuli, show interesting possibilities which will be further explored.

The reduction of iron ore lumps by carbon monoxide has been shown to be largely controlled by the rate of diffusion of carbon monoxide through the solid ore and the rate of conversion of wustite to iron.

The application of ultramicroscopy by incident light at various temperatures was expanded to study changes in the morphology of elastomers and plastics during vulcanization and polymerization. Work on the colloid chemical properties of antibiotics, on soil solidification and on the production and application of organophilic clays to rubber and plastics was continued. The latter research has been facilitated by the loan of extensive rubber laboratory equipment by the Elastic Colloid Research Corporation, in combination with the newly established Crawford Fellowship.

In the field of photomicrography Professor Ernst A. Hauser has made a new contribution by adapting the Land-Polaroid Camera to photomicrography, permitting the handing of a finished print of a microscopic photograph to a class one minute after the picture is taken.

Adhesives research has given at least a partial explanation of the thickness-strength behavior of bonds, with interesting practical applications. The whole question of cellulose cohesion, with particular reference to paper, is under study.

Research on the measurement of interfacial tension between oils and water at very high pressure, which is of interest to petroleum production, has been expanded to include three-phase systems. Other work in the field of applied surface chemistry has included an investigation of the surface tensions of ternary liquid systems and the development of techniques for estimating these quantities, and research on the preparation of special emulsions to be used as surface coatings.

Work in the field of applied thermodynamics has resulted in new relations for critical constants, surface tension and vapor-liquid equilibria.

During the year Professor J. Edward Vivian and former Professor Roy P. Whitney jointly received the Junior Award of the American Institute of Chemical Engineers and Professor Edwin R. Gilliland received an honorary Doctor of Engineering

degree from Northeastern University. Professor William H. McAdams was awarded the Certificate of Merit by Presidential Citation, Dr. Warren K. Lewis received the Medal of Merit by direction of the President and Professor Glenn C. Williams received the Army-Navy Certificate of Appreciation.

Professor Hauser and Professor Gilliland each engaged in a week's lecture tour last spring for the American Chemical Society, Professor Hauser speaking on the Colloid Chemistry of Natural and Synthetic Rubber, of Clays and of Antibiotics before various local sections in Tennessee, Alabama and Georgia, and Professor Gilliland addressing sections in Michigan, Wisconsin and Minnesota on Fluidization and Adsorption. Professor Hauser initiated a series of lectures on Colloid Chemistry in Chemical Engineering as a Visiting Professor at Worcester Polytechnic Institute, and Professor McAdams and Professor Charles N. Satterfield served as Visiting Lecturers on Chemical Engineering and Industrial Chemistry at Harvard University.

"Thermodynamic Charts for Combustion Processes" by Professors Hoyt C. Hottel, Glenn C. Williams and Charles N. Satterfield was published by John Wiley and Sons in two parts this spring and has had a most gratifying reception. In addition the staff increased its publication of professional papers, although the quantity is still inadequate when compared with the extent of our advanced thesis research.

Professor Warren K. Lewis is now designated as Lecturer, having passed the Institute's official retirement age last year. Aptly, this milestone slipped by without incident, other than a relaxation of his departmental responsibilities. Dr. Lewis counsels and stimulates his staff associates and students with unabated enthusiasm and imagination, he continues active thesis supervision, and his influence in Institute affairs and the profession of Engineering is steadily expanding. The philosophy outlined in his paper on "The Professional Responsibilities of the Technical Man" in accepting the Gold Medal of the American Institute of Chemists last May is an inspiration for the engineer to make more effective contributions to our civilization. In his case, "retirement" truly creates new opportunities for service.

WALTER G. WHITMAN

CIVIL AND SANITARY ENGINEERING

During the past year there has been an increase of 15 per cent in the total enrollment of students in the Department, as summarized in the following table:

<i>Date</i>	<i>1st Year Civil</i>	<i>2d Year Civil</i>	<i>3d Year Civil</i>	<i>4th Year Civil</i>	<i>Graduate Civil</i>	<i>Graduate Sanitary</i>	<i>Total Department</i>
November, 1947...	51	45	55	20	49	14	234
September, 1948...	47	54	59	47	48	16	271

This is significant in that the total enrollment of the Institute during the same period has, as a result of planned curtailment, been reduced by five per cent. As a result, the Department enrollment now constitutes 5 per cent of the total Institute enrollment, as compared to 4.1 per cent a year ago. This percentage now stands at the highest figure in recent years. At the end of the fall term, third year students elected options in the new undergraduate curriculum for the first time: 14 chose Option I, Theory and Design; ten selected Option II, Planning and Administration; and 32 registered for Option III, Construction and Management. On the graduate level there has been an increase in the number of men working for the Doctorate. The Department has voted to offer the new professional degrees, Civil Engineer and Sanitary Engineer. Included among the graduate students in Civil Engineering were ten Army Engineer officers.

A Department Seminar was initiated, consisting of ten meetings each term which were addressed by outstanding men in Civil and Sanitary Engineering. Each seminar was sponsored by a Departmental group, with the Student Chapter of the American Society of Civil Engineers, the Graduate Student group, the Structural Division, the Hydraulics Division, the Sanitary Division, the Soil Mechanics Division, and the Transportation and Surveying Division all participating. The Seminar was coordinated by a committee of which Professor Myle J. Holley, Jr. was chairman. Our annual lecture on Conservation of Natural Resources was incorporated into the Seminar—this year's speaker being Dr. Paul B. Sears of Oberlin College.

The Corporation Visiting Committee for the Department held a well-attended meeting at the Institute in December.

Under the Chairmanship of Thomas C. Desmond, '09, it has continued its effective support of the Department. The assistance of the Committee in bringing the construction of the new Hydrodynamics Laboratory into reality is particularly worthy of mention.

In December another Department News Letter was sent to the 2,500 living graduates of the Department.

Structural Division. The research program dealing with the effect of impulsive loads on reinforced concrete structures, being conducted in the Structural Dynamics Laboratory under the direction of Dr. Robert J. Hansen, has been continued for the Corps of Engineers. In connection with this project, a new device that applies controlled impulsive loads to slabs has been developed and built. Sponsored by the Welding Research Council, the research program dealing with the elastic stability of welded struts and flexural members has been continued in the Structural Analysis Laboratory by Dr. Charles H. Norris. The Concrete Laboratory is being rebuilt by Dr. Hansen.

A number of papers have been given by members of the Structural Division, including reports by Professor John B. Wilbur and Professor Holley to the American Society for Engineering Education; one by Dr. Norris to the Boston Society of Civil Engineers; one by Dr. Hansen to the American Society of Civil Engineers; and one by Professor Holley to the American Concrete Institute.

Professor Wilbur and Dr. Norris have continued as experts for the War Department. Professor Wilbur has become associated as consultant with Fay, Spofford & Thorndike, and as of July, 1949, has become Chief Engineer for Charles A. Maguire & Associates and Fay, Spofford & Thorndike, who have undertaken as a joint venture the design of Section I of the elevated express highway known as the Central Artery across Boston. Professor Wilbur is Vice President of the Boston Society of Civil Engineers, Civil Engineering Representative to the General Council of the American Association for Engineering Education, a member of the Executive Committee of the Northeastern Section of the American Society of Civil Engineers, and a member of the Accrediting Committee of the Engineers' Council for Professional Development.

John M. Biggs has been promoted to the rank of Assistant Professor. During the year he has been Faculty Adviser to the Student Chapter of the American Society of Civil Engineers.

Hydraulics Division. Action was resumed on the proposal for the new Hydrodynamics Laboratory in January and a revised set of plans was prepared. Early in June a contract for the construction of the building was signed, and actual construction began during that month. The new laboratory, which will be directed by Dr. Arthur T. Ippen, will constitute what is perhaps the most important new facility for the Department in its history.

Sponsored research continues at a high level in the old Hydraulics Laboratory, with projects including: "Studies and Experimental Investigation on the Validity and Applicability of the Hydraulic Analogy to Supersonic Flow of Gases," for the U. S. Army Air Forces; "Investigation of Fluid Friction and Cavitation Phenomena in Unsteady Motion," for the Office of Naval Research; "An Experimental Investigation of the Solitary Wave," for the Office of Naval Research; "Development of Methods and Instruments to Determine the Characteristics of Turbulent Motion in Water," for the Engineering Foundation and the Research Committee of the American Society of Civil Engineers; and "Fundamental Research on Methods of Air Dispersion to Secure Greater Efficiency in the Solution of Oxygen from the Air Supplied in the Activated Sludge Process for Sewage and Industrial Waste Treatment," for the United States Public Health Service.

A major change in the graduate teaching load came about through the introduction of a new program for Naval Construction officers of the Department of Naval Architecture.

Dr. Ippen has been active in professional matters, having attended a number of conferences and annual meetings, having served on various committees, and having served as a member of a board of consultants appointed by the Mississippi River Commission. In the spring he was elected a Fellow of The American Academy of Arts and Sciences.

Dr. James W. Daily has likewise been active professionally. His professional society activities have included membership on the subcommittee on Cavitation in Hydraulic Structures of

the Hydraulics Division of the American Society of Civil Engineers, and Research Secretary to the Hydraulics Division of the American Society of Mechanical Engineers. Dr. Daily has been promoted to the grade of Associate Professor.

Professor Allan T. Gifford has served as consultant on the stability of a number of water supply dams, and has given a series of lectures for the New England Water Works Association.

Mr. Henry M. Paynter wrote an essay on "The Obligations of an Engineer in a Free Society," which took second prize in a contest sponsored by the Engineering Societies of New England.

Sanitary Division. Professor William E. Stanley presented two papers, one to the Boston Society of Civil Engineers and one at the Annual Meeting of the Sewage Works Association. He has also served as consultant to the cities of Lowell and Providence.

Dr. Murray P. Horwood continued to supervise the sanitation of the Institute Dining Services and Alumni Pool. He has been made representative of the Massachusetts Public Health Association on the Governing Council of the American Public Health Association.

Research has continued in the Sedgwick Laboratories of Sanitary Science under the direction of Dr. Clair N. Sawyer. Under the Wallace and Tiernan grant-in-aid, laboratory and plant-scale investigations involving recovery of sugar and concurrent elimination of a highly pollutorial waste in the beet sugar industry were brought to a successful conclusion. The investigation of nutritional factors involved during biological stabilization of industrial wastes has been continued for the National Institute of Health. Under the Federation of Sewage Works grant-in-aid, studies dealing with determination of biochemical oxygen demand have been continued. Dr. Sawyer has attended a large number of professional society meetings, has participated in two hearings involving stream pollution, has presented three technical papers, and published another.

During the spring, negotiations were begun with the Atomic Energy Commission, with the result that a new research project has been initiated, dealing with the removal of radioactive materials from drinking water by conventional methods of

water treatment. Professor Ariel A. Thomas is in charge of this project.

As of July 1, 1949, Dr. Rolf Eliassen joined the staff of the Department to assume charge of the Sanitary Division.

Soil Mechanics Division. In addition to scheduled courses, a special Soil Mechanics course was given during the spring term. This course covered various phases of practical soil engineering. It was taken by 15 seniors, the majority of whom selected it as a thesis substitution.

The long range program on shear research on soils, temporarily discontinued during the war, was reinitiated by the Corps of Engineers, directed by Professor Donald W. Taylor. Professor Taylor is Secretary of the International Society of Soil Mechanics and Foundation Engineering, Chairman of the Committee on Subsoils of Boston, of the Boston Society of Civil Engineers, and Chairman of the Subcommittee on the Structural Design of Earth Dams and their Foundations, of the Committee on Earth Dams, of the American Society of Civil Engineers.

The research program on soil solidification, sponsored by the Corps of Engineers, has continued under the guidance of a steering committee, of which Dr. Harold C. Weber of the Department of Chemical Engineering is Chairman, and Dr. T. William Lambe is Executive Officer. Dr. Ernst A. Hauser of the Department of Chemical Engineering has been particularly helpful on this project. Dr. Lambe has been promoted to Assistant Professor.

Harl P. Aldrich has been promoted to Instructor.

Transportation and Surveying Division. Due to the large enrollment of students, it was again necessary to operate the Summer Surveying Camp at East Machias, Maine, in two sessions of four weeks each. It is believed that by next year the longer camp can be resumed. The camp buildings have been painted. Professor Herman J. Shea is Director of the camp, and Professor Allan T. Gifford the Executive Officer.

The new Photogrammetry Laboratory is now quite well equipped and is proving to be a notable addition to our facilities for teaching surveying. Professor Shea is in charge.

Professor John B. Babcock continued his very effective work as placement adviser for the Department. With the

largest number of graduates from the Department since 1933, this became a major assignment. He was very successful in his efforts, due in part to the cooperation of graduates of Courses I and XI who hold positions of responsibility. He has continued to place emphasis on summer jobs for undergraduates.

JOHN B. WILBUR

ELECTRICAL ENGINEERING

The over-all magnitude of activity in the Department during this past year was comparable with that of the year 1947-1948, the student load dropping off slightly from its post-war peak while research expenditures increased. The average number of students enrolling in the Department decreased from 1,150 in 1947 to about 1,000 in 1948. In the research for which Department staff members are responsible, the total increased from slightly under four million in 1947-1948 to five million this past year. In general, this past year proved to be exceedingly busy for members of the staff who have yet to experience any substantial easing of the accelerated wartime pace.

Serious attention was given to the previous year's Visiting Committee recommendations that more attention to the art of engineering should be added to the existing strength in the applied science of engineering. During the second term, Mr. Edward Butler, then manager of the Special Products Division of Sylvania Electric Products, Inc., taught a senior elective entitled "The Electrical Engineer in Industry." In this subject, he showed by a class-conducted case study, the function of the engineer as a member of the industrial team and his relations with and dependence on the other members. This experiment elicited enthusiastic response from the students. Although Mr. Butler is now geographically unavailable, the practice of offering senior electives in various aspects of the practice of engineering taught by successful industrial engineers is being continued.

As a further important step in bringing the art of engineering to our students as well as to lend further emphasis on a heavy current or power aspect of electrical engineering, Mr. Charles A. Powel, formerly of the Westinghouse Electric Corporation, has joined our faculty as lecturer beginning in the fall of 1949.

Mr. Powel brings a rich and varied experience in the practice of electrical engineering, including service on governmental commissions to foreign countries. For the first time, Professor Lawrence B. Arguimbau gave a senior elective subject dealing with the principles of television.

Promotions to faculty grade included the following, who were made assistant professors: Wilbur B. Davenport, Jr., Thomas F. Jones, Jr., John G. Linvill, William K. Linvill, Samuel J. Mason, George C. Newton, Jr., William M. Pease.

Crowding in the offices of the department staff was relieved slightly by the assignment of three additional offices to the Department for the use of the teaching staff.

Still carrying a heavy load, our staff devoted some effort to forward-looking activity. Some slight beginnings were made toward a better understanding of the teaching process. Professor Alex Bavelas of the Department of Economics and Social Science conducted a seminar with a nucleus of our younger teachers to study the learning and teaching processes. The year's work among other things led to a measurement of student attitude and motivation with probably significant results. It is hoped that work can be continued in this broad and very important field of learning and teaching at a college level of science and engineering education.

Group and committee activity within the department as a means of continued improvement and revitalization of our work has again appeared as a part of our normal peacetime activity. Such matters as the doctorate examination procedures, the orderly scheduling ahead of graduate subjects for several years to conserve staff effort, our graduate seminars, and a study of our basic undergraduate program, have received attention. In addition, the Advisory Group, including some half dozen of our associate and full professors, has proved a valuable means of securing mature and broadly based judgments on department problems and proposals, including some of the significant budgetary and promotion questions.

The cooperative course has been augmented by the inclusion of a scientific governmental agency, The Naval Ordnance Laboratory at White Oak, Maryland, as a cooperative organization of which Dr. Ralph Bennett, formerly professor in this department, is the technical director. This forms an opportu-

nity for students to obtain first-hand acquaintance with and experience in a large and strong governmental agency prior to graduation in the same way that the other cooperating groups provide experience with industry. There are indications that governmental laboratories may help provide cooperative work for the industrial students during a period of reduced industrial activity.

The postwar phase of the Radar School terminated at the end of the first term. In this program, a very select group of Naval officer students drawn from graduates of the United States Naval Academy and other engineering schools completed the requirements for the Bachelor of Science degree in Electrical Engineering plus about two-thirds of an academic year in additional specialized subjects in shipboard and aircraft communication and radar. A total of 168 graduates of this course provide a much-needed postwar nucleus of Navy electronics specialists. This brings to a close a major M. I. T. wartime activity which started in June, 1941.

During the past year, the Machinery Laboratory was presented with two three-unit motor-generator sets, the gift of Mr. H. A. Kuljian, '19. These sets are an important addition to the equipment of the Machinery Laboratory. Other gifts included a 15-kilowatt radio frequency generator for induction heating from the Radio Corporation of America, transformers and measuring equipment from Westinghouse Electric Corporation, and miscellaneous networks, telephone and radio equipment from the Western Electric Company.

One indication of the close relation between the department and engineering practice is the fact that the majority of our department faculty are providing consulting services of a substantial and important character to industrial agencies in addition to giving their services to various governmental boards and panels. This work is uniformly of a character to enrich the professors' qualifications as teachers of mature students and to extend their professional qualifications.

Other activities included the three-week Computer conference given by Professor Caldwell in June, attended by 100 engineers and scientists from governmental and industrial organizations throughout the country; and Professor Boehne's three-day conference on Electrical Contacts, held in September,

1948, attended by some 200 persons similarly distributed.

In addition to numerous visitors from all over the world, the Department appointed as guests to work with various groups at the Institute: Dr. Edward W. Webster of the English Electric Company, working with Dr. Trump to gain more experience in electrostatic generator design and something of the nuclear physics applications; Mr. Kundor Iah, Instructor in Electrical Engineering at the University of Mysore, who desired to attend classes and be associated with the routine of our educational program before returning to his duties in India; and Dr. Nai-Ta Ming of China, who worked with Dr. Guillemin.

Among personal notes may be mentioned the following:

Professor Samuel H. Caldwell received a medal from the Swedish Engineers' Academy of Science. Professor Harold Edgerton received the Joseph A. Sprague Award of the National Press Photographers' Association for developing the new flash and stroboscopic lights. Mr. Jay W. Forrester was one of the three award winners in the Eta Kappa Nu competition for designation as the Outstanding Young Electrical Engineer in the country, receiving an honorable mention. The President's Certificate of Merit was awarded on October 15, 1948 to the following for their contributions to the war effort while members of the Office of Scientific Research and Development: Professors Leo L. Beranek, Gordon S. Brown, Lan J. Chu, Ernst A. Guillemin, Harold L. Hazen, John G. Trump, Arthur R. von Hippel, and Jerome B. Wiesner. Professor Karl Wildes subsequently received the Army and Navy Certificate of Appreciation on December 15, 1948. Professor Leo Beranek, on invitation, spent the summer at the Instituto Radiotecnico of Buenos Aires giving a course in acoustical engineering. Professor Donald P. Campbell has been invited to give three one-month lecture series on automatic control in Sweden, Norway, and Denmark respectively, with shorter series in Holland and in England, during the first term of next year. Professor Eugene W. Boehne was invited to spend a month with the Bonneville Power Authority as consultant during the past summer on various circuit-breaker, switching, and power-system problems.

Memberships on governmental advisory bodies include Professor Ivan A. Getting's chairmanship of the Radar Panel

and Professor von Hippel's membership on the Solid State Panel of the Research and Development Board, National Military Establishment; Professor Hazen's membership on the Panel on Engineering and Science of the Service Academy Board; and several others mentioned last year.

While the \$5,000,000 research figure mentioned earlier includes the department's share in three interdepartmental laboratories which are reported on separately, there are a number of other major research activities of the department, the highlights of which are as follows:

Servomechanisms work under the direction of Professor Gordon S. Brown maintains its high level of activity in both teaching and research aspects. In the research area, the Brookhaven reactor control and instrumentation was completed early in the year, except for final adjustment and test following installation, which is now in process. Preliminary tests are gratifying. Further research in nuclear instrumentation is continuing under the direction of Professor Truman S. Gray.

Fire control systems research for the Air Forces continues, including as one item of interest a practical application of the Wiener theory of optimum synthesis. Magnetic clutches received considerable study. A strong industrial demand continues for men who have been associated with this servomechanisms activity in class or research laboratory. Further interesting possibilities under exploration promise rewarding activity in this field for at least the next few years.

Progress on the electronic digital computer, Whirlwind I, in the Electronic Computer Division of the Servomechanisms Laboratory at the Barta Building, is satisfactory, with two-thirds of the computer under test, and completion expected during the coming year. Much attention has been given to studies of applications such as air traffic control. Interest in this computer is international in scope. The integration of the Servomechanisms Laboratory activity, including Project Whirlwind, into the department educational program has been particularly close and successful.

Apart from Dr. Trump's work on Nuclear Science and Engineering Laboratory projects, reported elsewhere, his work on high-voltage X-ray and cathode-ray Van de Graaff accelerators for medical and biological applications continues. The

older three-million volt unit in Building 28 has been supplemented by a two-million volt unit provided by a grant from the American Cancer Society. Unusual efficiency has been attained in the irradiation of specific deep tumors by combining the excellent penetrating and skin-favoring radiation with multiple and continuous "crossfiring" on the suspected region. It is planned to resume clinical treatments with these radiations at M. I. T. during the forthcoming year. Sterilization of a wide variety of pharmaceuticals has been accomplished with high-energy cathode rays without adverse effect on their potency. Penicillin, streptomycin, heparin, and other heat-sensitive drugs, as well as surgical sutures, have been rendered sterile on a practical basis by directing a stream of three-million-volt cathode rays through their final container. The effects of cathode rays on microorganisms and food products is being studied cooperatively with the Department of Food Technology.

The Laboratory for Insulation Research is successfully continuing its fundamental research program devoted at present mainly to problems of the solid state and their relation to the development and application of new engineering materials. Such applications are usually made by industrial organizations based upon the suggestions and guidance of this laboratory. In the laboratory, appreciable progress has been made in the understanding of the ferroelectricity of the titanates by a complete analysis of the domain structure of BaTiO_3 single crystals and an evaluation of their phase transitions. In the studies on ferromagnetic semiconductors, the growing of single crystals of magnetite was accomplished and their properties investigated in static and microwave fields. The physics of high field strength was advanced by breakdown studies ranging in continuous transition from the gaseous into the liquid state and by a detailed theoretical and experimental analysis of the electron avalanches forming in alkali halide crystals. Absorption studies over a wide frequency range, X-ray structure investigations, and phase diagram studies are in progress. A new helium liquefier has been completed, and low temperature research on insulators and semiconductors is being started. In addition to numerous publications, a compilation, "Electric Dipole Moments," has been published by the Technology Press.

Most of the facilities of the Dynamic Analysis and Control Laboratory, under the direction of Professor Albert C. Hall, have been engaged in the development of a generalized analogue computer. A large portion of the computer was placed in operation during the past year and has already made an important contribution to the solution of guided missile problems. Approximately 5,000 solutions were computed by the machine in the first six months of 1949. The laboratory has been engaged also in the development of flight control equipment, with special emphasis upon hydraulic mechanisms. The development program in the laboratory has led to the commercial production of an improved type of hydraulic servomechanism. While the predominant portion of the work at the laboratory has been sponsored by the Bureau of Ordnance of the Navy Department, the development of flight control unit was sponsored by and completed for the Glenn L. Martin Company.

The Stroboscopic Research under Professor Harold E. Edgerton has made important advances in the measurement and evaluation of the radiation from electrical flash tubes. Some development has occurred in extremely high-frequency flash sources of high efficiency. During the past year, there has been a great interest in the application of electrical flash tubes to color photography problems.

The Synchrotron Project under Dr. Getting and the 12-million volt generator project of Dr. Trump are reported under the Laboratory of Nuclear Science and Engineering.

As a part of an evolutionary process in the Institute's mechanical computation facilities, the original mechanical differential analyzer has been presented to Wayne University in Detroit. Operation of the Rockefeller differential analyzer has been set up on a basis that makes it more widely available to activities throughout the Institute than heretofore. Inclusion of the International Business Machine computing activity under the Division of Industrial Cooperation is expected to implement its wider use in Division of Industrial Cooperation projects. Professor Zdenek Kopal's computation group continues to engage in a variety of sponsored research in which advanced analysis and computational methods are applied to

various physics and astronomy problems of interest to the Service sponsors.

HAROLD L. HAZEN
CARLTON E. TUCKER

GRAPHICS

The Section of Graphics during the past year has further concentrated its efforts toward a systematic development of the field of Engineering Graphics.

There exist many graphical methods originated independently for use in various branches of science and engineering. The study and coordination of these into a unified body of theory and method has constituted the research side of the work of the Section. This is reflected in the increasing emphasis on useful graphical methods of solution in the subjects given by the Department.

The Section is fortunate in having Professor J. N. Arnold of Purdue University on exchange for the coming year.

JOHN T. RULE

MECHANICAL ENGINEERING

General. The teaching load of the Department has decreased slightly during the year, but due to the reductions in personnel, the average load has remained nearly constant. A conscious effort is being made to increase the time available to the staff for creative work.

The problem of strengthening the professional point of view in the curriculum of mechanical engineering has been given much attention during the year. Motivation and interest in professional subjects are heightened if the students can have some realistic contacts with the industrial world prior to undertaking the program of the fourth year. There are many instances where awakened interest in some aspect of the profession has had a profound influence on the intellectual growth of the student, not only from the professional point of view, but also in respect to character building and general education. It is important, at the same time, not to disrupt unduly the

student's undergraduate academic program and his extra-curricular activities in the fourth year.

The new Cooperative Training Program, Course II-B, was launched during the year to achieve some of these objectives, and it is now in operation with 20 students distributed among four companies. The program, which is ably managed by Professor William M. Murray, involves a rearrangement of the undergraduate schedule which enables the student to spend about six months with an industrial concern in which he is interested and which has selected him from a number of applicants. Summer instruction during two half-summer periods makes up for the time away from the Institute. Some years of continuous activity will be required before the program can be assessed, but so far the results are encouraging. The principal problem appears to be to get the message across to the best students. Many other companies and government institutions have asked to participate in the program. The facilities available for summer instruction will set the limit of the size of the program, and it is expected to reach this limit in a few years. Extensions to the program reaching into the graduate year, along the lines of the former Course II-A, are now being studied.

We have considered the idea of requiring some industrial contacts of this kind from all students prior to the fourth year, but we are not yet prepared to make such a requirement mandatory.

An attempt is being made to introduce the sophomores to some aspects of their future profession. It is hoped that this professional indoctrination may serve to clarify the attitude of the sophomores to the II-B program.

As a part of this endeavor to strengthen the professional point of view, a new required subject for seniors, Problems in Mechanical Engineering, was given for the first time during the year by the Head of the Department. An attempt is made here to present a few problems in their professional entity. In the future a greater part of the program will be carried out by other senior members of the staff and by outside authorities. The program suffers from the large size of the graduating class, but on the whole the results are encouraging.

The field of manufacturing appears to be one of the most promising for a large number of our mechanical engineering

graduates of the future. Acting on this conviction, we are gradually encouraging a shift of emphasis towards the subjects of mechanical metallurgy and towards applied phases of physics of the solid state.

A beginning has been made in the strengthening of the undergraduate subjects related to materials processing, which now have been raised to a high level of scientific standard under the leadership of Professor John Wulff and his associates of the Metallurgy Department.

A vigorous program of research has been initiated within the Department on problems related to metals cutting under the leadership of Professor Milton C. Shaw. Through this program and through other changes initiated by Professor Prescott A. Smith, the instruction in machine tool practice is gradually being shifted from the vocational to the professional level.

Under the leadership of Professor John T. Burwell, Jr., there has been considerable research in friction and surface phenomena. Professor Burwell is incorporating some of this work into an undergraduate elective on the physics of the solid state. Coupled with the extensive program of research in materials under stress carried out under the leadership of Professor Charles W. MacGregor, as well as developments in machine design under Professor John A. Hrones, it is hoped that the Department will soon get into a position of leadership in this field.

When these more-or-less tentative programs have matured, we anticipate a modification of the undergraduate curriculum by which some of the basic instruction in thermodynamics and fluid mechanics will be moved into the second year, leaving room in the third year for a greater amount of applied professional work.

The Graduate School continues to be a major part of the Department's activities, as indicated by the number of graduate degrees awarded. Much attention has been given during the year to the technique of the doctorate examination. The method in use at present in the Department tends to make the oral doctorate examination a difficult and exacting ordeal, even though every effort is made to avoid trick questions. Consideration is being given to a preliminary examination prior to the major program.

Under the direction of Professor Joseph Kaye, graduate seminars have been held weekly, preceded by a social gathering at Department Headquarters. These seminars have been most effective in acquainting the staff with the younger members and their research programs.

The following major changes of personnel took place during the year. Professor Irving H. Cowdrey retired after forty years of devoted service to undergraduate teaching in materials testing. Professor F. Everett Reed resigned to accept a position with the Arthur D. Little Company. Professor Louis F. Coffin, Jr., resigned to assume a position of responsibility at the Knolls Atomic Power Laboratory of the General Electric Company in Schenectady. Professor Harry Majors, Jr., resigned to become Director of the Engineering Experiment Station at the University of Alabama. Arrangements were completed for Professor William A. Wilson to join the staff on July 1 to devote himself to further development of the teaching program in the Engine Laboratory.

Evening meetings of the staff of the Department as a whole have been continued under the direction of Professors Joseph H. Keenan and Warren M. Rohsenow.

Because of the illness of the chairman and members of the Visiting Committee, it was impossible to hold a meeting this year.

Applied Mechanics. No major change has been made during the year in the instruction program in Applied Mechanics.

An exchange of personnel took place with the Imperial College of Science and Technology in London, England. Our Assistant Professor Stephen H. Crandall is teaching in London for the period February, 1949, to February, 1950, while Mr. Deryck N. deG. Allen, Lecturer at Imperial College, is spending the same period at the Institute as Visiting Assistant Professor, giving a special course in Relaxation Methods, of which subject he is a recognized authority. This exchange arrangement gives an excellent opportunity for cultural exchange. Other cases will be encouraged whenever possible, particularly if funds can be obtained under the Fulbright Act to defray the added expense.

Lubrication Laboratory. Research on mechanical wear sponsored by the Chrysler Corporation has been continued with

emphasis on studying the wear characteristics of various combinations of commercial steels and cast irons which are used in automobiles. The radioactive tracer technique which was developed in this laboratory has also been applied to determining the scuffing and galling tendencies of these materials.

A small symposium on "Lubricants for Manufacture and Machinery" for the benefit of the grant-in-aid companies of M. I. T. was held on April 28 and 29. Papers on various aspects of the subject were presented by Professors John T. Burwell, Jr., Maurice E. Shank, Milton C. Shaw, and John Wulff. About 25 technical representatives from about a dozen companies attended and contributed valuable discussion on the papers, which was mutually helpful to both the M. I. T. staff and the visitors.

The proceedings of the conference on mechanical wear which was held last year will be published in the late summer.

Machine Design. The Machine Design Division carried the heaviest student load in its history. Approximately 200 took the junior Machine Design course, which for the first time included the awarding of two cash prizes for the outstanding original designs. A committee of engineers from industry served as a judging committee. This proved to be so successful that it will be continued in the future.

A new elective subject, a seminar in machine design, was offered by Professor John E. Arnold. The number of students in this subject is limited to approximately 12 and to those who have shown exceptional design ability. Its purpose is to develop creative thinking as well as to advance design technique.

The collection of working models to serve as teaching aids was increased considerably. Professor Alvin Sloane is writing a textbook in the field of strength of materials, while Professor Deane Lent is completing a machine drawing textbook. An increasing number of undergraduate theses are being carried on in machine design. During the past year approximately 12 students chose design topics.

The study of mechanisms continued at an accelerated pace. The first results make possible the synthesis of four bar linkages to produce certain desired motions and will be published in the near future under the joint authorship of Professor

John A. Hrones and Mr. George L. Nelson. Three graduate theses contributed to advancement in this field.

The application of fast analogs to the study of complicated problems in dynamics continued. The analogs are finding increased use as visual teaching aids in dynamics and automatic control courses. Wide student interest at the graduate level is evident from the number of theses being done in this field. Mr. J. Loewen Shearer was on leave of absence most of the year due to illness but is expected back in the fall.

Machine Tool Laboratory. During the past year 14 machine tools have been installed in the Machine Tool Laboratory. This has eliminated the need for line shafts and overhead belt drives. It has also made available the latest types of machine tools.

The content of the subjects offered has been steadily converted so that now they present the important aspects of machine tool work and manufacturing analysis. This has been completed with the cooperation of the Machine Design Division.

Metal Cutting Research Laboratory. During the past year a Metal Cutting Research Laboratory was established to study the fundamental aspects of metal cutting processes. Under the direction of Professor Milton C. Shaw this laboratory has enjoyed a normal growth during its brief span of existence. At present three graduate students are engaged in a basic study of the grinding process. This work is being sponsored by the Timken Roller Bearing Company and is being conducted in cooperation with Professor John Wulff of the Department of Metallurgy. Studies of the cutting characteristics of leather and other noncrystalline materials are being continued under the sponsorship of the United Shoe Machinery Company. A third project, which is jointly sponsored by the Ford Motor Company and the United States Air Force has to do with the drilling and broaching of high temperature materials for use in the fabrication of gas turbines for aircraft.

Professor Milton C. Shaw, in conjunction with Mr. E. Fred Macks of the National Advisory Committee for Aeronautics, has completed a textbook, *Analysis and Lubrication of Bearings*, which will be available this summer.

Materials. During the past academic year, the recently established laboratories for research in the flow and fracture of

metals have been actively engaged on various important Division of Industrial Cooperation projects. The Whirl Pit has made extensive studies of the flow and fracture of large steel disks rotated to bursting speeds. The High Speed Impact Laboratory has completed a large number of experiments on notched bars broken under wide ranges of strain rates and temperatures. Useful information on crack initiation and propagation has resulted from this study. The special equipment developed for studying the effects of various mechanical and metallurgical conditions on the transition temperature for brittle fracture has been consolidated and a new laboratory called the Brittle Fracture Laboratory has been established in Room 1-314. In this laboratory, such studies as the effect of pearlite size and distribution, fatigue, etc., on the transition temperature for brittle fracture have been completed. Also, experiments studying the correlation between other more commercial forms of test and the M. I. T. Slow Bend Test have been carried out, indicating the advantages of the latter.

Two Division of Industrial Cooperation projects are currently being conducted in the Creep and Plastic Flow Laboratory. The special dead-load creep machines and the special constant strain rate machine have been in active use, and considerable data are being accumulated for analysis under an Office of Naval Research contract. A second constant strain rate machine has been built and will be put into operation shortly. Rapid progress has been made on the Torsion-Stress-Rupture Study conducted for the National Advisory Committee for Aeronautics. Two special Torsion-Stress-Rupture machines have been built and are now in use. A third such machine is under consideration. In this laboratory during the past year, many improvements in equipment, temperature control and measurement, and automatic recording of test data have been completed. This laboratory is now operating at the limit of its capacity, and if further projects of this type are taken on, additional laboratory space will be needed.

Department research projects in this general field include the Rolling of Metals Project, conducted under the auspices of the Special Research Committee on the Plastic Flow of Metals of the American Society of Mechanical Engineers, and the Flow and Fracture of Cast Iron, the latter being a doctor's thesis by

Professor Louis F. Coffin. The Rolling of Metals Project is unique, since it is the only scientific research being conducted in this country to study the contact stresses, normal and shearing, in the contact region between the rolls during the rolling operation. Industry is very much interested in the study and has contributed financial support to it. The very special apparatus, including elaborate electronic equipment, has been developed here, and tests are being conducted now to yield this valuable information. The project on the Flow and Fracture of Cast Iron has yielded significant data on a little-known phase of the fracture problem. The study is being continued.

Several papers have been published during the year, and others are in preparation.

The Division has suffered the loss through retirement of one of its most valuable members, Professor Irving H. Cowdrey, who has long been associated with the field of testing of materials at the Institute.

Laboratory of Experimental Stress Analysis. During the past year the efforts of the staff have been concentrated largely on improvement of the laboratory exercises and equipment used in connection with the various subjects of instruction. Some research and collaboration with industry have also been carried on. The greatest physical change in the facilities has been the moving of the Photoelasticity Laboratory, which was formerly on the third floor in Room 1-314, to the second floor in Room 3-255. This has been a decided advantage, since all portions of the Laboratory of Experimental Stress Analysis and all instructors' offices are now relatively close together.

A laboratory model to demonstrate the theory of the beam on an elastic foundation has been constructed and used for student instruction. This model was exhibited at the New England Section meeting of the American Society for Engineering Education last fall.

The following investigations have been undertaken or are currently under way in the laboratory: investigation of the effect of grain size on strain observations made with very small electric resistance strain gages, development of an improved lateral extensometer for the photoelasticity laboratory, development of a rotary torsion fatigue machine, characteristics of wire resistance strain gages at very low temperatures, and character-

istics of Stresscoat and other brittle coatings for strain analysis.

Professor William M. Murray has continued as Secretary-Treasurer for the Society for Experimental Stress Analysis and as Editor of the organization's Proceedings.

Professor William M. Murray has been acting as Assistant Placement Officer in the Department, and during the summers when Professor Arthur L. Townsend has been on his vacation, he has taken over the Placement Officer's duties as well.

During the fiscal year just closed, a departmental committee on exhibits was set up. The members are Professor John T. Burwell, Jr., Warren M. Rohsenow, and William M. Murray, Chairman. The Committee has held several meetings and made a preliminary survey in regard to space available and exhibits which might be set up. In addition, the Committee has collaborated with the Development Office in the arrangement of departmental tours during the Mid-Century Convocation and other groups wishing to be shown about the Mechanical Engineering Department. Arrangements have already been made with the Executive Officer to set up an exhibit in the corridor on the second floor.

Thermodynamics. No major change was made in the instruction program in thermodynamics during the year.

Conferences on teaching methods and programs have been held jointly by the heat division and the fluid mechanics group throughout the past year. A high degree of coordination of these two subjects has been achieved.

Research under the direction of Professors Joseph H. Keenan, William H. McAdams, and Joseph Kaye on heat transfer to an air stream flowing at supersonic speeds has made notable progress. An application of the techniques of this field to the design of elements of supersonic aircraft has been made by Professor Kaye.

Engine Laboratory. The Engine Laboratory is one of our oldest units of undergraduate laboratory instruction. When steam power had the appeal of novelty, it played an important role in affording the students contact with problems of handling machinery. In recent years we have struggled with the problem of retaining this instruction without lapsing into stereotyped routine. Many of the recent physical changes of the laboratory have been made to improve this situation. Under

the leadership of Professor James Holt, Professor William A. Wilson will give the major part of his attention to this problem.

Cryogenic Laboratory. The low-pressure plant for the production of liquid nitrogen, liquid air, and dry gaseous air was completed late in 1948. More than 14,000 liters of liquefied gases have been delivered to various Institute laboratories. The current rate is 3,000 liters per month.

Work continues on projects sponsored by the United States Air Force and the Office of Naval Research relative to the improvement of apparatus for continuous refrigeration at extremely low temperatures.

Textile Technology. The changed emphasis in government research in the textile field has lessened slightly the activities in textile technology through the Division of Industrial Cooperation, but it continues, nevertheless, to be an important field of specialized professional training. A cooperative arrangement with the Lowell Textile Institute is being worked out whereby our men will have the benefit of their operational facilities, while some of their men will continue into the research field at M. I. T. An increasing number of fellowships for graduate work in textile research is becoming available. Two were added during the past year to the four already existing.

Sloan Automotive Laboratory. This laboratory was established on its present site just 20 years ago, after Mr. Alfred P. Sloan, Jr., had made the first of a series of generous gifts in support of facilities for instruction and research in the field of internal combustion engines. Since that time, under the able leadership of Professor C. Fayette Taylor, this facility has come to be recognized internationally as one of the leaders in its field, both for instruction and research. For example, important publications based on its research output now number over 80, while its thesis library contains some 300 titles, many of which constitute significant contributions frequently consulted by representatives of the automotive and diesel industries.

During the past year the test equipment in the laboratory was used to good advantage by graduate and undergraduate students. In all, 21 students from the departments of Mechanical Engineering, Naval Architecture, Chemical Engineering, and General Engineering worked on problems related to internal combustion engines.

A series of lectures covering M. I. T. research in the field of internal combustion engines was delivered by Professor C. Fayette Taylor during the month of June at the Technische Hochschule in Zurich, Switzerland, and at the Belgian Engineering Society's headquarters in Brussels.

A total of about 100 students received training in internal combustion engine theory, design, and laboratory testing during the year. These students represented seven different departments at the Institute.

Experimental work on the fundamental nature of engine detonation using a rapid compression machine has continued. The range of the apparatus has been extended by the development of a technique for taking high-speed photographs of the combustion process. These photographs have revealed certain aspects of combustion heretofore unknown.

A research project conducted in cooperation with the Aeronautical Instrumentation Laboratory to develop an instrument for automatically adjusting the fuel air ratio of an engine to give maximum economy operation was undertaken, and results to date have been encouraging. The development of a meter to give instantaneous values of indicated mean effective pressure was also undertaken as part of this project.

A study of piston ring wear using radio-activated piston rings was conducted in the Sloan Laboratory under the direction of Professor John T. Burwell, Jr., of the Lubrication Laboratory, and preliminary tests reveal that the method gives useful results.

A revised edition of "The Internal Combustion Engine" by Edward S. Taylor and C. Fayette Taylor and a revised edition of "The Airplane and Its Engine" by Charles H. Chatfield, C. Fayette Taylor, and Shatswell Ober were brought out during the year.

A report entitled "Improvement of Accuracy of Balanced-Pressure Indicators and Development of an Indicator Calibrating Machine" by Mr. James C. Livengood of the Sloan Laboratory staff was published by the National Advisory Committee for Aeronautics.

A hydraulic scale for the measurement of engine torque was developed by the Sloan Laboratory staff, and an article describing this instrument was published in "Laboratory Equipment for Testing and Research Work on Diesel Engines."

Professor C. Fayette Taylor, Director of the Laboratory, was elected a Fellow of the American Academy of Arts and Sciences in May, 1949.

Gas Turbine Laboratory. The initial difficulties incident to the operation of the Supersonic Wind Tunnel have been overcome, and the operation of this facility is now routine.

Operation of the laboratory involves cooperation of the Chemical Engineering Department, the Aeronautical Engineering Department, and the Mechanical Engineering Department.

Research problems now in progress are primarily concerned with fluid mechanics as involved in the various parts of gas turbines (compressors, combustors, and turbines).

The following reports have been issued in the last twelve months: "Some Experiments on the Interaction of Shock Waves with Boundary Layers on a Flat Plate," Ascher H. Shapiro, Ernest P. Neumann, and Frank W. Barry, October, 1948; "Supersonic Diffusers for Wind Tunnels," Ernest P. Neumann and Ferdinand Lustwerk, *Journal of Applied Mechanics*, June, 1949; "The Effect of Blade Cooling on the Stage Efficiency of a Gas Turbine," William R. Hawthorne and Antonia B. Walker, O.N.R. Technical Report No. 2, March 15, 1949; "The Effect of Blade Cooling on the Efficiency of a Multi-stage Turbine," William R. Hawthorne and Antonia B. Walker, O.N.R. Technical Report No. 3, May, 1949; "High Temperature Gas Turbines with Cooled Blades — A Preliminary Survey of Two Simple Plants," William R. Hawthorne, O.N.R. Technical Report No. 4, May, 1949.

Professor Edward S. Taylor, Director of the Laboratory, was elected a Fellow of the American Academy of Arts and Sciences in May, 1949.

George Westinghouse Professorship. The grant for the George Westinghouse Professorship in Mechanical Engineering was awarded to the Institute by the George Westinghouse Educational Foundation in 1948. With the chair is associated a sum of approximately \$5,000 for research, which is disbursed at the discretion of the professor. Professor William R. Hawthorne is the first holder of this chair, and the research activities have, therefore, centered in the gas turbine and associated fields. The research activities under this grant have been carried out by graduate students and have involved the construction of

several facilities, in particular, a special small wind tunnel with special provisions for uniform flow and with provisions for accurately adjusted gradients of velocities. An annular wind tunnel for the investigation of flow through compressor and turbine blades has also been completed. There has also been research on the separation of particles from gas streams and many analytical investigations of aerodynamical problems.

The results of the first year of operation under this professorship indicate that it represents an unusually effective form of endowment. So much of the research work at the Institute is confined to prescribed fields that even a grant of these modest proportions can play a very significant role. We enthusiastically express our appreciation to the George Westinghouse Foundation for this support.

C. RICHARD SODERBERG

METALLURGY

The past year in the Department of Metallurgy has been characterized by increasingly high teaching loads. The demand by industry for metallurgists has attracted more students into this field with the result that it has been necessary to limit the undergraduate enrollment to 40 students per class. In addition 85 graduate students were enrolled of whom 59 were working for the doctorate. There was also a heavy enrollment in the service subjects in metal processing which are primarily given for students in Mechanical Engineering, Aeronautical Engineering, and Business and Engineering Administration.

A new degree of Metallurgical Engineer is now being offered for the first time. This degree is awarded after the successful completion of four terms of prescribed graduate work. Its purpose is to provide broad graduate training in advanced engineering subjects with much less emphasis on research than is required for the doctorate.

Honors to staff members included an honorary Doctor of Science degree from Alfred University to Professor F. H. Norton in recognition of his outstanding work in the field of Ceramics. Professor John Chipman delivered the Howe Memorial Lecture for the American Institute of Mining and Metallurgical Engineers. Professor Morris Cohen gave the Campbell Memorial Lecture for the American Society for Metals. In addition he

also was asked to give several lectures in Sweden, Norway, Holland and England.

The high level of sponsored research under the supervision of Department staff members continued during the year. Programs sponsored through the Division of Industrial Cooperation included continuation of three classified research programs for the Atomic Energy Commission for which the annual budgets total approximately \$1,092,000. Nonconfidential D. I. C. programs sponsored both by government and industry aggregated \$575,659. In addition grants-in-aid and fellowships for Department research totalled \$136,016. With the exception of confidential work for the Atomic Energy Commission, all research programs are integrated with graduate instruction. Insofar as possible the practice is therefore to staff the projects with graduate students appointed as research assistants or research associates. During the year the great majority of graduate students of the Department held such appointments or industrial fellowships.

The demand for admission of foreign graduate students in Metallurgy continues very high and many excellent candidates must be rejected. During the year approximately 15 per cent of the graduate enrollment was of foreign students from New Zealand, Java, China, South Africa, Finland, Mexico, Turkey, Sweden, Spain, England, Italy and India, with no more than two from any one country.

In order to handle the increased numbers of students it has been necessary to modernize many of the laboratories and to adjust the experimental work given in connection with undergraduate subjects. These changes are practically complete except in the metal processing laboratories where it will be necessary to expend considerable money in a complete revision and modernization of the undergraduate instruction. Plans for the changes which have been under the supervision of Professor Wulff are complete, and it is hoped that his program can be put into effect in the near future.

JOHN CHIPMAN

METEOROLOGY

The number of graduate students in meteorology has continued to remain at or slightly above the established quota.

For the first time the number of undergraduates in meteorology was approximately equal to the number of graduate students. The total number of students registered in the spring term was 71. Although a few more undergraduate students could be accommodated without increasing the staff or space, the present number is considered to be very satisfactory from a pedagogical standpoint.

No major changes have been made in the subjects of instruction although the content of the subjects is continually revised to keep pace with the results of the greatly accelerated research effort in meteorology in this country. Our own research program is relatively large and varied, as indicated below, and has a stimulating effect on the teaching program. All members of the instructing staff are actively engaged in one or more lines of research.

In common with many other technical fields, employment opportunities are not as abundant as during the past few years but all graduates have been placed. The high standards of performance of previous graduates have been an important factor in placing recent graduates. In all cases our graduates have secured positions in the general type of work which they desired. The employment situation is now stabilized, barring a marked change in the economic situation, and placement in the future should be no more difficult than it was during the past year.

The well-rounded research program of the Department has continued at about the same level as last year. There were six major projects, all of which were supported by agencies of the Federal Government. In addition, members of the staff were engaged in a number of smaller researches of particular interest to the individual concerned. None of the research projects are classified so that the results may be immediately passed on to the students. In addition, most of the graduate students are active participants in one or another of the research programs.

The largest research project in terms of funds and manpower is the Weather Radar Research. This project operates under a contract with the Signal Corps, Department of the Army, and is under the direction of Mr. Alan C. Bemis. The object of the research is the exploration of atmospheric phenomena by means of radar. The project operates radar systems on wave lengths

of three and ten centimeters and the Air Force has supplied an airplane and crew. This aircraft has been equipped with special instrumentation and is used to make coordinated measurements in the region of the atmosphere from which the radar return is received. The project aircraft was damaged beyond repair in a landing accident in September. Fortunately there were no injuries to personnel. The task of removing, reconditioning and installing the equipment in another aircraft caused a delay of nearly six months in the program of airborne measurements. Ground radar observations were made on interesting weather situations throughout the year. This portion of the program received considerable impetus from the acquisition of a new radar system, specially designed for weather observations. The project now has a file of over 25,000 feet of 35-milimeter time lapse motion pictures of radar weather echoes.

New and improved instrumentation has been developed for making quantitative measurements both of the radar return and of atmospheric parameters from the plane. Much valuable and hitherto unavailable data have been collected. Many studies have been made on the basis of these data which have led to new knowledge of the detailed structure of weather systems. It has been demonstrated that radar is an exceedingly valuable new tool both for the practicing and for the research meteorologist. Radar has many unique advantages, one of which is its ability to make nearly instantaneous and continuous observations of a relatively large volume of the atmosphere whereas conventional free air observations are isolated in space and time. Because of the limited range and inability to "see" all types of atmospheric processes, radar will not replace more conventional meteorological measurements.

One of the fundamental problems of meteorology, the causes and prediction of changes in atmospheric pressure patterns, is being studied by a research group under the direction of Professors James M. Austin and Thomas F. Malone. This was the third year of this project which is supported by the Office of Naval Research. All methods of weather forecasting depend to a considerable extent on the prediction of changes in the pressure pattern. Knowledge gained in this research program has clarified the relation between pressure patterns and the distribution of wind currents, both horizontal and vertical.

Some of these results already have been applied to weather forecasting and it is expected that there will be many more results of practical importance in the future.

The general circulation of the atmosphere has been the subject of an investigation conducted under the supervision of Professor Victor P. Starr. This study is supported by a contract with the Department of the Air Force. Knowledge of the general or large-scale wind systems of the earth and their variability is basic to improvements in long-range forecasting. Major emphasis has been given to a study of the angular momentum balance of the atmosphere. Some highly gratifying results have been obtained for periods covering one month and it is planned to continue the work so as to cover an entire winter season. It has been apparent that a parallel study of the formation and flow of various types of energy should be made. Preliminary results of such a study are very encouraging and this work will receive increasing emphasis in the future.

The joint Weather Bureau-M. I. T. research program on extended forecasting has made steady progress under the direction of Professor Hurd C. Willett. The results of this research are utilized by the Five-Day Forecast Section of the Weather Bureau to improve the forecasts issued to the public. It has long been believed that the circulation patterns of the Southern Hemisphere are simpler than those of the Northern Hemisphere but no weather maps of the entire Southern Hemisphere have been available. During and since the war many new observing stations have been established and it was felt that an attempt should be made to construct a series of weather maps for the Southern Hemisphere. This effort was started during the year with the cooperation of many individuals and governments who send us the data. The results are encouraging in spite of many gaps in observations over the vast ocean areas. It is hoped that study of these maps will reveal important factors affecting the general circulation which are obscured by the effects of the large land masses of the Northern Hemisphere.

A new project on turbulence and diffusion in the lower layers of the atmosphere was started at the Round Hill Field Station. This project is supported by a contract with the Department of the Air Force and is under the general supervision of Professor Henry G. Houghton. The work is conducted at Round

Hill by a resident staff headed by Dr. E. Wendell Hewson. Round Hill is an ideal site for such research which could not be conducted in Cambridge. The project is studying the diffusion of smoke and similar suspensoids as a function of the detailed meteorological conditions. In addition to military applications the results of this project will be of value in connection with the problem of industrial pollution of the atmosphere.

A research project directed to the improvement of the hygrometric element of the radiosonde was brought to a successful conclusion under the direction of Professor Delbar P. Keily. This work was supported by the General Electric Company as a subcontract under their contract with the Navy Department. An improved hygrometric element was developed which is now being incorporated into the radiosonde by the General Electric Company.

Staff members have continued their activity on committees of Federal agencies and scientific societies. Professors Willett and Houghton served on a panel of the Research and Development Board and on a committee of the American Meteorological Society charged with planning a major publication to be called the Compendium of Meteorology. Professor Malone served as Chairman of the Committee on Admissions of the American Meteorological Society and has been appointed Editor of the Compendium of Meteorology. Professor Houghton served on the Scientific Advisory Board of the Air Force, on a subcommittee of the National Advisory Committee for Aeronautics and on the Contract Committee, the Nomination Committee, and the Council of the American Meteorological Society.

HENRY G. HOUGHTON

ROUND HILL FIELD STATION

The Round Hill estate of the late Colonel Edward H. R. Green located in South Dartmouth, Massachusetts was presented to the Institute on July 1, 1948 by Mrs. Matthew Astor Wilks, the sister of Colonel E. H. R. Green. The estate consists of 277 acres of land lying on the west shore of Buzzards Bay about six miles south of New Bedford. There are a large stone mansion, several smaller dwellings and a number of miscellaneous buildings. A portion of the estate was once a private airport. There are also a wooded area, open fields, cultivated

land and a salt marsh. The beach is one of the finest in southeastern Massachusetts.

Round Hill is not entirely new to the Institute. Over twenty years ago, during Colonel Green's lifetime, the Department of Electrical Engineering started a Communications Experiment Station there under the supervision of Professor Edward L. Bowles. Pioneer work on radio wave propagation, the use of sputtered thermocouples for sound wave detection, the transmission of light in fog and the local dissipation of natural fog were carried on at Round Hill over a ten-year period. The first large Van de Graaff electrostatic generator was designed, constructed and operated at Round Hill.

During the first year of ownership by the Institute an effort has been made to put many of the buildings in usable condition. These buildings were unoccupied for twelve years, a span which included the two disastrous hurricanes of 1938 and 1944. One of the houses has been turned over to the Technology Christian Association to replace Tech Cabin. This house is used by student groups for week-end outings throughout the year. Faculty members have been privileged to use the house during the week-day periods throughout the summer.

A research project has been established at Round Hill by the Meteorology Department. A fireproof building which originally housed a radio broadcasting station has been converted into a laboratory and a machine shop has been set up in a building previously used as a laundry. The resident staff of four research men and their families is housed in small dwellings on the estate.

It is hoped that additional research and other activities will be established at Round Hill in the future. The natural facilities of the site include ample space, clean air and immediate access to the ocean, none of which are available in Cambridge. It is believed that it should be used for projects which require this type of environment rather than attempting to construct facilities for the type of work now carried on in Cambridge.

HENRY G. HOUGHTON

MILITARY SCIENCE AND TACTICS

In addition to the basic freshman and sophomore Reserve Officers' Training Corps instruction, the Military Science De-

partment now offers advanced courses in the Air Force, Army Security Agency, Chemical Corps, Corps of Engineers, Ordnance Department, Quartermaster Corps, and the Signal Corps. Enrollment in the Department increased to 476 freshmen and 409 sophomores, making a total of 885 students enrolled in the basic course. A total of 198 juniors and 64 seniors were enrolled in the advanced course. During the academic year, 52 students were commissioned second lieutenants in the Organized Reserve Corps of the Department of the Army, and 17 students received similar commissions in the Department of the Air Force. A total of approximately 15 graduates of the advanced course are now on active duty as second lieutenants as a result of Section 7 of the Selective Service Act of 1948.

Those students in the basic course of Military Science who signed a draft agreement under the provisions of the Selective Service Act of 1948 were given draft deferments until graduation. Upon graduation, those who received draft deferments may be required to serve on active duty with the Army or the Air Force as second lieutenants for a period of two years. The present policy of the Departments of the Army and Air Force is not to call any additional Reserve Officers' Training Corps graduates to active duty; however, under the terms of the Act, compulsory active duty may be reinstated at any time that the National Military Establishment sees fit to do so.

During the academic year, Lieutenant Colonel Kenneth W. Holbert was transferred to the First Air Force, while Major Thomas U. Lineham, Jr., assumed charge of the Air Force Unit. Captain Lyman R. Blake and Captain Philip B. Anderson were assigned to the Air Force unit, arriving in September and October, 1948, respectively. Captain William Bell, III, arrived in September, 1948, to assist Lieutenant Colonel Fitzpatrick in the Chemical Corps unit. With the discontinuance of the Artillery unit, Major John C. Bolton was transferred to Puerto Rico.

The Department has continued to sponsor the activities of the Massachusetts Institute of Technology Chapters of Pershing Rifles and Scabbard and Blade. These national honorary military societies have served to promote the mutual interests of the Department and the Reserve Officers' Training Corps students in the basic and advanced courses.

HAROLD R. JACKSON

NAVAL ARCHITECTURE AND MARINE ENGINEERING

The major activity of this department continues to be the education in the Graduate School of young naval officers in naval architecture and marine engineering and the closely allied specialties of electrical and Diesel engineering. These specialties are handled as majors in a common basic course in naval construction, all of the work being tailored to the needs and desires of the Bureau of Ships of the Navy Department. That Bureau in furthering this work furnishes a great volume of data on the Bureau's current technical practices and also furnishes the services of two active duty naval officers as professors. One officer is trained and experienced as a naval architect and is assigned for full time. The other officer is trained and experienced as a naval engineer and is available for part-time duty.

The U. S. Coast Guard has continued to send young officers to take selected majors in the Navy course. The young coast guard officers are all graduates of the U. S. Coast Guard Academy at New London and are successfully absorbed in the classes with the naval officers, who come in the main from the U. S. Naval Academy but include in recent classes a number from the civilian universities and engineering schools.

Beginning with the class which graduated in June, 1949, these young officers are candidates for the newly approved professional degree of Naval Engineer (Nav.E.). All of the 37 officers of the 1949 class qualified for and received their professional degrees.

Since a great deal of the material furnished for these Navy courses is classified as to its security, many of the subjects given are restricted to officers of the U. S. Navy and of the U. S. Coast Guard, unless special clearances are obtained for others. On this basis we now have four officers of the Brazilian Navy and approval has been granted for one Canadian officer to take the course.

There has been a continued gradual increase in the enrollment of civilian graduate students. As a result, new fields and new possibilities for advanced study and research have opened up.

The enrollment in the undergraduate courses in Naval Architecture and Marine Engineering, as well as Marine Transportation, has held up and promises to increase as the new facilities become available.

The major event of the year for this department has been the decision to proceed with the Hydrodynamics Laboratory in which will be incorporated a small ship model towing tank. This is a project which has been under discussion almost since the department was started in 1895, and it has been a growing necessity for the past 30 years. Active plans and preparations for operating the towing tank are under way so that the benefits of its availability can be gained as early as possible. It is intended initially to concentrate on calibration and adjustment of the instrumentation, then to undertake academic work, and, finally, to broaden out into research and specific design testing when and as the industry may require it.

Another event of importance to the department was the reassignment of the Francis Russell Hart Nautical Museum to the direct custody of this department with an appropriation of funds for its redecoration and rearrangement. This work was completed with the assistance of the Department of Architecture in time to reopen for the Mid-Century Convocation. Having a modest but creditable museum to foster interest and illustrate evolution and current trends in shipbuilding is of great value to the teaching effort in professional subjects.

Captain Everett E. Mann, United States Navy, Professor of Naval Engineering, resigned as of June 30, 1949, because of official orders from the Navy Department to duty elsewhere. Commander Ernest C. Holtzworth, United States Navy, Professor of Naval Construction, also resigned as of the same date and for the same reason. They have been replaced by Captain Guy Chadwick, United States Navy, and Captain James M. Farrin, United States Navy, respectively, who will maintain the same high standards of teaching and leadership.

Mr. Martin A. Abkowitz, M.A., a graduate of this department, class of 1940, was appointed as an Assistant Professor of Naval Architecture as of July 1, 1949. He came from the David Taylor Model Basin at Carderock, Maryland, where he has been working on the hydrodynamic problems of ship propulsion. He will be assigned primarily to the operation of our new towing tank.

Mr. Gibbs W. Sherrill, B.A., Yale University, class of 1931, was appointed as Assistant Professor of Marine Transportation as of November 1, 1948. His training and experience have been

in Steamship Management. His appointment permits us to cover that specialized phase of marine transportation and will also permit the introduction of a new subject, "Cargoes in World Trade," which will be needed as a replacement for corresponding material which has been given in another department in specialized form.

A number of guest lecturers have spoken to the classes in Course XIII-A, each of them an outstanding expert in his field. Many of these lecturers came from the Navy Department and through the courtesy of the Bureau of Ships.

Due to the fact that refrigeration is becoming increasingly important in marine transportation, arrangements have been made to cover this field more thoroughly in the course in Marine Transportation.

Following the presently approved program for Marine Transportation (Course XIII-C) six students were sent out in June, 1949, for their required year of actual service at sea. This is the first large group to go to sea since this part of the course had to be suspended due to the war. The steamship companies have been very cooperative in arranging for this important phase of the curriculum.

A considerable increase in the space allocated to this department has been made to become effective as other activities move into the new Hayden Memorial Library building. This will permit very much better arrangements for the large student-officer classes centering all of their work around the plan vault on the third floor. They will be housed in three drawing rooms each large enough to accommodate a whole class. It further provides adequate and suitable space for the civilian graduate students and for the undergraduates also.

The ship model shop will also be moderately increased to permit the building of models for the new towing tank.

The undergraduate technical societies, Society of Naval Architecture and Marine Engineering for Course XIII and the Propeller Club, Port of Technology, for Course XIII-C, were both active during the year. They held both independent and joint meetings with outside speakers. Faculty Advisers have been appointed for them, but the students handle all the business themselves.

EDWARD L. COCHRANE

SCHOOL OF SCIENCE

BIOLOGY

The general trends in the undergraduate teaching program noted in last year's report have continued. Attention is being given to methods of informing eligible students around the country of the unique nature of our undergraduate program. Enrollment of out-of-course students has further increased, indicating a growing interest of the Institute student body in biophysics and biochemistry. At the suggestion of the Visiting Committee, the staff is now considering the introduction of a one-term survey course of principles of biology as an elective for all M. I. T. students.

The graduate enrollment continues to tax the present facilities of the department despite increasingly restrictive requirements for admission. The number of postdoctoral medical fellows has further increased (13 are now in residence). These fellows are relatively mature workers; they contribute importantly to the research program and are a source of stimulation to staff and students. Limitations of space and of staff prevent increasing the number of such fellows for the present.

To provide additional electives for advanced students, new subjects were given on the following topics: Biological Effects of Radiation, Tissue Ultra-structure, X-ray Diffraction in Biology, Enzymology, and Plant Physiology. It is expected that further additions will be made in the coming year.

Dr. W. Farnsworth Loomis was appointed Assistant Professor of Cytology to succeed Professor H. Stanley Bennett, who resigned. There has been some increase in the number of nonacademic professional staff, necessitated by the expanding research program.

The scope and tempo of the research program have been increased considerably. Stronger emphasis on the chemical aspects may be noted. Professor W. Farnsworth Loomis has been studying phosphorylation reactions in colloidal particles isolated from living cells. Professor David F. Waugh has continued his studies of the colloidal properties of insulin and the results promise to be of considerable industrial as well as aca-

demic interest. Professor Irwin W. Sizer's group has made detailed studies of the action of oxidases on proteins, enzymes and antibodies (including Rh antibodies). The chemistry and certain clinical aspects of ascorbic acid and related compounds have been investigated by Professor Bernard S. Gould, who has also collaborated with Professor George T. Johnson in studying microbiological pigments.

In the program on the molecular constitution of cellular constituents, Professor Richard S. Bear's X-ray studies have disclosed the basic nature of the colloidal organization of the fibrous protein collagen. Professor Cecil E. Hall has made important contributions to the structure of other proteins (fibrinogen, edestin); he made an extended tour of all important European electron microscope centers during the summer. Professor Francis O. Schmitt has been concerned chiefly with the structure of nerve fibers and with the alteration of a structure by virus (poliomyelitis) infection; an enlarged program on the protein chemistry of nerve has been initiated.

Professor John R. Loofbourow and associates have studied the low-temperature absorption spectra of a large number of organic compounds and have developed new methods for microspectroscopy.

A five-year program for the special training of Baruch Fellows in physical medicine, conducted with great success by Professor Kurt S. Lion, has been concluded; further fellows in this field will take the regular subjects offered by the department. Professor Lion's most recent research is concerned with a new type of radiation detector.

In addition to the sponsors mentioned in last year's report, the following have contributed generous support during the present year: United States Public Health Service, Trustees of the wills of Charles A. King and Marjorie King, Pepsodent Division of Lever Brothers, Inc., and Corn Industries Research Fund.

The Department's Planning Committee, under Professor Richard S. Bear, has devoted much effort to the design of a modern laboratory of physical and chemical biology. These plans are now fairly definitive and only await receipt of sufficient funds to meet the Department's primary need, additional space and facilities.

FRANCIS O. SCHMITT

CHEMISTRY

A recent change in the undergraduate curriculum has consisted in removal of the requirement that Chemistry majors register for Qualitative Analysis (5.10) during Summer Session. The subject may be taken during the summer at the option of the student, but the curriculum has been revised so that Qualitative Analysis is offered during the first semester and Quantitative Analysis during the second semester of the Sophomore year. This change reduces the expense for Chemistry majors of attendance at a Summer Session, and places all of the required subjects in the four regular academic years.

The Junior Physical Chemistry Laboratory has been moved to the new laboratory remodeled especially for use in the course, which will now be under the supervision of Professor Isadore Amdur and Dr. George L. Zimmerman. Professor Gerhard Dietrichson, who formerly was in charge of the subject, has retired and will continue research with the status of Lecturer.

A major change in the graduate curriculum has consisted of the formation of a course of study and research leading to the degree of Doctor of Philosophy in Analytical Chemistry. This program has been organized under the leadership of Professors David N. Hume, Lockhart B. Rogers, Stephen G. Simpson and Ralph C. Young. This reorganization places the field of Analytical Chemistry (including both Inorganic and Organic) parallel with Inorganic, Organic and Physical Chemistry as a course of study for graduate students. The revision takes advantage of the particular qualifications of members of the Chemistry Department staff in the field of Analytical Chemistry and has resulted from a steadily increasing demand for men trained at the doctorate level in this field. The curriculum provides for a broad background in Inorganic, Physical, and Organic Chemistry and emphasizes both inorganic and organic aspects of Analytical Chemistry. Emphasis is placed on modern instrumental methods for chemical analysis, particularly electrical and optical. Many of the research problems under investigation in the field of Analytical Chemistry under this program are concerned with the fission and spallation elements, and the determination of organic functional groups. Recent additions to the curriculum in Analytical Chemistry include Instrumental Analysis, three lecture subjects in Advanced

Analytical Chemistry, and seminars and research conferences in Analytical Chemistry, which are held jointly with the Inorganic seminars and research conferences.

Research in the department has continued at a high level as indicated by the publications of members of the staff which are listed separately in the President's Report. The number of chemistry students seeking advanced training before entering industrial, academic, or other research or development fields, has continued to increase. This increase has been noticeable both in the group of undergraduate students, more of whom are continuing study as candidates for advanced degrees after graduation, either at the Institute or elsewhere, and in the Graduate School. During the year from July 1, 1948, to June 30, 1949, 34 men received the degree of Doctor of Philosophy in Chemistry, bringing the total number of doctoral degrees in Chemistry awarded at the Institute since 1908 to 362.

ARTHUR C. COPE

FOOD TECHNOLOGY

The year has been marked by the continuing steady increase in our student body as well as in the amount and scope of our research. For the last term we have used a classroom adjacent to our space in Building 20 which materially aided the student instruction, and enabled us to utilize our projection equipment more fully.

The research projects listed last year have been continued with various ramifications naturally incident to progress in these fields. Professor Robert S. Harris gave a paper on the use of radioactive isotopes in nutritional studies before the annual technical meeting of the Nutrition Foundation, and Professor Bernard E. Proctor gave two papers at the annual meeting of the Institute of Food Technologists covering work done by members of the Department on sterilization with high voltage cathode rays.

Through the cooperation of the Chemical Engineering Department, Dr. William C. Bauer, who has been in charge of each one of their practice schools, joined the Food Technology Department in February as Assistant Professor. Professor Bauer will give the course in Chemical Engineering-Food

Applications beginning this September. This rounds out the plan of curriculum originally laid down when the Department was started. Professor August L. Hesselschwerdt, Jr., of the Mechanical Engineering Department, who gives the course in Food Engineering, has correlated his work with that of Professor Bauer. Professor John R. Loofbourow of the Biology Department and Professor Richard C. Lord of the Chemistry Department have helped in our Spectroscopic Studies. Professor John G. Trump of the Electrical Engineering Department and Professor Robert J. Van de Graaff of the Physics Department have assisted in our cathode ray work. These men deserve our thanks. We acknowledge the continued support of our collaborators from industry and foundations in our research program.

For the first time since 1941 a short summer course in Food Technology was given for the benefit of those in industry or other institutions to broaden their perspective in food fields. While registration was limited, an excellent class of 31 from ten states and four countries attended.

WILLIAM L. CAMPBELL

GEOLOGY

With enrollment in the Department the largest in its history, more staff time had to be devoted to undergraduate teaching and to direction and supervision of graduate instruction and research. This condition will be intensified in the fall of 1949 when, for the first time since the war, the Department will have a full quota of undergraduates in each of the three classes and a near quota enrollment of graduate students.

The most important change in our teaching program has been the introduction of a two-month course of instruction at our recently established field camp at Crystal Manor, Antigonish, Nova Scotia. This program makes it possible for geology undergraduates to get practical field instruction under optimum conditions. The first summer's operation of the camp was outstandingly successful and the camp is fully booked up for the summer of 1949 when we expect to have approximately 25 students in residence. Only undergraduate instruction was given this year, but it is planned to offer opportunities for graduate field investigations during the coming summer.

Professor Walter L. Whitehead served as director of the camp and was assisted by Professor Roland D. Parks, who had direct charge of the instruction in geological surveying.

A significant change in our research program is the increasing emphasis that is being placed on the quantitative approach to geological problems. This emphasis is being applied especially in our several advanced seminars and research projects. The unusual opportunities offered by our well-equipped laboratories are attracting graduate students who are interested in experimental work more than in the older field disciplines, and we are encouraging this kind of research.

A vigorous and extensive program of spectrographic research on both major and minor rock constituents was commenced during the year under a grant from the Office of Naval Research to Professor Harold W. Fairbairn. The analytical work is under the supervision of Dr. Louis H. Ahrens, Research Associate. A number of our graduate students have been trained in spectrographic techniques by Dr. Ahrens, and several doctorate theses are in preparation or have been completed. Dr. Ahrens is also preparing a book, "Spectrochemical Analysis," which will be extremely useful to analysis in this field.

The investigation of the origin of petroleum sponsored by the American Petroleum Institute and supervised by Professor Walter L. Whitehead continued for the seventh year. Of unusual interest was the discovery that certain organic substances isolated from marine muds crack at temperatures as low as 100° C. to yield hydrocarbons of the type known to be present in petroleum. The bearing of this discovery on the formation of petroleum is being actively investigated in our chemical laboratories.

Professor Patrick M. Hurley continued his investigation of age determination of ores and rocks by the helium method and obtained significant results that will soon be published. He expects to continue this program next year extending it to cores of bottom sediments that have recently been taken from the Gulf of Mexico.

Two books written by members of the staff were published during the year. *Sequence in Layered Rocks*, a comprehensive field and reference work written by Professor Robert R. Shrock,

was published in July; later in the year, a revised and enlarged edition of the original Baxter & Parks, *Mine Examination and Evaluation of Mineral Property* appeared. Professor Walter L. Whitehead collaborated with Professor Parks on a new section entitled "Evaluation of Oil Property." Professor Parks also contributed a chapter on "Source Material for Nuclear Power" for the volume *The Science and Engineering of Nuclear Power* under the editorship of Professor Clark Goodman of the Department of Physics.

Professor Harold W. Fairbairn attended the International Geological Conference in London during the summer. A completely revised edition of his *Structural Petrology of Deformed Rocks* is now in press. He is continuing for a fourth year the rock deformation studies sponsored by a grant from the Geological Society of America.

Several important staff changes were made during the year. Professor Warren J. Mead, Head of the Department since July, 1934, reached retirement age and was appointed Lecturer. He will continue to give certain of his special subjects during the school year 1949-1950.

Professor Martin J. Buerger was on leave during the fall term while serving as Visiting Professor of Crystallography in the Faculdade Nacional de Filosofia, Universidade do Brasil, Rio de Janeiro. In addition, he gave several public lectures and seminars at Sao Paulo. During the spring term, he delivered special lectures on crystallography to six different academic and industrial groups.

Professor Robert R. Shrock served as Visiting Lecturer in Paleontology at Harvard during the school year 1948-1949. Professor John N. Adkins was on leave during the entire year while serving as Chairman of the Geophysics Branch of the Office of Naval Research and after April 1 as Director of the Earth Sciences Division of the same office in Washington. He will continue his leave and serve in the latter capacity for the coming year.

Mr. James B. Thompson, Jr., Instructor in Mineralogy, resigned to accept a position as Instructor in Petrology at Harvard University, and Dr. William H. Dennen, 1949 graduate from our Department, has been appointed Instructor in Mineralogy for the next school year.

ROBERT R. SHROCK

MATHEMATICS

Registration in mathematics subjects averaged more than 2,500 students in approximately 100 sections during each of the two semesters, fall and spring. About one-third of the sections were in subjects at the third and fourth year and graduate levels. The new Course XVIII undergraduate curriculum introduced last year has generally been considered satisfactory. A few additional changes were made during the year to allow greater choice on the part of the students and, in particular, to afford those students interested in applied mathematics the opportunity of starting their work in this direction at an earlier stage. During the spring semester 12 students took the general examination for the doctorate in mathematics. This was the largest group to take the examination in any one semester.

At the beginning of the fall semester the Department opened a Common Room for mathematics staff and graduate students. The Common Room was used for many informal conferences and for various teas which the Department held. It was also used to hold meetings of graduate students and staff for the purpose of discussing the graduate program and other aspects of graduate work. These meetings proved to be helpful to the Department and it is planned to hold similar ones each year.

In July the Institute, through the Department, was host to the Second Annual Symposium on Applied Mathematics of the American Mathematical Society. The Symposium was cosponsored by the American Institute of Electrical Engineers, the American Institute of Physics and the Institute of Radio Engineers. The general subject of the Symposium was Electromagnetic Theory. Seventeen invited papers were presented. The planning of the Symposium was greatly aided by the counsel and work of Professor Julius A. Stratton of the Department of Physics. The hospitality and housing arrangements were handled efficiently and pleasantly by a departmental committee under the chairmanship of Professor Raymond D. Douglass.

The lecture series in mathematics, attended by staff and students from the Institute and from neighboring institutions, continued to be stimulating. The lecturers during the year were Professors S. S. Chern, Deane Montgomery, and Carl L. Siegel of the Institute for Advanced Study, and Professor Børge Jessen of the University of Copenhagen. Professor

Ralph P. Boas, Jr., Executive Editor of Mathematical Reviews, was Visiting Lecturer during the year and Professor Wouter van der Kulk of Brown University was Visiting Lecturer during the spring semester. Dr. Arturo Rosenblueth of the National Institute of Cardiology of Mexico City spent the fall semester with the Department in order to continue the work which he and Professor Norbert Wiener are pursuing.

Three members of the Department, Professors Warren Ambrose, Norman Levinson and Henry Wallman, were on leave during the year. During the summer of 1948 Professor Ambrose served as Visiting Professor of Mathematics at the University of Brazil under the auspices of the United States Department of State. Professor Ambrose spent the remainder of the year at the Institute for Advanced Study on a Guggenheim Fellowship. Professor Levinson spent the year at the University of Copenhagen, also on a Guggenheim Fellowship. Professor Wallman is spending two years as Visiting Professor in the Electrical Engineering Department of the Chalmers Institute of Technology in Gothenburg, Sweden.

The Department had two research projects sponsored by the National Advisory Committee for Aeronautics. One, under the supervision of Professor Chia-Chiao Lin, is on the theory of flow behind shocks, and one is on nonsteady aerodynamics under the supervision of Professor Eric Reissner. Professor Reissner was also in charge of a project on the theory of elastic shells sponsored by the Office of Naval Research. Professor Philip Franklin continued his work with Project Whirlwind. Professor George P. Wadsworth continued as Project Director for the Operations Evaluation Group, assigned to the office of Chief of Naval Operations, and also continued a project sponsored by the Geophysical Research Directorate of the Army Air Force on the development of statistical methods for use in weather forecasting.

During July Professor Lin was in residence at the Langley Field Laboratory of the National Advisory Committee of Aeronautics. During this time he gave a series of lectures on supersonic aerodynamics. In 1949 he was appointed a member of this Committee's sub-committee on fluid dynamics. Professor William T. Martin was elected Vice-President of the American Mathematical Society and served on the committee on post-

doctoral fellowships of the Division of Mathematical and Physical Sciences of the National Research Council. Professor Reissner was appointed the representative of the American Mathematical Society on the United States Committee for Theoretical and Applied Mechanics. Professor Raphael Salem requested a change in his status whereby he will be in residence at the Institute only during the fall semester of each year. During the spring semester of the year he again lectured at the Sorbonne.

Among the books published by members of the Department during the year two of very general interest were Professor Norbert Wiener's *Cybernetics* and Professor Dirk J. Struik's *Yankee Science in the Making*. Both received highly favorable reviews. One of the many recognitions of Professor Wiener's work on cybernetics was the Lord and Taylor American Design Award. This award, which carries with it a cash prize of one thousand dollars, honors the development of significant new concepts.

In the course of the year various members of the Department gave invited lectures in this country and abroad. In particular, Professor Wiener spoke at a large number of universities and at meetings of scientific and learned societies.

WILLIAM T. MARTIN

PHYSICS

During the year the approach to a steady postwar state, which was noted during the year 1947-1948, continued in a more marked way with few unusual occurrences. The one remaining portion of the curriculum, the graduate subjects, which had not been rearranged since the war, were examined in detail and a fundamental revision was made to take effect in the year 1949-1950. This included not only a rearrangement and renumbering of existing subjects, but the addition of a number of new subjects in various fields of special interests of the staff members. The expanded program of research since the war has led to enlarged interest in many fields, among both staff and students, and the new graduate subjects reflect this increased interest. Among these new fields of study we may mention low-temperature physics, taught by Professor Arnold

Herlin (promoted to Assistant Professor during the year); microwave physics, to be taught first during 1949-1950 by Professor Malcom W. P. Strandberg; a new subject in nuclear physics, to be conducted on a graduate seminar level during 1949-1950 by a number of senior staff members under the direction of Professor Jerrold R. Zacharias; and a new series of subjects in the properties of matter, principally the solid state, intended as much for students of metallurgy, chemistry, and other fields as for students of physics, to be offered during 1949-1950 by Professor John C. Slater.

Several of these subjects are in those fields of physics other than nuclear physics, and they represent a determined effort to strengthen these nonnuclear fields of interest. In many physics departments in the country, interest is centered almost wholly in the field of nuclear physics, where currently the most exciting discoveries are being made. In this way some of the most important branches of physics from a practical point of view, such as solid-state and low-temperature physics, electronics, microwaves, acoustics, optics, X-ray crystal structures, and many other fields, are being widely neglected, and many more openings exist for students trained in these fields, both in industry, government laboratories, and academic life, than can be filled by students now being trained. The Institute has always felt it essential to keep a proper balance of interest between nuclear and nonnuclear physics, and the new subjects of instruction now being added, coupled with the orientation of the research program, emphasize this trend even more than before. The influence of these changes extends even into the undergraduate years, through certain subjects which can be taken as senior electives, and through the senior theses, which have now been reinstated after the lapse of the war years.

The revision of the undergraduate curriculum of Course VIII planned during the preceding year was put into effect during 1948-1949 and proceeded smoothly, achieving the improvements in undergraduate instruction which had been expected of it.

The research program of the department, largely in a formative stage during the preceding postwar years, is beginning to lead to results of scientific importance. It would take too long to enumerate all the interesting results obtained during

the year, but a few may be mentioned. The annular magnetic analyzer for investigating the products of reactions of light nuclei, which had been started before the war for use with the two-million electron volt Van de Graaff generator, was put into operation by Professor William W. Buechner, and has already led to a mass of new data on nuclear reactions. With Professor M. Stanley Livingston's return from Brookhaven at the beginning of the year, the redesign of the cyclotron to permit using the emergent beam for nuclear experiments was completed, and during the last months of the year 1948-1949 this equipment has begun turning out results on nuclear energy levels which promise to add very greatly to our knowledge of nuclear physics; the Institute now possesses practically unique equipment in these fields, operating at maximum capacity to lead to new information. The cosmic ray and molecular beams groups have continued to get valuable results; the molecular beams group under Professor Zacharias and nuclear resonance under Professor Francis Bitter have led to increased accuracy in the measurement and intercomparison of nuclear magnetic moments, which in conjunction with similar results at Columbia University and elsewhere have led to new understanding of quantum electrodynamics, a project in which the theoretical group under Professors Weisskopf and Feshbach has made important contributions. The microwave gas discharge group under Professor Brown has been achieving for the first time an exact quantitative correlation between theory and experiment in the very difficult problem of gas discharges. The low temperature group under Professor Herlin has carried the measurement of the velocity of second sound in helium to lower temperatures than previously attained, answering certain previously unsolved theoretical questions regarding the nature of liquid helium. The spectroscopy laboratory, under Dean Harrison, was put into full-scale operation during the year with the collaboration of Dr. Van den Bosch, a visitor from Holland, and turned out many valuable spectrograms of the heavy elements, enough to keep the theoretical spectroscopists busy for a long time in sorting out the lines. The X-ray group under Professor Bertram E. Warren developed a new method of analyzing distorted and cold-worked materials by X-ray methods, which promises to lead to valuable new knowledge about properties

of great practical importance, previously not susceptible to X-ray techniques. All these advances and many more represent contributions to science after a postwar period devoted mainly to the construction of new equipment. This trend is likely to become even more striking in the next year or two, when a number of other pieces of apparatus still in the construction stage, such as the synchrotron, 12-million electron volt Van de Graaff generator, linear accelerator, and several other important installations, begin producing scientific results.

The program of the cosmic ray group in Colorado has been greatly stimulated during the year by the increasing collaboration of several universities in supporting a laboratory in the mountains, and particularly by a grant from the Research Corporation providing for living quarters at the site. The Institute now has members of the group in residence in Colorado all the time, and increasingly important results are constantly coming from this work.

Many staff members participated in scientific meetings and engaged in outside lecturing during the year; particularly worthy of note was Professor Martin Deutsch's sojourn in Sweden during the fall term, at the initiative of Professor Siegbahn of Stockholm.

The Department was host to a number of scientific conferences during the year. Among these were the Conference on Physical Electronics, which was held as usual in March, and an International Conference on the Physics of Very Low Temperatures, held in September, 1949.

As already mentioned, Professor Livingston returned from his leave of absence at Brookhaven at the beginning of the year. Professor Philip M. Morse hoped to return in the middle of the year, having completed his term as director of the Brookhaven National Laboratory. He had to ask for leave of absence again to undertake an important assignment in Washington, but he has had time for some work at the Institute. Professor Robert J. Van de Graaff unfortunately was absent through illness during the larger part of the year.

The administrative load of conducting the department has grown so much during the postwar years that it was finally decided that it would be wise to appoint an executive officer. Consequently Professor Nathaniel H. Frank, who has had long

experience in the running of the department, was named to this post and commenced his duties during the year. He relinquished his position as graduate registration officer, which he held for several years, to Professor Morse, who had held it before the war.

JOHN C. SLATER

SCHOOL OF ARCHITECTURE AND PLANNING

ARCHITECTURE

During the past academic year the Department awarded 23 undergraduate degrees. This number is about the desired annual turnover for the enrollment that has been set as normal for our space and staff. This first full graduating class since the war is composed almost entirely of men whose architectural education began here after demobilization. The opportunity presents itself of comparing the present attitudes and skills of this group with the standard our teaching organization is intended to develop. This comparison, together with other observations, should guide us in improving our procedures.

The superb technological diversity of the Institute provides meaty content for a curriculum in architecture, but the assimilation of this material and its firm relation to the work in design continues to be a central problem in the coordination of our program. Among all of the engineering fields involved, the work in architectural acoustics has had the most striking success in its effect on student approach to design problems. The idea has really been implanted that acoustical design is part of the basic concept of space enclosure and is not to be sought by applied correctives. A comparably imaginative treatment is needed in connection with problems involving structures, materials, thermal design, sanitary and electrical facilities, site engineering, and lighting. This is primarily a problem in coordination as the Institute is better equipped in these fields than other schools.

Our students need a firmer sense of their place in the world and of how the world and art forms are changing. No doubt the treatment of history in our curriculum is too little and too late. It needs to be strengthened with more of the type of scholarship that is interested in the past as it provided roots for the present. Some work in this area needs to be introduced in the second or third year.

The curriculum has developed over the years to include the real building problems that confront architects, and a course

in architecture is much less ivory tower than it was formerly. There is less time, however, for the development of that type of facility in drawing that comes, like touch on a musical instrument, only with constant practice. Teachers are frequently disturbed by evidences of ineptitude in architectural drawing. Whether or not a change in curriculum is needed to meet this deficiency is a matter of opinion. Some feel that the student who is interested in virtuosity can acquire it in the present framework of subjects if the teachers use proper emphasis.

The components of architectural education are cemented together in the courses in architectural design, and the Department has an able staff of senior critics and young assistants and a remarkably effective public forum in the open jury. In this work which extends over four years of the student's time, there is yet to be developed a real subject-matter organization. Such an organization may be achieved when the present teaching group has worked together over a period of time. It needs to be sufficiently flexible to allow the instructors initiative in the exposition of their ideas, yet tangible enough to convey to the student a sense of professional order and completeness within the area of common agreement.

The design teaching was enriched by the assistance of Mr. Erik C. Sorenson, a recent graduate of the Royal Academy of Fine Arts in Copenhagen who came to the United States for travel and study. Mr. Sorenson's interest in comparing education in the two countries led to suggestions for exchanging teachers, and correspondence has been conducted with the Academy in the effort to make such arrangements.

Professor Kevin A. Lynch, who teaches in both Architecture and City Planning, has been asked to develop situations for collaborative study by students of the two departments. It is felt that recognition of the separateness of the two professions should not be permitted to become a barrier between them, and that practice in joint solution of problems must be maintained.

Several staff members have made significant efforts outside of teaching duties. Among these the most conspicuous is the work of Professor Herbert L. Beckwith in the preparation for the Mid-Century Convocation.

Professor Beckwith has also continued his work as member

of an Institute committee for the study of improvement in methods of artificial lighting. One of the first designs by this committee is now in factory production and has been selected for use in the relighting of the drafting rooms in architecture and civil engineering.

LAWRENCE B. ANDERSON

BEMIS FOUNDATION

During the year, the Foundation completed the research work on its survey of the prefabrication industry in this country and undertook the process of presenting its observations and conclusions. Appointed to carry out this work were Research Assistants William F. Blitzer and John F. Falkenberg, and Mr. Cyril C. Herrmann of the Department of Business and Engineering Administration. Also undertaken was a survey of foreign prefabrication concerns exporting houses in competition with American concerns. In connection with this effort, the Foundation had a number of visits and requests for information and assistance from those interested in the industrial production of houses.

The study of Westgate, the housing project built by the Institute for its married veterans, was reported in book form by the Research Center for Group Dynamics and is destined for publication in the near future. The Foundation was fortunate enough to obtain the aid of Miss Catherine Bauer and Professor Robert Kennedy in preparing a section of the study dealing with the relationship between the social sciences and the architectural and planning professions.

The Director took part in meetings of the Massachusetts Housing Council, in the Housing Research Conference held at the Pierce Foundation, in several meetings of groups interested in preparing a housing program for Israel, and in many other housing meetings. Visitors from foreign countries included the housing research directors for national agencies in Israel, Denmark, and the Union of South Africa.

The Foundation assisted a number of students in the Institute and in the Harvard Business School in the preparation of reports and theses in the field, and the Director gave occasional lectures and seminars on housing subjects.

To give assistance and guidance in the formulation of programs of research, an Advisory Committee was appointed, consisting of: Dr. Alan C. Bemis, Professor Albert G. H. Dietz, Professor W. Rupert Maclaurin, Mr. Bruce S. Old, Professor Lloyd Rodwin, and ex officio, Dean William W. Wurster and Dean John E. Burchard. This Committee met for the first time on November 17, 1948, and again on May 24, 1949. It is taking an active interest in the work of the Foundation.

BURNHAM KELLY

CITY AND REGIONAL PLANNING

The Department continued to attract a full quota of Graduate students during the past year and the total enrollment reached the highest point since Course IV-B was established in 1933. The increasing demand for well-qualified technicians in the professional field of city planning promises a continuance of the present favorable placement situation and indicates that pressure on the Department is not likely to decrease in the near future.

The number of degrees awarded in city planning is now over 100, 84 students having received the Master's degree and 23 the Bachelor's degree during the past 15 years. Alumni of Course IV-B have found positions in many of the large urban centers of the United States and in several foreign countries, a substantial number having responsible charge of the planning programs in their respective communities. Several top positions in the teaching field are held by former graduates of the Course.

No major changes in program occurred during the past year, but several staff conferences were held for the purpose of developing a closer integration of subject matter in the various subjects offered both within and outside the Department. Inter-departmental cooperation has continued at a high level and every effort is being made to take full advantage of the unusual resources available at the Institute.

Visiting lecturers during the year included Leonard Haeger, Director of the Technical Division of the Housing and Home Finance Agency; Professor R. K. Merton, Director of the Bureau of Applied Social Research at Columbia University; Professor J. T. Dunlop, Associate Professor of Labor at

Harvard University; and Professor Gordon Stephenson, Chairman of the Department of Civic Design at the University of Liverpool. Professor Stephenson, who received his Master's degree in City Planning from the Institute in 1938, spent a week in residence here during a visit to this country in October.

The teaching staff continued to broaden its activities outside the Institute. Professor Roland B. Greeley served on the Executive Committee of the United Settlements of Greater Boston and as Chairman of the Greater Boston Census Tract Committee of United Community Services. He also was elected President of the New England Chapter of the American Institute of Planners and was reappointed Managing Editor of the *Journal* of this professional society. Professor Burnham Kelly served as Secretary-Treasurer of the New England Chapter of the American Institute of Planners and both he and Professor Lloyd Rodwin continued to take an active part in the formulation of housing legislation.

Professor Frederick J. Adams was reelected President of the American Institute of Planners at its Annual Meeting in March and has continued to serve as Chairman of the Cambridge Planning Board. During a short visit to England in June he lectured at Liverpool University's Department of Civic Design and attended the Annual Meeting of the British Town Planning Institute of which his brother, James W. R. Adams, is President. He also met with a committee set up by the Ministry of Town and Country Planning to study the qualifications and training of planners.

An important addition to the staff took place in May with the appointment of John T. Howard as Associate Professor of City Planning on a part-time basis. Professor Howard, who graduated from the Institute with the degree of Master in City Planning in 1936, has served for the past seven years as Planning Director of the City Planning Commission in Cleveland, Ohio. He is a member of the Board of Governors of the American Institute of Planners and also serves on the Board of Directors of the American Society of Planning Officials. Professor Howard is taking over the direction of the Urban Redevelopment Field Station and will assist the Department in its general program of teaching and research.

FREDERICK J. ADAMS

DIVISION OF HUMANITIES

ECONOMICS AND SOCIAL SCIENCE

There have been few noteworthy changes in the teaching program of the Department during the past year. Many of our subjects have been revised and some new ones have been added. Among the latter are Comparative Political and Economic Systems, and Government and Economic Policy.

Of the 49 students enrolled in our graduate program this fall, four are candidates for the Master's degree, 40 for the doctorate, and the rest are special students. We are pleased at the high quality of these students. The fact that this program is running smoothly is attributable in large measure to the efficiency of Professor Robert L. Bishop, our graduate registration officer.

The activities of staff members covered a wide range during the past year. Professor Paul A. Samuelson as a Guggenheim Fellow spent the fall months in England and on the Continent, doing research on the economics of inflation and giving lectures at Oxford, Cambridge, and the London School of Economics. During the spring he spent some time doing research on linear programming under the direction of the Air Force project set up at the Rand Corporation. Professor Charles P. Kindleberger served as consultant, first for the E. C. A. and later for a major industrial concern on its foreign exchange problems. He continued work on a monograph dealing with the dollar shortage. Professor Harold A. Freeman has been engaged in administrative work as Vice President of the American Statistical Association and as chairman of its Program Committee. He was elected fellow of the American Society for Quality Control.

Professor Charles A. Myers became a member of the Labor Market Research Committee of the Social Science Research Council and a member of the Committee on Teaching of the Industrial Relations Council. Professor Alex Bavelas conducted an interesting investigation in teaching methods and student motivation in conjunction with a group from the M. I. T. Electrical Engineering Department. He acted as consultant to the Rand Corporation and to the American

Museum of Natural History in connection with its studies of Soviet culture. Mr. Joseph Scanlon was a member of the *Fortune* panel on the "Pursuit of Happiness" and went to England as labor member of the Anglo-American Council on Productivity sponsored by the E. C. A. and the British Government. Professor Paul Pigors received the St. Toland Memorial Fellowship for a monograph on *Effective Communication in Industry*. Professor Cary Brown has continued his study of the effect of taxes on business decisions which is being carried on in conjunction with the Harvard Business School.

Other activities of Professors Myers, Pigors, Bavelas, Shultz and Mr. Scanlon and their associates are described in the Twelfth Annual Report of the Industrial Relations Section of the Department. Of special interest was the conference on techniques of union-management cooperation sponsored by the Section, and the series of dinner meetings at which officials of contributor companies discussed industrial relations problems with graduate students and members of the staff.

The trustees of the Merrill Foundation for Advancement of Financial Knowledge awarded a grant of \$50,000 for research on innovation in the housing industry. Professor W. Rupert Maclaurin who is directing this research visited the principal concerns in the United States which are innovating the housing industry; and in the summer he investigated the experience of British and Swedish companies in providing low-cost housing. A grant from the W. E. Upjohn Unemployment Trustee Corporation made it possible to expand and complete the field work for a study begun last September of the impact of partial textile-mill shutdown in a New England industrial city. This work is under the direction of Professor Myers. A grant from the American Academy of Arts and Sciences has enabled Professor Norman J. Padelford and his associates to publish a series of maps designed to facilitate the study of world economic and political problems.

RALPH E. FREEMAN

ENGLISH AND HISTORY

The list of subjects taught by the department has remained unchanged this year. The introduction to the social sciences given experimentally to 125 freshmen last year has been given

to nearly 300 this year. Materials have been assembled which present to the student some of the basic concepts, methods, and vocabulary of the major social sciences. At the same time these materials give him some conception of the complex interrelationship of the social sciences and some introductory knowledge of the major issues, ideas, and periods of the past. The basis for selecting the readings for this subject is always the contribution which the material makes to an understanding of the world today.

One of our immediate problems is how to provide effective training in composition while dealing with this subject matter from the social sciences. We believe it can be provided if those students who come to M. I. T. with serious inadequacies in their preparation in English will devote a little additional time to work in small groups on the fundamentals of writing.

The sophomore option, *Growth of Democratic Thought*, has also been revised to some extent. Again the basis for selecting the subject matter has been its relevancy to the world today in order that the student may be prepared to approach the current problems of a democratic society with historical perspective and critical standards.

The editing of the Theodore Roosevelt papers has continued under Professor Elting E. Morison's direction.

Mr. E. Neal Hartley has undertaken for the American Iron and Steel Institute a research project in connection with the reconstruction of the first iron works in America at Saugus, Massachusetts. The project involves search for written materials to authenticate the physical reconstruction and also an analysis of technological, social, and economic factors operating both in seventeenth century New England and in Europe.

Mr. Robert K. Lamb received a grant from the Committee on Research in Economic History to aid research on a volume devoted to the role of the family in American economic development over the first decades of our national existence.

In the summer of 1948, Professor Karl W. Deutsch attended the tenth International Congress of Philosophy at Amsterdam as a representative of M. I. T. He also attended the Anglo-American Meeting of Historians and The World Congress on Mental Health, both held in London. He participated in a Symposium on Higher Education at the eleventh Conference on Science, Philosophy, and Religion in New York.

Professor Thomas H. D. Mahoney was invited to participate in the annual Seminar on Problems of United States Foreign Policy conducted by the Brookings Institution in June at Lake Forest College, Lake Forest, Illinois.

Mr. Sterg O'Dell received a traveling fellowship from Harvard University which enabled him to leave in June for an entire summer of study in Europe. Mr. David L. Hoggan also left in June to spend the summer doing historical research in Munich.

Professor Lynwood S. Bryant served as chairman of the English conference at the fall meeting of the New England Section of the American Society for Engineering Education. Professor Howard R. Bartlett was elected chairman of the Humanistic-Social division of that society at its annual meeting at Troy, New York.

HOWARD R. BARTLETT

MODERN LANGUAGES

In the early days of M. I. T. languages held in the curriculum somewhat the position they do today in liberal arts colleges. Entering students had already had at least two years of one or more foreign languages, usually German and French. At Technology they continued two languages or started a second if they had had only one. In the press of business after the first World War, foreign language study was reduced until in 1920 only a few departments required language study at the Institute.

The cultural values of such studies, although not entirely lost from view, were sacrificed to subjects of more immediate practical interest. This trend was common throughout the country. It may have been partly the competitive pressure from other engineering schools which eliminated languages from all our undergraduate engineering curricula except Chemical Engineering. The science courses, Biology, Chemistry, Mathematics, and Physics, require a year of foreign language, with the aim of preparing their men to read technical literature in their field. Geology and Marine Transportation students usually take one year of spoken Spanish to fulfill their language requirement. A few departments require some knowledge of one language for the Master's degree, and by Institute rule all

Doctoral candidates must show that they are able to read material in their own field in two foreign languages. In the Graduate School, as in the undergraduate years, foreign languages are required now only for their value as tools. Yet this does not quite complete the picture of present-day language instruction at M. I. T. A third and a fourth term of French, Spanish, and Russian are offered to those wishing to go further into the literature and the cultural history of these countries. Only a few students have the inclination and sufficient preparation to take languages as an overload but they find these subjects a truly broadening experience comparable to the Humanities options. In addition, one more opportunity may be offered to exceptionally well-prepared men. A few have been allowed to substitute, for their fourth-year Humanities option, work on an equally high plane in the literature and thought of France or Germany.

In the schools of natural science and engineering in this country a new current is stirring. The path of narrow specialization has been followed to its extreme and now there is a turning back. More humanizing, more broadening studies are being advocated. It is felt that students should be in a better position to judge ethical and social values. In a sense English, too, has been relegated to the status of a tool. Both for English and foreign languages a "tool" knowledge of the vocabulary and structure must precede the real enjoyment of the language. For English this is usually assumed in our native-born students, but for foreign languages only very few receive sufficient preparation before college to have even a reading knowledge of the language at their command.

In languages, as elsewhere in the curriculum, the aims which the student pursues in his study may be quite different from the aims of the teacher. This paradox is probably universal and eternal. In all the language subjects at M. I. T. except for the advanced cultural subjects mentioned above, the goal pursued by the student is either simply to fulfill a requirement imposed upon him or to gain a knowledge of the language sufficient to consult technical literature in the foreign language. If he looks upon it as a mere requirement he is bound to regard language study as a waste of time. This attitude, unless counteracted, can render ineffective even the most skillful

language teaching. A real effort is necessary in these cases to arouse the man's interest by making him feel that he is acquiring something of practical value, and by giving him a feeling of accomplishment. This is relatively easy to do on the doctoral level but is more difficult with many undergraduates.

While language teachers strive to encourage any faltering interest by an appeal to the practical values, the aim which they truly pursue and the reason they gladly teach foreign languages to generation after generation of students may be not at all or only partially the desire to help them acquire a useful tool. For some teachers there is a second, far stronger motive: the hope and the certainty that a few students, once brought into contact with the different patterns of thought and expression of another country, will take fire with an enthusiasm to go on and really master the language. For other teachers the underlying motive may be to impart the exhilaration which comes when one suddenly discovers that through study of another language he has become objective about his own. Because he has learned to analyze and master the patterns of expression of another tongue he now finds himself able to analyze those of his own. Semantics gained a wide popularity a few years ago because it revealed to many people for the first time that speech is a symbolism, thus freeing them from what Stuart Chase called the "tyranny of words." The study of a foreign language frequently achieves this same end, even though the aim the student had in mind may be simply to fulfill a requirement or to gain a useful tool.

In addition to teaching languages and doing occasional translations or serving as interpreter for friends of the Institute, members of the Language Department during the past year carried on research along two lines. Under a subgrant from the Carnegie Scientific Aids to Learning Grant work was carried forward by Mr. John G. King on a new instrument for study of the fundamental nature of speech. In a quite different field a survey was conducted by Professor William N. Locke under the auspices of the American Association of Teachers of French to determine the extent and importance of untranslated scientific and technical material in the French language today.

Changes in the staff of the Department were few. Frederick Bodmer, author of *The Loom of Language*, was appointed

Lecturer in Modern Languages, and Herman Klugman was promoted to the rank of Assistant Professor.

WILLIAM N. LOCKE

MUSEUMS AND EXHIBITIONS

In collaboration with the Department of Naval Architecture, the Hart Nautical Museum was completely renovated during the year. Additional display facilities and new lighting were installed. Its collections were reorganized and so housed as to eliminate the need for an attendant. The Museum is therefore now always open to students and public.

The Museum has been greatly enriched by a loan from the H. F. Haffenreffer Family Foundation. The new collection contains sketches, drawings, photographs, and models of many of the famous boats designed by the late Captain Nathaniel Herreshoff.

The Navy has loaned the Museum five models of contemporary warships.

The program of changing exhibitions in the Building 7 Lobby was continued. Fifteen exhibits were shown principally of photography, painting, architecture and subjects of general cultural interest. Two of the above, the Course Selection Exhibit and the Acoustics Laboratory Exhibit, were prepared by the Institute staff. It is hoped to continue to present each year some of the programs and accomplishments of an Institute Department or Laboratory. Several of the loan exhibitions were of national importance and their Institute showing was, it is hoped, a contribution to the cultural activity of the greater Boston community.

H. A. BARTLETT
H. L. BECKWITH

INTERDEPARTMENTAL LABORATORIES

ACOUSTICS LABORATORY

Four years ago the Acoustics Laboratory was established on an interdepartmental basis to provide a center for fundamental and applied research in the field of acoustics. Several long range research programs initiated at that time have now progressed through the cycle from planning to instrumentation, to fact finding, to theoretical interpretation and technical evaluation. These evaluations, in turn, have suggested new attacks for old problems or have uncovered unsuspected avenues for new research, and thus new cycles have commenced.

Throughout this period, primary emphasis has been placed on the major function of an academic laboratory — the training of students in the methods and disciplines of research. All of the original group of graduate students had completed their training by the summer of 1949 and an even greater number had entered to pursue specialized studies in acoustics during the coming period. Parallel to this training, and as one measure of its success, many results of research had been disseminated in scientific and engineering journals and in the Quarterly Progress Reports of the Laboratory. It is gratifying to observe in these students and in their products a comprehension of the close interdependence of the several subjects in science and engineering that form the ingredients of a modern technological field. This point of view was a primary motivation of the Institute in establishing interdepartmental laboratories after the war.

The organization, plant facilities and budget structure of the Laboratory during 1948–1949 were generally similar to those described in the previous President's Report. The main part of the laboratory building appeared originally to have considerable room for expansion, but large scale facilities and the laboratory-office needs of an increased number of research students had committed virtually all of the available space by the end of this year, and some additional space was being sought. The financial support by the Bureau of Ships and the Office of Naval Research of the Navy Department and by the Army Air

Forces was continued at about its previous level. An industrial research fellowship granted by the Celotex Corporation supported one student during the year, and similar fellowships from the Armstrong Cork Company and the Acoustical Materials Association are available for the coming year. Funds from the Massachusetts General Hospital and the Raytheon Corporation have made it possible to initiate a new program in medical acoustics, and further possible support for this program is in application.

The staff continued to participate actively in Institute and professional affairs outside the Laboratory. Assistance was given on sound systems for the Mid-Century Convocation, on design of music rooms and reproduction equipment for the new library, on general acoustic treatment of classrooms, and on a number of problems posed by other Institute activities. Professor Leo L. Beranek spent the summer at the University of Buenos Aires where he taught a course and assisted in establishing an acoustics program. Professor Richard H. Bolt was scheduled to give in September and October a series of lectures on modern principles of room acoustics, at the Royal Institution, London, under sponsorship of the Physical Society.

The scope and nature of the research program are described briefly in the following sections.

Micro-behavior of Sound Fields. Classical analyses of sound are based on simplifying assumptions that ignore detailed hydrodynamic effects. This simple picture does not account for excess attenuation and distortion effects observed in sound waves of very large amplitude. These questions are being studied intensively with precision impedance tube apparatus and basic physical analyses. Particularly striking are the phenomena associated with sound impinging on a small orifice in a plate. Smoke particles and photography make it possible to obtain a quantitative picture of sound field motions which include circulation currents, torroidal vortices and jet effects. These results are being correlated with studies of perforated facings and acoustic cavity resonators.

Sound Waves in Enclosures. There is continuing emphasis on the behavior of sound waves in enclosures of arbitrary shape and boundary properties. The frequency response irregularity in a room has been studied intensively. A thesis on acoustic

transient analysis laid an important theoretical basis for work that has commenced on the response of a room to short pulses of sound. Largely through a graduate seminar subject given jointly with Professor Lawrence B. Anderson, advanced students in architecture have contributed to the interpretation of research findings in terms of architectural design and construction.

Transmission through Plates and Wall Structures. A long-range program on the measurement of sound transmission through wall structures yielded first results during the year. The small scale (two-by-two foot samples) chamber was completed and preliminary results gave satisfactory evidence of the validity of the new testing method which this research program is attempting to establish. The large scale (eight-by-eight foot samples) chamber was completed and treated absorptively, thus giving the Laboratory its first satisfactory anechoic space for free field measurements.

Dynamic Behavior of Visco-elastic and Plastic Materials. This subject, which formed a large part of the program during the previous three years, reached a state of considerable refinement in certain aspects. A descriptive theory of dynamic mechanical behavior of rubber-like materials was completed and checked experimentally over a considerable range of frequency and temperature. In collaboration with the Plastics Laboratory a method was developed for testing dynamic properties of adhesive bonds, and a method for testing dynamic elasticity of fabrics was developed in collaboration with the Slater Textile Laboratory.

Communication Studies in Psycho-acoustics. A long-range program in communication acoustics produced a definitive basic result during the year. This was the determination of the threshold of (hearing) detectability of frequency modulation on pure tones under a rigorously specified set of experimental conditions. The ultimate goal of this program, in common with related communications programs in the Research Laboratory of Electronics and elsewhere, is the better understanding of the transmission of speech information under arbitrary conditions of distortion.

Chemical Reactions under Ultrasonic Energy. An instrumentation program has been directed to the production and

precise measurement of ultrasonic energy fields and their influence on chemical and physical reactions. The mutarotation of d-glucose was studied (in collaboration with the Department of Chemical Engineering and Professor Herman P. Meissner) and was found to be accelerated by ultrasonic radiation. In another experiment it was shown that the viscosity of dilute polystyrene is permanently decreased by exposure to ultrasonics. Instruments completed during the year are ready for studying a number of problems of chemical interest.

Low Temperature Studies. In collaboration with the Research Laboratory of Electronics cryogenic group, research was conducted on the elasticity and internal friction of metals over a wide range of low temperatures down to the liquid helium transition. This program was carried largely by Professor Piero G. Bordoni of the University of Rome, a Guest of the Institute, with guidance by Professor John C. Slater. Results were obtained which are of considerable interest in solid state physics.

Medical Acoustics. A new program was established to explore possibilities for the detection and precise localization of brain tumors by the use of ultrasonics. Medical supervision of this program will be given by Dr. H. Thomas Ballantine, Jr., a brain surgeon associated with the Massachusetts General Hospital.

RICHARD H. BOLT

RESEARCH LABORATORY OF ELECTRONICS

The Laboratory continues to divide its research effort between the fields generally associated with electrical engineering and physics. In electrical engineering our effort has been directed mainly towards the broad field of communications and the application of electronic techniques to medical and mathematical problems. On the physics side, our work centers around the problems of electron emission, solid state physics, and the application of high frequency techniques to problems in atomic and molecular physics. In the study of the motion of electrons in electro-magnetic fields, there is a broad overlap of interest between the two fields.

Our senior staff is drawn almost wholly from the faculties

of Physics and Electrical Engineering, and in addition we have some 80 graduate students from the two departments participating in the work. As the Laboratory grows there is a tendency for more undergraduate participation in the work, and the number of undergraduate theses performed in the Laboratory is rapidly increasing. The fundamental research work of the Laboratory continues to be largely supported by the Signal Corps, the Air Materiel Command, and the Office of Naval Research jointly. In addition, a smaller fraction of our effort is directed towards the development of telemetering and radar guidance systems for missiles as part of the Bureau of Ordnance-Technology Meteor Program; this latter program is under the direction of Professors Lan Jen Chu, William H. Radford and Henry J. Zimmermann.

Since the last report the work of the group headed by Professor Norbert Wiener, Professor Jerome B. Wiesner, Professor Yuk Wing Lee, and Professor Robert M. Fano in the field of Information Theory and related problems has brought forth many interesting results and has stimulated a great deal of interest in the Laboratory by research people from outside. Of particular interest has been the construction of an automatic machine for determining auto-correlation and self-correlation functions of many arbitrary mathematical and experimental functions. The application of generalized feed-back principles to problems in the electronic and biological fields, almost to all fields of science and technology, will undoubtedly be a major contribution of the Laboratory.

In the field of radio-frequency spectroscopy, the work of the four groups under Professor Jerrold R. Zacharias, Professor Francis Bitter, Professor Malcom W. P. Strandberg, and Professor Arthur F. Kip has been very successful and has yielded much scientific information about the structure of the atomic nucleus, chemical properties of molecules, and the properties of the solid state of matter. Of particular note has been the investigation of radioactive cesium isotopes by molecular beam techniques, and the extensive survey of the magnetic properties of the nucleus carried out by induction techniques.

The group under Professor Stuart T. Martin has successfully completed several high-power magnetrons in the past year. These magnetrons have measured up to expectations in

that they delivered five megawatts of pulsed power, but as was anticipated, the cathode life is limited to approximately 50 hours. Work on thoria cathodes is continuing in the hope of rectifying this difficulty. The group under Mr. Louis D. Smullin is carrying on some rather interesting research in the design and construction of traveling wave tubes, and at the present time work on a low-voltage amplifier is of interest and practical importance.

Frequency-modulated communications systems have long been restricted to short-range coverage because multipath transmission would greatly impair the quality of such systems. The work of Professor Lawrence B. Arguimbau has definitely shown a way out of this difficulty, and as far as simulated tests in the Laboratory are concerned, his method can be called an unqualified success. It is expected that field tests of this method will be made shortly. Professor Ernst R. Guillemin and Dr. Manuel V. Cerrillo have undertaken to solve the very difficult problem of the synthesis of active networks. A real start has been made on this problem and at least an understanding of the manifold difficulties has been obtained, so that one may hope that a solution is possible in a few years' time.

In the absence of Professor Henry Wallman, who is working at the Chalmers Institute of Technology, Gothenburg, Sweden, Dr. Alan B. Macnee has very successfully completed the design and construction of a small all-electronic differential analyzer. The success of this instrument as a useful Laboratory device for a quick solution of differential equations has been so marked that several copies are being made by other Laboratories. The first stage of the work of Dr. Stanford Goldman on the automatic display of electroencephalographic information has been successfully completed. Since Dr. Goldman has accepted a professorship at Syracuse University and will continue this work at that institution, we are completing our activity in this field.

Professor Wayne B. Nottingham's group in physical electronics continues to make good headway in the understanding of the electron emission problems, particularly from oxide-coated cathodes, and in the field of low-frequency gaseous discharges. The group under Professor William P. Allis and Professor Sanborn C. Brown has made an outstanding con-

tribution to our understanding of the many detailed processes in the gaseous discharge. The approach has been entirely from the high-frequency end, and an exact theory for a limited range of frequency has been developed. Professor George G. Harvey and Dr. Emanuel R. Piore have constructed a soft X-ray spectrograph for the study of electronic properties of metals, and we hope that this will be in operation in the next several months.

The work of the low-temperature group under Professor John C. Slater, Professor Samuel C. Collins, Professor Laszlo Tisza, and Professor Melvin A. Herlin is continually becoming more effective as we gain more experience in the low-temperature field. Particularly noteworthy has been the work of Dr. John R. Pelham and Professor Herlin in the measurement of the velocity of second sound in the superfluid state of liquid helium, which in turn has had an influence on the theory of Professor Tisza, and the measurements of microwave conductivity over a wide range of temperatures by Professor Slater and his associates.

During the past year the Laboratory has been host to many guests, in particular to Dr. Emanuel R. Piore of the Office of Naval Research, Dr. Manuel V. Cerrillo of the University of Mexico, Dr. Brebis Bleaney of Oxford University, Dr. Piero G. Bordoni of Rome, and Dr. Richard Q. Twiss of the Ministry of Supply, London. Each of these visitors has contributed substantially to the scientific researches of the Laboratory. Industry and the Services are relying more and more on the facilities and personnel of the Laboratory as evidenced by the increasing number of visitors. During the past year the Laboratory was host to leaders of the electronics industry at a two-day conference which had the frank purpose of introducing the work of the Laboratory to the industry with the aim of cementing better relations. With the Department of Physics, the Laboratory sponsored a conference with the leading workers in the field of low-temperature physics. This conference, organized by Professor Slater, was international in its scope, and the majority of the leading workers in the field were present. All countries interested in low-temperature research were represented with the exception of Russia. The annual conference on physical electronics organized by Professor Nottingham and sponsored jointly by the Laboratory and the Department of Physics was

unusually successful this year in bringing together the leading scientists in this field.

ALBERT G. HILL

LABORATORY FOR NUCLEAR SCIENCE AND ENGINEERING

The general growth of the Laboratory continues, but is less pronounced than in previous years. Three faculty appointments in the Department of Physics and one in the Department of Chemistry have accounted for an increase in the number of Laboratory faculty, now totaling 27. A steady increase in the number of graduate students persists, with this figure now standing at 109. The very large majority of these students are doctoral candidates.

This year, as last, the level of expenditures remained substantially the same with the bulk of the support again being afforded by the joint program of the Office of Naval Research and the Atomic Energy Commission. The remaining support was received from industrial organizations, the American Cancer Society, the Godfrey M. Hyams Trust, and the National Institute of Health.

In cosmic ray research, advances were made on several fronts. In cloud chamber experiments at Echo Lake, Colorado, evidence was found indicating that at least some of the electronic showers which were previously known to be associated with nuclear interactions originate from photons. Additional significant theoretical and experimental results were obtained in air-shower studies.

In the radioactivity investigations, emphasis was again placed on the study of gamma rays from radioactive processes, including polarization and angular correlation observations. Of unusual interest was an experiment measuring the lifetime of slow positrons in various gases, which is of the order of less than a microsecond. All of these experiments were made possible through use of the Kallmann scintillation counter, the usefulness of which was made known in this country last year by Professor Martin Deutsch.

The newly located and renovated cyclotron with its high intensity beam of 15-million volt deuterons is finding excellent use in an exhaustive study of deuteron-proton reactions. An

extensive survey is in progress which will cover elements representing all regions of the periodic table.

The one-million volt Van de Graaff generator has been completed and is now undergoing final adjustments prior to its use for precision neutron-proton and proton-proton reactions. The larger 12-million volt Van de Graaff generator awaits tank delivery by the Boston Navy Yard in the fall of 1949. Completion of the building and the generator itself should then be achieved by spring, 1950. In common with the experience at other locations, there have been difficulties in making final adjustments on the new 350-million volt synchrotron, but successful operation seems assured for the coming academic year. The conversion of the 5-million volt Van de Graaff generator to a source of highly mono-energetic protons nears completion.

Fundamental work has been accomplished in studies of the fission elements and the evolution of new techniques for their analytical determination. Progress has been made in the subjects of isotopic exchange by electron transfer between complex elements, chemical effects of nuclear transformation, and isotope effects in chemical reactions.

In theoretical investigations a more thorough study of neutron-proton and proton-proton scattering has been made than ever before, achieving the utmost information from the experimental data. A new theory of scattering and absorption of nuclear particles has been evolved which makes possible many new qualitative predictions of cross sections.

Many of the Laboratory staff were engaged during the summer of 1948 in the Lexington Project, an undertaking assumed by the Institute (but not employing exclusively M. I. T. personnel) at the request of the Atomic Energy Commission. Its objective was an extensive review of the subject of nuclear power for aircraft and an evaluation of the possibilities. The report of the Project is now under study by the Commission.

The property at Mt. Evans, Colorado, which the Laboratory has formerly rented for its annual cosmic ray expeditions, has now been purchased by Research Corporation for use by the Institute and other universities. The space will be used, as before, to provide living facilities for expedition members from these institutions and their families. Funds have been appropriated by Research Corporation to improve the property.

Early in February the Laboratory was host to a representative group of industrial research leaders for a conference on nuclear science and engineering and some of its existing and potential applications to industrial problems.

Dean Thomas K. Sherwood replaced President James R. Killian, Jr., as the Institute's administrative representative on the Executive Committee of Associated Universities, Inc., which operates the Brookhaven National Laboratory. Professor Jerrold R. Zacharias is now Chairman of the Physical Sciences Advisory Committee of Associated Universities, Inc. Professor M. Stanley Livingston has rejoined the Laboratory from his leave of absence with the Brookhaven Laboratory as Chairman of the Accelerator Project.

During the year Professor Bruno Rossi was presented the Research Corporation Scientific Award for distinguished research in the fields of cosmic radiation and the properties of mesons, as well as for his work in nuclear fission.

Faculty members who have joined the Laboratory during the year include Professors David H. Frisch, Matthew L. Sands, and Robert W. Williams in the Department of Physics and Professor Lockhart B. Rogers in the Department of Chemistry.

JERROLD R. ZACHARIAS

COSMIC TERRESTRIAL RESEARCH

The laboratory for cosmic terrestrial research at Needham completed its tenth year of affiliation with the Institute on June 30.

During the past year, basic studies of radio wave propagation in relation to solar activity have continued to form the major part of the laboratory's program. High solar activity culminating in the summer of 1947 with the highest three-months mean sunspot number of 184.4 in September, 1947, was followed by a second corresponding peak in May, 1948, of 178.8 and a third peak in March, 1949, with a high value of 163.4. The persistence of prolonged sunspot activity has resulted, in general, in a high degree of upper atmospheric ionization making for the continuance of radio reception patterns previously reported.

In addition to the seven field intensity recorders in operation a year ago, an eighth recorder was installed for studies of tropo-

spheric reception from Alpine, New Jersey, at 104.9 megacycles.

In the last report, a discussion was given of the results of pilot stations set up by the laboratory at Intervale, New Hampshire, at New Haven, Connecticut, and at Tuckahoe in Westchester County, New York, for obtaining records of the National Bureau of Standards standard frequency time signals on both the frequencies of WWV five megacycles and ten megacycles. During the summer of 1948, the station at Intervale, New Hampshire was reoccupied for obtaining records on WWV 15 megacycles for comparison with the records obtained on this frequency at Needham. The results established the anticipated effect of higher morning values for this frequency with increased distance from the transmitter located at Beltsville, Maryland.

Studies have been made of both the five-megacycle and ten-megacycle reception, as recorded at Needham, with respect to each hour of the 24 throughout the years of sunspot rise 1944-1948. To eliminate the well-known wide seasonal variations in the ionosphere, a 12-months running mean has been taken for each mean hourly value throughout this period. The results have shown that nearly a tenfold increase in trend in field intensities of WWV five megacycles as received at Needham is experienced during the midnight hour 0000-0100 between the sunspot minimum 1944 and the sunspot maximum 1947. This trend persisted throughout the night hours with a decreasing slope until the average sunrise hour, 0600-0700 EST, when the trend is least significant.

Subsequent to sunrise, fields have decreased during the daytime hours from sunspot minimum to sunspot maximum; the greatest drop appearing during the noon hour when fields at sunspot maximum averaged about 1/20 of those at the corresponding hour of sunspot minimum. Afternoon hours show decreasing slopes in the trend until the average hour following sunset 1900-2000 EST is reached when any trend is least significant. These curves should prove valuable factors in predicting radio reception conditions with respect to solar activity throughout the sunspot cycle.

Harmonic analysis of our long series of ionospheric reception of WWV five megacycles has been made by Mr. Greenleaf W. Pickard in a search for correlation with a lunar tide in the upper atmosphere. The entire series of field intensity data for this

station was divided into suitable trial periods. Ampligrams and phasograms were plotted for the entire series. The results yielded unmistakably a true period of 29.53 days in variations in field strengths, determined to within one or two parts in 10,000. This value to two decimal places is the lunar synodic period. Another strong period of 27.3 days was derived which may be regarded as the generally accepted 27-day period in solar rotation. A third strongly indicated period of 31.3 days appears present but so far is inexplicable as to origin. Variation in amplitude in field intensities in the 29.53 day period is of the order of 35 per cent, with maximum occurring at near both full and new moon.

Investigations of reception of our WBBM 780 kilocycles (Chicago), long series of data yielded an identical 29.53 day period again corresponding to the accepted lunar synodic period. This same value appeared in Washington ionospheric data for critical frequencies of both the E and F₂ layers with amplitudes of somewhat less than one per cent.

Studies of tropospheric reception as affected by atmospheric refraction have been continued on both the 44.1-megacycle and 92.1-megacycle frequencies. It is to be noted that meteorological factors affecting over-the-horizon transmission affect very much alike both of these frequencies.

During the year July 1, 1948, to June 30, 1949, a total of 39,430 hours of observations of field intensities have been made, reduced and forwarded to the Central Radio Propagation Laboratory in Washington together with monthly reports of our findings. This makes a total of 166,219 hours of field intensity records supplied to the Central Radio Propagation Laboratory since the beginning of our association with the Bureau of Standards. The total number of hours of records obtained and reduced at the laboratory in Needham from all instruments has been 222,284 since the beginning of the program in 1939.

The program, during the last year, has continued to receive support from contracts placed through the Division of Industrial Cooperation with the Office of Naval Research and the National Bureau of Standards, supplemented by contributions to the Cosmic Terrestrial Research fund with which the laboratory has been operated from its inception.

Results of our investigations during the year have been pre-

sented at various scientific society meetings, in quarterly reports to the Office of Naval Research and in articles appearing in technical journals listed elsewhere. The laboratory has supplied certain technical data from our field intensity measurements to the Department of Meteorology of the Institute for use in Professor Hurd C. Willet's studies of possible correlation of upper atmospheric ionization with weather.

Numerous visitors to the laboratory during the year have included officers of the Navy, representatives of the Central Radio Propagation Laboratory of the National Bureau of Standards and of other scientific bureaus. Foreign visitors were Dr. W. Heiskanen, of the Isostatic Institute, Helsinki, Finland; Dr. Ronald E. Burgess of the National Physical Laboratory, England; Macier Naiecz, Engineering College of Warsaw; and Mateo Caserverde R. of the Geophysical Institute of Peru.

HARLAN T. STETSON

SPECTROSCOPY LABORATORY

The Spectroscopy Laboratory was given the status of an interdepartmental laboratory in July, 1946. It is administered by a steering committee consisting of Professor Richard C. Lord, Department of Chemistry, Chairman; Professor George R. Harrison, Department of Physics; and Professor John R. Loofbourow, Department of Biology. This committee is responsible to the Dean of Science.

The two years previous to the period covered by the present report saw a gradual reestablishment of the research program of the Laboratory after its interruption by wartime activities. The program has been enlarged to include spectroscopic research of interest to the Departments of Physics, Chemistry and Biology, and some work is also carried on by or for the Departments of Food Technology, Geology and Electrical Engineering. The Laboratory's program has been supported by grants-in-aid from industrial concerns and by a basic-research contract with the Office of Naval Research.

In the postwar years, the impressive equipment of the Laboratory has been placed once more in working order and has been augmented by important additions. The University

of Chicago has transferred to the Laboratory a large partially completed engine for the ruling of diffraction gratings. This engine is being completely rebuilt for interferometric control, and also to enable it to rule "echelles," a new type of grating developed by Professor Harrison. An automatic machine for the reduction of Fabry-Perot interference patterns has also been designed by Professor Harrison and completed to the stage of preliminary tests. Equipment for infrared spectroscopy has been installed, so that the investigation of infrared spectra in the range from the visible region to 40 microns can be carried out. A photographic apparatus for study of the Raman effect is in operation, and a photoelectric Raman spectrometer is under construction. Special equipment for micro- and low-temperature spectroscopy has been constructed and is in use; the latter includes apparatus for work at liquid helium temperatures as well as liquid nitrogen and hydrogen temperatures.

Various scholars from this country and abroad have visited the Laboratory during the past year to make use of its facilities for study of the Zeeman effect and for high-resolution spectroscopy. Among these have been Professor Miguel Catalan, University of Madrid; Dr. J. C. Van den Bosch, University of Amsterdam; Dr. William F. Meggers, National Bureau of Standards; M. Jean Brossel, University of Paris; Professor Dorothy Weeks, Wilson College. The Laboratory has participated in a joint project with the Laboratory for Nuclear Science and Engineering for the measurement of nuclear spins by high-resolution spectroscopy, and has carried out extensive infrared studies, apart from its regular infrared program, for the Department of Chemistry and for other departments.

The members of the Laboratory steering committee collaborated in writing the textbook *PRACTICAL SPECTROSCOPY*, published by Prentice-Hall, New York, late in 1948.

RICHARD C. LORD.

REPORT OF THE TREASURER

AUDITORS' CERTIFICATE

To the Auditing Committee of the Massachusetts Institute of Technology:

We have examined the balance sheet of Massachusetts Institute of Technology as at June 30, 1949 (pages 208 and 209) and the related statements of income and expense (page 210), deficit from operations (page 211) and certain reserve funds (page 195) for the year ended June 30, 1949. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying financial statements present fairly the position of Massachusetts Institute of Technology at June 30, 1949, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

LYBRAND, ROSS BROS. & MONTGOMERY

Boston, Massachusetts
September 9, 1949

REPORT OF THE AUDITING COMMITTEE

To the Corporation of the Massachusetts Institute of Technology:

The Auditing Committee reports that the firm of Lybrand, Ross Bros. & Montgomery was employed to make an audit of the books and accounts of the Institute for the fiscal year ended June 30, 1949 and their certificate is submitted herewith.

Respectfully,

REDFIELD PROCTOR

HAROLD BUGBEE

HENRY E. WORCESTER, *Chairman*

September 19, 1949

TREASURER'S STATEMENT

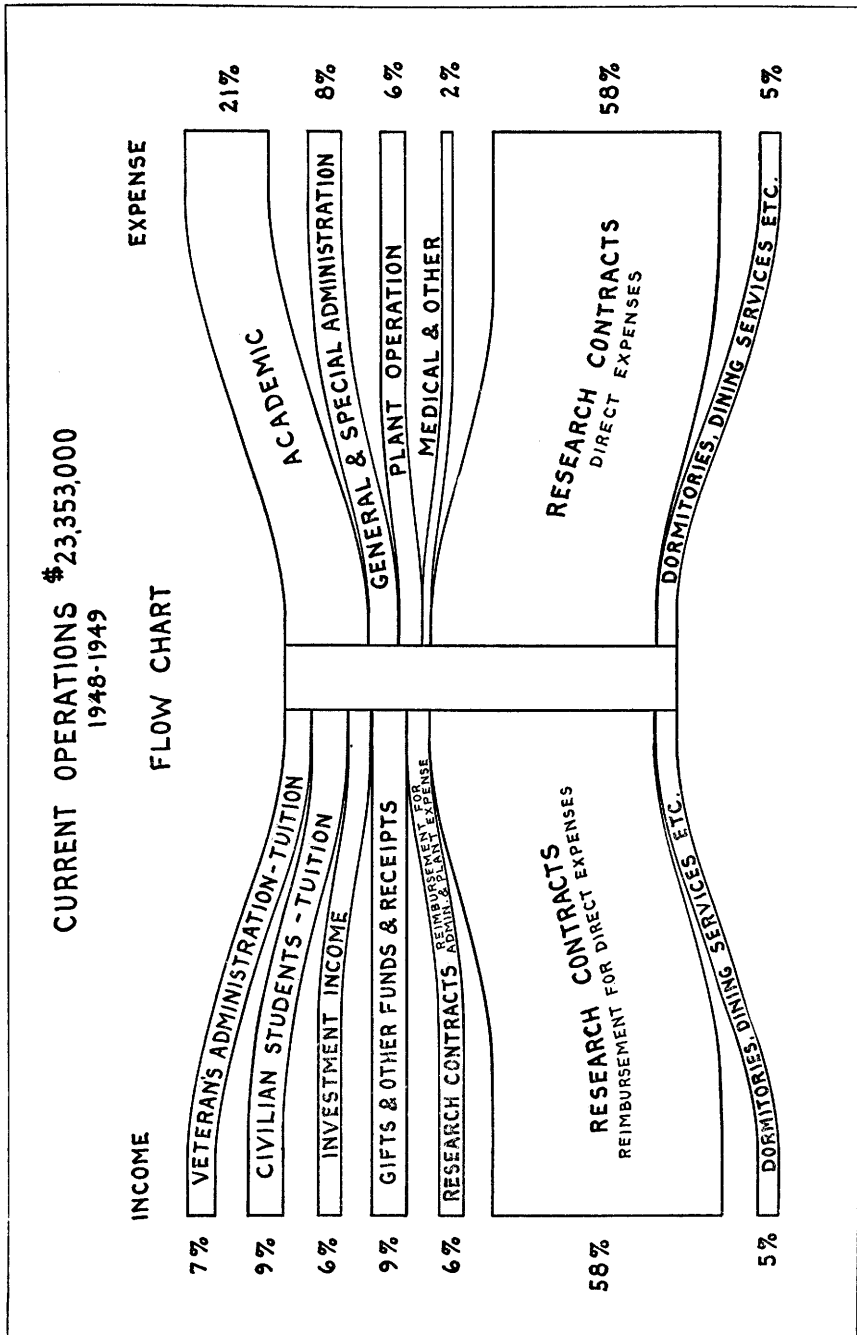
To the Corporation:

The statements and schedules submitted herewith, in accordance with Section VI of the By-Laws of the Corporation, show the financial condition of the Institute as at June 30, 1949, also the financial transactions during the year ended on that date.

Three major schedules present (A) BALANCE SHEET, (B) STATEMENT OF INCOME AND EXPENSE, (C) DEFICIT FROM OPERATIONS. The first two are broken down into supporting schedules designated A-1, B-1, etc.

EDUCATIONAL PLANT

Total plant assets \$22,243,000 (Schedule A-19) have increased \$2,654,000 during the year. Of this amount \$1,951,000 was paid for construction of the Charles Hayden Memorial Library, \$70,000 for additions to the Sloan Automotive Laboratories, \$157,000 for construction of the Twelve M.E.V. Laboratory, \$217,000 to complete the Rockwell Athletic Cage and \$175,000 set up as the book value of the Round Hill property at Dartmouth, Massachusetts, received by gift of Mrs. Wilks.



THE YEAR'S OPERATIONS

The flow chart opposite shows the sources of all income and expenses for the year ended June 30, 1949. Total income was \$23,353,000 — \$2,300,000 in excess of 1948, largely accounted for by the increase in research contract revenues for the year.

Income from students, including loan and scholarship awards was, \$3,636,000, or \$432,000 less than last year. Income from investments increased over 1948 by \$73,000, principally from increased dividends received on common stock holdings.

Academic expenses, \$5,040,000, were \$2,000 over last year. General Administrative Expenses were \$524,000 over 1948 and Plant Operation, including repairs and alterations, was \$1,405,000, or \$70,000 in excess of last year.

Other Expenses, Medical and Undergraduate Activities, \$400,000, increased \$40,000 over the previous year.

Total Expenses exceeded Income by \$232,000. The Cumulated Operating Deficit (Schedule C) now stands at \$228,625.

CONTRACT OPERATIONS

The two summaries of contract operations of the Division of Industrial Coöperation, which follow, show (1) the contract revenues and direct costs for the year ended June 30, 1949, and (2) a comparison of operations over the past five years. The number of contracts in force as at June 30, 1949, was 190 (176 last year).

D. I. C. OPERATIONS FOR 1948-49

Costs reimbursed:

Salaries and Wages.....	\$ 6,328,576.82
Materials and Services.....	3,039,469.33
Subcontracts	1,576,078.29
Construction of Major Facilities.....	1,746,178.73
Travel.....	216,102.71
Other.....	118,386.52
	<u>\$13,024,792.40</u>

Overhead allowances under contracts for administrative and plant expenses and for the use of Institute facilities and funds.....

2,448,393.81

Total Contract Revenues..... \$15,473,186.21

The following is a five-year summary of the operations of the Division of Industrial Coöperation:

	<i>Fiscal 1949</i>	<i>1948</i>	<i>1947</i>	<i>1946</i>	<i>1945</i>
Total Volume (Revenues).....	\$15,473,200	\$13,301,100	\$ 9,824,900	\$24,294,500	\$39,970,900
Dollar increase over previous year	2,172,100	3,476,200	14,469,600*	15,676,400*	14,509,600
Percentage increase over previous year.....	16%	35%	60%*	39%*	57%
Salaries and Wages.....	6,328,600	5,212,800	4,009,000	8,409,000	12,529,700
Overhead Allowances.....	2,448,394	2,195,300	1,806,600	1,547,100	1,312,300
Percentage of Salaries and Wages..	39%	42%	46%	18%	10.5%
Percentage of Revenues.....	15.8%	16.5%	18.5%	6.3%	3.3%

*Decrease

ENDOWMENT AND OTHER FUNDS

The book value of the Endowment and other funds stands at \$47,175,000 — a net decrease of \$873,000 principally because of the substantial payments for new building construction on the campus, previously referred to.

RESERVE FUNDS

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An analysis of the principal Reserve Funds is shown below:

ENDOWMENT RESERVE FUND

(Accumulated net gain on general investments)

BALANCE June 30, 1948	\$2,492,622.50
Net gain from sales of securities	30,467.62
BALANCE June 30, 1949	<u>\$2,523,090.12</u>

INDUSTRIAL FUND

BALANCE June 30, 1948	\$473,629.78
Add:	
Allocation from general investment income	18,288.00
Appropriation from 1949 industrial research contract revenues	126,443.00
Prior year appropriation adjustment	2,087.00
	\$620,447.78
Deduct:	
Special appropriations, principally for equipment	\$26,685.00
BALANCE June 30, 1949	<u>\$593,762.78</u>

RESERVE FOR USE OF FACILITIES

BALANCE June 30, 1948	\$200,663.61
Add:	
Appropriation from 1949 research contract revenues	343,311.00
	\$543,974.61
Deduct:	
Special appropriations for repairs, alterations and improvements:	153,414.64
BALANCE June 30, 1949	<u>\$390,559.97</u>

UNDISTRIBUTED INVESTMENT INCOME

BALANCE June 30, 1948	\$416.12
Add:	
1948-1949 General Investment income undistributed	66,841.89
BALANCE June 30, 1949	<u>\$67,258.01</u>

INVESTMENTS

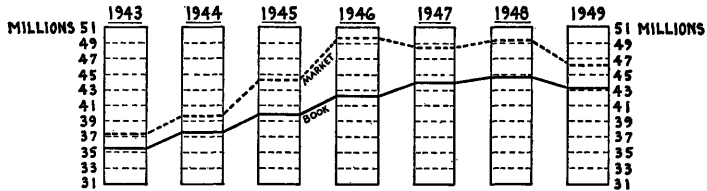
SUMMARY OF INVESTMENTS AS AT JUNE 30, 1949

<i>General Investments</i>	<i>Book</i>	<i>Market</i>	<i>Per Cent at Market</i>
Bonds —			
United States Government. . .	\$11,604,507	\$11,763,574	25.6
Public Utility	649,478	593,900	1.3
Railroad	451,652	409,798	0.9
Other	1,096,000	1,097,271	2.4
Total	\$13,801,637	\$13,864,543	30.2
Commercial Paper —	\$4,934,059	\$4,934,059	10.7
Preferred Stocks —			
Public Utility	\$240,767	\$226,800	0.5
Other	173,931	182,053	0.4
Total	\$414,698	\$408,853	0.9
Common Stocks —			
Industrial	\$9,175,373	\$12,059,117	26.2
Public Utility	1,214,370	1,201,816	2.6
Railroad	337,004	316,710	0.8
Bank and Finance	2,215,767	1,894,884	4.1
Insurance	1,703,057	2,091,829	4.4
Other	487,289	437,603	1.0
Total	\$15,132,860	\$18,001,959	39.1
Real Estate	7,370,429	7,370,429	16.0
Mortgages	146,970	146,970	0.3
Cash — Uninvested (Schedule A)	1,269,758	1,269,758	2.8
Total General Investments	\$43,070,413	\$45,996,571	100.0
Students' Notes	367,532	367,532	
Total General Investments including Students' Notes . . .	\$43,437,945	\$46,364,103	
<i>Special Investments</i>	3,736,737	3,830,700	
ALL INVESTMENTS	<u>\$47,174,682</u>	<u>\$50,194,803</u>	

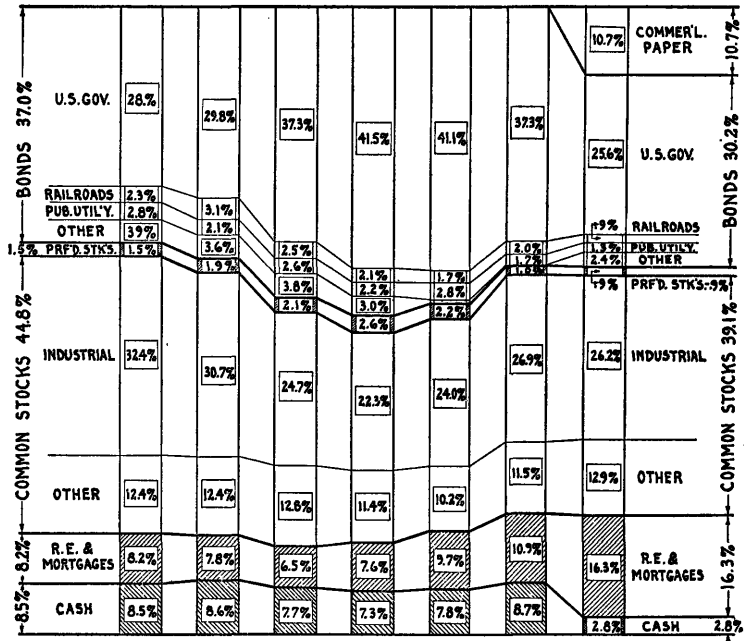
Trends in the pooled or general investments during the past seven years are shown in the one hundred per cent component bar graph presented on the opposite page.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY GENERAL INVESTMENTS

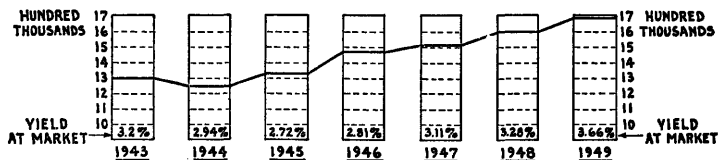
1
COMPARISON
OF BOOK
& MARKET
VALUES
AS OF
JUNE 30



2
PERCENTAGE
DISTRIBUTION
OF
SECURITIES
AT MARKET
AS OF
JUNE 30



3
ACTUAL
INCOME RECD.
FOR FISCAL
YEAR ENDING
JUNE 30



INVESTMENTS

The chart shows that bond holdings decreased 11 per cent largely covered by the replacement of Governments by commercial paper. Common stocks were slightly increased, but real estate investments were up 5.4 per cent to a total of 16 per cent.

The book value of all of the Institute's investments (including uninvested cash) was \$47,175,000. Despite the general reduction in market prices during the year, the market value as at June 30, 1949 was \$50,195,000, over \$3,000,000 in excess of book — a ratio of 106 per cent.

INVESTMENT INCOME

The income allocation to funds sharing the general investments was at 4.0 per cent of book value, the same as last year. The yield at market of the securities held was at the rate of 3.66 per cent.

GENERAL

On the pages immediately following will be found (1) a record of the gifts and bequests received by the Institute during the year, (2) a report of the Trustees of the M. I. T. Pension Association, and (3) a report of the Technology Loan Fund Committee.

Respectfully submitted,

HORACE S. FORD, *Treasurer*

JOSEPH J. SNYDER, *Assistant Treasurer*

August 30, 1949

GIFTS AND BEQUESTS

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GIFTS AND BEQUESTS RECEIVED DURING THE YEAR ENDED
JUNE 30, 1949

GIFTS FOR ENDOWMENT

Fund for Plant

H. Sylvia A. H. G. Wilks, Round Hill, Dartmouth, Mass. \$175,000.00

Funds for General Purposes

Class of 1909 (additional)	\$10,460.48
Caroline L. W. French Estate for Jonathan French Fund	65,637.77
Dale Kilburn Estate for Dale Kilburn Fund	68,893.95
Harriette A. Nevins Estate for George Blackburn Fund	100.00
Henry P. Talbot Estate for Henry P. Talbot Fund	45,210.57
Ethel M. Watt Estate for Arthur P. Watt Memorial Fund	1,500.00
Marion Westcott Estate for Marion Westcott Fund	1,452.74
	<u>\$193,255.51</u>

Funds for Designated Purposes

Maria T. Catlin Estate for Nino Catlin Fund (additional)	\$10,000.00
Class of 1922 (additional)	5.00
Boston Stein Club for Karl T. Compton Prize Fund	2,000.00
Technology Matrons' Association for Margaret Compton Fund ..	1,500.00
William A. Conant Estate for William A. Conant Fund (additional)	5.83
William T. Kneisner for Amelia S. Kneisner Scholarship Fund (add'l)	2,000.00
M.I.T. Club of Chicago for Scholarships (additional)	1,005.00
Alexander G. Mercer Estate for Hall Mercer Scholarship Fund (add'l)	273.88
William E. Nickerson Estate for William E. Nickerson Fund (add'l)	9,312.00
Anne C. Norris Estate for James F. Norris Fellowship	25,226.89
C. H. Porter for Elihu Thomson Fund	19.13
Odetta S. Price for Raymond B. Price Memorial Fund (additional)	4,000.00
Willis W. Reeves for Willis W. Reeves, Jr. Scholarship Fund (add'l) ..	200.00
Alfred P. Sloan, Jr., for Professorship Fund (additional)	50,000.00
Theodore N. Vail Estate for Theodore N. Vail Fund (additional) .	566.07
	<u>\$106,113.80</u>
TOTAL GIFTS FOR ENDOWMENT	<u>\$474,369.31</u>

GIFTS FOR STUDENT LOAN FUNDS

Contributions to William H. Timbie Fund (additional) \$115.00

GIFTS FOR BUILDING FUNDS

Raymond Concrete Pile Co. for Hydrodynamics Laboratory	10,000.00
Sloan Foundation (additional)	71,666.00
A. O. Smith Corporation for Metals Processing Laboratory	10,000.00
TOTAL GIFTS FOR BUILDING FUNDS	<u>\$91,666.00</u>

OTHER GIFTS (Principal available for expenses)

*Unexpended Balance of Endowment Fund Income
for Designated Purposes*Committee on Economic Development for Sloan Professorship in
Industrial Management (additional) \$1,680.00

OTHER GIFTS — continued

Charles Hayden Foundation for Charles Hayden Memorial Special (additional)	\$7,500.00
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\$9,180.00

Funds for General Purposes — Invested

Contributions to Development Fund	\$559,447.55
Contributions to Class of 1899 Fund	14,577.00
Contributions to Class of 1923 Fund	305.00
Contributions to Class of 1924 Fund	14,278.57
William T. Henry Trust for William T. Henry Fund (additional) .	16,950.00
William E. Nickerson Estate for William E. Nickerson Fund	9,312.00
Herman W. Tamkin Estate for Tamkin Fund (additional)	1,360.13
Harry C. Wiess for Wiess Fund (additional)	111,500.00
Anna B. Wood Estate for Edwin T. Wood Fund	5,000.00

\$732,730.25

Funds for Designated Purposes — Invested

Contributions to	
M.I.T. Alumni Fund 1948-49	\$51,358.10
M.I.T. Alumni Fund 1949-50	91,652.39
Boston Stein Club Fund (additional)	760.02
Development Fund for Departments and Research	200,000.00
Industrial Relations Fund (additional)	22,320.00
Tubby Rogers Fund	1,073.00
American Can Company for Food Technology Fund (additional) . .	10,000.00
Julian M. Avery for Julian M. Avery Fund	3,608.01
W. H. Carlisle, Jr., for Ellen A. King Memorial Fund	10.00
Carnegie Corporation of New York for S.A.L. Center (additional) . .	35,000.00
Dow Chemical Company for Food Technology Fund (additional) . .	10,000.00
Ford Motor Company for Industrial Relations	25,000.00
Oscar Horovitz for Oscar Horovitz Fund (additional)	500.00
International Tel. & Tel. Co. for Electronics Industrial Fellowship .	10,000.00
Sigmund Kunstadter for Nuclear Science	1,000.00
Lever Bros. for Research	2,500.00
Arthur D. Little, Inc., for Lecture Fund	3,000.00
Edward H. Lorenz for A. Norton Kent Fund (additional)	100.00
Johns Manville Company for Industrial Economics Fund	1,000.00
Merrill Foundation for Merrill Foundation Fund	25,000.00
C. Lillian Moore Estate for John A. Grimmons Fund (additional) . .	2,830.21
Radio Corporation of America for Research Lab. of Electronics . .	10,000.00
Radio Shack Corporation for Electronics Industrial Fellowship . . .	1,200.00
Martin D. Schwartz for Tau Beta Pi Memorial	10.00
Socony Vacuum Oil for Industrial Fellowship in Electronics (add'l)	5,000.00
Tau Beta Pi for Scholarship	19.00
Union Carbon & Carbide Company for Research	20,000.00
Westinghouse Educational Foundation for Ind. Econ. Grad. Fell. . .	2,500.00
Albert H. and Jessie Wiggin Foundation for Ind. Econ. Fund	1,000.00

\$536,440.73

OTHER GIFTS — continued

Funds for Designated Purposes — Not Invested

Airborne Instrument Laboratory for Fellowship	\$2,000.00
Allied Chemical & Dye Corporation for Fellowship (additional) . . .	950.00
American Cancer Society for Research (additional)	30,121.00
American Chemical Society for Library Fellowship (additional) . . .	11,560.00
American Chicle Company for Fellowship	8,000.00
American Cyanamid Corporation for Fellowship (additional)	2,000.00
American Petroleum Institute for Research (additional)	19,870.00
American Refractories Institute for Fellowship	2,600.00
American Smelting & Refining Corporation for Research	2,500.00
American Society of Mechanical Engineers for Research (add'l) . . .	6,338.80
Anonymous for William Barton Rogers Fund	1,000.00
Anonymous for Naval Architecture	1,000.00
Armour & Company for Research (additional)	5,000.00
Armour Laboratories, Inc., for Research	24,000.00
Armstrong Cork Company for Research	3,000.00
Baird Associates, Inc., for Spectroscopy	1,000.00
Bristol Laboratories, Inc., for Research (additional)	3,450.00
Carbide & Carbon Chemical Corporation for Fellowship	2,000.00
Celotex Corporation for Fellowship	3,000.00
Chicopee Manufacturing Company for Fellowship	1,200.00
Corn Industries Research Foundation for Research (additional) . . .	5,500.00
Thomas C. Desmond for Photogrammetry Laboratory	2,075.00
Dewey & Almy Chemical Co. for Dewey & Almy Fund (add'l) . . .	13,355.89
Douglas Aircraft Company for Fellowship (additional)	1,500.00
E. I. duPont deNemours & Co. for Fellowships (additional)	27,900.00
Eastman Kodak Company for Fellowships (additional)	3,000.00
Elastic Colloid Research Corporation for Research	5,000.00
Engineering Foundation for Research (additional)	10,507.66
Faculty Flower Fund (miscellaneous contributions)	664.50
Federation of Sewage Works Association for Research (additional) . .	6,142.65
Karl Fettes for Scholarship	15.00
Foreign Student Project (miscellaneous contributions)	22,153.99
Geological Society of America for Research (additional)	4,500.00
Gulf Oil Corporation for Fellowship (additional)	1,300.00
Harshaw Chemical Company for Research (additional)	11,000.00
Houston Endowment, Inc., for William S. Knudsen Fund (add'l) . .	2,500.00
Jerome C. Hunsaker for Aeronautical Engineering Research (add'l) .	1,000.00
Godfrey M. Hyams Trust for Research (additional)	10,500.00
Illuminating Engineering Society for Research	5,000.00
S. C. Johnson & Sons, Inc., for Johnson Fund	1,000.00
Kimberly Clark Corporation for Fellowship	1,900.00
Marjorie King Estate for Marjorie King Fund	10,000.00
Thurman Lee for Thurman Lee Fund	3,000.00
Lima Hamilton Corporation for Research	2,000.00
Linde Air Products Company for Research	654.00
Alfred L. Loomis for President's Fund "L"	5,000.00
Ellen F. Loomis for Dean's Fund Special	900.00
Newman Marsilius for Marsilius Fund (additional)	500.00
Massachusetts General Hospital for Research	500.00
Mechanical Design Prize Fund	50.00

OTHER GIFTS — continued

Funds for Designated Purposes — Not Invested

James C. Melvin Trust for Scholarship (additional).....	\$8,050.00
Memorial Hospital for Spectroscopy.....	8,000.00
National Lime Association for Research (additional).....	7,000.00
New England Textile Foundation for Research.....	1,800.00
Earl Newsom for Earl Newsom Fund.....	150.00
Nova Scotia Research Foundation.....	1,000.00
Nutrition Foundation, for Research (additional).....	4,000.00
Pan American Refining Company for Fellowship.....	2,000.00
Pepsodent, for Research.....	5,000.00
Pittsburgh Consolidation Coal Co. for Fellowship.....	3,000.00
Plastic Materials Manufacturing Assn. for Research (additional).....	33,327.24
John W. Poole for Undergraduate Scholarships.....	750.00
Poughkeepsie Fund.....	5.00
Procter & Gamble Co. for Fellowship.....	3,100.00
Procter & Gamble Co. for Research (additional).....	1,500.00
Quaker Oats Company for Research.....	420.00
Refrigeration Research Foundation, for Research.....	3,500.00
Republic Steel Corporation, for Research (additional).....	10,000.00
Research Corporation, for Research (additional).....	14,700.00
Revere Copper & Brass Company, for Research (additional).....	3,500.00
Rockefeller Foundation, for Research (additional).....	77,285.70
George Scher for George Scher Fellowship.....	1,000.00
Sharp & Dohme, Inc., for Research (additional).....	3,200.00
Shell Fellowship Committee, for Fellowship (additional).....	2,200.00
Sinex Corporation for Research.....	1,000.00
Alfred P. Sloan Foundation for Fellowship.....	25,000.00
Standard Brands, Inc., for Fellowship (additional).....	12,200.00
Standard Oil of California, for Fellowship (additional).....	4,300.00
Standard Oil of Indiana, for Fellowship (additional).....	2,000.00
Steel Founders Society of America, for Scholarship (additional)...	4,500.00
Sugar Research Foundation for Research (additional).....	18,598.00
Vernon Tate, for Carnegie S.A.L. Center.....	148.31
Teagle Foundation, for Teagle Fund (additional).....	20,000.00
Timken Roller Bearing Co., for Research.....	5,000.00
Titanium Alloy Mfg. Co., for Titanium Alloy Fund (additional)...	1,500.00
Unexcelled Manufacturing Co., for Research.....	300.00
Union Carbide & Carbon Co., for Fellowship.....	2,000.00
United Engineering Trustees, for Research (additional).....	4,550.00
United Fruit Company, for United Fruit Fund (additional).....	15,000.00
Vanadium Alloy Steel Co., for Research.....	2,500.00
Edwin S. Webster, for President's Fund.....	2,000.00
S. K. Wellman Company, for S. K. Wellman Fund.....	2,500.00
Wertz Engineering Co., for Steel Founders of America.....	200.00
Westinghouse Educational Foundation.....	27,500.00
Julia P. Whitney for Granger Whitney Fund (additional).....	200.00
Howard D. Williams for Williams Fund.....	500.00
Langdon Pearse for Insurance.....	372.30
	<u>\$636,065.04</u>
TOTAL OTHER GIFTS.....	<u>\$1,914,416.02</u>

MISCELLANEOUS GIFTS

Deposits and Advances Held for Investment

Class of 1898.....	\$ 2,960.00
Class of 1900.....	10,000.00
Class of 1917.....	1,815.00
Class of 1926 (additional).....	5,400.75
Class of 1928.....	650.00
Class of 1933.....	866.16
Class of 1935.....	281.30
Class of 1937.....	181.11
Class of 1948.....	20.00
M.I.T. Women's Dormitory Fund (additional).....	262.00
	\$ 22,436.32

Conditional Gifts

Anonymous for Anonymous "Q" Fund.....	\$ 1,300.00
George S. Witmer, for Witmer Fund (additional).....	2,500.00
Constance Lowell for Percival Lowell Scholarship Fund.....	30,000.00
	\$ 33,800.00

TOTAL MISCELLANEOUS GIFTS.....		\$ 56,236.32
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SUMMARY

Gifts for Endowment

Funds for Plant.....	\$175,000.00	
Funds for General Purposes.....	193,255.51	
Funds for Designated Purposes.....	106,113.80	\$ 474,369.31

Gifts for Student Loans.....		115.00
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Gifts for Building Funds.....		91,666.00
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Other Gifts (principal available for expenses)

Unexpended Balances of Endowment Fund Income..	\$ 9,180.00	
Funds for General Purposes — Invested.....	732,730.25	
Funds for Designated Purposes — Invested.....	536,440.73	
Funds for Designated Purposes — Not Invested....	636,065.04	1,914,416.02

Miscellaneous Gifts

Deposits and Advances held for Investment.....	\$22,436.32	
Conditional Gifts.....	33,800.00	56,236.32
		\$2,536,802.65

REPORT OF THE TREASURER

REPORT OF THE TRUSTEES OF THE
M. I. T. PENSION ASSOCIATION
COMPARATIVE BALANCE SHEET

ASSETS		
	<i>June 30, 1948</i>	<i>June 30, 1949</i>
Cash.....	\$45,302.41	\$16,565.07
Investments (page 205).....	2,129,230.42	2,453,614.48 ¹
Total.....	<u>\$2,174,532.83</u>	<u>\$2,470,179.55</u>

¹ Market Value June 30, 1949, \$2,577,334.42.

LIABILITIES		
Teachers' Annuity Fund (5% salary deduction, plus interest).....	\$1,282,704.39	\$1,436,342.40
*M.I.T. Pension Fund (3% appropriation, plus interest).....	861,128.19	959,196.19
Special Reserves for Annuity Payments....	22,134.65	67,018.15
Total Liabilities.....	<u>\$2,165,967.23</u>	<u>\$2,462,556.74</u>
Reserve Fund (including undistributed income).....	8,565.60	7,622.81
Total.....	<u>\$2,174,532.83</u>	<u>\$2,470,179.55</u>

* The Institute appropriates annually the equivalent of the 5% salary deduction, using 2% for payment of group insurance premiums.

RECEIPTS AND EXPENDITURES FOR 1948-1949

RECEIPTS	
5% salary deductions added to Teachers' Annuity Fund....	\$167,507.74
3% appropriations added to M.I.T. Pension Fund.....	100,624.65
Income from investments (Net).....	79,928.64
Total Receipts.....	<u>\$348,061.03</u>

EXPENDITURES	
Paid on account of withdrawal or decease of members.....	\$42,947.63
Pension paid directly to retired former members.....	9,466.68
Total Expenditures.....	<u>\$52,414.31</u>
Net Increase of Ledger Assets.....	<u>\$295,646.72</u>

TRUSTEES OF THE M.I.T. PENSION ASSOCIATION

Karl T. Compton	Horace S. Ford	John R. Macomber
Ralph E. Freeman		John R. Loofbrow

PENSION ASSOCIATION INVESTMENTS

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A RECORD OF INVESTMENTS HELD FOR ACCOUNT OF THE
TRUSTEES OF THE M.I.T. PENSION ASSOCIATION

<i>Par Value or Shares</i>				<i>Book Value</i>	<i>Net Income¹</i>
* \$75,000	U. S. Treasury.....	2s	1951-53	\$75,000.00	\$1,500.00
125,000	U. S. Treasury.....	2½s	1968	126,300.00	3,025.00
100,000	U. S. Treasury.....	2½s	1964-69	100,800.00	2,400.00
100,000	U. S. Treasury.....	2½s	1965-70	101,531.25	720.11
60,000	U. S. Treasury.....	2½s	1967-72	60,400.00	1,460.00
810,000	U. S. Savings, "G" ..	2½s	1954-61	810,000.00	17,125.00
35,000	Alabama Power.....	3½s	1972	35,000.00	1,225.00
50,000	Am. Tel. & Tel.....	2¾s	1961	54,400.00	975.00
50,000	Am. Tel. & Tel.....	2¾s	1980	50,150.00	1,325.00
50,000	Comm. Edison.....	3s	1977	52,500.00	1,400.00
47,000	Louisiana Pr. & Lgt..	3s	1974	48,250.00	1,360.00
50,000	Pac. Gas & Elec.....	3s	1974	51,600.00	1,400.00
50,000	Philadelphia Electric.	2¾s	1974	50,350.00	1,325.00
35,000	So. California Edison	3s	1965	36,700.00	950.00
25,000	Balt. & Ohio.....	4s	1975	24,987.50	1,000.00
800	du Pont.....			29,504.20	2,150.00
1,050	Eastman Kodak.....			28,500.00	1,670.00
1,500	General Electric.....			63,519.71	2,850.00
600	General Motors.....			29,332.24	3,300.00
478	Int. Business Machines.....			26,441.93	1,866.00
1,600	Sears Roebuck.....			29,391.89	4,400.00
1,000	Standard Oil, Ind.....			42,892.95	1,400.00
858	Standard Oil, N. J.....			39,798.13	2,080.00
1,500	Union Carbide and Carbon.....			41,575.54	3,000.00
1,500	United Fruit.....			38,575.21	6,000.00
500	United Shoe.....			35,910.62	1,437.50
200	Am. Telephone & Telegraph.....			33,252.59	1,800.00
1,200	Cleveland Electric Illuminating.....			44,110.95	2,310.00
600	Houston Lighting & Power.....			26,132.53	.....
560	Bankers Trust, N. Y.....			26,737.50	864.00
625	Chemical Bank and Trust, N. Y.....			25,187.50	1,125.00
500	First National Bank, Boston.....			27,500.00	1,125.00
100	Guaranty Trust, N. Y.....			23,989.50	795.00
720	Fireman's Fund Insurance.....			40,950.00	1,704.00
200	Hartford Fire.....			18,300.00	500.00
250	Insurance Co. of North America.....			16,000.00	812.50
400	Phoenix Insurance.....			33,775.00	1,200.00
	Real Estate, Albany, N. Y.....			54,267.74	1,789.75
<i>Total Pension Association.....</i>				<u>\$2,453,614.48</u>	<u>\$79,928.64</u>

¹ Net after premium amortization.

REPORT OF THE TREASURER

REPORT OF THE TECHNOLOGY LOAN FUND COMMITTEE
COMPARATIVE BALANCE SHEET

	Assets			
	<i>June 30, 1948</i>		<i>June 30, 1949</i>	
Cash.....	\$28,065.29		\$57,478.63	
Investments (Schedule A-2).....	1,563,939.47	\$1,592,004.76	1,598,218.20	\$1,655,696.83
Student Notes Receivable:				
Loans 1930 to date.....	\$1,980,609.75		\$2,041,659.75	
Less Repayments (including \$7,224.32 charged off).....	1,626,340.91	354,268.84	1,688,316.09	353,343.66
TOTAL ASSETS.....		<u>\$1,946,273.60</u>		<u>\$2,009,040.49</u>
	LIABILITIES			
Technology Loan Fund:				
Total Subscriptions.....		\$1,451,285.18		\$1,451,285.18
Add:				
Investment Income (net).....	\$501,966.21		\$558,576.97	
Interest from Loans.....	219,462.43		225,796.03	
Class of 1895 Memorial Fund.....	2,824.00	724,252.64	3,824.00	788,197.00
		<u>\$2,175,537.82</u>		<u>\$2,239,482.18</u>
Deduct:				
Net Loss on Sales of Securities.....	\$191,019.82		\$190,978.28	
Written Off, Deceased Borrowers.....	2,727.95		3,810.95	
Legal Settlements.....	3,277.36		3,413.37	
Life Insurance Premiums.....	32,239.09	229,264.22	32,239.09	230,441.69
		<u>\$1,946,273.60</u>		<u>\$2,009,040.49</u>

RECEIPTS AND EXPENDITURES FOR 1948-1949

RECEIPTS		
Income (Investments).....		\$56,610.76
Interest (Loans).....		6,333.60
Net Gains on Sales of Securities.....		41.54
Class of 1895 Memorial Fund.....		1,000.00
Repayment on Loans (plus charge-offs).....	\$61,975.18	
Less: Loans made.....	61,050.00	925.18
		<u>\$64,911.08</u>
EXPENDITURES		
Deceased Borrowers.....	\$1,083.00	
Legal Settlements.....	136.01	1,219.01
NET INCREASE IN CASH AND INVESTMENTS.....		<u>\$63,692.07</u>

TECHNOLOGY LOAN FUND COMMITTEE

Karl T. Compton, *Chairman*

Gerard Swope
Edwin S. Webster

Pierre S. du Pont

William C. Potter
Horace S. Ford

BURSAR'S STATEMENT

To the Treasurer:

The following principal Schedules

BALANCE SHEET (A)

STATEMENT OF INCOME AND EXPENSE (B)

DEFICIT FROM OPERATIONS (C)

together with their respective supporting schedules (A-1, B-1, etc.) have been drawn from the Institute's books of account. These summarize the financial condition of the Institute as at June 30, 1949, as well as the transactions during the year.

D. L. RHIND, *Bursar*.

W. A. HOKANSON, *Assistant Bursar*.

August 15, 1949

SCHEDULE A

BALANCE SHEET

JUNE 30, 1949

INVESTMENTS

General Investments:

U.S. Government Bonds	\$11,604,507.00
Other Bonds	2,197,130.04
Commercial Paper	4,934,059.04
Preferred Stocks	414,698.19
Common Stocks	15,132,860.59
Real Estate (including \$3,364,819.06 Campus properties) and Mortgages	7,517,399.04
Cash Allocated to General Investments	1,269,758.84

Total General Investments (A-1) \$43,070,412.74

Investments of Funds Separately Invested (A-2) 3,736,737.26
Students' Notes Receivable (A-12) 367,532.21

\$47,174,682.21

CURRENT AND DEFERRED ASSETS

Cash:

General Purposes	\$497,309.05
Segregated for Certain U.S. Government Research Con- tracts	
Special Cash Accounts	\$966,774.25
General Cash Account	71,041.29
	<u>1,037,815.54</u>
Students' Safe-Keeping Deposits	76,576.54

Accounts Receivable, U.S. Government and Other . . (A-13) 1,435,667.16

Contracts in Progress, U.S. Government and Other . . (A-14) 1,556,846.42

Inventories, Prepaid Expenses and Deferred Charges . (A-15) 694,056.28

\$5,298,270.99

EDUCATIONAL PLANT

Land, Buildings and Equipment (A-19) \$22,243,619.00

\$74,716,572.20

SCHEDULE A

BALANCE SHEET

JUNE 30, 1949

INVESTED FUNDS

Endowment Funds — Income Available:

For General Purposes	(A-3)	\$26,967,188.71
For Designated Purposes	(A-4)	8,126,060.47
Student Loan Funds	(A-5)	2,136,375.56
Building Funds — Principal and Income Available	(A-6)	850,153.59
Other Invested Funds — Principal and Income Available:		
For General Purposes	(A-7)	913,742.77
For Designated Purposes	(A-8)	3,801,820.53
Unexpended Balances of Endowment Fund Income for		
Designated Purposes	(A-4)	960,823.93
Deposits and Advances Held for Investment	(A-9)	463,195.47
Conditional Gifts, Income not yet available	(A-10)	432,231.06
Accumulated Net Gain on General Investments	(A-11)	2,523,090.12

\$47,174,682.21

CURRENT LIABILITIES, FUNDS AND SURPLUS

Accounts Payable and Accrued Wages	\$ 672,769.74
Students' Advance Fees and Deposits (A-16)	191,287.99
Students' Safe-Keeping Deposits	76,576.54
Federal Tax Withholdings, Savings Bond and Other	
Deposits (A-17)	322,758.00
Advances by U.S. Government for Certain Research Contracts	3,077,004.75
Total Current Liabilities	\$4,340,397.02

Unexpended Balances for Designated Purposes:

Investment Income not Distributed to Funds. (Page 9)	67,258.01
Gifts and Other Receipts for Current Expenses — not invested (including \$159,703.48 unexpended balances of appropriated income) (A-18)	1,119,241.40
Deficit from Operations (Schedule C)	228,625.44
	\$5,298,270.99

EDUCATIONAL PLANT CAPITAL

Endowment for Educational Plant (A-20)	\$22,243,619.00
	\$74,716,572.20

SCHEDULE B

STATEMENT OF INCOME AND EXPENSE FOR YEAR ENDED
JUNE 30, 1949

INCOME

EDUCATIONAL AND GENERAL:

TUITION AND OTHER FEES	(B-1)	\$ 3,635,628.49
INVESTMENT INCOME used for current expenses	(B-2)	1,323,606.80
GIFTS AND OTHER RECEIPTS used for current expenses	(B-3)	2,189,252.60
REVENUE FROM RESEARCH CONTRACTS (including allowances for expenses of administration and plant operation)	(B-4)	14,911,932.83
OTHER INCOME	(B-5)	69,796.54

Total Educational and General \$22,130,217.26

AUXILIARY ACTIVITIES — Dormitories, Dining Services and Housing Projects (B-13) 1,223,022.83

Total Operating Income \$23,353,240.09

EXPENSES

EDUCATIONAL AND GENERAL:

ACADEMIC EXPENSES:

Salaries and Wages	(B-6)	\$3,952,041.71
Departmental Expenses (including research expenses of academic departments)	(B-7)	850,970.72
Library and Museum	(B-8)	237,588.58
		<u>\$ 5,040,601.01</u>

RESEARCH CONTRACTS (direct expenses) (B-4) 13,422,904.22

GENERAL EXPENSES (B-9) 1,941,407.25

PLANT OPERATION (B-10) 1,404,784.68

MEDICAL DEPARTMENT (B-11) 149,748.07

UNDERGRADUATE BUDGET BOARD (B-12) 250,621.51

Total Educational and General \$22,210,066.74

AUXILIARY ACTIVITIES — Dormitories, Dining Services and Housing Projects (B-13) 1,202,893.02

Total Operating Expenses \$23,412,959.76

EXCESS OF OPERATING EXPENSES OVER OPERATING INCOME 59,719.67

EXPENDITURES FROM CURRENT INCOME FOR ADDITIONS TO EDUCATIONAL PLANT 172,016.83

DEFICIENCY OF INCOME FOR YEAR \$231,736.50

SCHEDULE C

DEFICIT FROM OPERATIONS

YEAR ENDED JUNE 30, 1949

DEFICIT June 30, 1948		\$21,118.85
Deficiency of income for the year ended June 30, 1949 . . .	\$231,736.50	
Unexpended balances of 1948-49 appropriations from current income, reserved for future expenditure	67,881.85	
	<u>\$299,618.35</u>	
Prior year's appropriations from current income, can- celed and restored to surplus or expended in the current year and charged to current expenses	92,111.76	
	<u>207,506.59</u>	
DEFICIT June 30, 1949		<u><u>\$228,625.44</u></u>

SCHEDULE A-1

GENERAL INVESTMENTS

U.S. GOVERNMENT BONDS

<i>Par Value</i>			<i>Book Value</i>	<i>Net Income¹</i>
\$5,000,000	U.S. Treasury	2¼s 1962-59	\$5,000,000.00	\$112,500.00
1,000,000	U.S. Treasury	2½s 1954-52	1,002,100.00	24,300.00
5,100,000	U.S. Treasury	2½s 1969-64	5,185,000.00	4,067.65
417,000	U.S. Savings "G" . . .	2½s 1953-56	417,000.00	10,425.00
550	U.S. Savings "F" . . .	1957	407.00	.....
	Income from bonds sold			201,248.12
<i>Total U.S. Government Bonds</i>			<u>\$11,604,507.00</u>	<u>\$352,540.77</u>

PUBLIC UTILITY BONDS

\$250,000	American & For. Pr.	5s 2030	\$246,478.00	\$12,500.00
200,000	Am. Tel. & Tel.	2¾s 1975	200,000.00	5,500.00
198,000	Puget Sound Pr.&Lt.	4¾s 1972	203,000.00	8,215.00
	Income from bonds sold or called . . . . .		.....	2,995.62
<i>Total Public Utility bonds</i>			<u>\$649,478.00</u>	<u>\$29,210.62</u>

RAILROAD BONDS

\$100,000	Baltimore & Ohio	4s 1975	\$ 86,985.00	\$ 4,000.00
50,000	B.&O., P., L.E.&W.Va.	4s 1980	48,643.75	2,000.00
50,000	Delaware & Hudson	4s 1963	50,000.00	2,000.00
115,000	Northern Pacific	4s 1997	105,228.29	4,600.00
150,000	Southern Pacific	4½s 1981	147,787.50	6,750.00
14,000	Texas & New Orleans R.R. Co.	3¾s 1970	13,007.50	455.00
	Income from bonds sold . . . . .		.....	17,782.25
<i>Total Railroad Bonds</i>			<u>\$451,652.04</u>	<u>\$37,587.25</u>

¹Net after premium amortization

SCHEDULE A-1 — (Continued)

<i>Par Value or Shares</i>	OTHER BONDS			<i>Book Value</i>	<i>Net Income</i>
\$250,000	Com'l Credit.....	2¾s	1954	\$250,000.00	.....
250,000	Com'l Credit.....	2¾s	1955	250,000.00	.....
250,000	Com'l Credit.....	2¾s	1956	250,000.00	.....
250,000	Com'l Credit.....	2¾s	1957	250,000.00	.....
96,000	Railway & Light Sec	3¾s	1955	96,000.00	\$3,120.00
Total Other Bonds.....				\$1,096,000.00	\$3,120.00

COMMERCIAL PAPER*					
\$500,000	Com'l Credit.....	1¾s	1949	\$ 493,437.50	.....
500,000	Com'l Invest. Trust..	1¾s	1949	493,437.50	.....
500,000	Com'l Invest. Trust..		1950	493,486.11	.....
500,000	Com'l Invest. Trust..		1950	493,461.81	.....
500,000	Gen. Motors Accept- ance Corp.....	1¾s	1949	493,388.89	.....
1,500,000	Gen. Motors Accept- ance Corp.....		1950	1,480,166.67	.....
1,000,000	Gen. Motors Accept- ance Corp.....		1950	986,680.56	.....
Income from notes matured.....				.....	\$32,635.42
Total Commercial Paper Notes.....				\$4,934,059.04	\$32,635.42

*Bought at a discount.

PUBLIC UTILITY PREFERRED STOCKS			
1,500	N.E. Gas & Elec. Assoc.....	4½%	\$154,500.00 \$6,750.00
900	Niagara Hudson Power.....	5%	86,267.05 4,500.00
Income from stocks sold.....			 375.00
Total Public Utility Preferred Stocks.			\$240,767.05 \$11,625.00

OTHER PREFERRED STOCKS			
1,000	Atch., Top. & Santa Fe.....	5%	\$69,813.64 \$5,000.00
1,500	Railway & Light Securities.....	4%	83,250.00 3,000.00
170	United States Rubber		20,867.50 740.00
Income from stocks sold.....			 60.00
Total Other Preferred Stocks			\$173,931.14 \$8,800.00

REPORT OF THE TREASURER

SCHEDULE A-1 — (Continued)

<i>Shares</i>		<i>Book Value</i>	<i>Net Income</i>
INDUSTRIAL COMMON STOCKS			
1,000	Allied Chemical and Dye	\$169,177.26	\$9,000.00
3,000	American Can	294,888.57	12,000.00
2,024	American Tobacco	154,736.11	8,000.00
2,600	Armstrong Cork	117,427.19	7,800.00
4,000	Caterpillar Tractor	92,194.13	6,000.00
223	Christiana Securities	579,374.35	45,202.10
4,000	Chrysler	131,644.60	18,000.00
4,000	Colgate Palmolive Peet	201,841.32	12,000.00
2,500	Consolidated Rendering	169,500.00	14,950.00
2,000	Draper	96,132.10	10,500.00
736	E. I. du Pont de Nemours	34,711.88	1,978.00
36,802	Eastman Kodak	616,486.83	58,533.30
8,950	General Electric	233,067.47	17,005.00
5,591	General Motors	238,812.46	26,052.50
2,700	General Radio	57,150.00	7,425.00
3,500	Gulf Oil	184,894.62	13,691.87
4,000	Hercules Powder	164,519.94	9,800.00
150	Heywood-Wakefield	2,250.00	75.00
8,000	Humble Oil & Refining	339,294.10	34,625.00
6,000	Inland Steel	199,974.49	18,000.00
1,929	International Business Machines	90,887.95	7,532.00
6,000	International Harvester	79,912.25	10,200.00
4,850	International Nickel	163,067.43	8,245.00
4,000	International Paper	180,221.60	20,000.00
6,000	Johns Manville	187,886.86	12,600.00
1,200	Kennecott Copper	54,911.80	6,900.00
2,625	Liggett & Myers Tobacco	183,606.14	11,025.00
3,150	Liquid Carbonic	53,551.11	3,075.00
200	Lithomat	1,600.00	.....
200	Mead Johnson	5,100.00	160.00
6,000	Merck & Co.	109,633.44	9,900.00
2,000	Minnesota Mining & Mfg.	147,416.80	1,200.00
6,000	Monsanto Chemical	132,927.64	12,000.00
4,000	Montgomery Ward	261,266.32	12,000.00
4,180	National Cash Register	139,047.62	9,880.00
4,200	National Lead	118,093.64	5,100.00
2,200	National Steel	149,488.34	11,500.00
6,000	Owens Illinois Glass	342,772.10	15,750.00
5,000	J. C. Penney	154,666.05	12,500.00
4,200	Phillips Petroleum	236,778.62	12,600.00
6,000	Pittsburgh Plate Glass	83,197.11	10,500.00

INVESTMENTS

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SCHEDULE A-1 — (Continued)

<i>Shares</i>		<i>Book Value</i>	<i>Net Income</i>
INDUSTRIAL COMMON STOCKS (Continued)			
5,000	Procter & Gamble.....	\$261,143.86	\$20,000.00
2,500	St. Joseph Lead.....	109,995.10	8,750.00
6,258	Sears Roebuck.....	126,745.79	16,964.50
2,000	Sherwin Williams.....	100,988.10	6,000.00
1,785	Standard Oil, Cal.....	91,240.78	6,970.00
5,050	Standard Oil, Ind.....	178,981.20	14,000.00
8,793	Standard Oil, N. J.....	348,060.71	21,341.50
2,126	Texas.....	116,981.92	6,301.50
13,710	Union Carbide and Carbon.....	270,383.10	27,300.00
12,006	United Fruit.....	185,883.18	48,000.00
3,062	United Shoe Machinery.....	210,042.06	8,731.40
4,080	U. S. Plywood.....	112,990.28	4,020.00
6,000	Westinghouse Electric.....	107,827.11	7,500.00
	Income from stocks sold.....		7,650.00
<i>Total Industrial Common Stocks.....</i>		<u>\$9,175,373.43</u>	<u>\$726,833.67</u>
PUBLIC UTILITY COMMON STOCKS			
7,500	Am. Gas & Elec.....	\$303,501.96	\$18,936.32
1,478	American Tel. & Tel.....	190,129.58	13,140.00
4,060	Boston Edison.....	146,849.74	10,556.00
3,000	Cleveland Electric Illuminating.....	124,875.00	5,775.00
8,075	Commonwealth Edison.....	230,222.21	11,910.64
3,025	Pacific Gas & Electric.....	113,964.91	5,500.00
3,250	Public Service Electric & Gas.....	101,926.84	4,550.00
100	Southern Natural Gas.....	2,900.00	.....
	Income from stock sold.....		112.50
<i>Total Public Utility Common Stocks..</i>		<u>\$1,214,370.24</u>	<u>\$70,480.46</u>
RAILROAD COMMON STOCKS			
2,030	Atch., Top. & Santa Fe.....	\$182,584.31	\$16,000.00
2,000	Great Northern.....	95,877.13	8,000.00
1,600	Norfolk & Western.....	58,542.78	6,400.00
<i>Total Railroad Common Stocks.....</i>		<u>\$337,004.22</u>	<u>\$30,400.00</u>

REPORT OF THE TREASURER

SCHEDULE A-1 — (Continued)

<i>Shares</i>	<i>BANK STOCKS</i>	<i>Book Value</i>	<i>Net Income¹</i>
3,750	Bankers Trust, N. Y.....	\$189,613.75	\$6,750.00
2,000	Central Hanover Bk. & Tr., N.Y.....	233,650.00	8,000.00
5,000	Chase National, N. Y.....	261,212.50	8,000.00
3,800	Chemical Bank & Trust, N. Y.....	192,887.50	6,840.00
2,425	Cont. Ill. Nat. Bank, Chicago.....	174,564.00	9,700.00
4,986	First National, Boston.....	300,481.21	11,218.50
1,152	Guaranty Trust, N. Y.....	321,949.04	13,764.00
667	Harris Trust & Savings, Chicago....	146,587.00	8,004.00
2,200	Lincoln Rochester Trust.....	102,800.00	4,400.00
5,800	National City, N. Y.....	252,022.08	9,280.00
500	New England Trust, Boston.....	40,000.00	3,000.00
	<i>Total Bank Stocks</i>	<u>\$2,215,767.08</u>	<u>\$88,956.50</u>
	<i>INSURANCE STOCKS</i>		
3,335	Boston.....	\$198,005.80	\$7,002.00
3,000	Continental Casualty.....	156,112.50	6,600.00
1,700	Continental Insurance.....	68,383.05	4,590.00
4,590	Fireman's Fund.....	265,650.00	10,863.00
2,475	Hartford.....	160,303.85	6,125.00
3,500	Insurance Co. of North America.....	212,146.66	11,375.00
7,500	National Union.....	248,437.51	10,500.00
2,500	Phoenix.....	194,179.60	7,500.00
1,700	Standard Accident.....	51,000.00	2,465.00
3,000	U.S.Fidelity & Guaranty.....	148,837.50	5,700.00
	<i>Total Insurance Stocks</i>	<u>\$1,703,056.47</u>	<u>\$72,720.00</u>
	<i>OTHER STOCKS</i>		
6,000	American Research & Development..	\$150,000.00	.....
2,050	Bond Investment Trust of America ..	202,031.50	\$8,200.00
6,000	Railway & Light Securities	105,750.00	10,500.00
1,000	Stone & Webster, Inc.....	29,507.65	1,250.00
	<i>Total Other Stocks</i>	<u>\$487,289.15</u>	<u>\$19,950.00</u>
	<i>REAL ESTATE</i>		
111	Bay State Road, Boston.....	\$17,800.00	\$ 712.00
120	Bay State Road, Boston.....	30,712.75	516.84
180	Beacon Street, Boston.....	30,000.00	.....
	Franklin Street, Boston.....	150,000.00	7,175.48
80	Memorial Drive, Cambridge.....	914,363.35	45,891.71
100	Memorial Drive, Cambridge.....	153,510.85	12,621.90
333	Memorial Drive, Cambridge (c).....	40,000.00	1,376.55
565	Memorial Drive, Cambridge (c).....	200,560.50	8,022.00
640	Memorial Drive, Cambridge.....	500,281.87 ²	7,520.76
	Main and Vassar Sts., Cambridge (c).....	50,335.70	154.10
	New Senior Dormitory (c) (see Schedule A-19) ..	1,962,299.36	.....
211	Massachusetts Avenue, Cambridge.....	100,000.00	4,446.03
	Graduate House, Cambridge (c).....	647,951.94	.....
	Bexley Hall, Cambridge.....	159,280.61	7,380.00

¹ Net after amortization.² Not including first mortgage of \$500,000 with Boston Five Cents Savings Bank.

(c) Campus properties.

SCHEDULE A-1 — (Continued)

<i>REAL ESTATE Continued</i>	<i>Book Value</i>	<i>Net Income¹</i>
Building 37, Power Plant (c)	\$4,178.96	.....
Westgate, Veterans Housing (c)	459,492.60	\$4,645.84
Gloversville, N. Y.	223,091.95 ³	10,622.04
Harrisonburg, Va.	30,814.12	1,495.00
New Bedford, Mass.	29,700.04	2,030.57
New London, Conn.	244,167.42	11,652.67
Lexington, Mass.	68,074.04	2,454.00
Plattsburgh, N.Y.	193,848.39	8,867.56
Taunton, Mass.	199,881.60	9,077.38
Waltham, Mass.	198,500.00 ⁴	11,027.54
Willimantic, Conn.	163,034.80	7,400.96
Worcester, Mass., Main Street	197,761.97	8,980.34
Worcester, Mass., Federal Street	400,786.62	17,593.90
<i>Total Real Estate</i>	<u>\$7,370,429.44</u>	<u>\$163,668.27</u>

¹Net after amortization.²Not including first mortgage of \$3,700 with Connecticut Mutual Life Insurance Co.³Not including first mortgage of \$164,000 with Metropolitan Life Insurance Company.

(c) Campus properties.

<i>MORTGAGE NOTES</i>		
Spear and Wibird Streets, Quincy	\$4,100.00	\$206.25
Common Street, Belmont	6,750.00	317.81
Park Avenue, Arlington	9,269.08	427.91
Pequosett Road, Belmont	11,222.58	518.78
Ruby Avenue, Marblehead	7,100.00	330.74
Alpha Tau Omega	11,900.00	632.50
Beta Theta Pi	22,000.00	1,137.50
Delta Kappa Epsilon	19,000.00	818.72
Kappa Sigma	9,000.00	471.26
Lambda Chi Alpha	14,377.94	742.70
Pi Lamda Phi	8,000.00	561.12
Phi Gamma Delta	5,250.00	293.76
Phi Mu Delta	9,500.00	1,310.13
Sigma Chi	3,500.00	175.00
Theta Chi	6,000.00	312.50
Income on Paid-up Mortgage . . . . .	.....	118.75
<i>Total Mortgage Notes</i>	<u>\$146,969.60</u>	<u>\$8,375.43</u>
<i>Total General Investments</i>	<u>\$41,800,653.90*</u>	<u>\$1,656,903.39</u>

(Schedule A)

*Exclusive of \$1,269,758.84 cash allocated to General Investments.

Add:

Interest on Funds Advanced for Research Contracts
(exclusive of \$15,246.00 credited to Real Estate income
and \$19,253.38 credited to book value of Real Estate) .

57,000.00
\$1,713,903.39

Deduct:

Compensation of Financial Agent

30,000.00
\$1,683,903.39

(Schedule B-2)

SCHEDULE A-2

INVESTMENTS OF FUNDS SEPARATELY INVESTED

<i>Par Value or Shares</i>		<i>Book Value</i>	<i>Net Income¹</i>
INVESTMENTS, AVOCA FUND			
3,600	General Radio.....	\$76,200.00	\$9,900.00
INVESTMENTS, BABSON FUND			
\$2,000	U. S. Treasury 2 1/4s 1956-59.....	\$2,000.00	\$9.87
469	A. P. W. Products.....	126.10	117.26
80	United Stores, Cum. Conv. Pfd.....	8,034.54	480.00
80	United Stores, 2d Pfd.....	1,288.56	96.00
30	Standard Oil, Ind.....	1,429.30	84.00
	<i>Total Babson Fund.....</i>	<i>\$12,878.50</i>	<i>\$767.39</i>
INVESTMENTS, ALBERT FARWELL BEMIS FUND			
	Miscellaneous building lots in Wellesley carried at.....	\$9,300.00	.....
INVESTMENTS, MALCOLM COTTON BROWN FUND			
\$2,500	U. S. Savings "G"..... 2 1/2s 1954	\$2,500.00	\$62.50
30	General Electric.....	1,019.70	57.00
	<i>Total Brown Fund.....</i>	<i>\$3,519.70</i>	<i>\$119.50</i>
INVESTMENTS, CLASS OF 1919 FUND			
\$4,650	United States Savings "F" 1956-57	\$3,441.00	.....
INVESTMENTS, CLASS 1920 FUND			
\$3,150	U. S. Savings "F"..... 1957	\$2,331.00	.....
2,175	U. S. Savings "F"..... 1958	1,609.50	.....
	<i>Total Class 1920 Fund.....</i>	<i>\$3,940.50</i>	<i>.....</i>
INVESTMENTS, DRAPER FUND			
\$29,900	U. S. Savings "G".. 2 1/2s 1954	\$29,900.00	\$747.50
24,000	U. S. Savings "G".. 2 1/2s 1955	24,000.00	600.00
10,000	U. S. Savings "G".. 2 1/2s 1959	10,000.00	250.00
21,000	U. S. Savings "G".. 2 1/2s 1960	21,000.00	525.00
5,000	Baltimore & Ohio... 4s 1975	5,000.00	200.00
5,000	Central Pacific.... 4s 1949	4,866.66	200.00
5,000	Northern Pacific... 4s 1997	4,598.31	200.00
5,000	Southern Pacific.... 4 1/2s 1981	5,000.00	225.00
	<i>Total Draper Fund.....</i>	<i>\$104,364.97</i>	<i>\$2,947.50</i>

¹Net after Premium Amortization.

INVESTMENTS

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SCHEDULE A-2 — (Continued)

<i>Par Value or Shares</i>		<i>Book Value</i>	<i>Net Income¹</i>
INVESTMENTS, ARTHUR D. LITTLE MEMORIAL FUND			
\$30,000	U. S. Treasury Note... 1 3/4s 1950	\$30,000.00	\$157.61
40,000	U. S. Treasury..... 2s 1953-51	40,000.00	645.58
40,000	U. S. Treasury..... 2s 1954-52	40,000.00	489.62
23,000	U. S. Treasury..... 2 1/4s 1959-56	23,000.00	113.50
466	Arthur D. Little, Inc., Pfd.....	46,600.00	2,796.00
5,543	Arthur D. Little, Inc., Com.....	110,860.00	38,801.00
	Income from bonds sold.....	.....	290.98
	<i>Total Little Fund</i>	<u>\$290,460.00</u>	<u>\$43,067.29</u>
INVESTMENTS, RICHARD LEE RUSSEL FUND			
\$1,000	Mortgage Note (participation).....	\$1,000.00	\$50.00
3,000	Mortgage.....	3,000.00	150.00
	<i>Total Russel Fund</i>	<u>\$4,000.00</u>	<u>\$200.00</u>
INVESTMENTS, SOLAR ENERGY FUND			
\$13,000	U. S. Treasury..... 2s 1951-49	\$13,000.00	\$260.00
13,000	U. S. Treasury..... 2s 1954-52	13,000.00	260.00
5,000	Godfrey L. Cabot, Inc.....	647,700.00	28,839.00
96	Columbian Carbon.....	3,408.00	192.00
530	General Electric.....	20,171.83	530.00
153	B. F. Goodrich.....	10,662.75	841.50
52	Hugoton Production.....	706.89	.....
108	Mission Corporation.....	6,291.00	815.17
104	Panhandle Eastern Pipe Line.....	5,733.00	1,018.89
	Income from stocks sold.....	.....	287.00
	<i>Total Solar Energy Fund</i>	<u>\$720,673.47</u>	<u>\$33,043.56</u>
INVESTMENTS, FRANCES E. AND SAMUEL M. WESTON FUND			
\$4,950	Mortgage Note, Bartlett.....	\$4,950.00	\$228.01

¹Net after Premium Amortization.

REPORT OF THE TREASURER

SCHEDULE A-2 — (Continued)

<i>Par Value or Shares</i>			<i>Book Value</i>	<i>Net Income¹</i>
INVESTMENTS, JONATHAN WHITNEY FUND				
\$331,000	U. S. Savings "G" 2½s	1954-60	\$331,000.00	\$8,275.00
40,000	American & For. Pr. 5s	2030	37,178.70	2,000.00
20,000	Pacific Gas & Elec. 3s	1974	20,650.00	550.00
400	Armstrong Cork		19,123.35	320.00
410	Bankers Trust, N. Y.		18,937.50	657.00
500	Boston Edison		18,567.12	825.00
300	Boston Insurance		19,200.00	180.00
300	Chrysler		16,594.85	750.00
400	du Pont		15,279.10	1,075.00
250	First National Bank of Boston		11,525.00	562.50
500	General Electric		13,188.05	950.00
66	Guaranty Trust, N. Y.		18,087.30	792.00
400	Inland Steel		16,220.12	400.00
300	International Paper		14,642.60	600.00
400	National City, N. Y.		18,850.00	640.00
321	Standard Oil, N. J.		12,277.35	779.50
450	United Fruit		10,690.25	1,800.00
	Income from Bonds Sold			2,289.75
	<i>Total Whitney Fund</i>		<u>\$612,011.29</u>	<u>\$23,445.75</u>
INVESTMENTS, TECHNOLOGY LOAN FUND				
\$600,000	U. S. Savings "G" 2½s	1954-60	\$600,000.00	\$15,000.00
20,000	U. S. Treasury Note 1¾s	1950	20,000.00	38.14
100,000	U. S. Treasury 2s	1953-51	100,000.00	2,000.00
96,000	U. S. Treasury 2½s	1962-59	96,000.00	2,160.00
88,000	U. S. Treasury 2½s	1958-56	88,200.00	2,050.03
100,000	U. S. Treasury 2½s	1954	100,300.00	2,000.07
35,000	American Tel. & Tel. 2¾s	1980	35,000.00	962.50
15,000	Pacific Gas & Elec. 3s	1974	15,000.00	450.00
450	American Can		36,089.83	1,800.00
1,200	Cleveland Electric Illuminating		46,337.47	2,310.00
800	du Pont		29,304.00	2,150.00
207	Engineers Pub. Serv., Pfd.		1.00	.....
1,000	General Electric		25,813.25	1,900.00
177	Guaranty Trust, N. Y.		50,333.82	2,124.00
625	Gulf Oil		32,630.80	2,442.89
1,100	National Cash Register		38,458.96	2,600.00
1,100	National City, N. Y.		40,650.00	1,760.00
1,000	North American		20,921.13	750.00
500	Procter & Gamble		29,511.45	2,000.00
642	Standard Oil, N. J.		24,862.79	1,560.00
1,250	Stone & Webster, Inc.		36,698.75	1,562.50
1,200	Union Carbide and Carbon		27,726.00	2,400.00
900	United Fruit		21,360.20	3,600.00
400	Hartford Fire Insurance of Conn.		44,725.00	1,000.00
450	Phoenix Insurance		38,293.75	1,350.00
	Income from Bonds and Stocks Sold			640.63
	<i>Total Technology Loan Fund</i>		<u>\$1,598,218.20</u>	<u>\$56,610.76</u>

¹ Net after Premium Amortization.

INVESTMENTS

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SCHEDULE A-2 — (Continued)

<i>Par Value or Shares</i>			<i>Book Value</i>	<i>Net Income¹</i>
INVESTMENTS, JOSEPH HEWETT FUND				
\$10,000	U. S. Savings "G" 2½s	1958	\$10,000.00	\$250.00
50,000	U. S. Savings "G" 2½s	1954	50,000.00	1,250.00
5,000	U. S. Savings "G" 2½s	1960	5,000.00	62.50
15,000	Alabama Power 3½s	1972	15,000.00	525.00
15,000	Puget Sound Pr. & Lt. 4¼s	1972	15,550.00	612.50
12,000	Baltimore & Ohio 4s	1975	12,000.00	480.00
10,000	Northern Pacific 4s	1997	10,500.00	375.00
10,000	Southern Pacific 4½s	1981	10,240.00	420.00
12,000	Texas & New Orleans 3¾s	1990	12,000.00	405.00
120	Bankers Trust, N. Y.		4,775.00	216.00
22	Guaranty Trust, N. Y.		5,078.70	264.00
50	Phoenix Insurance		3,750.00	150.00
100	American Can		7,520.00	400.00
200	du Pont		8,271.55	537.50
300	General Electric		8,107.50	570.00
165	National Cash Register		5,428.99	390.00
200	Standard Oil, Ind.		9,498.65	560.00
214	Standard Oil, N. J.		8,177.60	520.00
300	Union Carbide and Carbon		6,944.20	600.00
300	United Fruit		7,120.00	1,200.00
	<i>Total Hewett Fund</i>		<u>\$214,562.19</u>	<u>\$9,787.50</u>
INVESTMENTS, GEORGE S. WITMER FUND				
\$13,800	U. S. Savings "G" 2½s	1945-59	\$13,800.00	\$295.00
5,000	Atlantic Coast Line 4s	1952	4,854.44	200.00
4,000	Central Pacific 4s	1949	4,000.00	160.00
5,000	Northern Pacific 4s	1997	4,903.79	200.00
4,000	Southern Pacific 4½s	1981	3,942.68	180.00
150	Commonwealth Edison		5,082.43	221.25
205	Middle South Utilities		1,384.05	.....
133	Pacific Gas & Electric		5,310.87	242.00
295	United Gas Corporation		2,165.95	.....
30	Phoenix Insurance		2,677.50	15.00
50	General Electric		1,718.25	95.00
45	General Motors		2,503.46	187.50
100	R. J. Reynolds Tobacco		4,200.00	200.00
100	The Sperry Corporation		2,500.00	.....
43	Standard Oil, Ind.		1,967.70	120.40
42	Standard Oil, N. J.		1,706.32	104.00
90	Union Carbide and Carbon		2,051.85	180.00
65	Bankers Trust, N. Y.		3,071.50	117.00
22	Guaranty Trust, N. Y.		5,920.20	264.00
	Real Estate, Sanford, Fla.		4,456.45	280.55
	Income from Bonds Sold . . . . .		.....	80.00
	Income from Stocks Sold or Exchanged . . . . .		.....	360.00
	<i>Total Witmer Fund</i>		<u>\$78,217.44</u>	<u>\$3,501.70</u>
<i>Total of Investments of Funds Separately Invested</i>			<u>\$3,736,737.26</u>	<u>\$183,618.96</u>

¹ Net after Premium Amortization.

(Schedule A) (Schedule B-2)

REPORT OF THE TREASURER

SCHEDULE A-3

ENDOWMENT FUNDS

INCOME FOR GENERAL PURPOSES

PRINCIPAL				
	Balance, June 30, 1948	Gifts and Other Receipts	Other Additions	Balance, June 30, 1949
101 George Robert Armstrong.....	\$5,000.00	.....	.....	\$5,000.00
103 George Blackburn Memorial.....	962,030.22	\$100.00	.....	962,130.22
105 Clara H. Briggs.....	12,514.55	.....	.....	12,514.55
107 James A. Carney.....	17,170.01	.....	.....	17,170.01
109 Charles Choate.....	35,858.15	.....	.....	35,858.15
110 Class of 1909.....	.....	10,460.48	\$5,523.73(1)	15,984.21
111 Eben S. Draper.....	107,485.41	.....	.....	107,485.41
113 Coleman du Pont.....	221,325.48	.....	.....	221,325.48
115 Eastman Contract.....	9,498,869.55	.....	.....	9,498,869.55
117 Charles W. Eaton.....	261,148.19	.....	.....	261,148.19
119 Educational Endowment.....	7,573,855.60	.....	.....	7,573,855.60
121 Martha Ann Edwards.....	30,000.00	.....	.....	30,000.00
123 William Endicott.....	25,000.00	.....	.....	25,000.00
125 Francis Appleton Foster.....	1,000,000.00	.....	.....	1,000,000.00
127 John W. Foster.....	299,650.64	.....	.....	299,650.64
129 Alexis H. French.....	5,000.00	.....	.....	5,000.00
131 Jonathan French.....	25,212.48	65,637.77	.....	90,850.25
133 Henry C. Frick.....	2,208,482.92	.....	.....	2,208,482.92
135 General Endowment.....	1,527,449.00	.....	.....	1,527,449.00
137 Eliot Granger.....	21,568.43	.....	.....	21,568.43
139 Charles Hayden.....	1,000,000.00	.....	.....	1,000,000.00
141 John Marshall Hills.....	366,430.96	.....	.....	366,430.96
142 Walter W. Hodges.....	36,809.70	.....	.....	36,809.70
143 James Fund.....	163,654.21	.....	.....	163,654.21
145 Dale G. Kilburn.....	.....	68,893.95	.....	68,893.95
147 Thomas McCammon.....	15,000.00	.....	.....	15,000.00
149 Kate M. Morse.....	25,000.00	.....	.....	25,000.00
151 Everett Morss.....	25,000.00	.....	.....	25,000.00
153 Richard Perkins.....	50,000.00	.....	.....	50,000.00
155 J. W. and B. L. Randall.....	83,452.36	.....	.....	83,452.36
157 William Barton Rogers Memorial.....	250,225.00	.....	.....	250,225.00
159 Saltonstall Fund.....	68,236.87	.....	682.00(2)	68,918.87
161 Samuel E. Sawyer.....	4,764.40	.....	.....	4,764.40
163 Andrew Hastings Spring.....	50,000.00	.....	.....	50,000.00
165 George G. Stone.....	4,677.35	.....	.....	4,677.35
167 Seth K. Sweetser.....	25,061.62	.....	.....	25,061.62
168 Henry P. Talbot.....	.....	45,210.57	.....	45,210.57
169 William J. Walker.....	23,613.59	.....	.....	23,613.59
171 Horace Herbert Watson.....	36,057.19	.....	.....	36,057.19
172 Arthur P. Watt (Memorial).....	.....	1,500.00	.....	1,500.00
173 Albion B. K. Welch.....	5,000.00	.....	.....	5,000.00
175 Everett Westcott.....	171,394.00	.....	.....	171,394.00
177 Marion Westcott.....	244,152.00	1,452.74	.....	245,604.74
179 George Wigglesworth.....	26,766.45	.....	107.20(3)	26,873.65
181 Edwin A. Wyeth.....	254,703.94	.....	.....	254,703.94
Totals.....	\$26,767,620.27	\$193,255.51	\$6,312.93	\$26,967,188.71

(1) Transferred from other funds.

(2) One-fourth net income to Fund.

(3) One-tenth net income to Fund.

(Schedule A)

ENDOWMENT FUNDS INCOME FOR GENERAL PURPOSES

INCOME AND EXPENDITURES					
<i>Unexpended Balance June 30, 1948</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended</i>	<i>Transferred</i>	<i>Unexpended Balance June 30, 1949</i>
.....	\$200.00	.....	\$200.00	.....	.....
.....	38,484.00	.....	38,484.00	.....	.....
.....	500.00	.....	500.00	.....	.....
.....	688.00	.....	688.00	.....	.....
.....	1,436.00	.....	1,436.00	.....	.....
.....	264.00	.....	264.00	.....	.....
.....	2,947.50	.....	2,947.50	.....	.....
.....	8,852.00	.....	8,852.00	.....	.....
.....	379,956.00	.....	379,956.00	.....	.....
.....	10,444.00	.....	10,444.00	.....	.....
.....	302,956.00	.....	302,956.00	.....	.....
.....	1,200.00	.....	1,200.00	.....	.....
.....	1,000.00	.....	1,000.00	.....	.....
.....	40,000.00	.....	40,000.00	.....	.....
.....	11,988.00	.....	11,988.00	.....	.....
.....	200.00	.....	200.00	.....	.....
.....	2,312.00	.....	2,312.00	.....	.....
.....	88,340.00	.....	88,340.00	.....	.....
.....	61,096.00	.....	61,096.00	.....	.....
.....	864.00	.....	864.00	.....	.....
.....	40,000.00	.....	40,000.00	.....	.....
.....	14,656.00	.....	14,656.00	.....	.....
.....	1,472.00	.....	1,472.00	.....	.....
.....	6,548.00	.....	6,548.00	.....	.....
.....	1,688.00	.....	1,688.00	.....	.....
.....	600.00	.....	600.00	.....	.....
.....	1,000.00	.....	1,000.00	.....	.....
.....	1,000.00	.....	1,000.00	.....	.....
.....	2,000.00	.....	2,000.00	.....	.....
.....	3,340.00	.....	3,340.00	.....	.....
.....	10,008.00	.....	10,008.00	.....	.....
.....	2,728.00	.....	2,046.00	\$682.00	.....
.....	192.00	.....	192.00	.....	.....
.....	2,000.00	.....	2,000.00	.....	.....
.....	188.00	.....	188.00	.....	.....
.....	1,004.00	.....	1,004.00	.....	.....
.....	1,220.00	.....	1,220.00	.....	.....
.....	944.00	.....	944.00	.....	.....
.....	1,444.00	.....	1,444.00	.....	.....
.....	24.00	.....	24.00	.....	.....
.....	200.00	.....	200.00	.....	.....
.....	6,856.00	.....	6,856.00	.....	.....
.....	9,792.00	.....	9,792.00	.....	.....
.....	1,072.00	.....	964.80	107.20	.....
.....	10,188.00	.....	10,188.00	.....	.....
.....	<u>\$1,073,891.50</u>	.....	<u>\$1,073,102.30</u>	<u>\$789.20</u>	.....

REPORT OF THE TREASURER

SCHEDULE A-4
ENDOWMENT FUNDS
INCOME FOR DESIGNATED PURPOSES

DEPARTMENTS AND RESEARCH		PRINCIPAL			
		Balance, June 30, 1948	Gifts and Other Receipts	Other Additions	Balance June 30, 1949
201	William Parsons Atkinson (English).....	\$13,082.20	.....	.....	\$13,082.20
203	Albert Farwell Bemis (Bemis Foundation).....	308,768.00	\$173.88	.....	308,941.88
205	Frank Walter Boles Memorial (Architecture) ..	25,200.00	.....	.....	25,200.00
207	Samuel Cabot (Chemical Engineering).....	50,000.00	.....	.....	50,000.00
209	William E. Chamberlain (Architecture).....	7,309.77	.....	.....	7,309.77
211	Crosby Honorary (Geology).....	1,633.60	.....	.....	1,633.60
213	Susan E. Dorr (Physics).....	95,955.67	.....	.....	95,955.67
215	George Eastman (Chemistry and Physics).....	400,000.00	.....	.....	400,000.00
217	Harold H. Fletcher (Medical).....	10,000.00	.....	.....	10,000.00
218	Edith Morrill Hobbs (Arch. Library).....	5,000.00	.....	.....	5,000.00
219	William R. Kales (Medical).....	75,001.48	.....	.....	75,001.48
221	Arthur E. Kennelly (Mathematics).....	67,058.49	.....	.....	67,058.49
223	Arthur D. Little Memorial (Chem. & Chem. Eng.)	157,460.00	75.00	.....	157,535.00
225	Katherine Bigelow Lowell (Physics).....	5,000.00	.....	.....	5,000.00
227	George Henry May (Chemistry).....	4,250.00	.....	.....	4,250.00
231	Edward D. Peters (Geology).....	5,000.00	.....	.....	5,000.00
233	Pratt Naval Architectural (Naval Architecture)	395,676.29	.....	.....	395,676.29
234	Raymond B. Price (Chemistry).....	5,000.00	4,000.00	.....	9,000.00
235	Ellen H. Richards (Chemistry).....	15,076.05	.....	.....	15,076.05
237	Charlotte B. Richardson (Chemical Engineering)	30,000.00	.....	.....	30,000.00
241	William Barton and Emma Savage Rogers (Research).....	179,538.17	.....	\$14,259.80(1)	193,797.97
243	Frances E. Roper (Mechanical Engineering)....	2,000.00	.....	.....	2,000.00
245	Arthur Rotch (Architecture).....	25,000.00	.....	.....	25,000.00
251	Solar Energy (Research).....	647,700.00	2,186.52	.....	645,513.48
255	Edmund K. Turner (Civil Engineering).....	288,436.26	.....	2,847.00(2)	291,283.26
257	William R. Ware (Architecture).....	15,000.00	.....	.....	15,000.00
		<u>\$2,834,145.98</u>	<u>\$2,062.36</u>	<u>\$17,106.80</u>	<u>\$2,853,315.14</u>
LIBRARY					
261	Walter S. Barker.....	\$10,000.00	.....	.....	\$10,000.00
263	Samuel Berke.....	20,000.00	.....	.....	20,000.00
267	Charles Lewis Flint.....	5,000.00	.....	.....	5,000.00
269	William Hall Kerr.....	2,000.00	.....	.....	2,000.00
271	George A. Osborne.....	10,000.00	.....	.....	10,000.00
273	Arthur Rotch Architectural.....	5,000.00	.....	.....	5,000.00
275	John Hume Todd.....	2,500.00	.....	.....	2,500.00
277	Theodore N. Vail Memorial.....	67,506.27	\$566.07	.....	68,072.34
		<u>\$122,006.27</u>	<u>\$566.07</u>	<u>.....</u>	<u>\$122,572.34</u>

(1) Income added to principal until 1957.

(2) One-fourth net income carried to Fund.

ENDOWMENT FUNDS INCOME FOR DESIGNATED PURPOSES

<i>INCOME AND EXPENDITURES</i>					
<i>Unexpended Balance June 30, 1948</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended</i>	<i>Transferred</i>	<i>Unexpended Balance June 30, 1949</i>
.....	\$516.00	.....	\$516.00	.....	.....
52,035.02	14,240.00	.....	10,555.35	.....	\$55,719.67
12,051.14	1,528.00	.....	412.87	.....	13,992.01
8,028.20	2,320.00	.....	.....	.....	10,348.20
16.95	288.00	.....	276.00	.....	28.95
458.69	84.00	.....	84.00	.....	458.69
.....	3,840.00	.....	3,840.00	.....	.....
.....	16,000.00	.....	16,000.00	.....	.....
303.23	404.00	.....	400.00	.....	307.23
32.00	200.00	.....	29.20	.....	202.80
1,281.78	2,992.00	.....	3,000.00	.....	1,273.78
13,555.47	2,972.00	.....	12,700.00	.....	3,827.47
132,695.22	43,067.29	.....	90,000.00	\$6,800.00	78,962.51
.....	200.00	.....	200.00	.....	.....
1,164.25	216.00	.....	.....	.....	1,380.25
1,378.88	256.00	.....	256.00	.....	1,378.88
.....	15,788.00	.....	15,788.00	.....	.....
100.00	284.00	.....	.....	.....	384.00
9,365.52	736.00	.....	.....	.....	10,101.52
22,753.78	2,112.00	.....	2,112.00	.....	22,753.78
7,057.20	7,460.00	.....	257.40	14,259.80	.....
.....	80.00	.....	.....	.....	80.00
.....	1,000.00	.....	1,000.00	.....	.....
50,732.16	33,043.56	.....	5,857.33	39,385.92	38,532.47
.....	11,388.00	.....	8,541.00	2,847.00	.....
841.50	620.00	.....	681.79	.....	779.71
<u>\$313,850.99</u>	<u>\$161,634.85</u>	.....	<u>\$171,681.20</u>	<u>\$63,292.72</u>	<u>\$240,511.92</u>
\$632.59	\$416.00	.....	\$400.24	.....	\$648.35
1,736.95	852.00	.....	783.64	.....	1,805.31
947.35	232.00	.....	200.57	.....	978.78
2,623.90	180.00	.....	68.00	.....	2,735.90
3,146.80	516.00	.....	369.95	.....	3,292.85
2,527.13	296.00	.....	2,823.13	.....	.....
1,438.54	156.00	.....	104.55	.....	1,489.99
3,435.06	2,784.00	.....	3,972.82	.....	2,246.24
<u>\$16,488.32</u>	<u>\$5,432.00</u>	.....	<u>\$8,722.90</u>	.....	<u>\$13,197.42</u>

REPORT OF THE TREASURER

SCHEDULE A-4—(Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

		PRINCIPAL			
		Balance, June 30, 1948	Gifts and Other Receipts	Other Additions	Balance, June 30, 1949
SALARIES					
281	Samuel C. Cobb.....	\$36,551.31	.....	.....	\$36,551.31
283	Sarah H. Forbes.....	500.00	.....	.....	500.00
285	George A. Gardner.....	20,000.00	.....	.....	20,000.00
287	James Hayward.....	18,800.00	.....	.....	18,800.00
289	William P. Mason.....	18,800.00	.....	.....	18,800.00
291	Henry B. Rogers.....	25,000.00	.....	.....	25,000.00
293	Alfred P. Sloan Professorship.....	300,000.00	\$50,000.00	.....	350,000.00
295	Nathaniel Thayer.....	25,000.00	.....	.....	25,000.00
297	Elihu Thomson.....	23,680.87	19.13	.....	23,700.00
		\$468,332.18	\$50,019.13	.....	\$518,351.31
GRADUATE SCHOLARSHIPS AND FELLOWSHIPS					
301	Edward Austin.....	\$360,000.00	.....	.....	\$360,000.00
303	William Sumner Boles.....	25,000.00	.....	.....	25,000.00
305	Malcolm Cotton Brown.....	1,506.25	.....	.....	1,506.25
307	Francis W. Chandler.....	7,988.02	.....	.....	7,988.02
309	Collamore.....	10,100.00	.....	.....	10,100.00
311	Dalton Graduate Chemical.....	5,000.00	.....	.....	5,000.00
313	Richard C. du Pont Memorial.....	108,772.07	.....	.....	108,772.07
15	Clarence J. Hicks Memorial.....	20,000.00	.....	.....	20,000.00
316	Edith Morrill Hobbs.....	5,000.00	.....	.....	5,000.00
317	Rebecca R. Joslin.....	6,540.00	.....	.....	6,540.00
319	Wilfred Lewis.....	5,000.00	.....	.....	5,000.00
321	Moore.....	37,137.44	.....	.....	37,137.44
323	James F. Norris.....	.....	\$25,226.89	.....	25,226.89
325	Willard B. Perkins.....	6,000.00	.....	.....	6,000.00
327	Henry Bromfield Rogers.....	20,057.03	.....	.....	20,057.03
329	Richard Lee Russel.....	2,000.00	.....	.....	2,000.00
331	Henry Saltonstall.....	10,000.00	.....	.....	10,000.00
333	James Savage.....	10,000.00	.....	.....	10,000.00
335	Susan H. Swett.....	10,000.00	.....	.....	10,000.00
337	Gerard Swope.....	100,050.00	.....	.....	100,050.00
339	Frank Hall Thorp.....	10,000.00	.....	.....	10,000.00
340	Tillotson.....	1,900.00	.....	.....	1,900.00
341	Thomas Upham.....	409,018.92	.....	.....	409,018.92
343	Luis Francisco Verges.....	10,000.00	.....	.....	10,000.00
345	Jonathan Whitney.....	518,168.00	1,974.05	.....	516,193.95
		\$1,699,237.73	\$23,252.84	.....	\$1,722,490.57

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

INCOME AND EXPENDITURES					
<i>Unexpended Balance, June 30, 1948</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended</i>	<i>Transferred</i>	<i>Unexpended Balance June 30, 1949</i>
.....	\$1,464.00	.....	\$1,464.00	.....	.....
.....	20.00	.....	20.00	.....	.....
.....	800.00	.....	800.00	.....	.....
.....	752.00	.....	752.00	.....	.....
.....	752.00	.....	752.00	.....	.....
.....	1,000.00	.....	1,000.00	.....	.....
\$8,530.44	14,028.00	\$1,680.00	11,275.00	.....	\$12,963.44
.....	1,000.00	.....	1,000.00	.....	.....
.....	948.00	.....	948.00	.....	.....
\$8,530.44	\$20,764.00	\$1,680.00	\$18,011.00	.....	\$12,963.44
\$75,562.79	\$17,064.00	.....	\$17,000.00	.....	\$75,626.79
6,547.27	1,236.00	.....	1,200.00	.....	6,583.27
2,578.04	119.50	.....	100.00	.....	2,597.54
3,352.62	444.00	.....	500.00	.....	3,296.62
5,002.43	604.00	.....	.....	.....	5,606.43
2,979.04	312.00	.....	350.00	.....	2,941.04
9,173.00	4,704.00	.....	.....	\$700.00	14,577.00
621.25	808.00	.....	800.00	.....	629.25
32.00	200.00	.....	.....	.....	232.00
6,330.33	516.00	.....	.....	.....	6,846.33
2,565.76	304.00	.....	.....	.....	2,869.76
3,928.43	1,608.00	.....	1,800.00	.....	3,736.43
.....	672.00	.....	.....	.....	672.00
1,483.13	300.00	.....	.....	.....	1,783.13
7,220.05	1,092.00	.....	.....	.....	8,312.05
2,509.79	200.00	.....	.....	.....	2,709.79
1,898.41	468.00	.....	350.00	.....	2,016.41
4,644.73	576.00	.....	400.00	.....	4,820.73
1,930.55	476.00	.....	.....	.....	2,406.55
6,483.50	4,180.00	.....	4,000.00	.....	6,663.50
1,830.56	468.00	.....	350.00	.....	1,948.56
8.00	76.00	.....	.....	.....	84.00
20,947.00	16,860.00	.....	17,000.00	.....	20,807.00
1,647.22	464.00	.....	.....	.....	2,111.22
96,371.61	23,445.75	.....	22,582.50	.....	97,234.86
\$265,647.51	\$77,197.25	.....	\$66,432.50	\$700.00	\$277,112.26

REPORT OF THE TREASURER

SCHEDULE A-4 — (Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

		PRINCIPAL		
		Balance, June 30, 1948	Gifts and Other Receipts	Other Additions
UNDERGRADUATE SCHOLARSHIPS				Balance, June 30, 1949
351	Louie G. Applebee.....	\$400.00	.....	\$400.00
353	Elisha Atkins.....	5,000.00	.....	5,000.00
357	Thomas Wendell Bailey.....	2,172.24	.....	2,172.24
359	Charles Tidd Baker.....	37,400.49	.....	\$818.00(1)
361	Billings Student.....	50,000.00	.....	38,218.49
				50,000.00
363	Huse Templeton Blanchard.....	6,550.64	.....	6,550.64
365	Levi Boles.....	10,000.00	.....	10,000.00
367	Jonathan Bourne.....	10,000.00	.....	10,000.00
369	Albert G. Boyden.....	571,692.25	.....	571,692.25
371	Harriet L. Brown.....	6,024.79	.....	6,024.79
373	Mabel Blake Case.....	25,000.00	.....	25,000.00
375	Nino Tesher Catlin.....	2,265.07	\$10,000.00	12,265.07
377	Lucius Clapp.....	4,900.00	.....	4,900.00
379	Class of 1895 Memorial.....	25,000.00	.....	25,000.00
381	Class of 1896.....	5,577.00	.....	5,577.00
	Class of 1909.....	4,423.38	.....	4,423.38(2)
385	Class of 1922.....	20,500.88	5.00	20,505.88
387	Class of 1922, Special.....	4,800.00	.....	4,800.00
389	Class of 1938.....	961.82	106.02	1,067.84
393	Fred L. and Florence L. Coburn.....	5,000.00	.....	5,000.00
397	Coffin Memorial.....	36,018.50	.....	36,018.50
399	William A. Conant.....	153,409.78	5.83	153,415.61
401	Albert Conro.....	25,000.00	.....	25,000.00
403	George R. Cooke.....	3,500.00	.....	3,500.00
405	Lucretia Crocker.....	50,551.06	.....	50,551.06
407	Isaac W. Danforth.....	5,000.00	.....	5,000.00
409	Ann White Dickinson.....	40,000.00	.....	40,000.00
411	Dormitory Fund.....	2,857.10	.....	2,857.10
413	Thomas Messenger Drown.....	50,000.00	.....	50,000.00
415	Frances and William Emerson.....	100,000.00	.....	100,000.00
417	Farnsworth.....	5,000.00	.....	5,000.00
419	Charles Lewis Flint.....	5,000.00	.....	5,000.00
421	Sarah S. Forbes.....	3,454.87	.....	3,454.87
423	Philip Jacob Friedlander.....	1,000.00	.....	1,000.00
425	Norman H. George.....	89,452.96	.....	89,452.96
427	Arthur B. Gilmore.....	10,000.00	.....	10,000.00
429	Barnett D. Gordon.....	10,000.00	.....	10,000.00
431	Lucia G. Hall.....	54,413.71	.....	54,413.71
433	Hall-Mercer.....	76,298.67	273.88	76,572.55
435	James H. Haste.....	241,074.18	.....	241,074.18
	(1) One-half net income to fund.			
	(2) Transferred to other funds.			

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

INCOME AND EXPENDITURES					
<i>Unexpended Balance June 30, 1948</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended</i>	<i>Transferred</i>	<i>Unexpended Balance June 30, 1949</i>
\$112.37	\$20.00	.....	.....	.....	\$132.37
118.08	200.00	.....	\$200.00	.....	118.08
207.89	92.00	.....	100.00	.....	199.89
3,663.62	1,636.00	.....	350.00	\$18.00	4,131.62
990.24	2,000.00	.....	2,000.00	.....	990.24
271.50	268.00	.....	200.00	.....	339.50
336.15	404.00	.....	400.00	.....	340.15
182.10	400.00	.....	400.00	.....	182.10
119,973.41	27,360.00	.....	15,232.81	.....	132,100.60
598.96	260.00	.....	300.00	.....	558.96
1,033.34	1,020.00	.....	1,001.00	.....	1,052.34
217.96	264.00	.....	75.00	.....	406.96
307.72	204.00	.....	175.00	.....	336.72
.....	1,000.00	.....	.....	1,000.00	.....
5,014.31 †	412.00	.....	.....	.....	5,426.31 †
1,292.91	.....	.....	192.56	1,100.35	.....
2,541.63	1,108.00	.....	200.00	.....	3,449.63
.....					
288.64	52.00	.....	.....	.....	340.64
264.26	208.00	.....	200.00	.....	272.26
6,379.23	1,668.00	.....	1,400.00	.....	6,647.23
17,359.20	6,792.00	.....	2,000.00	.....	22,151.20
2,133.89	1,084.00	.....	150.00	.....	3,067.89
401.58	156.00	.....	100.00	.....	457.58
31,222.77	3,228.00	.....	2,200.00	.....	32,250.77
266.48	208.00	.....	200.00	.....	274.48
566.38	1,592.00	.....	1,600.00	.....	558.38
117.32	116.00	.....	75.00	.....	158.32
1,034.84	2,000.00	.....	2,000.00	.....	1,034.84
4,623.85 †	4,128.00	.....	2,600.00	.....	6,151.85 †
353.84	212.00	.....	200.00	.....	365.84
232.22	204.00	.....	200.00	.....	236.22
116.50	140.00	.....	125.00	.....	131.50
136.50	44.00	.....	50.00	.....	130.50
6,526.18	3,768.00	.....	3,500.00	.....	6,794.18
1,207.25	448.00	.....	.....	.....	1,655.25
437.75	408.00	.....	400.00	.....	445.75
1,200.50	2,184.00	.....	2,100.00	.....	1,284.50
1,703.80	3,064.00	.....	3,000.00	.....	1,767.80
25,821.23	10,504.00	.....	8,600.00	.....	27,725.23

†Includes students' notes receivable.

REPORT OF THE TREASURER

SCHEDULE A-4 — (Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

		PRINCIPAL			
UNDERGRADUATE SCHOLARSHIPS (Continued)		Balance, June 30, 1948	Gifts and Other Receipts	Other Additions	Balance June 30, 1949
437	Charles Hayden Memorial.....	\$100,000.00	.....	.....	\$100,000.00
439	Charles Hayden Memorial, Special.....	.....	.....	.....	.....
441	George Hollingsworth.....	5,000.00	.....	.....	5,000.00
443	Samuel P. Hunt.....	7,495.80	.....	.....	7,495.80
445	T. Sterry Hunt.....	3,000.00	.....	.....	3,000.00
447	William F. Huntington.....	5,000.00	.....	.....	5,000.00
449	David L. Jewell.....	25,000.00	.....	.....	25,000.00
451	Edward A. Jones.....	41,254.33	.....	.....	41,254.33
453	Joy Scholarships.....	7,500.00	.....	.....	7,500.00
455	Amelia S. Kneisner.....	16,000.00	\$2,000.00	.....	18,000.00
457	William Litchfield.....	5,000.00	.....	.....	5,000.00
459	Elisha T. Loring.....	5,000.00	.....	.....	5,000.00
461	Lowell Institute.....	2,314.76	.....	.....	2,314.76
463	Rupert A. Marden.....	2,000.00	.....	.....	2,000.00
465	M. I. T. Club of Chicago.....	6,355.00	1,005.00	.....	7,360.00
467	Margaret A. Mathews.....	111,682.17	.....	.....	111,682.17
469	George Henry May.....	5,000.00	.....	.....	5,000.00
471	Robert W. Milne.....	75,856.47	.....	.....	75,856.47
473	James H. Mirrlees.....	2,500.00	.....	.....	2,500.00
475	Fred W. Morrill.....	2,000.00	.....	.....	2,000.00
477	Nichols.....	5,000.00	.....	.....	5,000.00
478	Wm. E. Nickerson.....	.....	9,312.00	.....	9,312.00
479	Charles C. Nichols.....	5,000.00	.....	.....	5,000.00
481	John Felt Osgood.....	5,000.00	.....	.....	5,000.00
483	George L. Parmelee.....	17,641.69	.....	.....	17,641.69
484	Frank Stetson Pecker.....	59,731.18	.....	.....	59,731.18
485	Richard Perkins.....	50,000.00	.....	.....	50,000.00
487	Florence E. Prince.....	7,689.28	.....	.....	7,689.28
489	Thomas Adelbert Read.....	21,117.00	.....	.....	21,117.00
491	Willis Ward Reeves.....	2,500.00	200.00	.....	2,700.00
493	Charles A. Richards.....	31,719.32	.....	.....	31,719.32
495	John Roach.....	6,290.20	.....	.....	6,290.20
496	William B. Rogers.....	36,504.83	.....	.....	36,504.83
497	William P. Ryan Memorial.....	3,557.42	.....	.....	3,557.42
499	John P. Schenkl.....	43,821.12	.....	.....	43,821.12
500	Paul D. Seghers, Jr.....	4,800.00	.....	.....	4,800.00
501	Frank Arnold Sherman.....	10,000.00	.....	.....	10,000.00
503	Thomas Sherwin.....	5,000.00	.....	.....	5,000.00
505	G. H. Miller Smith.....	10,000.00	.....	.....	10,000.00
507	Horace T. Smith.....	33,019.41	.....	.....	33,019.41
509	Sons and Daughters of New England Puritan Colony.....	600.00	.....	.....	600.00
511	Anna Spooner.....	10,896.14	.....	.....	10,896.14
513	Samuel E. Tinkham.....	2,338.16	.....	.....	2,338.16
515	F. B. Tough.....	465.00	.....	.....	465.00

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

INCOME AND EXPENDITURES					
<i>Unexpended Balance June 30, 1948</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended</i>	<i>Transferred</i>	<i>Unexpended Balance June 30, 1949</i>
.....					
\$19,138.86	\$4,832.00	\$7,500.00	\$6,675.00	.....	\$24,795.86
155.73	208.00	.....	200.00	.....	163.73
375.25	308.00	.....	300.00	.....	383.25
67.76	120.00	.....	100.00	.....	87.76
314.08	208.00	.....	200.00	.....	322.08
2,547.99	1,080.00	.....	1,000.00	.....	2,627.99
1,783.50	1,700.00	.....	1,600.00	.....	1,883.50
9,721.35	684.00	.....	300.00	.....	10,105.35
696.75	696.00	.....	600.00	.....	792.75
208.91	204.00	.....	200.00	.....	212.91
155.88	204.00	.....	200.00	.....	159.88
1,335.89	144.00	.....	.....	.....	1,479.89
366.23	92.00	.....	75.00	.....	383.23
740.25	268.00	.....	700.00	.....	308.25
6,050.50	4,708.00	.....	.....	.....	10,758.50
10,754.13 †	544.00	.....	.....	.....	11,298.13 †
1,718.75	3,044.00	.....	3,000.00	.....	1,762.75
123.48	100.00	.....	100.00	.....	123.48
252.80	88.00	.....	75.00	.....	265.80
92.77	200.00	.....	200.00	.....	92.77
.....					
349.40	208.00	.....	200.00	.....	357.40
342.88	204.00	.....	200.00	.....	346.88
92.00	696.00	.....	650.00	.....	138.00
1,724.00	2,424.00	.....	1,700.00	.....	2,448.00
833.21	1,992.00	.....	2,000.00	.....	825.21
350.50	316.00	.....	300.00	.....	366.50
569.42	852.00	.....	800.00	.....	621.42
104.00	104.00	.....	100.00	.....	108.00
738.22	1,276.00	.....	1,200.00	.....	814.22
493.51	268.00	.....	200.00	.....	561.51
18,100.98	2,128.00	169.03	.....	.....	20,398.01
2,049.34 †	220.00	.....	.....	.....	2,269.34 †
2,375.01 †	1,808.00	.....	1,775.00	.....	2,408.01 †
32.00	192.00	.....	.....	.....	224.00
400.00	408.00	.....	400.00	.....	408.00
464.48	212.00	.....	300.00	.....	376.48
667.25	420.00	.....	425.00	.....	662.25
3,682.54	1,452.00	.....	900.00	.....	4,234.54
217.88	32.00	.....	.....	.....	249.88
337.12	440.00	.....	400.00	.....	377.12
254.70	100.00	.....	100.00	.....	254.70
435.64	36.00	.....	.....	.....	471.64

†Includes students' notes receivable.

REPORT OF THE TREASURER

SCHEDULE A-4 — (Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

		PRINCIPAL			
UNDERGRADUATE SCHOLARSHIPS (Continued)		Balance, June 30, 1948	Gifts and Other Receipts	Other Additions	Balance, June 30, 1949
517	Susan Upham.....	\$1,000.00	.....	.....	\$1,000.00
519	Samson R. Urbino.....	1,000.00	.....	.....	1,000.00
512	Vermont Scholarship.....	25,000.00	.....	.....	25,000.00
523	Ann White Vose.....	60,718.27	.....	.....	60,718.27
525	Arthur M. Waitt.....	9,761.45	.....	.....	9,761.45
527	Grant Walker.....	55,000.00	.....	.....	55,000.00
529	James Watt.....	13,359.48	.....	.....	13,359.48
531	Louis Weisbein.....	4,000.00	.....	.....	4,000.00
533	Frances Erving Weston.....	5,000.00	.....	.....	5,000.00
535	Samuel Martin Weston.....	5,000.00	.....	.....	5,000.00
537	Amasa J. Whiting.....	4,515.65	.....	.....	4,515.65
539	Elizabeth Babcock Willmann.....	5,065.51	.....	.....	5,065.51
541	Morrill Wyman.....	66,538.18	.....	.....	66,538.18
		<u>\$2,816,307.21</u>	<u>\$22,907.73</u>	<u>\$3,605.38</u>	<u>\$2,835,609.56</u>
PRIZES					
551	Babson.....	\$10,000.00	.....	.....	\$10,000.00
553	Robert A. Boit.....	5,000.00	.....	.....	5,000.00
555	Class of 1904.....	447.00	.....	.....	447.00
556	Karl T. Compton.....	.....	\$2,000.00	.....	2,000.00
557	William Emerson.....	2,145.00	.....	.....	2,145.00
559	Roger Defriez Hunneman.....	1,050.00	.....	.....	1,050.00
561	James Means.....	2,700.00	.....	.....	2,700.00
565	Arthur Rotch.....	5,000.00	.....	.....	5,000.00
567	Arthur Rotch, Special.....	5,000.00	.....	.....	5,000.00
568	Henry Webb Salisbury.....	1,000.00	.....	.....	1,000.00
571	Samuel W. Stratton.....	1,880.00	.....	.....	1,880.00
		<u>\$34,222.00</u>	<u>\$2,000.00</u>	<u>.....</u>	<u>\$36,222.00</u>
MISCELLANEOUS					
575	Ednah Dow Cheney.....	\$13,965.16	.....	.....	\$13,965.16
576	Margaret Compton.....	.....	\$1,500.00	.....	1,500.00
577	Jacob and Jennie Lichter.....	10,474.75	.....	.....	10,474.75
579	Edward F. and Mary R. Miller.....	10,000.00	.....	.....	10,000.00
581	Alice Brown Tyler.....	1,559.64	.....	.....	1,559.64
		<u>\$35,999.55</u>	<u>\$1,500.00</u>	<u>.....</u>	<u>\$37,499.55</u>
Totals.....		<u>\$8,010,250.92</u>	<u>\$102,308.13</u>	<u>\$13,501.42</u>	<u>\$8,126,060.47</u>

(Schedule A)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (Continued)

INCOME AND EXPENDITURES					
<i>Unexpended Balance, June 30, 1948</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended</i>	<i>Transferred</i>	<i>Unexpended Balance, June 30, 1949</i>
\$178.00	\$48.00	.....	\$50.00	.....	\$176.00
89.35	44.00	.....	.....	.....	133.35
3,579.05	1,132.00	.....	500.00	.....	4,211.05
288.00	2,392.00	.....	2,400.00	.....	280.00
147.09	388.00	.....	350.00	.....	185.09
1,418.75	2,212.00	.....	2,200.00	.....	1,430.75
570.30	548.00	.....	500.00	.....	618.30
177.36	164.00	.....	200.00	.....	141.36
3,733.87	346.01	.....	.....	.....	4,079.88
641.88	226.00	.....	200.00	.....	667.88
169.37	184.00	.....	150.00	.....	203.37
717.48	228.00	.....	200.00	.....	745.48
5,579.53	2,832.00	.....	2,600.00	.....	5,811.53
<u>\$347,761.37</u>	<u>\$124,820.01</u>	<u>\$7,669.03</u>	<u>\$88,051.37</u>	<u>\$2,918.35</u>	<u>\$389,280.69</u>
\$3,084.20	\$767.39	.....	.....	.....	\$3,851.59
1,770.91	272.00	.....	.....	.....	2,042.91
352.71	32.00	.....	.....	.....	384.71
.....					
471.95	104.00	.....	.....	.....	575.95
15.00	44.00	.....	\$40.00	.....	19.00
1,473.13	168.00	.....	4.80	.....	1,636.33
3,830.97	352.00	.....	250.00	.....	3,932.97
9,448.63	576.00	.....	.....	.....	10,024.63
373.64	52.00	.....	46.47	.....	379.17
.....	72.00	.....	72.00	.....	.....
<u>\$20,821.14</u>	<u>\$2,439.39</u>	<u>.....</u>	<u>\$413.27</u>	<u>.....</u>	<u>\$22,847.26</u>
\$2,212.17	\$608.00	.....	\$1,884.48	.....	\$935.69
.....	4.00	.....	.....	.....	4.00
320.00	432.00	.....	.....	.....	752.00
2,526.40	492.00	.....	436.78	.....	2,581.62
553.63	84.00	.....	.....	.....	637.63
<u>\$5,612.20</u>	<u>\$1,620.00</u>	<u>.....</u>	<u>\$2,321.26</u>	<u>.....</u>	<u>\$4,910.94</u>
<u>\$978,711.97</u>	<u>\$39,3907.50</u>	<u>\$9,349.03</u>	<u>\$355,633.50</u>	<u>\$65,511.07</u>	<u>\$960,823.93</u>

(Schedule A)

REPORT OF THE TREASURER

SCHEDULE A-5
STUDENT LOAN FUNDS

		<i>Balance, June 30, 1948</i>	<i>Gifts and Other Receipts</i>
582	Bursar's.....	\$36,226.38†	\$84.29
583	Class of 1898.....	12,919.58	.....
585	Dean's.....	12,008.12†	21.56
587	Dennett, Carl P.....	1,966.83†	24.46
589	George, Nathan R.....	34,414.12	.....
591	Lamson-Virgin.....	10,599.50	.....
592	Medical Department.....	5,377.47†	.....
593	Rogers, Minnie Hempel.....	1,323.54	.....
595	Summer Surveying Camp.....	3,005.72†	.....
597	Technology Loan.....	1,946,273.60†	6,375.14
598	William H. Timbie.....	4,984.50	115.00
<i>Totals</i>		<u>\$2,069,099.36</u>	<u>\$6,620.45</u>

SCHEDULE A-6
BUILDING FUNDS

PRINCIPAL AND INCOME AVAILABLE

601	Arthur J. Conner.....	\$211,911.38	.....
603	George Eastman.....	130,373.02	.....
605	Matilda A. Fraser.....	1,063.98	.....
609	Charles Hayden Memorial Library.....	2,080,102.84	.....
611	Hydrodynamics Laboratory and Towing Tank.....	22,987.24	\$10,000.00
613	Library Building.....	1,073.50	.....
615	Metals Processing Laboratory.....	68,203.97	10,000.00
619	Sloan Foundation.....	.....	71,666.00
621	Charles D. Waterbury.....	17,240.65	.....
<i>Totals</i>		<u>\$2,532,956.58</u>	<u>\$91,666.00</u>

SCHEDULE A-7
OTHER INVESTED FUNDS
PRINCIPAL AND INCOME AVAILABLE

GENERAL PURPOSES

623	Anonymous H.....	\$10,000.00	.....
625	Anonymous J.....	3,402.00	.....
627	Anonymous M.....	1,500.00	.....
629	Anonymous R.....	57,150.00	.....
633	Edmund Dana Barbour.....	20,736.94	.....
635	Stephen L. Bartlett.....	52,371.53	.....
638	Class of 1899.....	.....	\$14,577.00
639	Class of 1923.....	.....	305.00
640	Class of 1924.....	.....	41,939.73
641	Helen Collamore.....	49,710.45	.....
643	Co-operative Foundation.....	1,577.44	.....
645	Development Fund No. I.....	38,425.10	559,447.55
649	Erastus C. Gaffield.....	21,052.12	.....
651	William T. Henry.....	35,210.00	16,950.00

STUDENT LOAN FUNDS

<i>Net Transfers</i>	<i>Investment Income</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance, June 30, 1940</i>
.....	\$1,316.00	.....	\$250.00	\$37,376.67 †
\$22.00	516.00	.....	.....	13,413.58
.....	408.00	.....	.....	12,437.68 †
.....	4.00	.....	.....	1,995.29 †
.....	1,376.00	.....	.....	35,790.12
.....	424.00	.....	.....	11,023.50
.....	112.00	.....	.....	5,489.47 †
.....	56.00	.....	.....	1,379.54
.....	120.00	.....	.....	3,125.72 †
1,000.00	56,610.76	.....	1,219.01	2,009,040.49 †
.....	204.00	.....	.....	5,303.50
<u>\$978.00</u>	<u>\$61,146.76</u>	<u>.....</u>	<u>\$1,469.01</u>	<u>\$2,136,375.56</u>
				(Schedule A)

†Includes students' notes receivable.

BUILDING FUNDS

PRINCIPAL AND INCOME AVAILABLE

.....	\$8,476.00	.....	.....	\$220,387.38
.....	5,216.00	.....	.....	135,589.02
.....	40.00	.....	.....	1,103.98
.....	52,204.00	.....	\$1,950,810.13	181,496.71
\$200,000.00	3,712.00	.....	25,100.86	211,598.38
.....	44.00	.....	.....	1,117.50
.....	2,728.00	.....	.....	80,931.97
71,666.00	.....	.....	.....	.....
.....	688.00	.....	.....	17,928.65
<u>\$128,334.00</u>	<u>\$73,108.00</u>	<u>.....</u>	<u>\$1,975,910.99</u>	<u>\$850,153.59</u>
				(Schedule A)

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE

.....	\$400.00	\$400.00	.....	\$10,000.00
.....	92.00	2,392.00	.....	1,102.00
.....	60.00	60.00	.....	1,500.00
.....	2,288.00	2,288.00	.....	57,150.00
.....	828.00	828.00	.....	20,736.94
.....	.....	.....	\$52,371.53	.....
.....	44.00	.....	.....	14,621.00
\$60,444.35	2,424.00	6.68	.....	63,166.67
33,984.47	1,696.00	.....	.....	77,620.20
.....	.....	.....	49,710.45	.....
.....	64.00	64.00	.....	1,577.44
.....	7,032.00	425,330.20	.....	179,574.45
.....	844.00	20,099.54	.....	1,796.58
.....	1,736.00	3,571.45	.....	50,324.55

REPORT OF THE TREASURER

SCHEDULE A-7 — (Continued)

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (Continued)

GENERAL PURPOSES (Continued)		Balance, June 30, 1948	Gifts and Other Receipts
653	Ernest R. Hosbach	\$1,000.00	.....
659	Keller	100.00	.....
665	Alice Butts Metcalf	50,000.00	.....
667	John Wells Morss	50,000.00	.....
669	William E. Nickerson .....	.....	\$9,312.00
673	Herman W. Tamkin	13,500.00	1,360.13
675	Towle	10,500.00	.....
677	Charles A. Tripp	100,000.00	.....
679	Grant Walker	75,500.00	.....
683	Harry C. Wiess	34,300.00	111,500.00
684	Belle A. Williston	17,118.68	.....
686	Edwin J. Wood .....	.....	5,000.00
<i>Totals</i>		<u>\$643,154.26</u>	<u>\$760,391.41</u>

SCHEDULE A-8

DEPARTMENTS AND RESEARCH

701	Anonymous (S)	\$536,811.00	.....
703	Applied Mathematics	22,617.50	.....
705	Julian M. Avery .....	.....	\$3,608.01
709	Bemis — Land Account	11,300.00	.....
713	Center of Analysis	21,646.25	.....
715	Badger — Chemical Engineering	20,302.46	.....
717	Chemical Engineering Practice	270,524.05	.....
718	Collins Helium Cryostat .....	.....	.....
719	Cosmic Terrestrial Research	31,552.43	.....
720	Development Fund No. 2 .....	.....	200,000.00
721	Electronics, Research Laboratory of	61,084.50	.....
722	Electronics, Industrial Fellowships in	51,812.25	26,200.00
723	Food Technology	127,782.57	20,000.00
724	Ford Motor Co. — Ind. Rel. ....	.....	25,000.00
725	John A. Grimmons	5,265.98	2,830.21
727	Group Dynamics Research	8,175.08	.....
729	Harvey Non-Ferrous Forgings	10,408.00	.....
731	Hayden Dental Clinic	3,120.34	.....
733	Industrial Economics, Graduate	36,891.55	4,500.00
737	Industrial Fund	473,629.78	126,443.00
739	Industrial Relations Section	182,721.66	22,320.00
741	Instrumentation Fund	271,092.76	.....
743	A. Norton Kent	100.00	100.00
749	John Lawrence Mauran	3,455.76	.....
750	Merrill Foundation .....	.....	25,000.00
751	Susan Minns	40,000.00	.....
753	Forris Jewett Moore	30,833.70	.....

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (Continued)

<i>Net Transfers</i>	<i>Investment Income</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance, June 30, 1949</i>
.....	\$40.00	\$40.00	.....	\$1,000.00
.....	4.00	51.37	.....	52.63
.....	2,000.00	2,000.00	.....	50,000.00
.....	2,000.00	2,000.00	.....	50,000.00
.....	.....	.....	.....	9,312.00
.....	540.00	540.00	.....	14,860.13
.....	420.00	420.00	.....	10,500.00
.....	4,000.00	4,000.00	.....	100,000.00
.....	1,020.00	1,020.00	\$50,000.00	25,500.00
.....	5,429.50	.....	.....	151,229.50
.....	684.00	684.00	.....	17,118.68
.....	184.00	184.00	.....	5,000.00
<u>\$94,428.82</u>	<u>\$33,829.50</u>	<u>\$465,979.24</u>	<u>\$152,081.98</u>	<u>\$913,742.77</u>
				(Schedule A)

\$200,000.00	\$16,140.00	.....	.....	\$352,951.00
6,000.00	684.00	.....	.....	17,301.50
2,687.56	104.00	\$500.00	.....	5,899.57
.....	.....	.....	\$2,000.00	9,300.00
21,646.25	.....	.....	.....	.....
.....	772.00	2,452.15	.....	18,622.31
.....	10,196.00	21,632.38	.....	259,087.67
2,380.00	.....	2,283.47	.....	96.53
824.43	1,184.00	31,912.00	.....	.....
75,000.00	.....	187,500.00	.....	87,500.00
.....	2,544.00	.....	.....	63,628.50
.....	2,140.00	7,200.00	1,450.00	71,502.25
55,725.11	4,456.00	1,629.52	.....	94,883.94
.....	164.00	80.56	.....	25,083.44
.....	144.00	5,200.00	.....	3,040.19
.....	.....	849.35	7,325.73	.....
.....	416.00	.....	.....	10,824.00
.....	108.00	1,000.00	.....	2,228.34
.....	1,272.00	12,450.00	1,150.00	29,063.55
24,610.00	18,288.00	12.00	.....	593,762.78
.....	6,620.00	55,735.38	.....	155,926.28
63,700.00	8,796.00	3,220.90	.....	212,967.86
.....	4.00	.....	.....	204.00
.....	136.00	154.89	.....	3,436.87
.....	284.00	2,833.15	.....	22,450.85
.....	.....	.....	.....	40,000.00
.....	1,148.00	4,303.96	.....	27,677.74

REPORT OF THE TREASURER

SCHEDULE A-8 — (Continued)

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (Continued)

		Balance, June 30, 1948	Gifts and Other Receipts
DEPARTMENTS AND RESEARCH (Continued)			
755	Nuclear Science and Engineering	\$47,300.25	\$1,000.00
757	F. Ward Paine	3,626.25	.....
758	Theodore B. Parker Memorial	2,950.00	.....
759	Radioactivity Center	31,423.00	.....
761	Richards Memorial	944.80	.....
763	W. T. Sedgwick	55,756.69	.....
765	Servomechanism Laboratory	35,638.25	.....
767	Servomechanism Research	50,403.33	.....
769	Sloan Automotive Laboratory	4,880.17	.....
771	Special Research, Padelford	2,730.42	.....
773	Submarine Signal Co.	21,777.87	.....
775	Henry N. Sweet	10,554.72	.....
777	Swift Amino Acid	8,752.50	.....
779	Swift Protein Research	10,850.50	.....
781	Nellie Florence Treat	681.00	.....
783	Twentieth Century Fox Film Corporation Research	2,682.75	.....
785	William Lyman Underwood	13,583.92	.....
786	Union Carbide & Carbon Corporation	20,132.00	20,000.00
		<u>\$2,545,796.04</u>	<u>\$477,001.22</u>
LIBRARY			
791	Boston Stein Club	\$25,546.48	\$760.02
792	Carnegie S. A. L. Center	15,300.00	35,000.00
793	Frank Harvey Cilley	85,391.59	.....
795	Class of 1874	289.55	.....
797	Arthur Elson	559.50	.....
799	Library Growth	4,729.49	.....
		<u>\$131,816.61</u>	<u>\$35,760.02</u>
MISCELLANEOUS FUNDS AND DEPOSITS			
801	Albert	\$4,510.50	.....
802	Athletics Fields Special	1,028.00	.....
803	Bess Bigelow	37,810.24	.....
804	A. V. Clarke Scholarship	1,490.50	.....
805	Class of 1917	1,207.81	.....
806	Class of 1918 Organ	148.88	.....
807	Davis R. Dewey Memorial	603.70	.....
808	Drama Club Theatre	576.39	.....
809	Oscar H. Horovitz	1,058.75	\$500.00
810	Ellen A. King Mem. Stud. . . . .	.....	10.00
811	Kurrelmeyer	2,113.29	.....
812	Lever Bros. Co. . . . .	.....	2,500.00
813	Arthur D. Little Memorial Lectureship	2,759.82	3,000.00
814	John R. Macomber	2,819.95	.....
815	M. I. T. Alumni 1940-1949	237,886.66	56,197.96
820	M. I. T. Alumni 1949-50 . . . . .	.....	91,652.39
821	M. I. T. Teachers Insurance	151,060.80	67,083.09

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (Continued)

<i>Net Transfers</i>	<i>Investment Income</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance, June 30, 1940</i>
.....	\$1,216.00	\$49,516.25	.....	.....
\$50.38	144.00	.....	.....	\$3,719.87
.....	116.00	.....	\$100.00	2,966.00
.....	1,256.00	.....	.....	32,679.00
.....	36.00	15.84	37.98	926.98
1,000.00	2,024.00	11,900.00	.....	44,880.69
.....	1,424.00	.....	.....	37,062.25
.....	2,016.00	.....	.....	52,419.33
.....	196.00	.....	.....	5,076.17
.....	108.00	.....	.....	2,838.42
3,553.79	752.00	.....	.....	18,976.08
.....	424.00	.....	.....	10,978.72
.....	348.00	.....	.....	9,100.50
5,000.00	252.00	.....	.....	6,102.50
.....	28.00	.....	.....	709.00
.....	108.00	.....	.....	2,790.75
5,000.00	400.00	400.00	.....	8,583.92
.....	768.00	28,482.54	.....	12,417.46
<u>\$307,042.40</u>	<u>\$87,216.00</u>	<u>\$431,240.34</u>	<u>\$12,063.71</u>	<u>\$2,359,666.81</u>
.....	\$1,036.00	.....	.....	\$27,342.50
\$15,000.00	980.00	.....	.....	36,280.01
3,200.00	3,324.00	\$300.00	.....	85,215.50
.....	12.00	10.88	.....	290.67
.....	24.00	20.19	.....	563.30
.....	188.00	.....	.....	4,917.49
<u>\$18,200.00</u>	<u>\$5,564.00</u>	<u>\$331.07</u>	.....	<u>\$154,609.56</u>
.....	\$148.00	.....	\$2,088.50	\$2,570.00
.....	40.00	.....	.....	1,068.00
.....	1,512.00	.....	.....	39,322.29
.....	60.00	.....	.....	1,550.54
.....	56.00	.....	.....	1,263.81
.....	4.00	.....	.....	152.88
.....	24.00	.....	.....	627.70
.....	24.00	.....	.....	600.39
.....	60.00	.....	.....	1,618.75
.....	.....	.....	.....	10.00
.....	84.00	.....	.....	2,197.29
.....	32.00	.....	.....	2,532.00
.....	156.00	\$2,096.67	.....	3,819.15
.....	84.00	1,615.96	.....	1,287.99
.....	9,744.00	2,250.00	53,242.54	248,336.08
.....	460.00	750.00	14,268.00	77,094.39
.....	5,728.00	.....	45,446.47	178,425.42

REPORT OF THE TREASURER

SCHEDULE A-8 — (Continued)

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (Continued)

MISCELLANEOUS FUNDS AND DEPOSITS (Continued)		Balance, June 30, 1948	Gifts and Other Receipts
823	John D. Mitsch Memorial.....	\$2,739.00	.....
825	Henry A. Morss Nautical.....	55.90	.....
827	Charles Francis Park Memorial.....	5,810.25	.....
829	President's, Special.....	11,904.61	.....
830	Tubby Rogers.....	.....	\$1,073.00
831	William Patrick Ryan, Special.....	449.06	.....
833	Sedgwick Memorial Lecture.....	17,059.11	122.00
835	Tau Beta Pi Memorial Scholarship.....	2,460.85	29.00
837	Teachers' Fund.....	121,514.39	.....
839	Technology Press.....	98,840.87	.....
841	Towle Lecture.....	901.00	.....
		<u>\$706,810.33</u>	<u>\$222,167.44</u>
RESERVES			
861	Photo Service.....	\$17,410.75	.....
863	Use of Facilities.....	200,663.61	\$343,311.00
865	Walker Memorial.....	13,618.50	.....
867	Walker Memorial Dining Service.....	17,819.62	1,488.44
		<u>\$249,512.48</u>	<u>\$344,799.44</u>
Totals.....		<u>\$3,633,935.46</u>	<u>\$1,079,728.12</u>

SCHEDULE A-9

DEPOSITS AND ADVANCES HELD FOR INVESTMENT

ALUMNI AND CLASS FUNDS

881	Class of 1887.....	\$4,342.86	.....
883	Class of 1889.....	173.63	.....
884	Class of 1900.....	.....	\$10,000.00
885	Class of 1914.....	1,016.62	.....
887	Class of 1917.....	.....	1,815.00
889	Class of 1919, Special.....	3,441.00	.....
891	Class of 1920.....	4,147.25	.....
893	Class of 1921.....	4,696.75	.....
895	Class of 1923.....	60,444.35	.....
897	Class of 1924, Anonymous.....	3,024.02	.....
899	Class of 1924.....	33,984.47	.....
901	Class of 1925.....	19,723.76	57.00
903	Class of 1926.....	37,565.70	5,400.75
905	Class of 1927.....	23,614.56	.....
907	Class of 1928.....	46,942.22	650.00
909	Class of 1929.....	19,030.29	4.17
911	Class of 1930.....	15,722.38	.....
912	Class of 1933.....	.....	904.35
913	Class of 1934.....	4,098.40	142.34
915	Class of 1934, Special.....	814.00	.....
917	Class of 1935.....	668.74	1,622.72
919	Class of 1936.....	1,364.98	100.00
920	Class of 1937.....	.....	258.51

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (Continued)

<i>Net Transfers</i>	<i>Investment Income</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance, June 30, 1949</i>
.....	\$108.00	.....	.....	\$2,847.00
.....	4.00	.....	.....	59.90
.....	232.00	.....	\$125.00	5,917.25
\$1,500.00	408.00	\$500.00	.....	10,312.61
.....	8.00	.....	.....	1,081.00
.....	12.00	.....	250.00	211.06
.....	684.00	.....	.....	17,865.11
.....	100.00	.....	.....	2,589.85
.....	4,688.00	8,241.04	.....	117,961.35
200.00	4,376.00	.....	19,455.65	122,472.52
.....	36.00	.....	.....	937.00
<u>\$1,700.00</u>	<u>\$28,872.00</u>	<u>\$15,453.67</u>	<u>\$95,964.86</u>	<u>\$844,731.24</u>
.....	\$696.00	\$3,337.75	\$8,350.04	\$23,119.04
\$78,028.82	.....	10,565.66	64,820.16	390,559.97
.....	544.00	.....	.....	14,162.50
.....	632.00	4,968.65	.....	14,971.41
<u>\$78,028.82</u>	<u>\$1,872.00</u>	<u>\$18,872.06</u>	<u>\$56,470.12</u>	<u>\$442,812.92</u>
<u>\$404,971.22</u>	<u>\$123,524.00</u>	<u>\$465,897.14</u>	<u>\$164,498.69</u>	<u>\$3,801,820.53</u>

(Schedule A)

DEPOSITS AND ADVANCES HELD FOR INVESTMENT

.....	\$172.00	.....	.....	\$4,514.86
.....	8.00	.....	.....	181.63
.....	.....	.....	.....	10,000.00
.....	40.00	.....	.....	1,056.62
.....	4.00	.....	.....	1,819.00
.....	.....	.....	.....	3,441.00
.....	188.00	.....	.....	4,147.25
\$60,444.35	.....	.....	.....	4,884.75
.....	120.00	.....	\$28.80	3,115.22
33,984.47	.....	.....	.....	.....
.....	788.00	.....	133.48	20,435.28
.....	1,624.00	.....	202.48	44,387.97
.....	944.00	.....	.....	24,558.56
.....	1,884.00	.....	.....	49,476.22
.....	760.00	.....	.....	19,794.46
.....	628.00	.....	.....	16,350.38
.....	8.00	.....	695.63	216.72
.....	168.00	.....	18.00	4,390.74
.....	32.00	.....	.....	846.00
.....	28.00	.....	.....	2,319.46
.....	56.00	.....	.....	1,520.98
.....	.....	.....	52.59	205.92

SCHEDULE A-9 — (Continued)
DEPOSITS AND ADVANCES HELD FOR INVESTMENT
(Continued)

ALUMNI AND CLASS FUNDS (Continued)		<i>Balance, June 30, 1948</i>	<i>Gifts and Other Receipts</i>
921	Class of 1939	\$1,193.72	.....
923	Class of 1945	25.00	.....
925	Class of 1946	25.00	.....
927	Class of 1947	80.00	.....
928	Class of 1948, Athletic Award .....	.....	\$682.84
929	Class of 1948 .....	.....	20.00
930	Association of Class Secretaries	3,000.33	.....
931	M. I. T. Alumni Association, Permanent	106,536.12	.....
932	M. I. T. Alumni Association, Class of 1898	9,760.84	2,960.00
		<u>\$405,436.99</u>	<u>\$24,617.68</u>
STUDENT ACTIVITIES			
951	Alpha Chi Sigma House	\$5,511.77	\$139.08
953	Major Briggs	36,029.17	122.24
955	Lillie C. Smith	6,616.11	.....
957	Walter B. Snow	10,053.82	.....
958	Technology Christian Assoc. ....	.....	3,500.00
959	Technology Matrons' Teas.	9,109.62	.....
960	M. I. T. Women's Dormitory	1,083.25	262.00
961	W. B. S. Thomas	2,689.24	.....
963	Undergraduates Activities Trust	1,836.87	.....
965	Undergraduate Publications Trust	5,762.23	.....
967	Undergraduate Dues, Athletics	22,521.65	.....
969	Undergraduate Dues, Reserve and Contingent	16,405.75	.....
		<u>\$117,619.48</u>	<u>\$4,023.32</u>
Totals		<u><u>\$523,056.47</u></u>	<u><u>\$28,641.00</u></u>

SCHEDULE A-10
CONDITIONAL GIFTS
INCOME NOT YET AVAILABLE

981	Anonymous Q	\$7,125.50	\$1,300.00
983	Anonymous X	20,458.12	.....
984	Anonymous Y	100.00	.....
985	Avoca	78,000.00	.....
987	Joseph Hewett	214,471.64	.....
988	Percival Lowell Scholarship .....	.....	30,000.00
989	George S. Witmer	76,278.26	2,108.10
Totals		<u><u>\$396,433.52</u></u>	<u><u>\$33,408.10</u></u>

<i>SCHEDULE A-11</i> ACCUMULATED NET GAIN ON GENERAL INVESTMENTS			
995	Endowment Reserve (see Page 195)	<u><u>\$2,492,622.50</u></u>	<u><u>\$30,467.62</u></u>

DEPOSITS AND ADVANCES HELD FOR INVESTMENT (Continued)

<i>Net Transfers</i>	<i>Investment Income</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance, June 30, 1949</i>
.....	\$48.00	.....	.....	\$1,241.72
.....	.....	.....	.....	25.00
.....	.....	.....	.....	25.00
.....	.....	.....	.....	80.00
.....	12.00	.....	\$101.42	593.42
.....	.....	.....	.....	20.00
.....	120.00	.....	.....	3,120.33
.....	4,220.00	.....	3,364.00	107,392.12
\$22.00	464.00	.....	614.00	12,592.84
<u>\$94,406.82</u>	<u>\$12,316.00</u>	<u>.....</u>	<u>\$5,210.40</u>	<u>\$342,753.45</u>
.....	\$220.00	.....	.....	\$5,870.85
.....	1,444.00	.....	.....	37,595.41
.....	264.00	.....	.....	6,880.11
.....	404.00	.....	.....	10,457.82
.....	64.00	.....	\$1,500.00	2,064.00
.....	364.00	.....	356.00	9,117.62
.....	48.00	.....	.....	1,393.25
.....	108.00	.....	.....	2,797.24
.....	72.00	.....	.....	1,908.87
.....	184.00	.....	1,500.00	4,446.23
.....	808.00	.....	2,480.78	20,848.87
.....	656.00	.....	.....	17,061.75
.....	\$4,636.00	.....	\$5,836.78	\$120,442.02
<u>\$94,406.82</u>	<u>\$16,952.00</u>	<u>.....</u>	<u>\$11,047.18</u>	<u>\$463,195.47</u>

(Schedule A)

CONDITIONAL GIFTS

INCOME NOT YET AVAILABLE

.....	\$308.00	.....	.....	\$8,733.50
.....	820.00	.....	\$630.00	20,648.12
.....	4.00	.....	.....	104.00
.....	9,900.00	.....	7,200.00	80,700.00
.....	9,787.50	.....	8,028.00	216,231.14
.....	.....	.....	2,558.50	27,441.50
.....	3,501.70	.....	3,515.26	78,372.80
.....	<u>\$24,321.20</u>	<u>.....</u>	<u>\$21,931.76</u>	<u>\$432,231.06</u>

(Schedule A)

ACCUMULATED NET GAIN ON GENERAL INVESTMENTS

<u>.....</u>	<u>.....</u>	<u>.....</u>	<u>.....</u>	<u>\$2,523,090.12</u>
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(Schedule A)

RECEIVABLES

245

SCHEDULE A-12

STUDENTS' NOTES RECEIVABLE

<i>Fund</i>	<i>Notes Receivable June 30, 1948</i>	<i>Loans Made 1948-49</i>	<i>Loans Repaid 1948-49</i>	<i>Notes Receivable June 30, 1949</i>	<i>Interest Received 1948-49</i>
Technology Loan Fund.....	\$354,268.84	\$61,050.00	\$61,975.18*	\$353,343.66	\$6,333.60
Bursar's Fund.....	3,640.57	2,500.00	3,491.68*	2,648.89	84.29
William B. Rogers Fund.....	1,630.00	.....	150.00	1,480.00	169.03
Dean's Fund.....	1,060.48	2,530.00	1,295.42*	2,295.06	21.56
C. E. Summer Camp.....	60.00	200.00	.....	260.00	.....
Carl P. Dennett Fund.....	1,863.00	.....	94.63	1,768.37	24.46
George Henry May Fund.....	2,350.00	400.00	400.00	2,350.00	.....
Medical Department.....	2,604.36	59.55	39.00	2,624.91	.....
Class of 1896 Fund.....	300.00	300.00	.....	600.00	.....
Frances and William Emerson Fund	300.00	.....	300.00*	.....	.....
Wm. P. Ryan Memorial Fund.	205.69	.....	44.37	161.32	.....
Totals.....	\$368,282.94	\$67,039.55	\$67,790.28*	\$367,532.21	\$6,632.94

(Schedule A)

*Includes Written Off.

SCHEDULE A-13

ACCOUNTS RECEIVABLE

United States Government:

Armed Services, N.A.C.A. and A.E. C Research Contracts	\$1,217,028.67*
Veterans Administration.....	\$47,384.22
Navy — Radar School.....	3,417.55
Other Tuition Fees.....	54,358.15
Total United States Government.....	\$1,322,188.59

Industrial Corporations — Research Contracts \$76,370.81*

Others:

Aeronautical Engineering Department —	
Wind Tunnel Accounts.....	12,662.00
Students' Fees and Deposits.....	1,617.00
Miscellaneous Accounts.....	22,828.76
Total (Schedule A).....	\$1,435,667.16

*Total under direction of Division of Industrial Cooperation \$1,293,399.48.

SCHEDULE A-14
CONTRACTS IN PROGRESS

United States Government:

Armed Services, N.A.C.A. and A.E.C. Research Contracts	\$1,240,309.62*
Weather Bureau Research Program	10,248.83
<i>Total United States Government</i>	<i>\$1,250,558.45</i>

Industrial Corporations—Research Contracts	\$49,631.27*	
American Cancer Society Research	5,138.32	
Costs unallocated in above accounts, represented by Accounts Payable and Accrued Wages	242,199.48*	
Other	9,318.90	306,287.97
<i>Total (Schedule A)</i>		<i>\$1,556,846.42</i>

*Total under direction of Division of Industrial Cooperation \$1,529,088.09

SCHEDULE A-15

INVENTORIES, PREPAID EXPENSES AND DEFERRED CHARGES

Inventories:

Department of Buildings and Power:	
Maintenance Supplies.....	\$44,563.24
Oil.....	2,320.46
	\$46,883.70
Laboratory Supplies.....	68,087.82
Dining Halls, Food and Supplies including	
Games Dept.....	13,733.62
Photographic Merchandise and Supplies.....	15,698.84
Dormitories, Room Service Supplies.....	22,155.52
Stationery and Stamps.....	3,484.89
Technology Store, Lecture Notes.....	492.00
Civil Engineering Summer Camp.....	257.51
<i>Total Inventories.....</i>	<i>\$170,793.90</i>

Prepaid Expenses and Deferred Charges:

Deposits with Mutual Fire Insurance Companies	\$136,856.20
Unexpired Insurance Premiums.....	15,381.80
Cooperative Foundation Plan —	
Insurance Premiums.....	10,436.48
Folding Chairs, less Depreciation.....	5,663.69
Barracks Dormitories, less Amortization.....	50,772.20
Westgate West, less Amortization.....	91,496.14
Foreign Student Project.....	5,652.62
Equipment acquired by Division of Industrial	
Coöperation, less Depreciation.....	85,895.42
Division of Industrial Coöperation:	
Due from Vendors.....	\$12,532.53
Deferred Charges to Operations...	8,532.98
	21,065.51
Other Deferred Charges (principally accounts	
payable and accrued wages for expenses	
undistributed).....	100,042.32
<i>Total Prepaid Expenses and Deferred Charges.....</i>	<i>523,262.38</i>
<i>Total (Schedule A).....</i>	<i>\$694,056.28</i>

REPORT OF THE TREASURER

SCHEDULE A-16

STUDENTS' ADVANCE FEES AND DEPOSITS

1949 Summer Term:	
Tuition Fees.....	\$129,123.52
Students' Deposits.....	3,096.89
Dormitory Rentals.....	44,913.50
Summer Surveying Camp.....	2,100.00
	\$179,233.91
1948-49 Students' Deposits, Returnable.....	11,304.08
1949-50 Tuition Fees.....	750.00
Total (Schedule A).....	<u>\$191,287.99</u>

SCHEDULE A-17

FEDERAL TAX WITHHOLDINGS, SAVINGS BOND
AND OTHER DEPOSIT ACCOUNTS

	Balance June 30, 1948	Additions	Deductions	Balance June 30, 1949
Additional Group Insurance.....		\$14,253.52	\$13,816.02	\$437.50
Blue Cross Hospitalization Program.....	\$6,482.45	86,280.11	85,829.46	6,933.10
Carnegie Foundation Pension Account.....		60,240.84	60,240.84	
Division of Industrial Cooperation Advance Payments or Billings...	146,499.73	188,308.84	146,499.73	188,308.84
Division of Industrial Cooperation Overhead Suspense.....	19,790.96	10,364.05	19,790.96	10,364.05
Employees Union Dues.....		10,654.25	10,654.25	
J. N. Tata Endowment Fund.....		1,000.00	740.00	260.00
I. C. Y. R. A. Deposits Account.....	2,526.26	200.00	1,063.67	1,662.59
Iraqi Education Directorate Account.....	2,654.57	5,298.33	5,257.52	2,695.38
Lowell Institute.....		1,805.00	1,795.00	10.00
Y. W. Lee Fellowship.....	1,900.00		1,900.00	
M. I. T. Physical Electronic Conference.....	148.82	943.74	846.06	246.50
Library Construction Fire Account.....		2,924.29	2,924.29	
Nautical Association.....	236.00	1,013.00	995.00	254.00
Radar School, Harbor Building.....	50,490.66	206,633.59	257,124.25	
Kispert Special.....	475.40	48.00	523.40	
National Students Association Purchase Card.....		345.00	315.75	29.25
Technology Christian Association.....		631.25	628.75	2.50
Watumull Foundation Fellowship.....	500.00		500.00	
Student Health and Accident Insurance.....		40,012.00	40,012.00	
Radar School Student Fund.....		182.55		182.55
United States Savings Bonds.....	13,994.82	146,666.41	146,439.70	14,221.53
United States Withholding Tax.....	88,776.65	1,156,812.64	1,148,439.08	97,150.21
United States Government Contract No. W30-291 TNG(AA1)-83....		500.00	500.00	
United States Government Contract No. W30-291 AA1-106.....		30.00	30.00	
United States Government Contract No. a(S)10267.....		202.69	202.69	
United States Government Contract No. N161-S-20453.....		2,174.04	2,174.04	
United States Navy V-5 Program.....		151.77	151.77	
Veterans Administration.....		1,708,984.66	1,708,984.66	
United States Government Contract Navy D3R Ord. Engr. Electronics		689.60	689.60	
United States Government Contract No. W30-291-TNG-AA1-22....		150.00	150.00	
United States Government Contract No. W19-016 Eng. 3194.....		500.00	500.00	
	\$334,476.32	\$3,648,000.17	\$3,659,718.49	\$322,758.00

(Schedule A)

SCHEDULE A-18

UNEXPENDED BALANCES OF GIFTS AND OTHER RECEIPTS
FOR CURRENT PURPOSES

<i>Department Accounts</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
Aeronautical Engineering:						
Aerodynamic Eng. Special (Hunsaker)...	\$969.60	\$1,000.00	.....	\$864.46	.....	\$1,105.14
Aerodynamic Research.....	421.55	.....	\$1,089.90	1,511.45	.....	.....
Carnegie Aerodynamics Research.....	20,267.88	.....	9,500.00	1.25	.....	10,766.63
Cascade Research.....	22,561.22	.....	.....	5,755.59	.....	16,805.63
Compressible Vortex Flow Investigation..	.....	.....	3,000.00	2,149.06	.....	850.94
Diffuser Research.....	.....	.....	3,000.00	941.59	.....	2,058.41
Douglas Aircraft Co. Fellowship.....	1,000.00	1,500.00	760.00	1,460.00	\$300.00	1,500.00
Elastic Research Lab. Alt. Spec. 2246...	1,111.07	.....	1,500.00	2,611.07	.....	.....
Fire Control Instr. Lab.....	.....	.....	35,000.00	32,623.17	.....	2,376.83
Goodyear Fellowship.....	6,038.50	.....	.....	1,600.00	1,400.00	3,038.50
Instrument Laboratory Maintenance....	17,802.41	.....	23,700.00	33,958.46	.....	7,543.95
Rotating Wing Research.....	.....	.....	1,910.10	1,808.49	.....	101.61
Special Apparatus Wright Tunnel.....	10,000.00	.....	.....	.....	.....	10,000.00
Special Appro. No. 1990.....	2,384.52	.....	.....	594.61	.....	1,789.91
Special Appro. No. 2065.....	3,285.68	.....	.....	152.84	.....	3,132.84
Sperry Gyroscope Fund.....	4,759.75	.....	.....	3,600.00	900.00	259.75
Structural Lab. Equipment.....	.....	.....	500.00	427.34	.....	72.66
Theoretical Analysis.....	.....	.....	500.00	493.86	.....	6.14
Vibration Research No. 1333.....	21.01	.....	.....	19.80	.....	1.21
Wright Bros. Wind Tunnel.....	74,142.78	87,898.00	.....	54,037.99	.....	108,002.79
Wright Bros. Tunnel, Equip.....	30,000.00	.....	.....	.....	.....	30,000.00
Architecture:						
Special Appro. No. 2238.....	4,556.89	.....	.....	4,415.10	.....	141.79
Special Appro. No. 2282.....	15.41	.....	.....	15.41	.....	.....
Housing Research Special No. 1899....	2,485.84	.....	.....	583.32	.....	1,902.52
Traveling Fellowship.....	1,500.00	.....	.....	1,500.00	.....	.....
Biology and Biological Engineering:						
American Cancer Society.....	.....	10,605.00	.....	7,801.07	2,803.93	.....
American Cancer Society — Vallee.....	.....	1,000.00	.....	1,000.00	.....	.....
American Cancer Society — Bennett....	.....	4,000.00	.....	1,721.11	2,278.89	.....
American Cancer Society — Spectro.....	.....	14,516.00	2,000.00	16,516.00	.....	.....
Armour & Co. Research — Waugh.....	125.42	12,152.46	.....	13,892.95	1,615.07	.....
Equipment Special No. 2247.....	4,350.71	.....	.....	4,350.71	.....	.....
Baruch Fund.....	15,469.91	.....	.....	8,056.65	.....	7,413.26
Baruch Comm. on Physical Medicine Fellowship.....	186.94	.....	.....	.....	.....	186.94
Corn Industries Research Found.....	5,595.75	5,500.00	.....	5,485.04	.....	5,610.71
Electron Microscope Research.....	10,278.74	.....	9,138.57	242.55	.....	897.62
Gillette Safety Razor Co.....	150.00	.....	.....	.....	.....	150.00
Illuminating Engineering Soc. Research..	.....	5,000.00	.....	3,054.26	.....	1,945.74
Charles A. and Marjorie King Fund.....	.....	10,000.00	1,000.00	5,478.23	.....	3,521.77
A. C. Lawrence Fund.....	1,802.75	.....	.....	1,802.75	.....	.....
Lilly P. I. Fund.....	776.47	.....	.....	775.04	.....	1.43
Pepodent Keratin Research — Bear....	.....	5,000.00	.....	3,436.38	.....	1,563.62
Mass. General Hospital — Gross.....	.....	500.00	.....	357.22	.....	142.78
Rockefeller Fund for Biological Eng....	.....	59,181.07	10,138.57	60,448.00	8,871.64	.....
Submarine Signal Fund.....	1,696.61	.....	3,553.79	5,250.40	.....	.....

REPORT OF THE TREASURER

SCHEDULE A-18 — (Continued)

<i>Department Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
Building Engineering and Construction:						
Cabot Pigment Research.....	\$495.77	.....	.....	\$495.77	.....	.....
National Lime Association.....	3,289.99	\$7,000.00	.....	9,814.54	\$240.00	\$235.45
Plastic Materials Manufacturing Assoc....	11,085.60	33,327.24	.....	26,826.42	955.00	16,631.42
Research Corporation Building Material..	23.49	.....	.....	5.30	.....	18.19
Revere Building Material Research.....	467.30	3,500.00	.....	2,895.65	.....	1,071.65
Ross Francis Tucker Memorial Fund.....	70.06	.....	.....	7.45	.....	62.61
Business and Engineering Administration:						
Lemuel R. Boulware Fund.....	17.53	.....	.....	.....	.....	17.53
Alvin Brown Fund.....	408.25	.....	.....	397.12	.....	11.13
Newman M. Marsilius Fund.....	176.61	500.00	.....	432.31	.....	244.30
Earl Newson.....	.....	150.00	.....	.....	.....	150.00
Sloan Book Account.....	148.02	10.00	.....	59.70	.....	98.32
Sloan Sponsored Fellowship, Operating...	.....	26,100.00	\$1,052.60	19,580.79	300.00	5,166.61
Sloan Sponsored Fellowship, Special.....	1,302.85	.....	851.48	546.17	.....	1,608.16
Sloan Sponsored Fellowship, Research....	2,167.42	4.00	201.12	.....	.....	2,372.54
Special Appro. No. 1850.....	454.47	.....	.....	.....	.....	454.47
Standard Oil of Cal. Fellowship.....	.....	1,250.00	.....	1,250.00	.....	.....
Howard D. Williams Fund.....	116.88	500.00	.....	481.37	.....	135.03
Chemical Engineering:						
Allied Chemical & Dye Corp. Fellowship..	2,771.38	950.00	.....	2,400.00	900.00	421.38
American Cyanamid Co. Fellowship.....	600.00	2,000.00	.....	1,200.00	200.00	1,200.00
Bituminous Coal Research.....	14,817.01	.....	.....	6,219.28	.....	8,597.73
du Pont Fellowship.....	1,400.00	2,800.00	700.00	1,800.00	700.00	1,000.00
Eastman Kodak Fellowship.....	28.00	1,500.00	.....	1,500.00	.....	28.00
Elastic Colloid Research Corp.....	.....	5,000.00	.....	1,231.96	650.00	3,118.04
Fuels Research.....	2,274.20	.....	.....	155.19	.....	2,119.01
Gottesman Foundation.....	.....	.....	2,500.00	1,337.40	.....	1,162.60
Humble Oil & Refining Co. Fellowship...	4,800.00	.....	.....	1,250.00	.....	3,550.00
Humble Oil & Refining Co. Research....	25,000.00	.....	25,000.00	.....	.....	.....
S. C. Johnson & Son Colloid Chemistry Fellowship.....	952.50	1,000.00	.....	1,200.00	700.00	52.50
Kimberley Clark Corp. Fellowship.....	.....	1,900.00	.....	1,550.00	350.00	.....
Thomas Midgley, Jr. Fellowship.....	1,507.00	.....	.....	.....	.....	1,507.00
Pan American Refining Corp. Fellowship	700.00	2,000.00	.....	1,200.00	.....	1,500.00
Procter & Gamble Fellowship.....	3,844.13	3,100.00	.....	3,155.51	.....	3,788.62
Pittsburgh Consolidation Coal Co. Fellowships.....	481.20	3,000.00	.....	1,179.92	.....	2,301.28
Standard Oil of Indiana Fellowship.....	1,900.00	2,000.00	.....	1,638.72	200.00	2,061.28
Standard Oil of Cal. Fellowship.....	.....	1,950.00	.....	1,250.00	700.00	.....
Standard Oil Co. Fellowship — Lewis...	142.36	.....	.....	108.47	.....	33.89
Standard Oil Development Co. Research..	12,726.74	12,424.16	.....	12,661.16	.....	12,489.74
Special Research No. 1421.....	388.40	.....	.....	.....	.....	388.40
Chemistry:						
American Academy of Arts and Sciences..	712.48	.....	.....	24.40	.....	688.08
Abbott Laboratories.....	3,207.02	.....	.....	1,040.00	.....	2,167.02
American Chicle Co. Fellowship.....	.....	8,000.00	.....	5,125.34	.....	2,874.66
Bristol Laboratories Research.....	4,145.54	3,450.00	.....	2,350.31	1,000.00	4,245.23

BALANCES FOR CURRENT PURPOSES

251

SCHEDULE A-18 — (Continued)

<i>Department Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
Chemistry: (Continued)						
Building 2, Fire Account.....	.....	\$3,407.69	.....	.....	.....	\$3,407.69
Cope Research.....	\$3,680.00	.....	.....	\$2,714.35	\$525.00	440.65
Harshaw Chemistry Fund.....	1,814.70	3,000.00	.....	1,250.42	300.00	3,264.28
du Pont Fellowship.....	5,004.28	7,300.00	.....	5,405.50	200.00	6,698.78
du Pont Peroxide Research.....	2,000.00	.....	.....	.....	.....	2,000.00
du Pont Fundamental Research.....	.....	10,000.00	.....	.....	.....	10,000.00
Eastman Kodak Fellowship.....	.....	1,500.00	.....	.....	.....	1,500.00
Journal Meetings.....	68.00	194.00	.....	15.73	.....	246.27
Linde Air Products Research.....	.....	654.00	.....	654.00	.....	.....
Little, Arthur D. Special Fellowship 48-49.....	.....	.....	\$6,800.00	6,100.00	700.00	.....
Physical Chemistry Royalties.....	3,837.43	886.40	.....	865.79	.....	3,858.04
Polymerization Research.....	1,665.25	.....	.....	.....	.....	1,665.25
Procter & Gamble Fund.....	2,684.85	.....	.....	.....	.....	2,684.85
Rockefeller Research Grant 45107.....	13,127.25	9,585.70	.....	10,085.35	.....	12,627.60
Research Corp. — Amdur.....	4,925.28	5,000.00	.....	4,376.50	84.00	5,464.78
Research Corp. Morton Fund.....	5,962.99	.....	.....	1,567.13	475.00	3,920.86
Research Corp. Vitamins A and D Research.....	946.28	4,700.00	.....	2,826.48	.....	2,819.80
Royalty Receipts Pat. 665135.....	1,102.96	.....	.....	967.94	.....	135.02
Sharp and Dohme, Inc.....	988.00	3,200.00	.....	3,525.00	.....	663.00
Socony Vacuum Oil Co. Fellowship.....	2,010.00	.....	.....	1,310.00	700.00	.....
Sugar Research Fund.....	11,070.39	18,598.00	.....	19,503.60	1,775.00	8,389.79
Swift Amino Acid Fund.....	4,857.61	.....	.....	4,392.03	300.00	165.58
Swift Protein Research.....	560.26	.....	5,000.00	3,670.74	770.00	1,119.52
Union Bay State — Milas.....	659.05	.....	.....	422.08	.....	236.97
U. S. Rubber Co. Fellowship.....	3,100.00	.....	.....	2,200.00	.....	900.00
City Planning:						
Conference Account.....	119.91	.....	.....	119.91	.....	.....
Civil Engineering:						
Concrete Structural and Dynamics						
Laboratory.....	9,965.90	.....	.....	4,115.88	.....	5,850.02
Equipment Special 1326.....	338.82	.....	.....	.....	.....	338.82
Freeman Hydraulic Research.....	800.00	.....	.....	.....	.....	800.00
Hydraulics Laboratory Special No. 2155.....	38.49	.....	.....	38.49	.....	.....
Photogrammetry Laboratory.....	5,278.41	2,075.00	2,075.00	2,071.66	.....	3,206.75
Research Foundation Hydrodynamics.....	.....	5,000.00	.....	4,394.02	.....	605.98
River Hydraulic Laboratory.....	.....	272.66	2,700.00	2,972.66	.....	.....
Sanitary Engineering Lab. 2032.....	.....	.....	2,200.00	1,659.59	.....	540.41
Sanitary Science Lab. Special No. 2087..	643.26	.....	1,000.00	88.79	.....	1,732.05
Soil Mechanics Laboratory.....	8.56	63.65	750.00	808.62	.....	13.59
Sanitary Engineering Transportation....	255.02	.....	.....	158.71	.....	413.73
Sewage Federation Research.....	1,199.81	6,142.65	.....	4,478.20	.....	2,864.26
Structural Laboratory.....	45.26	65.00	1,000.00	1,055.77	.....	54.49
Structural Laboratory Donations.....	457.00	120.00	.....	577.00	.....	.....
Summer Camp Construction Reserve....	443.37	.....	.....	301.49	.....	141.88
Wallace and Tiernan Grant.....	2,503.92	.....	.....	2,464.94	.....	38.98
Welding Research.....	396.49	2,800.00	.....	998.95	.....	2,197.54

REPORT OF THE TREASURER

SCHEDULE A-18 — (Continued)

<i>Department Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
Economics:						
Map Project.....	\$1,025.04	\$4,000.00	.....	\$3,057.15	.....	\$1,967.89
Rockefeller Foundation Grant 45082.....	3,541.65	5,884.44	.....	2,609.98	.....	6,816.11
Statistical Conference.....	621.32	.....	.....	621.32	.....	.....
Electrical Engineering:						
Airborne Instrument Lab. Fellowship....	.....	2,000.00	.....	.....	.....	2,000.00
American Cancer Society Special Trump..	51,034.17	.....	.....	47,334.72	.....	3,699.45
American Philosophical Society — Kopal..	1,280.87	.....	.....	392.93	.....	887.94
Army Officers Aid.....	2,368.04	650.00	.....	408.22	.....	2,609.82
Balsbaugh Research.....	1,212.84	.....	.....	1,114.17	.....	98.67
Celotex Corp. Fellowship.....	.....	3,000.00	.....	1,800.00	\$700.00	500.00
Center of Analysis.....	113.14	21,815.45	\$21,646.25	49,461.33	5,886.49	.....
Coating Metals Special No. 1946.....	598.00	.....	.....	.....	.....	598.00
Communications Lab. U. H. F. Research..	146.38	.....	69.55	76.83	.....	.....
Course Revision Special No. 1250.....	485.92	247.40	.....	294.77	.....	438.55
du Pont Fellowship.....	.....	2,200.00	.....	1,200.00	200.00	800.00
Edgerton Film Research.....	1,919.97	82.22	.....	843.70	.....	1,158.49
Equipment Special.....	18,606.71	.....	.....	4,062.46	.....	14,544.25
Hyams Radiation Research.....	1,252.38	11,044.09	.....	9,295.23	.....	3,001.24
Int. Tel. & Tel. Research.....	865.70	.....	.....	.....	.....	865.70
Micro Wave Research.....	668.68	.....	69.55	738.23	.....	.....
Network Analyzer.....	20,013.47	4,899.45	.....	15,095.97	.....	9,816.95
Oil Gear Research.....	7,000.00	.....	7,000.00	.....	.....	.....
Photoelectric Cells Res. Spec. 1874A....	4,157.98	.....	.....	.....	.....	4,157.98
Radar School — Salaries.....	.....	38,801.72	.....	38,801.72	.....	.....
Radio Research Spec. 1550.....	1,724.15	.....	.....	.....	.....	1,724.15
Rapid Selection Research.....	6,981.62	.....	.....	.....	.....	6,981.62
Research Corp. Arithmetical Mach. Spec.	412.97	.....	.....	.....	.....	412.97
Servos Special Brown.....	5,125.25	128.25	7,000.00	3,335.71	.....	8,917.79
Table of Planckian Radiation.....	1.44	.....	.....	1.44	.....	.....
U. H. F. Dielectrics Res. Spec. 1874B....	6,000.00	.....	.....	.....	.....	6,000.00
English and History:						
International Relations Library.....	80.35	.....	.....	73.87	.....	6.48
Roosevelt Spec. 2356.....	.....	.....	2,000.00	1,189.74	.....	810.26
Food Technology:						
Apple Fellowship.....	1,642.26	.....	.....	211.06	.....	1,431.20
Bruce's Juices Inc. Fellowship.....	2,500.00	.....	.....	500.00	.....	2,000.00
Campbell Special.....	2,135.08	.....	.....	363.58	.....	1,771.50
Carbide & Carbon Chemical Corp.....	.....	2,000.00	.....	1,800.00	.....	200.00
Dewey and Almy Fund.....	.....	12,267.89	324.20	13,761.03	1,817.34	.....
Fat Research Fund.....	1,417.62	4,000.00	.....	4,055.16	.....	1,362.46
Food Research.....	.....	.....	55,725.11	55,725.11	.....	.....
Hoffman La Roche Fund.....	2,490.83	.....	.....	24.38	.....	2,466.45
Joe Lowe Corp. Research.....	1,937.95	.....	.....	500.00	.....	1,437.95
Moore, Emma B., Ration Research, Proctor	500.00	.....	.....	.....	.....	500.00
Moore, Emma B., Ration Research, Harria	36.06	.....	.....	8.50	.....	27.56
Nutrition Research.....	.....	1,088.00	209.59	1,015.62	.....	1,894.03
Procter and Gamble Research.....	525.05	1,500.00		1,428.46	350.00	246.59

BALANCES FOR CURRENT PURPOSES

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SCHEDULE A-18 — (Continued)

<i>Department Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
<i>Food Technology (Continued)</i>						
Quaker Nutrition Fund.....	\$4,333.98	\$420.00	.....	\$4,609.44	.....	\$144.54
Refrigeration Research Foundation.....	.....	3,500.00	.....	.....	.....	3,500.00
Royalties Receipts Pat. 665135.....	1,199.61	.....	.....	1,019.05	.....	180.56
Standard Brands Fellowship.....	2,200.00	12,200.00	.....	4,543.62	.....	9,856.38
United Fruit Fund.....	17,576.57	15,000.00	\$533.79	13,703.11	.....	19,407.25
Vitamin Foundation Research.....	5,193.70	.....	.....	4,132.46	.....	1,061.24
<i>Geology:</i>						
American Petroleum Institute Fund.....	2,562.80	19,870.00	301.16	22,055.73	.....	75.91
Cabot Spectrographic Laboratory.....	270.71	.....	249.69	21.02	.....	.....
Geological Research Special 1863.....	1,460.75	.....	249.69	28.80	.....	1,681.64
G.S.A. 452-45.....	169.87	.....	301.16	471.03	.....	.....
G.S.A. 466-45.....	639.41	4,500.00	.....	1,547.29	.....	3,592.12
G.S.A. 472-45.....	882.67	504.12	.....	1,386.79	.....	.....
Geophysical Research.....	66.78	.....	.....	16.59	.....	50.19
National Research Council, Research.....	97.62	.....	97.62	.....	.....	.....
Nova Scotia Coal Research.....	177.71	1,000.00	.....	1,044.17	.....	133.54
Owens Illinois Glass Co. Fellowship.....	477.07	.....	1.33	182.79	.....	295.61
Special Appro. No. 2229.....	3,131.27	.....	96.29	3,227.56	.....	.....
Paine Fund Special No. 2213.....	790.10	.....	50.38	840.48	.....	.....
<i>Graphics:</i>						
National Research Council Grant.....	180.01	.....	.....	.....	.....	180.01
<i>Industrial Relations:</i>						
Special Appro. No. 1955.....	601.59	.....	.....	.....	.....	601.59
<i>Mathematics:</i>						
Applied Mathematics Program.....	1,535.70	.....	6,000.00	2,118.35	\$500.00	4,917.35
Journal of Mathematics and Physics.....	3,180.21	3,485.50	2,600.00	4,452.66	.....	4,813.05
Special Appro. No. 2260.....	4,144.06	.....	.....	146.47	.....	3,997.59
Putnam Fund.....	506.14	.....	.....	283.79	.....	222.35
Rockefeller Fund 47009.....	2,000.00	5,500.00	.....	4,745.13	.....	2,754.87
<i>Mechanical Engineering:</i>						
A. S. M. E. Research.....	2,540.26	6,338.80	.....	7,634.68	.....	1,244.38
A. S. R. E. Research.....	800.82	.....	.....	10.00	.....	790.82
American Soc. of Tool Engineering.....	417.50	.....	.....	.....	.....	417.50
Cavitation Research.....	1,020.91	.....	.....	344.35	.....	676.56
Chicopee Fellowship.....	.....	1,200.00	.....	1,000.00	200.00	.....
Clark Thread Fellowship.....	7,587.50	.....	.....	2,300.00	850.00	4,437.50
deForest Research Special 1254.....	2,230.60	.....	.....	.....	.....	2,230.60
du Pont Predoctoral Fellowship.....	1,610.40	2,800.00	.....	1,836.00	200.00	2,374.40
Dynamics Special 2319.....	3,421.82	.....	.....	929.50	.....	2,492.32
Fatigue Lab. Special No. 2224.....	181.93	.....	.....	.....	.....	181.93
Gas Turbine Building and Equipment.....	45,852.90	.....	.....	15,193.35	25,000.00	5,659.55
Heat Measurements Laboratory.....	927.23	.....	.....	694.12	.....	233.11
Lab. Rev. Special No. 2095.....	2,949.35	.....	.....	1,108.09	.....	1,841.26
Low Temperature Research.....	2,380.00	.....	2,380.00	.....	.....	.....
Machine Tool Lab. Spec. No. 2201.....	.....	1,306.34	.....	1,010.02	.....	296.32
Magnafux Research Fund.....	7,952.64	.....	.....	2,000.00	.....	5,952.64
Mechanical Design Prize.....	.....	50.00	.....	50.00	.....	.....

REPORT OF THE TREASURER

SCHEDULE A-18 — (Continued)

<i>Department Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
<i>Mechanical Engineering: (Continued)</i>						
Mechanics of Materials Spec. No. 2041...	\$17,034.98	.....	.....	\$7,363.97	.....	\$9,671.01
N. E. Textile Foundation Fellowship.....	.....	\$1,800.00	.....	.....	.....	1,800.00
Proprietors Locks and Canals.....	1,573.02	.....	.....	.....	.....	1,573.02
S. Slater & Sons, Inc., Fund.....	776.90	.....	.....	343.09	.....	433.81
Shell Fellowship.....	300.00	2,200.00	.....	1,200.00	\$700.00	600.00
Shop Maintenance Account.....	4,786.70	10,142.24	.....	10,894.46	.....	4,034.48
Sloan Engine Control Research.....	.....	.....	\$5,000.00	673.60	.....	4,326.40
Special Appro. No. 2176.....	1,946.38	.....	.....	738.51	.....	1,207.87
Testing Materials Lab. Special.....	1,643.10	.....	.....	476.68	.....	1,166.42
Textile Equipment Special.....	54.36	.....	.....	.....	.....	54.36
Textile Foundation Research.....	2,453.63	.....	.....	277.36	.....	2,176.27
Special Appropriation No. 2160.....	.....	.....	71,666.00	.....	70,669.31	996.69
Special Appro. 2169A.....	3,982.01	676.48	.....	208.04	.....	4,450.45
Thermodynamic Research.....	967.96	.....	.....	32.45	.....	935.51
Wear Conference.....	863.22	.....	.....	272.79	.....	590.43
George Westinghouse Professorship.....	.....	15,000.00	.....	11,224.62	.....	3,775.38
<i>Metallurgy:</i>						
American Brake Shoe Fellowship.....	2,000.00	.....	.....	1,030.32	.....	969.68
American Brake Shoe — Operating.....	4,997.94	.....	.....	2,841.45	.....	2,156.49
American Refractories Institute Fellowship.....	.....	2,600.00	.....	2,600.00	.....	.....
American Smelting & Ref. Co. Fell.....	1,414.00	2,500.00	.....	3,200.00	.....	714.00
Armour Dry Cyaniding.....	3,128.98	5,000.00	.....	4,378.20	.....	3,750.78
Armour Flotation Research — Gaudin...	8,186.03	12,000.00	.....	12,900.29	1,535.00	5,750.74
Julian M. Avery Research.....	2,687.56	.....	2,687.56	.....	.....	.....
Chipman Research Special 1337.....	6,824.47	5,744.97	100.00	1,828.88	350.00	10,490.56
Clay Research.....	711.95	.....	.....	328.20	.....	383.75
Corrosion Research.....	4,182.74	.....	.....	1,031.31	.....	3,151.43
Engineering Foundation — Bartholemew.....	.....	4,250.00	.....	3,788.34	461.66	.....
Engineering Foundation — Cohen.....	620.00	2,735.00	.....	2,955.00	.....	400.00
Engineering Foundation Welding Res....	3,385.51	.....	.....	49.61	.....	3,335.90
Equipment Spec. No. 1234.....	1,463.91	572.89	.....	1,094.91	.....	941.89
Equipment Special No. 1259.....	1,890.62	.....	.....	1,030.00	.....	2,920.62
Equipment Special No. 2386.....	.....	.....	8,000.00	3,000.47	.....	4,999.53
Foundry Educational Foundation — Research.....	17,474.83	.....	.....	6,713.74	10,375.17	385.92
Foundry Educational Foundation — Scholarship.....	11,000.00	.....	.....	.....	10,400.00	600.00
Gray Iron Founders Society.....	467.90	.....	.....	467.90	.....	.....
Illinois Clay Products Co. Research.....	2,024.76	.....	.....	2,024.76	.....	.....
International Nickel Co. Fell.....	2,458.31	.....	.....	2,458.31	.....	.....
Loeb Foundation.....	3,208.10	.....	.....	2,193.53	1,014.57	.....
Mineral Dressing Research.....	.....	.....	1,500.00	1,500.00	.....	.....
Modernization of Processing Laboratory...	40,289.01	.....	.....	37,873.52	.....	2,415.49
Ore Dressing Special No. 2382.....	.....	.....	685.00	685.00	.....	.....
Republic Steel Corp. Fund.....	5,437.44	10,000.00	.....	8,408.28	.....	7,029.16
Research Corporation — Uhlig.....	2,500.00	.....	.....	2,180.16	.....	319.84
Research Corporation — Schuhmann....	5,667.85	.....	.....	5,307.85	360.00	.....
Revere Copper and Brass Co. Res.....	1,035.39	.....	.....	690.20	175.00	170.19
Special Research No. 1818.....	679.13	.....	500.00	701.99	.....	477.54
Special Appropriation 2297.....	427.77	.....	10,000.00	7,203.34	.....	3,224.43
Steel Founders Society — Arc Furnace...	357.51	.....	.....	111.12	.....	246.39
Steel Founders Society — Scholarship...	.....	4,700.00	.....	4,500.00	.....	200.00

SCHEDULE A-18 — (Continued)

<i>Department Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
<i>Metallurgy: (Continued)</i>						
Timken Roller Bearing Research.....		\$5,000.00		\$4,389.47	\$350.00	\$260.53
Titanium Co. Fund.....	\$1,320.96	1,500.00		1,045.07		1,775.89
Unexcelled Mfg. Co.....	538.92	300.00		188.92	650.00	
Union Carbide and Carbon Fellowship...	1,050.00	2,000.00		2,516.06		533.94
Vanadium Corp. Fund.....	257.74	2,500.00		1,789.88		967.86
Wellman, S. K. Fund.....	1,024.82	2,500.00		1,664.25	490.83	1,369.74
Williams, Robert Seton Fund.....			\$200.00	136.86		63.14
<i>Meteorology:</i>						
Pamphlets Deposit Special.....	164.00					164.00
Weather Bureau Research.....		9,875.00		15,277.24	5,402.24	
<i>Military Science:</i>						
Freshman Equipment Account.....	3,752.33				2,156.09	5,908.42
Senior Uniform Upkeep Account.....	1,295.70	68.28			1,323.33	40.65
Senior Uniform Account 1948-1949.....		24,025.92			23,809.82	216.10
<i>Naval Architecture:</i>						
Lima Hamilton Corp. Research.....		2,000.00		372.98		1,627.02
Propeller Tunnel Special No. 1548A.....	2,249.87	1,800.00		747.86		3,302.01
Special Fund (Anonymous).....	2,189.81	1,000.00		1,930.93		1,258.88
<i>Physics:</i>						
Acoustics Laboratory Special No. 2115...	608.62		6,500.00	6,596.38		512.24
Armstrong Cork Co. Fellowship.....		3,000.00				3,000.00
Cabot X-Ray Fund.....	6,000.00			306.25		5,693.75
Conference Low Temperature.....		5,000.00				5,000.00
Crystal Research.....	1,494.87	750.00		1,007.26		1,237.61
du Pont Fellowship.....	1,800.00	2,800.00		1,800.00	200.00	2,600.00
Evans Research.....	239.68			239.68		
Glass Industry Fellowship.....	250.00			250.00		
Gulf Oil Corp. Fellowship.....	350.00	1,300.00		1,500.00		150.00
Harshaw-Stockbarger.....	8,864.03	8,000.00		14,927.65	400.00	1,536.38
Jewett, Frank B. Fellowship.....	1,275.74			296.05		979.69
Magnetic Laboratory Special No. 1222...	422.04			123.94		298.10
Methods of Theoretical Physics.....	1,300.00					1,300.00
Nuclear Research.....	8,903.19					8,903.19
Radioactivity Center.....	49,417.13	2,115.71		4,524.90		47,007.94
Special Appro. No. 2047.....	19,687.38			2,527.00		17,160.38
Spectroscopy Lab. Special.....	949.86	360.04		749.38		560.48
Spectroscopy — Loofbourrow.....			4,000.00	3,974.22		25.78
Spectroscopy Research.....	23,447.72	3,500.00	6,000.00	15,922.22		5,025.50
Spectroscopy Special.....	6,789.62	158.00		885.04		6,062.58
Spectroscopy — Biology —						
Memorial Hospital.....		8,000.00		4,805.57		3,194.43
Zeeman Effect Program Special 1755.....	466.65					466.65
<i>Solar Energy Research:</i>						
Solar Energy — Architecture.....			4,500.00	4,500.00		
Solar Energy — Bldg. Eng. & Const.....			733.36	733.36		
Solar Energy — Chemistry.....	349.13		350.00	284.16	175.00	239.97
Solar Energy — Elec. Eng.....	2,256.44		2,500.00	20.36		4,736.08
Solar Energy — Geology.....	485.83					485.83
Solar Energy — Headquarters.....		283.50	6,000.00	4,838.88		1,444.62
Solar Energy — Metallurgy.....	300.42		3,405.03	3,705.45		
Solar Alterations — Special.....			21,897.53	21,897.53		
	<u>\$1,043,019.96</u>	<u>\$786,874.34</u>	<u>\$285,679.89</u>	<u>\$1,147,880.03</u>	<u>\$163,840.92</u>	<u>\$803,853.24</u>

REPORT OF THE TREASURER

SCHEDULE A-18 — (Continued)

<i>Other Accounts</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
Library:						
American Chemical Society						
Library Fellowship.....	\$736.72	\$11,598.30	.....	\$10,853.56	.....	\$1,481.46
Biology Library.....	849.35	.....	\$5,000.00	871.70	.....	4,977.65
Carnegie S. A. L. Center.....	8,083.03	148.31	15,000.00	20,150.78	.....	3,080.56
Crafts Library.....	468.84	.....	.....	84.84	.....	553.68
Dewey Library.....	11.35	.....	.....	7.68	.....	3.67
German Chemical Documents.....	1,431.60	.....	.....	5.36	.....	1,426.24
Humanities Library Spec. No. 2103.....	8.42	.....	.....	.....	.....	8.42
Library Growth.....	4,758.92	.....	.....	1,087.26	.....	3,671.66
Special No. 1.....	.....	2,773.40	.....	.....	.....	2,773.40
Special No. 1853.....	735.87	.....	.....	176.94	.....	558.93
Special Appropriation No. 2240.....	188.62	.....	.....	147.40	.....	41.22
Walker Memorial Library.....	47.88	.....	3,200.00	2,325.16	.....	922.72
	<u>\$17,320.60</u>	<u>\$14,520.01</u>	<u>\$23,200.00</u>	<u>\$35,541.00</u>	.....	<u>\$19,499.61</u>
Research (other than those under Department Accounts):						
All American Aviation, Inc. Richard C. du Pont Memorial.....	\$1,700.00	.....	.....	\$250.00	\$350.00	\$1,100.00
Bush Research Fund.....	215.00	.....	.....	.....	.....	215.00
Cosmic Terrestrial Research.....	646.41	\$9,192.30	\$824.43	8,964.39	.....	1,698.75
General Radio Company Fund.....	2,000.00	.....	.....	.....	.....	2,000.00
	<u>\$4,561.41</u>	<u>\$9,192.30</u>	<u>\$824.43</u>	<u>\$9,214.39</u>	<u>\$350.00</u>	<u>\$5,013.75</u>
Reserves:						
Bemis Real Estate.....	\$4,115.17	\$3,862.55	.....	.....	.....	\$7,977.72
Division of Laboratory Supplies.....	2,246.21	12,984.42	.....	\$2,246.21	.....	12,984.42
Medical Student Health.....	.....	5,997.75	.....	.....	.....	5,997.75
Radar School, Harbor Building.....	11,237.75	11,013.17	.....	3,000.00	\$8,662.75	10,588.17
Round Hills.....	.....	.....	\$13,286.16	.....	.....	13,286.16
Special War Reserve Fund.....	23,003.72	.....	.....	2,597.95	.....	20,405.77
Trucking Reserve.....	5,000.00	.....	.....	5,000.00	.....	.....
	<u>\$45,602.85</u>	<u>\$33,857.89</u>	<u>\$13,286.16</u>	<u>\$12,844.16</u>	<u>\$8,662.75</u>	<u>\$71,239.99</u>
Miscellaneous:						
Additional Power — Building 35.....	\$19,979.33	.....	.....	\$21.31	.....	\$19,958.02
Alumni Register, 1948.....	8,126.97	\$2,841.00	.....	7,877.53	\$3,090.44	.....
Ames Street Parking Lot 2361.....	.....	.....	\$3,500.00	494.93	.....	3,005.07
Arch. Drafting Room Lighting.....	.....	.....	14,000.00	.....	.....	14,000.00
Biology Renovations.....	.....	.....	18,000.00	1,741.59	.....	16,258.41
Boat House Equipment.....	256.60	.....	.....	.....	.....	256.60
Building Key Account.....	3,918.06	.....	.....	328.08	.....	4,247.04
Building 5 Special 2333.....	2,571.97	.....	.....	195.79	.....	2,376.18
Building 18 Renovations.....	.....	3,200.00	.....	953.36	.....	2,246.64
Building 20 Spec. 2376.....	.....	.....	10,500.00	10,381.05	.....	118.95
Building 20 Painting.....	8,247.47	.....	.....	3,805.74	.....	4,441.73
Building 20 Power Lines.....	2,500.00	.....	.....	1,224.85	.....	1,275.15
Building 33 Dark Room.....	.....	.....	1,450.00	1,450.00	.....	.....
S. H. Caldwell Special.....	.....	1,000.00	.....	.....	.....	1,000.00
Chairman's Fund.....	.....	.....	843.08	198.00	.....	645.08
Civil Eng. Camp — Painting.....	.....	.....	3,500.00	3,142.86	.....	357.14
Civil Eng. — Drafting Room Lighting...			6,600.00			6,600.00

BALANCES FOR CURRENT PURPOSES

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SCHEDULE A-18 — (Continued)

<i>Other Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
<i>Miscellaneous: (Continued)</i>						
Consolidated Vultee Aircraft Corp.....	\$4,760.00	\$500.00	.....	.....	\$5,260.00	.....
Corporation Flower Fund.....	583.68	.....	.....	\$15.00	.....	\$568.68
Corporation K Fund.....	69.17	.....	.....	.....	.....	69.17
Dean's Fund Special.....	900.00	900.00	.....	1,100.00	700.00	.....
Dean of Humanities Refurbishing.....	.....	.....	\$350.00	350.00	.....	.....
Demonstration Special 2351.....	.....	.....	2,500.00	15.12	.....	2,484.88
Dewey Library Special 2354.....	.....	.....	5,492.32	5,492.32	.....	.....
D. I. C. — A. M. P. Royalty Account....	7,538.93	.....	.....	.....	.....	7,538.93
Douglas Aircraft Scholarship.....	760.00	.....	760.00	.....	.....	.....
Drainage East Parking 2387.....	.....	.....	6,100.00	5,402.45	.....	697.55
Richard C. du Pont Mem. Spec.....	388.56	.....	.....	.....	.....	388.56
Electrical Dist. Special 2209.....	3,259.92	.....	5,000.00	6,840.53	.....	1,419.39
Educational Survey Special No. 2251....	282.72	.....	3,614.75	3,897.47	.....	.....
Faculty Flower Fund.....	.....	664.50	.....	148.00	.....	516.50
Fly Ash Eliminator.....	2,476.59	.....	.....	376.82	.....	2,099.77
Foreign Students Project 1948.....	9,025.90	12,779.19	506.66	22,244.76	.....	66.99
Foreign Students Project 1949.....	.....	9,374.80	6.66	15,020.76	5,652.62	.....
Foreign Students Project —						
Air Travel Deposits.....	.....	19,610.00	.....	.....	19,399.19	210.81
Fund Raising Special No. 2267.....	3,714.38	.....	.....	.....	3,714.38	.....
Gottesman Foundation Fellowship	2,500.00	.....	2,500.00	.....	.....	.....
Graduate Student Fund.....	136.82	.....	.....	.....	.....	136.82
Grounds Special 2350.....	.....	.....	42,246.74	42,246.74	.....	.....
Haynes Student Aid Fund.....	1,400.00	.....	.....	675.00	.....	725.00
High Altitude Lab.....	600.00	.....	1,000.00	.....	.....	1,600.00
Kasch Fellowships.....	180.00	.....	.....	.....	.....	180.00
William S. Knudsen Fellowship.....	225.00	2,500.00	.....	1,800.00	.....	925.00
Llora Culver Krueger Fund.....	1,755.36	.....	.....	.....	500.00	1,255.36
Land Grant Colleges Expense.....	.....	700.00	.....	.....	667.32	32.68
Lecture Fund.....	.....	.....	2,000.00	1,973.86	.....	26.14
Thurman Lee.....	.....	3,000.00	.....	.....	750.00	2,250.00
Lexington Field Station —						
Air Conditioning 2363.....	.....	.....	5,500.00	5,500.00	.....	.....
Lighting Improvements.....	.....	.....	2,000.00	.....	.....	2,000.00
Arthur D. Little Inc. Royalties.....	.....	956.81	.....	.....	.....	956.81
M. I. T. Detroit Alumni Club Scholarship.	750.00	.....	.....	.....	750.00	.....
Mathematics Special 2355.....	.....	.....	3,836.50	3,836.50	.....	.....
Melvin Trust Scholarships.....	10,325.00	8,050.00	.....	.....	9,975.00	8,400.00
Modernization of Lighting.....	3,479.47	.....	.....	426.77	.....	3,052.70
New Student Program.....	46,504.20	.....	.....	14,730.01	.....	31,774.19
Parking Special 2306.....	5,937.69	.....	1,000.00	6,937.69	.....	.....
Langdon Pearce.....	.....	372.30	.....	372.30	.....	.....
Photographic Service.....	2,230.47	.....	.....	.....	2,230.47	.....
Poughkeepsie Funds.....	955.00	5.00	.....	960.00	.....	.....
President's Fund.....	796.34	2,000.00	1,700.00	3,747.92	.....	748.42
President's Portrait Fund.....	230.40	.....	.....	230.40	.....	.....
President's Special Fund "L".....	777.86	5,000.00	543.08	884.78	.....	4,350.00
Radar School, Harbor Building.....	.....	4,770.32	.....	.....	.....	4,770.32
Renovations City Planning Headquarters.	.....	.....	1,000.00	620.44	.....	379.56
Repairing Roads West of Mass. Ave.....	.....	.....	10,000.00	6,283.94	.....	3,716.06
Emma Rogers Room — Social.....	.....	84.65	.....	84.65	.....	.....
Emma Rogers Room — Special.....	.....	.....	1,000.00	970.88	.....	29.12
George Scher Scholarship.....	.....	1,000.00	.....	.....	.....	1,000.00
Science Teachers' Fellowship.....	.....	12,500.00	.....	.....	.....	12,500.00

REPORT OF THE TREASURER

SCHEDULE A-18 — (Continued)

<i>Other Accounts (Continued)</i>	<i>Balance June 30, 1948</i>	<i>Gifts and Other Receipts</i>	<i>Net Transfers</i>	<i>Expense</i>	<i>Other Charges</i>	<i>Balance June 30, 1949</i>
Miscellaneous: (Continued)						
Space Changes 2296.....	\$333.04	.....	\$15,000.00	\$13,706.62	.....	\$1,626.42
Spectroscopy Lab. Improvements.....	.....	.....	6,000.00	6,000.00	.....	.....
Standard Oil Co. N. J.....	50,000.00	.....	50,000.00	.....	.....	.....
Summer Session 1949 Spec. 2390.....	.....	.....	1,000.00	497.00	.....	503.00
Teagle Foundation, Inc., Scholarships.....	.....	\$20,000.00	.....	.....	\$7,624.00	12,376.00
Tech. War Record Spec. 2116.....	7,132.69	.....	.....	.....	.....	7,132.69
Undergraduate Schp. Award Special.....	.....	1,765.00	.....	.....	1,765.00	.....
Unesco Fellowship.....	1,050.00	.....	.....	.....	.....	1,050.00
Vassar Street Driveway.....	.....	.....	3,500.00	3,459.45	.....	40.55
Visiting Comm. Reports, Special.....	.....	.....	500.00	405.00	.....	95.00
Henry E. Wehmiller Fund.....	702.40	.....	.....	.....	.....	702.40
Granger Whitney Fund.....	213.50	200.00	.....	.....	200.00	213.50
Water Line Building 2.....	4,500.00	.....	.....	2,360.17	.....	2,139.83
Westgate Survey.....	2,500.00	.....	.....	.....	.....	2,500.00
Westgroup Elec. Distribution.....	.....	.....	17,600.00	.....	.....	17,600.00
	<u>\$224,575.49</u>	<u>\$113,773.57</u>	<u>\$143,030.31</u>	<u>\$210,771.38</u>	<u>\$50,973.18</u>	<u>\$219,634.81</u>
Total.....	<u>\$1,335,080.31</u>	<u>\$958,218.11</u>	<u>\$466,020.79</u>	<u>\$1,416,250.96</u>	<u>\$223,826.85</u>	<u>\$1,119,241.40</u>

EDUCATIONAL PLANT

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SCHEDULE A-19

EDUCATIONAL PLANT ASSETS¹

Land in Cambridge:		
Campus — east of Massachusetts Avenue	\$1,125,766.67	
Campus — west of Massachusetts Avenue	850,014.82	\$1,975,781.49
Educational Buildings, Cambridge:		
Main Group.....	\$5,655,949.64	
George Eastman Research Laboratories...	1,225,098.58	
Pratt School of Naval Architecture.....	674,971.70	
Chemical Engineering Laboratories.....	536,268.99	
Guggenheim Aeronautical Laboratory....	293,637.46	
Wright Brothers Memorial Wind Tunnel..	217,506.25	
Magnetic Substation.....	76,272.73	
Gas Turbine Laboratory.....	545,892.45	
Sloan Automotive Laboratories.....	549,936.81	
Mechanic Arts Building.....	83,658.89	
Nuclear Research Laboratory.....	42,891.27	
Cyclotron Laboratory.....	20,247.92	
Solar Energy Laboratory.....	10,500.00	
Hyams Radiation Laboratory.....	13,500.00	
Research Building (Servo-mechanisms)....	104,589.55	
Hydraulic Laboratory (Building 21).....	11,000.00	
Hydrodynamics Laboratory and Towing Tank (Under Construction).....	69,187.63	
Chemical Engineering Laboratory (Bldg.38)	31,000.00	
Building Twenty-Four.....	318,049.27	
Building Eighteen.....	44,158.93	
Twelve M.E.V. Bldg. (Under Construction)	156,823.48	10,681,141.55
Educational Equipment.....		2,039,953.60
Charles Hayden Memorial Library (Under Construction)		2,255,357.29
Undergraduate Dormitories.....	\$1,487,423.79	
Senior House.....	500,000.00 ²	1,987,423.79
Infirmary, Recreational and Athletic Buildings:		
Homborg Memorial Infirmary.....	\$188,441.60	
Walker Memorial.....	714,587.02	
Alumni Swimming Pool.....	377,992.93	
Boat House.....	54,244.13	
Barbour Field House.....	84,042.54	
Sailing Pavilion.....	28,849.09	
Briggs Field House and Track.....	121,197.99	
Rockwell Cage.....	216,902.14	1,786,257.44
Summer Camp: East Machias, Maine.....		120,558.00
Round Hill, Dartmouth, Massachusetts.....		175,000.00
Miscellaneous:		
Power Plant.....	\$389,064.17	
Steam and Electrical Distribution System.	310,795.32	
Service Building and Garages.....	55,369.74	
Other Plant Assets.....	466,916.61	1,222,145.84
Total, June 30, 1949 (Schedule A).....		\$22,243,619.00

¹ Not including the Graduate House, Westgate Veterans Housing, Women's Dormitory, 120 Bay State Road, Boston and M. I. T. Student House, 111 Bay State Road, Boston (see Investments, pages 216-217.)

² Additional Construction Cost provided for by Investment Funds (see Investments, page 216).

SCHEDULE A-20

PRINCIPAL GIFTS AND APPROPRIATIONS
FOR EDUCATIONAL PLANT

For Land:

T. C. duPont.....	\$625,000.00	
A. F. and Ida F. Estabrook Funds.....	105,000.00	
Maria A. Evans.....	169,080.60	
Edmund D. Barbour Fund.....	234,634.18	
From Miscellaneous Contributors.....	277,222.89	
Appropriations from Funds —		
Blake, \$5,000; Lyman, \$5,000; Kimball, \$10,000; McGregor, \$2,500; Philbrick, \$2,000; Richards, \$1,000; Perkins, \$3,252.32;		
Current Income, \$6,500.....	35,252.32	\$1,446,189.99

For Educational Buildings (including President's House,
Power Plant and buildings other than Dormitories and
those used for Student Recreational and Athletic
Purposes):

George Eastman.....	\$5,808,752.88*	
T. C. and P. S. duPont, Charles Hayden, Arthur Winslow for Mining Engineering Building.....	225,000.00	
Maria A. Evans Fund.....	100,000.00	
C. A. Stone and E. S. Webster.....	187,500.00	
Sale of Land and Building in Boston (1938)	972,283.33	
Pratt Fund, for School of Naval Architecture	675,150.00	
Guggenheim Fund, for Aeronautical Labora- tory.....	230,000.00	
Appropriations for Aeronautical Laboratory—		
From Funds: Perkins, \$12,508.02; Hayden, \$42,700.76; Frisbie, \$7,614.98.....	62,823.76	
Alfred P. Sloan, Jr., for Automotive Labora- tory.....	367,533.01	
Appropriation for Automotive Laboratory—		
From Current Income and Wind Tunnel Account.....	160,000.00	
Edmund D. Barbour Fund for:		
Nuclear Laboratory.....	32,341.27	
Magnetic Laboratory.....	40,772.73	
Power Plant.....	90,006.59	
Miscellaneous Contributions and Appropri- ations from Funds for: Magnetic Lab., \$5,500; Nuclear Research Lab., \$2,500; Cyclotron, \$20,247.92; Hyams Radiation Lab., \$13,500; and Solar Energy Lab., \$10,500; Anonymous, \$1,000, Bldg. 6; Industrial Fund for Bldg. 32, \$27,753.67; Hydrodynamics Lab., \$69,187.63; Gas Tur- bine Lab., \$530,699.10; Bldg. 24, \$318,049.27; Twelve M.E.V. Bldg., \$156,823.48.....	1,155,761.07	

* Includes Mr. Eastman's original gift of \$3,500,000 together with appropriations from the Building Fund of \$2,500,000 which he established.

EDUCATIONAL PLANT

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SCHEDULE A-20 — (Continued)

For Educational Buildings (Continued)

Subscriptions to Wright Brothers Memorial Wind Tunnel	\$95,795.00*	
Appropriation for Wind Tunnel — Current Income	9,000.00	
Miscellaneous Appropriations from Current Income for: Compression Lab., \$31,000; Tractor Garage, \$6,400; Gas Turbine Lab., \$15,193.35; Building 18, \$44,158.93	96,752.28	\$10,309,471.92

For Educational Equipment:

Emma Rogers Fund	\$528,077.06	
F. W. Emery Fund	126,423.80	
C. L. W. French Fund	100,843.34	
Equipment moved from Boston (1916) Est. Alumni Fund	500,000.00	
	82,119.38	
Appropriations from Funds — Drew, \$305,171.52; Peabody, \$52,238.89; duPont, \$12,500; Tuttle, \$50,000; Thayer, \$25,000; Dorr, \$49,573.47	494,483.88	
Appropriations from Current Income	193,576.34	
Miscellaneous Contributions	14,429.80	2,039,953.60

For Charles Hayden Memorial Library:

Charles Hayden Foundation Fund	2,255,357.29	
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For Dormitories:

Maria A. Evans Fund	\$261,192.55	
T. C. duPont	100,000.00	
Alumni Dormitory Fund	566,945.66	
Alumni Fund 1947 — Senior Dormitory ..	500,000.00	
Edmund D. Barbour Fund	258,599.40	
Erastus C. Gaffield Fund	120,000.00	
Appropriations from Funds — Robb, \$28,750; Thorndike, \$15,000; Hodges, \$57,316.26; Wood, \$28,750; Miscellaneous Funds, \$28,500	158,316.26	
Appropriated, Current Income	22,369.92	1,987,423.79

For Summer Camp:

Edward Cunningham Fund	\$15,000.00	
Charles W. Eaton Fund	15,501.45	
Appropriations from Current Income	90,056.55	120,558.00

For Infirmary, Recreational and Athletic Buildings:

Julius Rosenwald and family — Homberg Infirmary	\$110,225.00	
Appropriations from Funds — Homberg Infirmary — Chase, \$4,090.09; A.H. Munsell, \$7,908.28; M. A. Munsell, \$1,105.32; Industrial, \$41,137.61; A. F. Estabrook, \$10,000; I.F. Estabrook, \$2,157.51; Perkins, \$764.66	67,163.47	

* Otherwise paid for from Eastman Building Fund.

REPORT OF THE TREASURER

*SCHEDULE A-20 — (Continued)*For Infirmary, Recreational and Athletic Buildings (*Continued*):

Appropriation for Homberg Infirmary from		
Current Funds	\$11,500.00	
Walker Memorial Fund	167,303.96	
Improvement Fund, for Walker Memorial	24,491.34	
Alumni Fund, for Walker Memorial	490,000.00	
Edmund D. Barbour Fund, for Field House	55,000.00	
Alumni Fund, for Swimming Pool	228,479.15	
Stephen Bartlett Fund, for Swimming Pool	117,071.64	
Class of 1923, Sun Garden	10,000.00	
Alumni Fund, for Briggs Field House and Track	156,169.13	
Edmund D. Barbour Fund, Sailing Pavilion	13,363.89	
Anonymous for Boat House	30,000.00	
Misc. funds for Rockwell Cage	216,902.14	
Appropriations from Current Income for:		
Boat House	6,500.00	
Sailing Pavilion	15,485.20	
Squash Courts	29,042.54	
Rifle Range	1,500.00	
		<u>\$1,750,197.46</u>
Miscellaneous:		
From Sale of Land and Buildings in Boston 1916	\$656,919.45	
Mrs. Wilks, Round Hill	175,000.00	
Other Contributions, Appropriations, etc. . .	1,502,547.50	2,334,466.95
		<u>\$22,243,619.00</u>
<i>Total June 30, 1949 (Schedule A)</i>		<u><u>\$22,243,619.00</u></u>

SCHEDULE B-1
STUDENTS' FEES

TUITION

From Students (Cash)	\$1,860,933.55	
Veterans Administration (Cash)	1,512,700.64	
Navy V-5 Program (Cash)	700.00	
Scholarship Awards	214,662.80	
Student Loan Awards	38,158.00	
		<u>\$3,627,154.99</u>
Locker, Examination and Other Fees		8,473.50
		<u>8,473.50</u>
<i>Total Schedule B</i>		<u><u>\$3,635,628.49</u></u>

INVESTMENT INCOME

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SCHEDULE B-2

INVESTMENT INCOME

Income from General Investments \$1,713,903.39 (Schedule A-1) less Compensation of Financial Agent.....		\$1,683,903.39
Income from Funds Separately Invested (Schedule A-2).....		183,618.96
Total Investment Income.....		<u>\$1,867,522.35</u>
Investment Income Distributed to Funds per Statement below.....		1,800,680.46
Increase in Balance of Undistributed Investment Income.....		\$66,841.89
Balance of Undistributed Investment Income June 30, 1948.....		416.12
Balance of Undistributed Investment Income June 30, 1949.....		<u>\$67,258.01</u>
Investment Income Distributed to Funds, as above.....		\$1,800,680.46
Less:		
Income of Scholarship Funds, Transferred to Income from Tuition and Other Fees.....	\$121,006.00	
Income of Funds for Designated Purposes Transferred to Income from Gifts and Other Receipts.....	169,009.92	
Income Added to Funds.....	187,057.74	477,073.66
Investment Income Used for Current Expenses, per Statement of Income and Expense (Schedule B).....		<u>\$1,323,606.80</u>

SCHEDULE B-3

GIFTS AND OTHER RECEIPTS USED FOR CURRENT EXPENSES

Received During the Year:		
Expendable Gifts.....	\$1,914,416.02	
Other Receipts.....	423,516.65	
Appropriated from Research Contract Revenues:		
Reserve for Use of Facilities.....	343,311.00	
Industrial Fund.....	126,443.00	
Income of Invested Funds Transferred.....	169,009.92	\$2,976,696.59
Less:		
Expenditures (principally for educational plant) not Reflected in Operating Expenses.....	515,277.70	
Net Amount Added to Unexpended Balances (receipts of current year reserved for future use, less expenditures from receipts of prior years)	272,166.29	787,443.99
Gifts and Other Receipts Used for Current Expenses (Schedule B).....		<u>\$2,189,252.60</u>

REPORT OF THE TREASURER

*SCHEDULE B-3 A*ALLOCATION OF GIFTS AND OTHER RECEIPTS
FOR CURRENT EXPENSES

<i>Department</i>	<i>Salaries</i>	<i>Other Expenses</i>	<i>Total</i>
Aeronautical Engineering.....	\$59,103.23	\$86,801.36	\$145,904.59
Architecture.....	583.32	6,959.52	7,542.84
Bemis Research.....	8,467.72	2,087.63	10,555.35
Biology.....	88,677.98	60,990.38	149,668.36
Building Engineering and Construction.....	30,465.18	9,579.95	40,045.13
Business and Engineering Administration.....	20,680.00	14,958.42	35,638.42
Chemical Engineering.....	89,204.27	27,833.34	117,037.61
Chemical Engineering Practice School.....	.....	24,084.53	24,084.53
Chemistry.....	153,950.28	29,246.37	183,196.65
City Planning.....	.....	119.91	119.91
Civil Engineering.....	12,280.03	8,262.19	20,542.22
Cosmic Terr. Research.....	.....	8,964.39	8,964.39
Economics.....	1,449.38	6,647.18	8,096.56
Electrical Engineering.....	118,461.90	81,583.07	200,044.97
English and History.....	.....	73.87	73.87
Food Technology.....	68,087.00	39,311.86	107,398.86
Geology.....	16,613.04	14,209.21	30,822.25
Industrial Relations.....	45,245.73	10,570.21	55,815.94
Mathematics.....	5,066.35	11,780.05	16,846.40
Mechanical Engineering.....	44,034.78	35,176.90	79,211.68
Metallurgy.....	38,452.65	61,704.98	100,157.63
Meteorology.....	15,277.24	.....	15,277.24
Naval Architecture.....	141.60	2,910.17	3,051.77
Oak Ridge Practice.....	10,100.00	2,000.00	12,100.00
Physics.....	151,450.01	39,277.84	190,727.85
Solar Energy Research.....	16,633.32	25,203.75	41,837.07
Library and Museum.....	16,135.91	28,210.43	44,346.34
Medical Department.....	.....	4,400.00	4,400.00
General Administrative Expenses	3,000.00	558,316.88	561,316.88
Plant Operation.....	.....	116,467.53	116,467.53
Undergraduate Budget Board..	.....	2,600.00	2,600.00
Clerical Office Expense.....	1,380.00	8,179.26	9,559.26
Staff Scholarships.....	.....	17,000.00	17,000.00
	<u>\$1,014,940.92</u>	<u>\$1,345,511.18</u>	<u>\$2,360,452.10</u>
Less:			
Expenditures from Current Year Investment Income In- cluded in Schedule B-2.....			171,199.50
<i>Total</i> (Schedule B).....			<u>\$2,189,252.60</u>

RESEARCH CONTRACTS

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SCHEDULE B-4

RESEARCH CONTRACTS

DIVISION OF INDUSTRIAL COOPERATION

Revenues from Research Contracts		\$15,473,186.21
Less Appropriations Therefrom:		
Reserve for Use of Facilities	\$ 343,311.00	
Industrial Fund	126,443.00	
Investment Income for Use of Funds and Amortization of Facilities	91,499.38	561,253.38
Net Revenues (Schedule B)		<u>\$14,911,932.83</u>
Direct Expenses on Research Contracts:		
Salaries and Wages	\$6,328,576.82	
Materials and Services	3,039,469.33	
Subcontracts	1,576,078.29	
Construction of Major Facilities	1,746,178.73	
Travel	216,102.71	
Other	118,386.52	\$13,024,792.40
Direct Expenses of Division of Industrial Cooperation:		
Salaries and Wages	\$148,333.55	
Materials and Services	20,211.33	
Travel	5,682.50	
Vacation Accrual — Hourly Employees ..	78,000.00	
Depreciation on Equipment	31,472.01	
Insurance	10,082.76	
Auditing and Professional Services	5,919.95	
Outside Rentals	21,258.90	
Instrumentation Laboratory — Indirect expenses	18,640.25	
Servos-Mechanism Laboratory — Indirect Expenses	17,780.71	
Health Physics Program	17,960.91	
Unallowable Contract Expense	18,857.65	
Other	3,911.30	398,111.82
Total Direct Expenses (Schedule B)		<u>\$13,422,904.22</u>
Allowance for Institute's Expenses of Administration and Plant Operation		1,489,028.61
Total		<u>\$14,911,932.83</u>

SCHEDULE B-5

RENTALS AND OTHER INCOME

Anonymous for Chemical Engineering	\$1,000.00
Land Rentals, etc.	4,650.00
Lecture Notes	1000.04
General Electric Company for Course VI-A	7,000.00
General Radio Company for Course VI-A	1,200.00
 Boston Edison Company for Course VI-A	 1,200.00
Philco Corporation for Course VI-A	7,000.00
American Gas and Electric Company for Course VI-A	2,500.00
Recoveries of Student Fees Prior Years (Net)	623.66
Foundry Educational Foundation	10,375.17
 Appropriation Recoveries Prior Years	 1,455.40
Federal Aid	21,571.69
U. S. Government — Veterans Administration	10,220.58
 <i>Total</i> (Schedule B)	 <u><u>\$69,796.54</u></u>

SCHEDULE B-6

SALARIES AND WAGES OF STAFF, ACCESSORY TO TEACHING
AND LABORATORY SERVICE

<i>Department</i>	<i>Staff Salaries</i>	<i>Wages Accessory to Teaching</i>	<i>Wages Laboratory Service</i>	<i>Salaries and Wages Transferred to D.I.C.</i>	<i>Academic Salaries and Wages</i>
Aeronautical Engineering.....	\$255,718.99	\$23,432.83	\$21,263.02	\$71,699.19	\$228,715.65
Architecture.....	65,923.74	6,675.01	3,589.24	.....	76,287.99
Bemis Research.....	6,529.82	1,937.90	.....	.....	8,467.72
Biology and Biological Engineering...	140,589.14	12,085.21	37,023.25	6,274.59	183,423.01
Building Eng. and Construction.....	55,870.90	4,314.90	9,071.89	764.12	68,493.57
Business and Eng. Administration...	131,953.31	19,507.70	.....	.....	151,461.01
Chemical Engineering.....	167,599.83	12,593.17	24,200.90	47,052.10	157,341.80
Chemical Eng. Practice School.....	32,220.96	.....	.....	.....	32,220.96
Chemistry.....	375,795.03	17,025.93	38,938.57	97,045.74	334,713.79
City Planning.....	31,570.65	1,950.00	.....	.....	33,520.65
Civil Engineering.....	191,955.81	7,826.60	16,480.41	54,777.67	161,485.15
Division of Laboratory Supplies.....	.....	.....	48,277.68	.....	48,277.68
Economics.....	132,700.74	10,637.82	.....	.....	143,338.56
Electrical Engineering.....	751,167.50	50,862.35	75,179.57	382,636.16	494,573.26
English and History.....	153,151.32	6,773.01	.....	2,738.27	157,186.06
Food Technology.....	85,823.24	7,311.87	4,901.51	4,520.84	93,515.78
General Eng. and General Science....	4,250.00	1,960.63	.....	.....	6,210.63
Geology.....	96,501.37	6,019.97	8,328.63	18,811.21	92,038.76
Graphics.....	51,033.30	2,236.83	.....	.....	53,270.13
Industrial Relations Section.....	38,927.16	4,407.03	.....	.....	43,334.19
Lantern Operation.....	.....	.....	2,882.05	.....	2,882.05
Mathematics.....	198,392.73	7,751.88	.....	24,318.16	181,826.45
Mechanical Engineering.....	441,655.47	26,725.67	73,949.16	89,431.28	452,899.02
Metallurgy.....	286,105.66	14,268.38	37,891.85	139,871.24	198,394.65
Meteorology.....	92,684.00	14,046.05	288.06	39,050.57	67,967.54
Military Science.....	17,324.81	3,721.00	.....	.....	21,045.81
Modern Languages.....	35,707.97	3,252.08	.....	.....	38,960.05
Naval Architecture.....	67,670.78	6,687.60	7,710.72	583.10	81,486.00
Nuclear Science.....	13,300.00	.....	.....	11,561.84	1,738.16
Oak Ridge.....	10,100.00	.....	.....	.....	10,100.00
Physics.....	471,642.92	16,372.29	70,988.58	248,771.48	310,232.31
Solar Energy Research.....	11,290.69	2,408.83	2,933.80	.....	16,633.32
<i>Totals.....</i>	<u>\$4,415,157.84</u>	<u>\$292,792.54</u>	<u>\$483,998.89</u>	<u>\$1,239,907.56</u>	<u>\$3,952,041.71</u>

(Schedule B)

REPORT OF THE TREASURER

SCHEDULE B-7

DEPARTMENTAL EXPENSES

	<i>General</i>	<i>Staff Schp.</i>	<i>Current Fds.</i>	<i>Major Fds.</i>	<i>Total</i>
Aeronautical Engineering.....	\$3,438.36	\$700.00	\$88,176.32	\$552.38	\$92,867.06
Architecture.....	3,395.10	.....	5,930.51	1,979.01	11,304.62
Bemis Research.....	2,087.63	.....	.....	.....	2,087.63
Biology and Biological Engineering ...	9,747.64	926.00	60,990.38	.....	71,664.02
Building Engineering and Constr. ...	2,495.74	423.00	9,579.95	.....	12,498.69
Business and Engineering Admin. ...	6,607.58	.....	13,342.46	1,615.96	21,566.00
Chemical Engineering.....	13,199.84	4,165.00	25,833.34	2,452.15	45,650.33
Chemical Engineering Practice.....	11,632.38	.....	.....	.....	11,632.38
Chemistry.....	30,301.71	6,998.80	23,942.41	4,303.96	65,546.88
City Planning.....	699.38	.....	119.91	.....	819.29
Civil Engineering.....	5,498.88	1,191.00	15,909.74	.....	22,599.62
Civil Engineering Camp.....	14,966.49	.....	.....	.....	14,966.49
Cosmic Terrestrial Research.....	.....	.....	8,964.39	.....	8,964.39
Economics.....	2,829.62	700.00	5,084.07	2,588.15	11,201.84
Electrical Engineering.....	21,154.19	5,387.00	53,795.53	19,650.00	99,986.72
English and History.....	4,504.02	.....	1,263.61	.....	5,767.63
Food Technology.....	3,029.52	.....	37,282.34	.....	40,311.86
General Science.....	58.64	.....	.....	.....	58.64
Geology.....	2,546.02	.....	14,209.21	.....	16,755.23
Geology Camp.....	1,209.75	.....	.....	.....	1,209.75
Graphics.....	1,435.42	.....	.....	.....	1,435.42
Industrial Relations.....	8,874.44	.....	.....	80.56	8,955.00
Mathematics.....	3,483.25	2,975.00	11,680.05	.....	18,138.30
Mechanical Engineering.....	22,354.18	4,300.00	20,732.55	2,283.47	49,670.20
Mechanical Metallurgy.....	2,847.21	.....	.....	.....	2,847.21
Metallurgy.....	9,567.52	1,025.00	63,420.62	8,998.38	83,011.52
Meteorology.....	3,106.43	.....	.....	.....	3,106.43
Military Science.....	1,829.25	.....	.....	.....	1,829.25
Modern Languages.....	2,501.13	.....	.....	.....	2,501.13
Naval Architecture.....	2,136.97	.....	2,910.17	.....	5,047.14
Nuclear Science.....	29,205.25	600.00	.....	.....	29,805.25
Oak Ridge.....	1,919.33	.....	.....	.....	1,919.33
Physics.....	18,556.94	5,083.00	36,401.78	.....	60,041.72
Solar Energy.....	.....	.....	25,203.75	.....	25,203.75
<i>Totals</i>	<u>\$247,219.81</u>	<u>\$34,473.80</u>	<u>\$524,773.09</u>	<u>\$44,504.02</u>	<u>\$850,970.72</u>

(Schedule B)

SCHEDULE B-8

LIBRARY AND MUSEUM EXPENSES

Library:		
Salaries — Staff.....	\$53,874.53	
Salaries — Other.....	94,421.61	
Expenses:		
Books, Periodicals and Binding.....	52,902.35	
Other.....	14,515.72	
		<u>\$215,714.21</u>
Museums:		
Salaries.....	\$17,395.75	
Expenses.....	4,478.62	
		<u>21,874.37</u>
<i>Total (Schedule B)</i>		<u><u>\$237,588.58</u></u>

SCHEDULE B-8 A

CLERICAL AND OFFICE EXPENSE — ADMINISTRATION

	<i>Salaries</i>	<i>Expense</i>	<i>Total</i>
President.....	\$15,784.00	\$12,410.96	\$28,194.96
Dean of Engineering.....	2,870.42	829.69	3,700.11
Dean of Science.....	1,117.00	283.67	1,400.67
Dean of Humanities.....	4.20	637.24	641.44
Dean of Students.....	6,591.00	1,754.84	8,345.84
Dean of Graduate School.....	2,635.32	696.26	3,331.58
Registrar.....	62,952.21	24,638.16	87,590.37
Director of Admissions.....	34,976.88	15,613.61	50,590.49
Treasurer and Bursar.....	81,996.56	18,809.59	100,806.15
Superintendent.....	25,461.00	3,696.31	29,157.31
News Service.....	4,652.04	7,467.01	12,119.05
Undergraduate Scholarship and Loan Fund Board.....	7,271.17	3,615.61	10,886.78
New Student Publicity.....	.....	4,116.64	4,116.64
Placement Bureau.....	19,262.77	2,114.57	21,377.34
Register of Former Students...	.....	10,082.93	10,082.93
Personnel Office.....	13,167.55	2,773.36	15,940.91
Industrial Liaison Officer.....	.....	2,379.26	2,379.26
Housing Bureau.....	1,658.76	87.30	1,746.06
<i>Total</i>	<u>\$280,400.88</u>	<u>\$112,007.01</u>	<u><u>\$392,407.89</u></u>
			(Schedule B9)

SCHEDULE B-9

GENERAL EXPENSES

Salaries of Officers of Administration	\$289,700.97
Clerical Salaries and Expenses — Administration (B-8A)	392,407.89
Staff and Employee Pensions and Retirement Allowances	347,982.27
Publications: Alumni Register, Catalogues and Other Bulletins	51,306.31
Telephone	87,993.58
Development Program	358,738.94
Inauguration and Convocation	145,872.81
Commencement	20,101.83
 New Student Program	 10,413.37
Foreign Student Summer Project	37,265.52
Special Tuition Awards and Prizes	14,587.81
Expense Allowances and President's Funds	20,289.55
Insurance	26,788.41
Taxes (Cambridge) (Net)	3,050.35
Auditing	8,400.00
Travel	21,280.66
 Dues and Legal Fees	 11,709.83
Surplus Property	8,250.66
New Equipment	3,255.13
Public Address System	2,922.95
Society of Arts	2,199.27
Hobby Shop	7,236.17
Lowell Institute Cooperative Program	6,250.00
New Dormitory Operation	6,738.54
 Graduate House Food Bar	 8,508.43
Walker Memorial Dining Service Equipment	4,968.65
Photo Service Equipment	3,337.75
Laboratory Supply Division Equipment	2,246.21
Arthur D. Little Lecture Fund	2,096.67
Special Lecture Fund	1,973.86
Nuclear Science Building	10,747.11
Walker Memorial Organ Equipment	2,063.00
 Radar School Royalties	 3,000.00
Radiation Laboratory File Room	2,597.95
Emma Rogers Room	1,055.53
Margaret Cheney Room	1,884.48
Educational Survey	3,897.47
Miscellaneous	8,287.32
 <i>Total (Schedule B)</i>	 <u><u>\$1,941,407.25</u></u>

SCHEDULE B-10
PLANT OPERATION

Building Services:

Janitors	\$131,832.32	
Night Cleaners	106,002.91	
Watchmen	49,083.72	
Window Cleaning	18,358.97	
Heating and Ventilating	34,740.17	
Mail Clerks and Elevator Operators	17,337.10	
Shipping, Stock Room, Matron and Messenger	25,670.74	
Shop Foremen (Net)	4,547.69	\$387,573.62

Repairs, Alterations and Maintenance:

Buildings	\$158,438.41	
Grounds, Roads, etc.	42,068.85	
Mains and Conduits	21,945.28	
Water and Gas	21,696.76	
Furniture	9,013.83	
Elevators	5,382.06	
Misc. (Net)	54,716.87	313,262.06

Fire Insurance	19,163.10
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Power Plant and Electric Power:

Fuel Oil	\$118,899.88
Coal	85,145.00
Power (Cambridge Electric Light Co.)	178,126.30
Salaries	48,835.18
Repairs	16,627.86
Water, Supplies, etc.	10,470.46

Total Operating Cost

Less Credits for Power Sold:¹

Electric Power

Steam

Total

338,828.00

\$1,058,826.78

Special Alterations, Maintenance and Construction:

Buildings	\$73,402.89	
Grounds	64,825.20	
Electrical Distribution System Extension and		
Power Lines Bldg. 20	8,065.38	
Modernization of Processing Laboratory	37,873.52	
Round Hill — Dartmouth, Mass.	43,713.84	
Off Campus Buildings — Maintenance:		
Servomechanisms	\$10,399.40	
Hood & Whittemore	54,671.26	
Barta Building	26,217.09	
Supersonic Wind Tunnel	11,658.36	
Lexington Station	15,130.96	118,077.07
		345,957.90

Total (Schedule B)

\$1,404,784.68

¹ Including Dormitories, Graduate House, Walker Memorial and Bexley Hall.

SCHEDULE B-11

MEDICAL DEPARTMENT

Salaries, Staff.....		\$54,169.18
Expense of Clinic:		
Salaries.....	\$34,721.05	
Supplies, etc.....	15,371.17	
X-Ray Operation.....	7,790.63	
Physical Examinations.....	5,082.84	62,965.69
Expense of Infirmary:		
Salaries.....	\$32,827.57	
Supplies, etc.....	8,713.57	
Food.....	11,750.80	
Laundry.....	4,111.04	57,402.98
Expense of Dental, Eye, Nose and Throat Clinics.....		6,474.39
Maintenance and Repairs.....		3,343.12
		<u>\$184,355.36</u>
Less Services Billed.....		34,607.29
<i>Total</i> (Schedule B).....		<u><u>\$149,748.07</u></u>

SCHEDULE B-12

UNDERGRADUATE BUDGET BOARD

Athletic Coaches' Salaries.....	\$57,953.29	
Director's Office Expense.....	798.07	
Non-Staff Salaries.....	3,434.30	
Undergraduate Dues.....	47,101.50	
Cambridge Armory, Rental of.....	1,492.00	
Walker Memorial (excluding Dining Service) (net)	39,131.55	
Walker-Memorial Games (Loss).....	1,250.27	
Athletic Fields, Maintenance.....	30,510.32	
Sailing Pavilion and Activities (net).....	11,615.42	
Rockwell Cage, Maintenance.....	1,631.12	
Boat House and Launches, Maintenance.....	18,488.83	
Musical Clubs, Equipment and Supplies.....	3,781.42	
Swimming Pool (Including Wages).....	31,682.65	
Equipment for Freshman Athletics.....	1,112.72	
Publications Advertising.....	338.05	
Miscellaneous.....	300.00	
<i>Total</i> (Schedule B).....		<u><u>\$250,621.51</u></u>

SCHEDULE B-13
AUXILIARY ACTIVITIES

SUMMARY		<i>Income</i>	<i>Expense</i>
B-13A.	Graduate House	\$169,643.85	\$169,643.85
B-13B.	Undergraduate Dormitories	243,568.47	201,792.63
B-13 C.	Walker Memorial Dining Service . . .	391,806.90	391,806.90
B-13 D.	Graduate House Dining Service . . .	194,361.75	216,007.78
B-13 E.	Barracks Dormitory	83,849.85	83,849.85
B-13 F.	Women's Dormitory	10,497.10	10,497.10
B-13 G.	Westgate	60,667.88	60,667.88
B-13 H.	Westgate West	68,627.03	68,627.03
<i>Total</i> (Schedule B)		<u>\$1,223,022.83</u>	<u>\$1,202,893.02</u>

SCHEDULE B-13 A
GRADUATE HOUSE OPERATION

Income:	
Rentals (Net)	\$165,058.00
Miscellaneous	4,585.85
<i>Total (Schedule B-13)</i>	<u>\$169,643.85</u>
Expense:	
Salaries	\$97,805.15
Real Estate Tax	6,898.71
Light, Heat, Power and Water	30,005.34
Repairs	14,329.70
Supplies (Net)	5,610.96
Laundry	4,505.79
Administration	2,347.75
Equipment	1,694.41
Depreciation	1,696.52
House Tax Allowance	2,262.50
Insurance	2,487.02
<i>Total (Schedule B-13)</i>	<u>\$169,643.85</u>

SCHEDULE B-13 B
UNDERGRADUATE DORMITORY OPERATION

Income:	
Rentals (Net)	\$240,000.35
Miscellaneous	3,568.12
<i>Total (Schedule B-13)</i>	<u>\$243,568.47</u>
Expense:	
Salaries	\$116,881.79
Light, Heat, Power, Water	30,217.10
Repairs	17,000.59
Boiler and Shower Alterations	14,032.16
Supplies (Net)	7,166.07
Equipment	4,037.63
Laundry	5,450.35
Administration	3,421.94
House Tax Allowance	3,585.00
<i>Total (Schedule B-13)</i>	<u>\$201,792.63</u>
Balance	41,775.84
<i>Total</i>	<u>\$243,568.47</u>

SCHEDULE B-13 C
WALKER MEMORIAL DINING SERVICE

Income:

Cash.....	\$391,806.90
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Total (Schedule B-13).....	<u>\$391,806.90</u>
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Expense:

Food.....	\$229,948.02
Salaries.....	113,244.14
Light, Heat, Power, Water.....	14,141.56
Laundry.....	4,121.57
Equipment and Supplies.....	9,564.11
Repairs.....	4,757.65
Insurance.....	1,161.53
Ice and Refrigeration.....	1,698.74
Printing and Advertising.....	981.40
Administration.....	1,699.74
Occupancy.....	9,000.00

Total Expense.....	\$390,318.46
Balance — To Dining Service Reserve.....	<u>1,488.44</u>

Total (Schedule B-13).....	<u>\$391,806.90</u>
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SCHEDULE B-13 D
GRADUATE HOUSE DINING SERVICE

Income:

Cash.....	\$194,361.75
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Total (Schedule B-13).....	<u>\$194,361.75</u>
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Expense:

Food.....	\$123,267.14
Salaries.....	77,571.17
Light, Heat, Power, Water.....	3,794.31
Laundry.....	2,790.89
Equipment and Supplies.....	2,516.31
Repairs.....	3,552.12
Insurance.....	912.45
Ice and Refrigeration.....	915.05
Administration.....	688.34

Total Expense (Schedule B-13).....	\$216,007.78
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Deficit.....	<u>21,646.03</u>
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Total.....	<u>\$194,361.75</u>
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REPORT OF THE TREASURER

SCHEDULE B-13 E

BARRACKS DORMITORY OPERATION

Income:

Rentals (Net).....	\$81,120.00
Miscellaneous.....	2,729.85

Total (Schedule B-13)..... \$83,849.85

Expense:

Salaries.....	\$42,643.44
Light, Heat, Water.....	10,000.00
Repairs.....	1,830.15
Supplies (Net).....	3,412.84
Laundry.....	2,132.66
Equipment.....	448.75
Administration.....	1,311.13
Depreciation.....	21,096.88
House Tax Allowance.....	974.00

Total (Schedule B-13)..... \$83,849.85

SCHEDULE B-13 F

WOMEN'S DORMITORY OPERATION

Income:

Rentals (Net).....	\$10,497.10
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Total (Schedule B-13)..... \$10,497.10

Expense:

Salaries.....	\$2,873.74
Food (Net).....	2,496.75
Real Estate Taxes.....	667.50
Light, Heat, Power, Water.....	1,425.80
Repairs.....	683.42
Supplies.....	190.24
Equipment.....	119.58
Laundry.....	245.56
Insurance.....	92.00
Depreciation.....	800.00
Administration.....	173.32
Service (Cleaning).....	142.35
House Tax Allowance.....	70.00

Total..... \$9,980.26
 Balance — Income (Schedule A-1)..... 516.84

Total (Schedule B-13)..... \$10,497.10

VETERANS' HOUSING

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SCHEDULE B-13 G

WESTGATE — VETERANS' HOUSING

Income:

Rentals (Net).....	\$60,667.88
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Total (Schedule B-13).....	<u>\$60,667.88</u>
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Expense:

Real Estate Tax.....	\$13,965.00
Agency Commission.....	3,031.59
Utilities.....	6,147.18
Insurance.....	788.76
Repairs.....	10,832.29
Administration.....	211.16
Supplies.....	452.25
Grounds.....	593.81
Depreciation.....	20,000.00

Total.....	\$56,022.04
Balance — Income (Schedule A-1).....	4,645.84

Total (Schedule B-13).....	<u>\$60,667.88</u>
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SCHEDULE B-13 H

WESTGATE WEST — VETERANS' HOUSING

Income:

Rentals.....	\$68,627.03
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Total (Schedule B-13).....	<u>\$68,627.03</u>
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Expense:

Real Estate Tax.....	\$6,766.02
Repairs.....	9,555.67
Utilities.....	14,971.69
Agency Commission.....	3,435.77
Administration.....	109.03
Liability Insurance.....	1,079.13
Operating Service.....	71.00
Depreciation.....	25,817.71
Treasurer of United States.....	6,821.01*

Total (Schedule B-13).....	<u>\$68,627.03</u>
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* Operated under Federal Public Housing Authority from July 1, 1948 to Sept. 30, 1948. Operating profit at that time of \$6,821.01 paid to U. S. Government.

A BRIEF DESCRIPTION OF THE ENDOWMENT AND OTHER FUNDS OF THE INSTITUTE

Including funds which have been wholly expended since 1916 for plant, equipment, facilities, and special projects. The reference numbers correspond with the active funds, listed by groups on pp. 222-243, Schedules A-3 to A-II.

- 801 ALBERT FUND, 1930-49. Balance \$2,570. Gifts from anonymous donor covering twenty years' operation (approximately \$2,000 per annum) of M. I. T. Student House on Bay State Road, Boston.
 - 951 ALPHA CHI SIGMA HOUSE FUND (Alpha Zeta Chapter), 1935-1949. Balance \$5,870.85. Deposited for investment purposes only.
 - 623 ANONYMOUS FUND (H), 1942-43, \$10,000. For general purposes of the Institute.
 - 625 ANONYMOUS FUND (J), 1944-47, \$3,400. Gift for unrestricted purposes. Present balance, \$1,102.
 - 627 ANONYMOUS FUND (M), 1941, \$1,500. For general purposes of the Institute.
 - 981 ANONYMOUS FUND (Q), 1945-49. Balance \$8,733.50. Subject to special annuity provisions.
 - 629 ANONYMOUS FUND (R), 1946, \$57,150. Principal and income for general purposes of the Institute.
 - 701 ANONYMOUS FUND (S), 1946, \$500,000. For research. Present balance, \$352,951.
 - 983 ANONYMOUS FUND (X), 1944-45. Balance \$20,648.12. Subject to special annuity provisions.
 - 984 ANONYMOUS (Y), 1948, \$100. For general purposes or a possible Faculty Fund. Present balance, \$104.
 - 897 ANONYMOUS FUND, 1924, \$1,052.50. Gift of member of Class of 1924 to accumulate until twenty-fifth reunion of Class in 1949. Balance \$3,024.02.
 - 351 LOUIE G. APPLEBEE FUND, 1941-42, \$400. Bequest for assisting deserving students.
 - 703 APPLIED MATHEMATICS FUND, 1943. Balance \$17,301.50. Appropriated from surplus to provide support for postwar program.
 - 101 GEORGE ROBERT ARMSTRONG FUND, 1902, \$5,000. Bequest of George W. Armstrong in honor of son. Income available for general purposes of the Institute.
- ARMY AND NAVY TRAINING RESERVE FUND, 1943-1944. Balance \$28,779.80 used for new construction, 1947.

- 929 ASSOCIATION OF CLASS SECRETARIES FUND, 1940-45. Balance \$3,000. Held for investment purposes only. Present balance \$3,120.33.
- 802 ATHLETICS FIELDS SPECIAL FUND, 1948, \$1,000. Gift for improvements. Present balance \$1,068.00.
- 353 ELISHA ATKINS SCHOLARSHIP FUND, 1894, \$5,000. Bequest of Mary E. Atkins. For undergraduate scholarship.
- 201 WILLIAM PARSONS ATKINSON FUND, 1918, \$13,082. Bequest of Charles F. Atkinson as a memorial to father — for English Department of the Institute.
- 301 EDWARD AUSTIN FUND, 1899, \$360,000. Bequest. Interest paid to needy, meritorious students and teachers to assist in payment of studies.
- 705 JULIAN M. AVERY FUND, 1949, balance \$5,899.57. For special research.
- 985 AVOCA FUND, 1946, \$76,200. In trust, subject to life annuities. Present balance \$80,700.
- 551 BABSON FUND, 1938, \$10,000. Gift of Babson's Statistical Organization Inc. Income to be applied at intervals of not more than three years as prizes for one or more persons for certain studies and research in Economics.
- E. B. BADGER AND SONS CO. FUND, 1944, \$10,000. Gift. Used for new construction 1947.
- 715 E. B. BADGER & SONS CO. FUND, 1945, \$20,000. Gift for use of Chemical Engineering Department. Present balance, \$18,622.31.
- 357 THOMAS WENDELL BAILEY FUND, 1914, \$2,172. Bequest. Income used for rendering assistance to needy students in Department of Architecture.
- 359 CHARLES TIDD BAKER FUND, 1922, \$20,000. Bequest. One-half of net income for assistance of poor and worthy students and one-half to principal. Present balance \$38,218.49.
- 633 EDMUND DANA BARBOUR FUND, 1926, \$847,000. Bequest. Principal and income for general purposes of Institute. Over \$826,000 used for buildings and equipment. Balance \$20,736.94.
- 261 WALTER S. BARKER FUND, 1927, \$10,000. Bequest. Income only available for purposes of the Library.
- SIDNEY BARTLETT FUND, 1889, \$10,000. Bequest. Appropriated for new dormitories, 1924.
- 635 STEPHEN L. BARTLETT FUND, 1939-46, \$375,208.53. Bequest. Principal and income unrestricted, appropriated for educational plant, including swimming pool and current purposes.
- 203 ALBERT FARWELL BEMIS FUND, 1938, \$270,000. Bequest. To establish and maintain the Albert Farwell Bemis Foundation for research on housing. Increased in 1941-46 through proceeds of sale of land carried under No. 709. Present balance \$308,941.88.
- 709 ALBERT FARWELL BEMIS FUND — LAND ACCOUNT, 1938, \$119,450. Estimated book value of land in Wellesley, Newton, and Dedham received under bequest. Proceeds of sales carried to No. 203. Present balance \$9,300.

- ALBERT FARWELL BEMIS FUND, 1923, \$100,000. Gift. Used for new dormitory unit, 1923.
- 263 SAMUEL BERKE FUND, 1943-46, \$20,000. Gifts. Income for general purposes of the Institute Library.
- 803 BESS BIGELOW FUND, 1936-38, \$25,000. Anonymous donation for special purposes as suggested by donor, but subject to approval of President. Present balance \$39,322.24.
- 361 BILLINGS STUDENT FUND, 1900, \$50,000. Bequest of Robert C. Billings. Students receiving benefit are expected to abstain from use of alcohol or tobacco in any form.
- 103 GEORGE BLACKBURN MEMORIAL FUND, 1931-49, \$962,130.22. Bequest of Harriette A. Nevins. Income for general purposes.
- STANTON BLAKE FUND, 1889, \$5,000. Bequest. Used for educational plant, 1926.
- 363 HUSE TEMPLETON BLANCHARD FUND, 1947, \$6,551. Bequest. For undergraduate scholarships.
- 553 ROBERT A. BOIT FUND, 1921, \$5,000. Bequest. Income to stimulate students' interest in best use of English language through annual prizes of scholarships.
- 205 FRANK WALTER BOLES MEMORIAL FUND, 1915, \$25,200. Under agreement between Harriet A. Henshaw and M. I. T., income paid to committee of Department of Architecture, to purchase fine arts material to supplement and strengthen instruction in architectural design and for the care and preservation of such material.
- 365 LEVI BOLES FUND, 1915, \$10,000. Bequest of Frank W. Boles in memory of father. Income for assistance of needy and deserving students.
- 303 WILLIAM SUMNER BOLLES FUND 1924, \$25,000. Bequest of William P. Bolles in memory of son, to maintain either fellowship, traveling scholarship, or resident scholarship. Recipient to have character, ability, or promise.
- 791 BOSTON STEIN CLUB FUND, 1945-49, \$27,342.50. Contributions for equipment of Map Room in new library building.
- 367 JONATHAN BOURNE FUND, 1915, \$10,000. Bequest of Hannah B. Abbe. Income to aid deserving students.
- 369 ALBERT G. BOYDEN FUND, 1931-48. Balance \$571,692.25. Bequest. Estate of Elizabeth R. Stevens. Income for scholarships. Preference to students from Fall River and Swansea, Mass.
- 105 CLARA H. BRIGGS FUND, 1941, \$12,514.55. Bequest. Income for general purposes.
- 953 MAJOR BRIGGS FUND, 1940-42, \$32,969.71. Bequest under will of Frank Harrison Briggs, the principal and/or income to be used as Advisory Council in Athletics may decide. No part of either principal or income is to be used to defray living expense or tuition fees of any student. Present balance \$37,595.41.

- 371 HARRIET L. BROWN FUND, 1922, \$6,024. Bequest. Income to needy and deserving young women students, as would otherwise be unable to attend. In case of two or more applicants of equal merit, preference given to native of either Massachusetts or New Hampshire.
- 305 MALCOLM COTTON BROWN FUND, 1919, \$1,506. Under agreement between Caroline Cotton Brown, Charles A. Brown, and M. I. T., to establish memorial to son, Lieutenant Brown, R. A. F., for advanced study and research in Physics.
- MATTHEW C. BRUSH FUND, 1946, \$31,395.74. Bequest. Used for construction of Campus Room at Graduate House.
- 582 BURSAR'S FUND, 1907, \$6,000. Bequest of Lyman S. Rhoads. Income and repayments used for loans to students in discretion of Bursar, subject to approval of President and Treasurer. Present balance \$37,376.67.
- 207 SAMUEL CABOT FUND, 1912, \$50,000. Gift of Helen N. Cabot in honor of husband. Income for purchase of apparatus and supplies required in conduct of research in Industrial Chemistry.
- MARY A. CARLETON FUND, 1946, \$14,456.48. Bequest for general purposes of the Institute. Appropriated for buildings, 1947.
- 792 CARNEGIE S. A. L. CENTER FUND, 1948, \$60,000. Gift toward the support of a Center for Scientific Aids to Learning. Present balance \$36,280.
- 107 JAMES A. CARNEY FUND, 1944-45, \$17,170.01. Bequest. Income for general purposes.
- HOWARD A. CARSON FUND, 1932, \$1,000. Bequest. Used for new equipment.
- 373 MABEL BLAKE CASE FUND, 1920, \$25,000. Bequest of Caroline S. Freeman. Income to aid deserving students (preferably women) who are in need of assistance.
- 375 NINO TESHER CATLIN FUND, 1926, \$1,000. Gift of Maria T. Catlin in memory of son. Income for needy and deserving students — not a condition but, if possible, award to be made to member of Lambda Phi Fraternity. Present balance \$12,265.07.
- 713 CENTER OF ANALYSIS FUND, 1945. Transferred from current operating fund as a reserve, used in 1948-49.
- 209 WILLIAM E. CHAMBERLAIN FUND, 1917-19, \$7,309. Bequest. Income used for Department of Architecture.
- 307 FRANCIS W. CHANDLER FUND, 1927-36, \$4,511. Originally a gift from Architectural Society and used as a loan fund to be administered by Head of Architectural Department. Increased by \$5,000 in 1939, gift of Mr. and Mrs. William Emerson and income to be used for Travelling Fellowship in City Planning. Present balance \$7,988.
- WILLIAM L. CHASE FUND, 1925, \$11,590.09. Bequest. \$7,500 appropriated for Homberg Infirmary, 1927. Balance used for educational plant, 1928.

- 717 CHEMICAL ENGINEERING PRACTICE FUND, 1915-16, \$300,000. Gift of George Eastman for Chemical Engineering Stations provided Institute has carried forward this plan of education for a reasonable period. Present balance \$259,087.67.
- 575 EDNAH DOW CHENEY FUND, 1905-06, \$13,965. Bequest. Income for maintenance and care of Margaret Cheney Room for women students.
- 109 CHARLES CHOATE FUND, 1906-21, \$35,858.15. Bequest. Income for general purposes.
- 793 FRANK HARVEY CILLEY FUND, 1913, \$57,700. Bequest. Income and such part of principal as necessary for purchase of suitable books, photographs, statuary, etc., for library and gymnasium of Walker Memorial. Present balance, \$85,215.59.
- 377 LUCIUS CLAPP FUND, 1905, \$4,900. Bequest. Income to worthy students who may not be able to complete their studies without help.
- 804 A. V. CLARKE SCHOLARSHIP FUND, 1948, \$1,462.50. Gift. Principal and interest for student aid. Present balance \$1,550.50.
- 795 CLASS OF 1874 FUND, 1934, \$290.67. For purposes of the Library.
- 881 CLASS OF 1887 FUND, 1941-46. Balance \$4,514.86. Held for use of Class and for final distribution as provided in Declaration of Trust.
- 883 CLASS OF 1889 FUND, 1947. Balance \$181.63. Held for special purposes.
- 379 CLASS OF 1895 MEMORIAL FUND, 1945-46. Balance \$25,000. Gift of the Class on fiftieth anniversary, income only to be used to provide scholarships to suitably qualified descendants of members of the Class. Balance of unexpended income in any year to be added to Technology Loan Fund.
- 381 CLASS OF '96 FUND, 1923-46. Balance \$5,577. Gift. Award subject to approval of Class Secretaries. Preference to descendants of members of Class. Scholarships to be considered a loan to be repaid when and if able.
- 583 CLASS OF 1898 FUND. Balance \$13,413.58. By subscription of certain members of class from 1927-31. Income only for scholarship loans, as authorized by committee of Class.
- 638 CLASS OF 1899 FUND, 1949, \$14,621. Contributions from members of the Class. For general purposes.
- 884 CLASS OF 1900 FUND, 1949, \$10,000. Contributions by members of Class for Fifty Year Fund.
- 555 CLASS OF 1904 FUND, 1925, \$447. Contributions received by Professor Gardner for Architectural Department prizes.
- 110 CLASS OF 1909 FUND, 1934-49. Balance \$15,984. Accumulated through contributions and from proceeds of life insurance policies. By vote of the Class the fund was made a General Endowment Fund, the income for the general purposes of the Institute.
- 885 CLASS OF 1914 FUND. Balance \$1,056.62. Held for investment purposes only.
- 805 CLASS OF 1917 FUND. Present balance \$1,263.81. For special purposes.

- 887 CLASS OF 1917 FUND, 1949, \$1,819. Contributions by members of Class for Fifty Year Fund.
- 806 CLASS OF 1918 (ORGAN) FUND. Balance \$152.88. Subscriptions by Class members toward purchase of an organ for Walker Memorial, purchased in 1948 for \$2,975.
- 889 CLASS OF 1919, SPECIAL FUND, 1944. Balance \$3,441. Contributions from Class members toward gift to M. I. T. on the occasion of the twenty-fifth reunion of Class.
- 891 CLASS OF 1920 FUND, 1945-47. Balance \$4,147.25. Gift of U. S. Savings "F" Bonds and cash on the twenty-fifth reunion of the Class.
- 893 CLASS OF 1921 FUND, 1946-47. Balance \$4,884.75. Contributed for Class Twenty-Fifth Year Memorial Fund.
- 385 CLASS OF 1922 SCHOLARSHIP FUND, 1942-49. Balance \$20,505.88. For scholarships.
- 387 CLASS OF 1922 SPECIAL SCHOLARSHIP FUND, 1944-46. Balance \$4,800. For special scholarships.
- 639 CLASS OF 1923 FUND, 1949, \$63,166.67. Twenty-five Year Gift of Class for general purposes.
- 640 CLASS OF 1924 FUND, 1949, \$77,620.20. Twenty-five Year Gift of Class for general purposes.
- 389 CLASS OF 1938 SCHOLARSHIP FUND, 1938-49. Balance \$1,067.84. Gift of Class of 1938. Income for scholarships.
- 895-927 inc.

CLASS ENDOWMENT FUNDS (see pages 240 to 243).

Note: These funds are being accumulated for the several classes whose members took out life insurance or are otherwise accumulating contributions toward a gift to the Institute on the occasion of their Twenty-Fifth Reunions. From certain of these, a portion may be applied in accordance with the terms of the several plans toward keeping alive policies that might lapse on account of nonpayment or as otherwise designated. By vote of the Class of 1923, \$10,000 was appropriated in 1940 from their Class Fund toward construction of the sun garden adjoining swimming pool.

- 928 CLASS OF 1948 ATHLETIC AWARD FUND, 1949, \$682.84. For purchase of Trophy to be awarded annually to outstanding athlete.
- 281 SAMUEL C. COBB FUND, 1916, \$36,551. Bequest. Income for salaries of President and professors.
- 393 FRED L. AND FLORENCE L. COBURN FUND, 1932, \$5,000. Bequest. Income to aid needy and worthy students, preference being given to those residing in Somerville, Mass.
- 397 COFFIN MEMORIAL FUND, \$35,000. Gift of the Estate of Charles A. Coffin. For loans or other aid to students as determined by Executive Committee. Present balance, \$36,019.
- 309 COLLAMORE FUND, 1916, \$10,100. Bequest of Helen Collamore. Income primarily to aid women students in post graduate courses, and, secondarily, for purchase of instruments for Chemical Laboratory.
- HELEN COLLAMORE FUND, 1917, \$12,384.97. Bequest. Used for new dormitories, 1924.

- 641 HELEN COLLAMORE FUND, 1947, \$49,500. Bequest. For unrestricted use. Used in 1948-49.
- 718 COLLINS HELIUM CRYOSTAT FUND, 1949, \$2,380. For special research. Present balance \$96.53.
SAMUEL P. COLT FUND, 1920-22, \$20,000. Bequest. Used for new dormitories, 1924.
- 556 KARL TAYLOR COMPTON PRIZE FUND, 1949, \$2,000. Gifts from Stein Club members. Income for prizes.
- 576 MARGARET COMPTON FUND, 1949, \$1,500. Gifts from Technology Matrons to be expended on authorization by Mrs. Compton.
- 399 WILLIAM A. CONANT FUND, 1943-49, \$153,415.61. Bequest. The income to provide for scholarship carrying annual stipend of \$800 for New England Protestant boy of Protestant parents, preference to be given to graduates of the public schools of Brookline.
- 601 ARTHUR J. CONNER FUND, 1941-48. Balance \$220,387.38. The total of gifts and the residue of two trusts for construction of a dormitory.
- 401 ALBERT CONRO FUND, 1943, \$25,000. Bequest for scholarship.
- 403 GEORGE R. COOKE FUND, 1939-40, \$3,500. Gift of George R. Cooke, Jr. Income to be awarded, preferably in Civil Engineering or related field, to student preparing for Public Service and Government.
- 643 COOPERATIVE FOUNDATION FUND, 1945, \$1,577.44. Cash surrender value of first insurance policy taken under Plan. Use of fund not yet determined.
- 719 COSMIC TERRESTRIAL RESEARCH FUND, 1938-48, \$86,100. Gifts (anonymous) for special research. Research completed 1947 and fund completely used.
CRANE AUTOMOTIVE FUND, 1928, \$5,000. Gift of Henry M. Crane. Used for purchase of equipment for Aeronautical Laboratory, 1928-40.
- 405 LUCRETIA CROCKER FUND, 1916, \$50,551. Bequest of Matilda H. Crocker. Income for establishment of scholarships for women in memory of sister.
- 211 CROSBY HONORARY FUND, 1916, \$1,633. Contributions in honor of William Otis Crosby (Professor Emeritus). Income for upbuilding of the Geology Department, especially its collections.
EDWARD CUNNINGHAM FUND, 1917, \$15,000. Gift. For new building and equipment at Civil Engineering Summer Camp, Maine.
- 311 DALTON GRADUATE CHEMICAL FUND, 1896, \$5,000. Gift of Charles H. Dalton. Income for scholarships for American male graduates of M.I.T., for advanced chemical study and research — preference given to chemical research especially applicable to textile industries.
WILLIAM S. B. DANA FUND, 1946, \$500. Bequest for general purposes. Used for construction, 1947.
- 407 ISAAC W. DANFORTH FUND, 1903, \$5,000. Bequest of James H. Danforth. Income for scholarship purposes as a memorial to brother.
N. LORING DANFORTH FUND, 1937, \$5,000. Bequest. Principal and income for general purposes. Appropriated for educational plant, 1940.

- 585 DEAN'S FUND, 1924, \$3,350. Contributions. To be loaned by Dean to needy students. Present balance \$12,437.68.
- 587 CARL P. DENNETT FUND, 1926, \$500. Gift. To be loaned to students, preferably Freshmen, at discretion of President. Present balance \$1,995.29.
- 645 DEVELOPMENT FUND No. 1, 1949, \$597,872.65. Miscellaneous gifts for general purposes. Present balance \$179,574.45.
- 720 DEVELOPMENT FUND No. 2, 1949, \$275,000. Miscellaneous contributions from Industrial Companies for department and research purposes. Present balance \$87,500.
- 807 DAVIS R. DEWEY MEMORIAL FUND, 1943, \$500. To provide a suitable memorial for the late Professor Dewey. Present balance \$627.70.
- 409 ANN WHITE DICKINSON FUND, 1898, \$40,000. Bequest. Income used to establish free scholarships. Such persons enjoying benefit shall be worthy young men of American origin.
- 411 DORMITORY FUND, 1903, \$2,857. Contributions. Income for scholarship purposes.
GEORGE B. DORR FUND, 1890, \$49,573.47. Bequest. Appropriated for educational plant, 1918.
- 213 SUSAN E. DORR FUND, 1914, \$95,955. Bequest. Income for use and benefit of Rogers Physical Laboratory.
- 808 DRAMA CLUB THEATRE FUND, 1938, \$400. Deposited by Drama Club of M.I.T. toward future purchase of theatrical equipment. Present balance \$600.39.
- 111 EBEN S. DRAPER FUND, 1915, \$100,000. Bequest. Specially invested. Income used for general purposes of the Institute. Present balance \$107,485.41.
CHARLES C. DREW FUND, 1920, \$305,171.52. Bequest. Appropriation to educational plant, 1921-24.
- 413 THOMAS MESSINGER DROWN FUND, 1928, \$50,000. Bequest of Mary Frances Drown. Income to establish scholarships for deserving undergraduate students.
CARBON P. DUBBS FUND, 1943, \$5,000. Gift. For general purposes. Used for new construction, 1947.
- 113 COLEMAN DU PONT FUND, 1931-38, \$221,325. Bequest. Income for support and maintenance of the Institute.
PIERRE DU PONT FUND, 1938, \$25,000. Gift. Used for new equipment.
- 313 RICHARD CHICHESTER DU PONT MEMORIAL FUND, 1946, \$108,772. Contributions by members of his family to establish Memorial Fellowship in Aerodynamics or Meteorology.
- 115 EASTMAN CONTRACT FUND, 1924, \$9,498,869. Gift of George Eastman. Income for general purposes of the Institute.
- 603 GEORGE EASTMAN BUILDING FUND, 1916-17, \$2,500,000. Gift of George Eastman on condition that \$1,500,000 be raised by alumni and others. Balance to be used as needed for new educational buildings. \$1,225,000 used for George Eastman Research Laboratories in 1932, \$725,000 for Rogers Building and Wind Tunnel in 1939, \$268,700 for one-half of building No. 12 in 1943, \$80,000 for Medical Department alterations in 1943. Present balance \$135,589.02.

- 215 GEORGE EASTMAN FUND, 1918, \$400,000. Gift of George Eastman. Income for Chemistry and Physics. Principal available for addition to EASTMAN BUILDING FUND after latter is exhausted.
The total of the gifts of GEORGE EASTMAN to the Institute for both buildings and endowment was \$20,500,000.
- 117 CHARLES W. EATON FUND, 1929-43, \$261,148. Bequest. Income for advancement of general purposes of Institute. (From 1911 to 1923 Mr. Eaton gave \$15,501.45 for Civil Engineering Summer Camp in Maine.)
- 119 EDUCATIONAL ENDOWMENT FUND, 1920-21, \$7,574,000. \$4,000,000 gift from George Eastman and balance contributed by alumni and others. Income for current educational expenses.
- 121 MARTHA ANN EDWARDS FUND, 1890, \$30,000. Bequest. Income for general purposes.
- 722 ELECTRONICS, INDUSTRIAL FELLOWSHIPS IN, 1946-49, \$86,200. Contributions for Fellowships. Present balance \$71,502.25.
- 721 ELECTRONICS, RESEARCH LABORATORY OF, 1943. Balance \$63,628.50 Appropriations from surplus for postwar research.
- 797 ARTHUR ELSON FUND, 1944, \$500. For the purpose of special book purchases for the Library. Present balance \$563.31.
- 415 FRANCES AND WILLIAM EMERSON FUND, 1930, \$100,000. Gift. Income for aid of regular and special students in Department of Architecture.
- 557 WILLIAM EMERSON PRIZE FUND, 1939, \$2,145. Contributed by friends as a fund for prizes to architectural students.
F. W. EMERY FUND, 1916, \$120,000. Bequest. Used for buildings and equipment.
- 123 WILLIAM ENDICOTT FUND, 1916, \$25,000. Bequest. Income for general purposes.
- 995 ENDOWMENT RESERVE FUND, 1924. Created and otherwise increased by gains from sales or maturities of investments and decreased by premium amortization of bonds and losses and charges from sales or maturities. Belongs to all funds sharing general investments. (Page 9, this report.) Present balance \$2,396,649.93.
ARTHUR F. ESTABROOK FUND, 1923-38, \$100,800. Bequest. Used for purchase of land and equipment.
IDA F. ESTABROOK FUND, 1926-37, \$22,157.51. Bequest. Used for educational plant.
- 417 FARNSWORTH FUND, 1889, \$5,000. Bequest of Mary E. Atkins. Income for scholarships.
HENRIETTA G. FITZ FUND, 1930, \$10,000. Bequest. For general purposes. Appropriated for educational plant, 1940.
- 217 HAROLD H. FLETCHER FUND, 1942, \$10,000. Bequest under will of Herbert H. Fletcher. To endow a bed in the Institute's Infirmary.
- 419 CHARLES LEWIS FLINT FUND, 1889, \$5,000. Bequest. Income for support of worthy student, preference given graduate of English High School, Boston.

- 267 CHARLES LEWIS FLINT FUND, 1889, \$5,000. Bequest. Income for purchase of books and scientific publications for Library.
- 723 FOOD TECHNOLOGY FUND, 1945-49, \$260,000. Contribution for research. Present balance \$94,883.94.
- 283 SARAH H. FORBES FUND, 1901, \$500. Gift of Malcolm Forbes as memorial to mother. Income for salaries.
- 421 SARAH S. FORBES FUND, 1913, \$3,455. Gift of Sarah S. Forbes, William B. Rogers, and Henry S. Russell. Income for maintenance and education of scholar in M. I. T.
- 724 FORD MOTOR COMPANY FUND, 1949, \$25,000. For special research in the field of Industrial Relations. Present balance \$25,083.44.
- 125 FRANCIS APPLETON FOSTER FUND, 1922, \$1,000,000. Bequest. Income for purposes of Institute.
- 127 JOHN W. FOSTER FUND, 1938, \$299,650. Bequest. Income for purposes of the Institute.
- 605 MATILDA A. FRASER FUND, 1942, \$859.89. Bequest. Towards construction of a women's dormitory. Present balance \$1,103.98.
- 129 ALEXIS H. FRENCH FUND, 1930, \$5,000. Bequest. Income for general purposes of Institute.
CAROLINE L. W. FRENCH FUND, 1916, \$100,843.34. Bequest. Used for new equipment, 1928.
- 131 JONATHAN FRENCH FUND, 1915-49, \$90,850.25. Bequest of Caroline L. W. French. For purposes of the Institute.
- 133 HENRY CLAY FRICK FUND, 1925-48, \$2,208,482.92. Bequest. Institute received ten shares of a total of one hundred shares of his residuary estate. Income for general purposes.
- 423 PHILIP JACOB FRIEDLANDER FUND, 1945, \$1,000. Gift. Income to be used to aid qualified students in need of assistance.
WALTER L. FRISBIE FUND, 1923, \$7,614.98. Bequest. Used for educational plant, 1928.
- 649 ERASTUS C. GAFFIELD FUND, 1944-45, \$387,854. Bequest. Principal and income available for general purposes. In 1945, \$120,000 was applied to retirement of Dormitory mortgages. In 1947 \$158,000 was applied toward the purchase from the U.S. Government of Building 24 and \$108,100 appropriated for miscellaneous purposes. Present balance \$1,796.58.
- 285 GEORGE A. GARDNER FUND, 1898, \$20,000. Gift. Income for salaries of instructors.
GAS TURBINE LABORATORY FUND, 1946, \$500,000. Contributions from five industrial corporations for construction and operation of new laboratory. Used for construction 1946-48.
- 135 GENERAL ENDOWMENT FUND, 1921, \$1,527,449. Contributions by alumni and others to meet George Eastman's condition relative to gift of \$2,500,000, his building fund.
- 589 NATHAN R. GEORGE FUND, 1943, \$29,197.37. Bequest. Income to be loaned to undergraduates under certain administrative conditions. Balance \$35,790.12.

- 425 NORMAN H. GEORGE FUND, 1919-25, \$89,453. Bequest. Income for assistance of worthy and needy students.
- 427 ARTHUR B. GILMORE FUND, \$10,000, 1941. Bequest. Net income to assist needy students, members of Beta Theta Pi — not more than two students in any one year.
CHARLES W. GOODALE FUND, 1929, \$50,000. Bequest. Used for new dormitory, 1930.
- 429 BARNETT D. GORDON FUND, 1942-44, \$10,000. The income to be used as scholarships for deserving students.
- 137 ELIOT GRANGER FUND, 1936, \$21,568.43. Bequest under will of Mary Granger in memory of deceased son. Income for the general purposes of the Institute.
- 725 JOHN A. GRIMMONS FUND, 1930-49, Balance \$3,040.19. Bequest of C. Lillian Moore of Malden. Principal held by Old Colony Trust Co., Trustee. Income for loans to undergraduates in Electrical Engineering. Unused balances available for purchase of apparatus and equipment in Department of Electrical Engineering.
- 727 GROUP DYNAMICS RESEARCH FUND, 1945-47. Gift. For conduct of research in this field. Research terminated in 1948. Funds completely used.
- 431 LUCIA G. HALL SCHOLARSHIP FUND, 1945-46. Balance \$54,413. Bequest of Louise K. Gunn. The income only used for aid of worthy students.
- 433 HALL-MERCER SCHOLARSHIP FUND, 1940-49. Balance \$76,572.55. Bequest under will of Alexander G. Mercer. The income to be used for tuition and other necessary expenses of students.
GEORGE WYMAN HAMILTON FUND, 1935, \$54,414.15. Appropriated for new equipment, 1937-39.
- 729 HARVEY NONFERROUS FORGING FUND, 1946, \$10,000. For research. Present balance \$10,824.
- 435 JAMES H. HASTE FUND, 1930-45. Balance \$241,074. Bequest. Income for aid of deserving students of insufficient means.
- 139 CHARLES HAYDEN FUND, 1937, \$1,000,000. Bequest of Charles Hayden. Income for general educational purposes of the Institute.
CHARLES HAYDEN FUND, 1925, \$42,700.76. Gift. Used for educational plant.
CHARLES HAYDEN FUND, 1927, \$100,000. Gift for new dormitories.
- 609 CHARLES HAYDEN MEMORIAL LIBRARY FUND, 1945-47, \$2,200,000. Gift of Charles Hayden Foundation for new library. Used in 1948 and 1949 for library construction. Present balance \$181,496.71.
- 437 CHARLES HAYDEN MEMORIAL SCHOLARSHIP FUND, 1940-43, \$100,000. From the Charles Hayden Foundation. For entrance scholarships. Preference given to students from Boston and New York.
- 439 CHARLES HAYDEN MEMORIAL SCHOLARSHIP FUND, SPECIAL 1947, \$11,078.36. Accumulation of income of Scholarship Fund (No. 437).

- 731 CHARLES HAYDEN FOUNDATION DENTAL CLINIC FUND, 1940, \$10,000. To assist in establishment of and necessary equipment for a Dental Clinic available to entire student body, faculty and employees. Present balance \$2,228.34.
- 287 JAMES HAYWARD FUND, 1866, \$18,800. Bequest. Income for salaries.
JAMES W. HENRY FUND, 1935, \$8,226. Bequest. Used for new equipment.
- 651 WILLIAM T. HENRY FUND, 1943-49. Present balance \$50,324.55. Income from Trust Fund held outside M. I. T. Fund for general purposes.
- 987 JOSEPH HEWETT FUND, 1921-24, \$200,000. In Trust subject to special annuity provisions. Present balance \$216,231.14.
- 315 CLARENCE J. HICKS MEMORIAL FUND, 1946, \$20,000. For fellowship in Industrial Relations.
- 141 JOHN MARSHALL HILLS FUND, 1941-42, \$366,430.96. Bequest. Income for general purposes of M. I. T.
- 218 EDITH MORRILL HOBBS FUND, 1948, \$5,000. Bequest. Income for purchase of books on Architecture.
- 316 EDITH MORRILL HOBBS FELLOWSHIP FUND, 1948, \$5,000. Bequest. Income for aid to graduate students in Architecture.
FREDERICK S. HODGES FUND, 1928, \$57,316.26. Bequest. Appropriated for new dormitories.
- 142 WALTER W. HODGES FUND, 1946, \$36,797.20. Bequest. Income only, for general purposes.
ELLIS HOLLINGSWORTH FUND, 1940, \$10,000. Bequest for unrestricted use. Used for new construction, 1947.
- 441 GEORGE HOLLINGSWORTH FUND, 1916, \$5,000. Bequest of Rose Hollingsworth. Income used for scholarship.
- 809 OSCAR H. HOROVITZ FUND, 1947-49, \$1,500. Gift for special purposes. Present balance, \$1,618.75.
- 653 ERNEST R. HOSBACH MEMORIAL FUND, 1948, \$1,000. Gift of Frederick W. Hosbach in memory of his son. For general purposes of Institute.
- 559 ROGER DEFRIEZ HUNNEMAN PRIZE FUND, 1927, \$1,050. Gift of W. C. Hunneman in memory of Roger Defriez Hunneman, '23. Income paid as annual award to most meritorious student in Chemical Engineering who has shown most outstanding originality in his work as determined by that Department.
ABBY W. HUNT FUND, 1936-44, \$79,400. Bequest. For general purposes. \$60,000 used for alterations, 1937. \$16,000 for new equipment, 1938. Balance \$3,400, for new construction 1947.
- 443 SAMUEL P. HUNT FUND, 1946, \$7,496. Gift. For undergraduate scholarships.
- 445 T. STERRY HUNT FUND, 1894, \$3,000. Bequest. Income to a student in Chemistry.

- 447 **WILLIAM F. HUNTINGTON FUND, 1892, \$5,000.** Gift of Susan E. Covell. Income to deserving students. Preference to be given to students in Civil Engineering.
- 611 **HYDRODYNAMICS LABORATORY AND TOWING TANK FUND, 1946-49.** Balance \$211,598.38. Gifts toward construction of new building.
- 733 **INDUSTRIAL ECONOMICS FUND, 1940-49.** Balance \$29,063.55. Contributions in support of Graduate Program in Economics.
- 737 **INDUSTRIAL FUND, 1924-49.** This fund succeeded "Tech Plan" Contracts, payments under which went to the Educational Endowment Fund. Now receives surplus from industrially sponsored operations of Division of Industrial Cooperation and Research. Used for purchase of new equipment and support of special research. (Page 195 this report.)
- 739 **INDUSTRIAL RELATIONS SECTION FUND, 1938-49.** Balance \$155,926.28. Contributions in support of the Industrial Relations Section of the Department of Economics.
- 741 **INSTRUMENTATION FUND, 1943-45.** Balance \$212,967.86. For research in the field of instrument design.
- INSURANCE ENGINEERING FUND, 1944, \$835.13.** Established by private subscriptions and donated to M. I. T. through the Boston Manufacturers Mutual Fire Insurance Co. Used for new construction 1947.
- CHARLES C. JACKSON FUND, 1912, \$25,000.** Gift. Used for purchase of new site.
- 143 **JAMES FUND, 1898-99, \$163,654.** Bequest of Julia B. H. James. Income for development of M. I. T.
- 449 **DAVID L. JEWELL FUND, 1928, \$25,000.** Bequest. Income for tuition of five young men who are worthy of assistance and who, were it not for such assistance, might be unable to pursue their studies at M. I. T.
- 451 **EDWARD A. JONES FUND, 1947, \$41,254.** Bequest for scholarships.
- 317 **REBECCA R. JOSLIN FUND, 1924-36, \$6,540.** Gift and Bequest. Income awarded as a loan to advanced student in Chemical Engineering on recommendation of that Department — restricted to native and resident of Massachusetts. Beneficiary to abstain from using tobacco in any form.
- 453 **JOY SCHOLARSHIPS, 1886, \$7,500.** Gift of Nabby Joy. Income for scholarships for one or more women studying natural science at M. I. T.
- 219 **WILLIAM R. KALES FUND, 1944, \$75,001.48.** Gift of Mrs. Kales and family. To establish and maintain Eye Clinic in Medical Department.
- WILLIAM R. KALES FUND, 1925-27, \$11,000.** Gift for new dormitories.
- 659 **KELLER FUND, 1948, \$100.** Gift of Carl T. Keller. For expenditures under the direction of Doctor Tate. Present balance \$52.63.
- 221 **ARTHUR E. KENNELLY FUND, 1940-44, \$67,058.** Bequest. Income only to be used for the study of mathematics directed toward physics or physical applications.
- CARRIE BELLE KENNEY FUND, 1945, \$1,000.** Bequest. Used for new construction, 1947.
- 743 **A. NORTON KENT FUND, 1944-49, \$700.** Gift. For research in Physics. \$500 appropriated, 1947. Present balance \$204.

- 269 WILLIAM HALL KERR FUND, 1896, \$2,000. Gift of Alice M. Kerr. Income for the annual purchase of books and drawings in machine design.
- 145 DALE G. KILBURN FUND, 1949, \$68,894. Bequest. Income for general purposes.
DAVID P. KIMBALL FUND, 1924, \$10,000. Bequest. Used for educational plant, 1926.
- 810 ELLEN A. KING MEMORIAL STUDENT FUND, 1949, \$10. Gift for purposes as indicated.
- 455 AMELIA S. KNEISNER SCHOLARSHIP FUND, 1945-49, \$18,000. Gift of the family. Income to provide scholarship aid to meritorious or needy students — preference to students from Danbury (Connecticut).
- 811 KURRELMAYER FUND, 1945-46, \$2,033. Contributions toward Memorial Fund. Present balance \$2,197.29.
- 591 LAMSON-VIRGIN LOAN FUND, 1946-48, \$10,600. Bequest. Income to be used in aiding worthy students, with provision for repayment. Present balance \$11,023.50.
- 812 LEVER BROS. CO. FUND, 1949, \$2,500. Income or principal to be used on recommendation of M. I. T. and Lever Bros. Co. presidents.
- 319 WILFRED LEWIS FUND, 1930, \$5,000. Gift of Emily Sargent Lewis. Income for maintenance of graduate student in Mechanical Engineering.
- 613 LIBRARY BUILDING FUND, 1946, \$1,000. Gift toward new building. Present balance \$1,117.50.
- 799 LIBRARY GROWTH FUND, 1943-47. Balance \$4,917.49. For investment purposes.
- 577 JACOB AND JENNIE LICHTER FUND, 1944-48, \$10,475. Gift. To accumulate income and ultimately add to bequest.
- 457 WILLIAM LITCHFIELD FUND, 1910, \$5,000. Bequest. Income for scholarship on competitive examination.
- 223 ARTHUR DEHON LITTLE MEMORIAL FUND, 1937. Balance \$157,535. Bequest under will of Dr. Arthur D. Little. Income to be used in Departments of Chemistry and Chemical Engineering. (The accumulated income from 5,543 shares of common stock of Arthur D. Little, Inc., held by Voting Trustees for the benefit of the Institute under declaration of trust dated November 18, 1936, and in force for twenty years, amounted to \$78,962.51 at June 30, 1949.)
- 813 ARTHUR D. LITTLE MEMORIAL LECTURESHIP FUND, 1944-49, \$9,100. Gift of Arthur D. Little, Inc., for purpose indicated. Present balance \$3,819.15.
HIRAM H. LOGAN FUND, 1933-46, \$44,195.79. Bequest. Principal and income for general purposes of M.I.T. \$19,455 appropriated for educational plant, 1940. Balance for new construction, 1947.
JOHN M. LONGYEAR FUND, 1915-16, \$30,000. Gift. Used for land and equipment, 1916.
- 459 ELISHA T. LORING FUND, 1890, \$5,000. Bequest. Income for assistance of needy and deserving pupils.
- 461 LOWELL INSTITUTE FUND, 1923, \$2,000. Gift from alumni of Lowell Institute to establish scholarship for its graduates.

- 225 KATHARINE BIGELOW LOWELL FUND, 1895, \$5,000. Gift of Augustus Lowell in honor of Mrs. Lowell. Income for purchase of books and apparatus for Department of Physics.
- 988 PERCIVAL LOWELL SCHOLARSHIP FUND, 1949, \$30,000. Fund created by gift of Real Estate to be sold and proceeds to be used for Special Fund, to pay annuity to donor and on her death to create a Scholarship Fund. Present balance \$27,441.50.
ARTHUR T. LYMAN FUND, 1913, \$5,000. Bequest. Used for educational plant, 1926.
JAMES MCGREGOR FUND, 1913, \$2,500. Bequest. Used for educational plant, 1926.
- 814 JOHN R. MACOMBER FUND, 1948, \$3,780. Gift. For general expenses. Present balance \$1,287.99.
- 463 RUPERT A. MARDEN FUND, 1933, \$2,000. Gift (anonymous). Income to aid worthy student — Protestant and of American origin — preference to student taking Cooperative Course in Electrical Engineering (Course VI-A).
- 289 WILLIAM P. MASON FUND, 1868, \$18,800. Bequest. Income to support a professorship in the Institute.
M. I. T. ALUMNI FUND, 1907. Total subscriptions of alumni to 1924, \$632,500. \$632,000 appropriated for new equipment, Walker Memorial, 1916 Reunion, and Dormitories.
M. I. T. ALUMNI GYMNASIUM FUND, 1938-42. Total subscription \$400,000. Appropriated for Briggs Field House, for Athletic Field, and for swimming pool.
- 932 M. I. T. ALUMNI, CLASS OF 1898, 1944-49. Balance \$12,592.84. Gifts to provide annual contribution to Alumni Fund from earned income.
- 815 M. I. T. ALUMNI FUND, 1940-49. Plan adopted by the alumni of the Institute for the annual raising of funds for support of the Alumni Association and the *Technology Review* — the balance to be applied toward specific purposes other than operating expenses of the Institute. Total \$695,508. In 1947, \$500,000 was applied to the new Senior Dormitory construction, and \$10,000 toward new Tennis Courts. Present balance \$248,336.08.
- 820 M. I. T. ALUMNI FUND, 1949-50. Net subscriptions to date of the tenth year of operation. Balance \$77,094.39.
- 931 M. I. T. ALUMNI ASSOCIATION PERMANENT FUND, 1929-49. Balance \$107,392.12. Deposited with M. I. T. for investment purposes only.
- 465 M. I. T. CLUB OF CHICAGO FUND, 1944-49, \$7,360. Gift. For scholarships.
- 821 M. I. T. TEACHERS' INSURANCE FUND, 1928-49. Refund of premiums paid on Group Insurance under M. I. T. Pension and Insurance Plan held at interest and accumulated, plus unused part of 2% M. I. T. appropriation for Group Insurance annual premium. Appropriated for special pension purposes only. Balance \$178,425.42.
- 960 M. I. T. WOMEN'S DORMITORY FUND, 1948-49, \$1,393.25. Contributions for additional equipment and replacements.
- 467 MARGARET A. MATHEWS FUND, 1947, \$111,682. Bequest. For scholarship. For women students who expect to become teachers.

- 749 JOHN LAWRENCE MAURAN FUND, 1934, \$10,000. Bequest. Principal and income for benefit of Department of Architecture. Used, in part, toward house projects in Wellesley and Wakefield, 1937-40. Balance \$3,436.87.
- 227 GEORGE HENRY MAY FUND, 1914, \$4,250. Gift. Income for benefit of Chemistry Department.
- 469 GEORGE HENRY MAY FUND, 1914, \$5,000. Gift. Income to assist graduates of Newton High School recommended as eligible by superintendent and head masters of Newton High School. Beneficiary to issue a note payable without interest.
- 147 THOMAS McCAMMON FUND, 1930, \$15,000. Bequest in honor of father, James Elder McCammon. Income available for general purposes.
- 561 JAMES MEANS FUND, 1925, \$2,700. Gift of Dr. James H. Means as a memorial to father. Income for annual prize for essay on an aeronautical subject.
- 592 MEDICAL DEPARTMENT NEEDY STUDENT FUND. Appropriation by M. I. T. to assist needy students in payment of medical and hospital bills. Present balance \$5,489.47.
- CHARLES E. MERRILL FUND, 1943, \$2,300. Used for new construction, 1947.
- 750 MERRILL FOUNDATION FUND, 1949, \$25,000. For special research in the field of Industrial Relations. Present balance \$22,450.85.
- 615 METALS PROCESSING LABORATORY FUND, 1947-49, \$80,931.97. Contribution. For construction and equipment.
- METALLURGY, SPECIAL FUND, 1938, \$10,000. Subscription (anonymous) used for special equipment for Department of Metallurgy.
- 665 ALICE BUTTS METCALF FUND, 1945, \$100,000. Bequest for unrestricted use. \$50,000 used for new construction, 1947.
- 579 EDWARD F. AND MARY R. MILLER FUND, 1941, \$10,000. Bequest. To be used at discretion of Bursar as a fund in assisting needy students who have been found by the medical director to require special medical or surgical treatment.
- HIRAM F. MILLS FUND, 1923, \$10,175. Bequest. Appropriated for educational plant, 1937.
- 471 ROBERT W. MILNE FUND, 1943, \$75,856. Bequest. Income for assistance of worthy and needy students.
- 751 SUSAN MINNS FUND, 1930. Gift of Miss Susan Minns — tract of land on Memorial Drive for use in any way deemed best for benefit of plan regarding construction and maintenance of an hydraulic laboratory. Carried at \$40,000.
- 473 JAMES H. MIRRELES FUND, 1886, \$2,500. Gift of James Buchanan Mirreles. Income to such student in third or fourth year Mechanical Engineering most deserving pecuniary assistance.
- 823 JOHN D. MITSCH MEMORIAL FUND, 1946. Balance \$2,847. Contributions toward memorial to the late Professor Mitsch and education of his children.

- 753 **FORRIS JEWETT MOORE FUND**, 1927-31, \$32,000. Gift of Mrs. F. Jewett Moore as a memorial to husband. Income or principal (under special conditions) expendible subject to approval of Executive Committee by a committee of three members of the Department of Chemistry — to make the study of Chemistry more interesting and surroundings of such study more attractive. Present balance \$27,677.74.
- 321 **MOORE FUND**, 1914-28-29, \$24,200. Gift of Mrs. F. Jewett Moore. Income to help some Institute graduate to continue studies in Europe, especially organic chemistry. Preference to student who has distinguished himself in this subject while an undergraduate. Present balance \$37,137.
- 475 **FRED W. MORRILL FUND**, 1941, \$2,000. Bequest. Income for financial assistance to students.
- 149 **KATE M. MORSE FUND**, 1925, \$25,000. Bequest. Income for general purposes of M. I. T.
- 151 **EVERETT MORSS FUND**, 1934, \$25,000. Bequest. Income for general purposes of M. I. T.
- EVERETT MORSS**, 1916, 1921-25, \$35,000. Gifts. For Walker Memorial murals by E. H. Blashfield.
- 825 **HENRY A. MORSS NAUTICAL FUND**, 1937, \$3,500. Gift for maintenance of sailing activities and sailing pavilion. Present balance \$59.90.
- 667 **JOHN WELLS MORSS FUND**, 1940, \$50,000. Bequest. Principal and income for general purposes.
- ALBERT H. MUNSELL FUND**, 1920, \$7,908.28. Bequest. Used for educational plant, 1928.
- MARGARET A. MUNSELL FUND**, 1920, \$1,105.32. Bequest. Used for educational plant, 1928.
- NATHANIEL C. NASH FUND**, 1881, \$10,000. Bequest. Appropriated for new dormitories, 1924.
- 477 **NICHOLS FUND**, 1895, \$5,000. Bequest of Betsy F. W. Nichols. Income for scholarship to student in Chemistry.
- 479 **CHARLES C. NICHOLS FUND**, 1904, \$5,000. Bequest. Income for scholarship.
- 478 **WILLIAM E. NICKERSON FUND**, 1949, \$9,312. Bequest. Income for undergraduate scholarships.
- 670 **WILLIAM E. NICKERSON FUND**, 1945, \$9,312. Bequest for general purposes.
- WILLIAM E. NICKERSON FUND**, 1928, \$50,000. Gift. Principal and income used to finance chair in Humanics, 1928-40.
- 323 **JAMES F. NORRIS FUND**, 1949, \$25,226.89. Bequest. Income for graduate fellowships.
- 755 **NUCLEAR SCIENCE AND ENGINEERING FUND**, 1947-49, \$66,000. For research. Used during 1947-48 and 1948-49.
- MOSES W. OLIVER FUND**, 1921, \$12,870.49. Used for educational plant, 1938.
- CHRISTEL ORVIS FUND**, 1942, \$539.42. Bequest. Used for new construction, 1947.

- 271 GEORGE A. OSBORNE FUND, 1928, \$10,000. Bequest. Income for benefit of mathematical library.
- 481 JOHN FELT OSGOOD FUND, 1909, \$5,000. Bequest of Elizabeth P. Osgood in memory of husband. Income for scholarship in Electricity.
- 757 F. WARD PAINE FUND, 1944, \$10,000. Bequest. For special research in Geology. Present balance \$3,719.87.
- 827 CHARLES FRANCIS PARK MEMORIAL FUND, 1947, \$5,500. For investment purposes. Present balance \$5,917.25.
- 758 THEODORE B. PARKER MEMORIAL FUND, 1945-46, \$3,000. For special graduate scholarships. Present balance \$2,966.
- 483 GEORGE L. PARMELEE FUND, 1921, \$17,641. Bequest. Income for tuition of either special or regular worthy students.
EMERETTE O. PATCH FUND, 1935-38, \$8,240.84. Bequest. \$5,964 used for special expenditures, 1938-40. Balance for new construction, 1947.
FRANK E. PEABODY FUND, 1920, \$51,467.35. Bequest. Used for educational plant, 1921 and 1926.
- 484 FRANK STETSON PECKER SCHOLARSHIP FUND, 1948, \$59,731.18. Bequest.
FRANCES M. PERKINS FUND, 1912, \$122,569.67. Bequest. Used for educational plant.
H. B. PERKINS FUND, 1940 AND 1949, \$354. Bequest. Used for new equipment in 1940 and development program in 1949.
- 153 RICHARD PERKINS FUND, 1887, \$50,000. Bequest. Income for general purposes.
- 485 RICHARD PERKINS FUND, 1887, \$50,000. Bequest. Income for scholarships.
- 325 WILLARD B. PERKINS FUND, 1898, \$6,000. Bequest. Income to be expended every fourth year for traveling scholarships in architecture.
- 231 EDWARD D. PETERS FUND, 1924, \$5,000. Bequest of Elizabeth W. Peters. Income for the Department of Mineralogy.
E. S. PHILBRICK FUND, 1922, \$36,213.92. Bequest. Used for educational plant, 1926.
- 861 PHOTO SERVICE RESERVE FUND, 1945-49. Present balance, \$23,119.04. For equipment and maintenance of Photo Service.
PRESTON PLAYER FUND, 1933, \$20,000. Bequest. Used for educational plant, 1938.
- 233 PRATT NAVAL ARCHITECTURAL FUND, 1916, \$1,071,000. Bequest of Charles H. Pratt to endow the Department of Naval Architecture and Marine Engineering to be called forever Pratt School of Naval Architecture and Marine Engineering — to erect a building — remainder \$395,676, held in trust. Income to support said school.
CHARLES O. PRESCOTT FUND, 1935, \$30,640.78. Principal and income used for educational plant, 1938.
- 829 PRESIDENT'S FUND, SPECIAL, 1941-44, \$10,500. Gifts. Principal and/or income to be used by President as desired. Present balance \$10,312.61.
- 234 RAYMOND B. PRICE MEMORIAL FUND, 1948-49, \$9,000. Gift. Income for research in chemistry or related sciences.

- 487 FLORENCE E. PRINCE FUND, 1943, \$7,689.28. Bequest. Income for aid to worthy students.
- 759 RADIOACTIVITY CENTER FUND, 1945. Balance \$32,679. Appropriation for postwar research.
- 155 J. W. & B. L. RANDALL FUND, 1897, \$83,452. Bequest of Belinda L. Randall as a permanent fund or in erecting a building with those names.
- 489 THOMAS ADELBERT READ FUND, 1934-35, \$21,117. Bequest of Julia A. Read to establish scholarship in memory of her brother and their father and mother. Income to be awarded to some worthy and needy student, preferably resident of Fall River, Mass.
- 491 WILLIS WARD REEVES FUND, 1946-49, \$2,700. For undergraduate scholarships.
- 493 CHARLES A. RICHARDS FUND, 1939, \$31,719.32. Bequest. Income only to be used for assistance of poor Protestant students in the Institute.
- 235 ELLEN H. RICHARDS FUND, 1912, \$15,076. Income for promotion of research in Sanitary Chemistry, for fellowships to advanced students, for employment of research assistants, and in such other ways as will best promote investigation in that field.
- 761 RICHARDS MEMORIAL FUND, 1929. Balance of subscriptions from friends for portrait of Professor Robert Hallowell Richards available for the Department of Metallurgy. Present balance \$926.98.
- 237 CHARLOTTE B. RICHARDSON FUND, 1891, \$30,000. Bequest. Income to support of Industrial Chemical School.
- 495 JOHN ROACH SCHOLARSHIP FUND, 1937. Balance \$6,290. Bequest under will of Emeline Roach, income to provide annual scholarship to needy and deserving student in Naval Architecture and Marine Engineering.
- RUSSELL ROBB FUND, 1928, \$28,750. Bequest. Appropriated for new dormitories, 1930.
- ROCKEFELLER FOUNDATION RESEARCH FUND, 1931-36, \$170,000. Contributed and expended for Research in Science Departments over period of five years.
- 291 HENRY B. ROGERS FUND, 1873, \$25,000. Gift. Income for salaries of one or more professors or instructors.
- 327 HENRY BROMFIELD ROGERS FUND, 1921, \$20,057. Bequest of Anna Perkins Rogers. Income to establish fellowship or scholarship for women graduates of M. I. T. or other colleges whose graduate work is carried on at M. I. T.
- 593 MINNIE HEMPEL ROGERS FUND, 1945, \$1,195.04. Bequest for student loans. Present balance \$1,379.54.
- ROBERT E. ROGERS FUND, 1886, \$7,600. Bequest in memory of his brother, William B. Rogers. Used for new equipment, 1940.
- 496 WILLIAM BARTON ROGERS FUND. Present balance \$36,505. Established by subscriptions of members of Alumni Association through Prof. R. H. Richards for loans to students. By vote of Executive Committee in March 1935, approved by Alumni Council, the income, not now needed for loans, is made available for special scholarship aid in the discretion of the President and Treasurer.

- 157 WILLIAM BARTON ROGERS MEMORIAL FUND, 1883-84-85, \$250,225. Contributions from 91 persons. Income for support of Institute.
- 241 WILLIAM BARTON AND EMMA SAVAGE ROGERS FUND, 1937, \$102,064.18. Bequest of Dr. Francis H. Williams. Income to be added to principal for twenty years — after which 80 per cent of income may be used for research in pure science — balance to be added to fund. Present balance \$186,595.
- 243 FRANCIS E. ROPER FUND, 1936, \$2,000. Bequest. Income for use in Department of Mechanical Engineering.
- 273 ARTHUR ROTCH ARCHITECTURAL FUND, 1895, \$5,000. Bequest. Income for Library or collection of Department of Architecture.
- 245 ARTHUR ROTCH FUND, 1895, \$25,000. Bequest. Income for general purposes of Department of Architecture.
- 565 ARTHUR ROTCH FUND, 1895, \$5,000. Bequest. Income for annual prize to student in regular course in Architecture graduating highest in class.
- 567 ARTHUR ROTCH SPECIAL FUND, 1895, \$5,000. Bequest. Income for annual prize to student who shall be ranked highest at end of two years' special course in Architecture.
- 329 RICHARD LEE RUSSEL FUND, 1904, \$2,000. Gift of Theodore E. Russel. Income to assist worthy student of high standing in Department of Civil Engineering either undergraduate or postgraduate.
- 497 WILLIAM PATRICK RYAN MEMORIAL FUND, 1935, \$3,557. Contributed by friends of Professor Ryan. Income for scholarship in Chemical Engineering.
- 831 WILLIAM PATRICK RYAN SPECIAL FUND, 1933. Balance \$211.06. Appropriation. Educational fund for three children of late Prof. W. P. Ryan.
- 569 HENRY WEBB SALISBURY FUND, 1941, \$1,000. Gift. Income for award to outstanding student in Aeronautics — initially in form of reference books in Aeronautics. (\$100 of gift to be considered as income.)
- 159 SALTONSTALL FUND, 1901, \$40,000. Bequest of Henry Saltonstall. One-fourth income each year added to principal and remaining three-fourths expended for benefit of Institute. Present balance \$68,918.87.
- 331 HENRY SALTONSTALL FUND, 1901, \$10,000. Bequest. Income to aid one or more needy students.
- 333 JAMES SAVAGE FUND, 1873, \$10,000. Bequest. Income for scholarships in institution "where my son-in-law, William B. Rogers, is President."
- 161 SAMUEL E. SAWYER FUND, 1895, \$4,764. Bequest. Income to be used in such a manner as will best promote interests of M. I. T.
- 499 JOHN P. SCHENKL FUND, 1922, \$43,821. Bequest of Johanna Pauline Schenkl in memory of father. Income for scholarships in Department of Mechanical Engineering.
- THEODORE EDWARD SCHWARZ MEMORIAL FUND, 1937-38, \$4,391.86. Gift. Use for equipment of a room for map collection.

- 833 SEDGWICK MEMORIAL LECTURE FUND, 1930-49. Balance \$17,865.11. Bequest of Mary Katrine Sedgwick in memory of husband. Proceeds of interest in copyrights and from contracts with publishers for benefit of Department of Biology.
- 763 W. T. SEDGWICK FUND, 1928, \$69,500. Received from Trustees of the Estate of W. T. Sedgwick under Agreement and Declaration of Trust following decease of Mary Katrine Sedgwick for Department of Biology. Present balance \$44,880.69.
- 500 PAUL D. SEGHERS, JR., SCHOLARSHIP FUND, 1948, \$4,800. Bequest Income for annual scholarship.
SENIOR HOUSE FUND, 1947, \$500,000. Gift of Alumni Association from accumulated Alumni Fund, for new dormitory unit. Used for new dormitory, 1948.
- 765 SERVOMECHANISMS LABORATORY, 1943. Appropriation from Industrial Fund for postwar research. Present balance \$37,062.25.
- 767 SERVOMECHANISMS RESEARCH FUND. Present balance \$52,419.33. Proceeds from royalties for research.
RICHARD B. SEWALL FUND, 1919, \$30,000. Bequest. Used for educational plant, 1924.
- 501 FRANK ARNOLD SHERMAN FUND, 1947, \$10,000. Bequest. For scholarships with preference to Westerly, R. I., students.
- 503 THOMAS SHERWIN FUND, 1871, \$5,000. Gift of Committee on Sherwin Memorial Fund for free scholarship to graduate of English High School.
- 293 ALFRED P. SLOAN PROFESSORSHIP FUND, 1945-49, \$350,000. For endowment of Professorship in Industrial Management.
- 769 SLOAN AUTOMOTIVE LABORATORY FUND, 1929-48, \$166,065.35. Gift. Expended for automotive laboratory. Present balance \$5,076.17.
- 619 SLOAN FOUNDATION, 1946-49, \$215,000. Expended for automotive laboratory.
GEORGE A. SLOAN FUND, 1945, \$500. Gift. Used for new construction, 1947.
ELLEN VOSE SMITH FUND, 1930, \$25,000. Bequest. Used for new equipment.
- 505 G. H. MILLER SMITH FUND, 1946, \$10,000. For undergraduate scholarships.
- 507 HORACE T. SMITH FUND, 1930, \$33,019. Bequest. Income for scholarships. Preference to graduates of East Bridgewater (Mass.) and Bridgeport (Conn.) High Schools.
- 955 LILLIE C. SMITH FUND, 1937, \$4,800. Bequest to M. I. T. Women's Association for purposes of the Association. Present balance \$6,880.11.
- 957 WALTER B. SNOW FUND, 1938-49. Balance \$10,457.82. Reserve funds of Technology Christian Association Advisory Board. Deposited for investment purposes.
- 251 SOLAR ENERGY FUND, 1938, \$645,513.48. Gift of Dr. Godfrey L. Cabot. Principal to be held for fifty years — income to be used in development of the art of converting energy of the sun to use of man by mechanical, electrical, or chemical means. After fifty years, fund becomes part of general unrestricted endowment of the Institute.

- 509 SONS AND DAUGHTERS OF NEW ENGLAND PURITAN COLONY SCHOLARSHIP FUND, 1931, \$600. Gift. Income for scholarship aid to a boy of New England ancestry.
- 771 SPECIAL RESEARCH (PADELFORD) FUND. Balance \$2,838.42. For research.
- 511 ANNA SPOONER FUND, 1939-41, \$10,896. Bequest. Income to be used in assisting meritorious students.
- 163 ANDREW HASTINGS SPRING FUND, 1921, \$50,000. Bequest of Charlotte A. Spring in memory of nephew as a permanent fund. Income for general purposes.
CHARLES A. STONE, 1912-24, \$15,000. Gift for land. 1928, \$25,023.59. Gift for dormitories.
GALEN L. STONE, 1912, \$10,000. Gift for land. 1916, \$10,000. Gift for Mining Building.
- 165 GEORGE G. STONE FUND, 1939, \$4,677.35. Bequest by will of Eliza A. Stone as memorial to brother, a graduate in Mining Engineering in 1889. Income to be used in manner most useful to Institute as well as a most fitting memorial.
- 571 SAMUEL W. STRATTON PRIZE FUND, 1933, \$1,880. Contributed by friends of the late Dr. S. W. Stratton for competition prizes in the presentation of scientific papers.
- 773 SUBMARINE SIGNAL COMPANY FUND, 1945, \$25,000. Gift. To be used for fundamental studies relating to application of ultrasonics to biological problems. Present balance \$18,976.08.
- 595 SUMMER SURVEYING CAMP LOAN FUND, 1927, \$500. Gift of Lammot du Pont as a revolving loan fund to help students in Civil Engineering attend summer surveying camp. Present balance \$3,125.72.
- 775 HENRY N. SWEET FUND, 1936, \$8,036.50. Bequest. For industrial research. Present balance \$10,978.72.
- 167 SETH K. SWEETSER FUND, 1915, \$25,061. Bequest as a permanent fund. Income for general purposes.
- 335 SUSAN H. SWETT FUND, 1888, \$10,000. Bequest. Income to support a graduate scholarship.
- 777 SWIFT AMINO ACID FUND, 1947. Balance \$9,100.50. For research.
- 779 SWIFT PROTEIN RESEARCH FUND, 1944, \$20,000. Gift. For research. Present balance \$6,102.50.
- 337 GERARD SWOPE GRADUATE FELLOWSHIPS FUND, 1945, \$100,050. Gift. Income annually or from time to time to be granted as Gerard Swope Fellowships under certain conditions and with certain preferences. Principal to be maintained except under conditions presented.
- 673 HERMAN W. TAMKIN, 1948-49, \$14,860.13. Bequest. For general purposes.
- 168 HENRY P. TALBOT FUND, 1949, \$45,210. Bequest. Income for general purposes.
- 835 TAU BETA PI MEMORIAL SCHOLARSHIP FUND, 1948-49, \$2,589.85. Contributions. For special scholarship purposes.

- 837 **TEACHERS' FUND, 1899-1900.** Gifts of \$50,000 each from Augustus Lowell and A. Lawrence Lowell to establish fund for use in case of retirement, disability, or death of members of instructing staff. Present balance \$117,961.35.
- 958 **TECHNOLOGY CHRISTIAN ASSOCIATION FUND, 1949.** Balance \$2,064. Deposited for investment purposes.
- 597 **TECHNOLOGY LOAN FUND, 1930-41.** Present balance \$2,009,040.49. Contributed by eighteen alumni to provide loans for students.
- 959 **TECHNOLOGY MATRONS' TEAS FUND, 1916-22-31, \$8,500.** Gifts of Mrs. F. Jewett Moore. Income for social activities of Technology Matrons. Present balance \$9,109.62.
- 839 **TECHNOLOGY PRESS FUND, 1946-49.** Balance \$122,472.52. Royalties on books published. For special expense.
- STURGIS H. THORNDIKE FUND, 1928, \$15,000.** Bequest. Appropriated for new dormitories, 1930.
- NATHANIEL THAYER, 1906, \$25,000.** Gift. Used for educational plant.
- 295 **NATHANIEL THAYER FUND, 1868, \$25,000.** Gift. Income for professorship of Physics.
- 961 **W. B. S. THOMAS FUND, 1935-37, \$2,000.** Gift of parents of W. B. S. Thomas '29, the income only to be expended, one-half for the benefit of the M. I. T. Crew and one-half to other activities of the M. I. T. A. A. Present balance \$2,797.24.
- 297 **ELIHU THOMSON FUND, 1933-49, \$23,700.** Contributed toward fund for Professorship in Electrical Engineering.
- ELIHU THOMSON, 1912, \$25,000; 1924, \$5,000.** Gift. Used for purchase of land.
- 339 **FRANK HALL THORP FUND, 1932, \$10,000.** Anonymous gift. Income for fellowship in Industrial Chemistry.
- 340 **TILLOTSON FELLOWSHIP FUND, 1948, \$1,900.** Gift. For Graduate Fellowship in Electrical Engineering.
- 598 **WILLIAM H. TIMBIE LOAN FUND, 1948, \$4,860.50.** Contributions to assist needy students in the Cooperative Course in Electrical Engineering. Present balance \$5,303.50.
- 513 **SAMUEL E. TINKHAM FUND, 1924, \$2,338.** Gift of Boston Society of Civil Engineers. Income to assist worthy student in Civil Engineering.
- 275 **JOHN HUME TOD FUND, 1913, \$2,500.** Gift of Mrs. F. Jewett Moore. Income for purchase of books of a humanistic character for General Library.
- 515 **F. B. TOUGH FUND, 1924, \$465.** Gift to extend financial assistance to worthy students in mining or oil production.
- 675 **TOWLE FUND, 1944-46, \$10,500.** Gift. For general purposes.
- 841 **TOWLE LECTURE FUND, 1947, \$1,000.** Gift. For special lectures. Present balance \$937.
- 781 **NELLIE FLORENCE TREAT FUND, 1944, \$609.** Bequest. For use in the field of Food Technology. Present balance \$709.

- 677 CHARLES A. TRIPP FUND, 1943, \$100,000. Bequest. For dormitory construction — or such other use of all or part as may seem advisable.
- 830 TUBBY ROGERS FUND, 1949, \$1,073. Contributions for special Fund as memorial to Professor Rogers.
- 255 EDMUND K. TURNER FUND, 1915-41, \$206,814. Bequest. Income, three-quarters for Department of Civil Engineering and one-quarter to be added annually to principal. Present balance \$288,436.26.
- LUCIUS TUTTLE FUND, 1916, \$50,000. Bequest. Used for educational plant, 1918.
- 783 TWENTIETH CENTURY-FOX FILM RESEARCH CORPORATION FUND, 1947, \$2,500. For research. Present balance \$2,790.75.
- 581 ALICE BROWN TYLER FUND, 1937-41, \$1,559.64. Gift of Prof. and Mrs. H. W. Tyler. Income to be used for benefit of women students at the Institute.
- 963 UNDERGRADUATE ACTIVITIES TRUST FUND, 1935. Balance \$1,908.87. Established by 1915 Technique Board from which recognized student activities may borrow if deemed necessary and desirable, at a low rate.
- 967 UNDERGRADUATE DUES RESERVE FUND, ATHLETICS. Present balance \$20,848.87. Transferred from Undergraduate Dues (current operating account) to secure investment income.
- 969 UNDERGRADUATE DUES RESERVE FUND, CONTINGENT. Present balance, \$17,061.75. Transferred from Undergraduate Dues (current operating account) to secure investment income.
- 965 UNDERGRADUATE PUBLICATIONS TRUST FUND, 1935. Balance \$4,446.23. Deposited by Alumni Advisory Council on Publications for investment purposes only.
- 785 WILLIAM LYMAN UNDERWOOD FUND, 1932, \$16,252. Bequest. For benefit of Biology Department or otherwise for general purposes. Present balance \$8,583.92.
- 786 UNION CARBIDE & CARBON CORPORATION FUND, 1948-49, \$40,000. Gift for research in the fields of gas turbine research, nuclear science and engineering, and heat transfer and fluidized powder research. Present balance \$12,417.46.
- 517 SUSAN UPHAM FUND, 1892, \$1,000. Gift. Income to assist students deserving financial aid.
- 341 THOMAS UPHAM FUND, 1939-46. Balance \$409,019. Bequest of Marcella B. Upham. Principal to be held as a permanent trust fund, the income to be used in assisting poor and deserving students or graduates of the Institute.
- 519 SAMSON R. URBINO FUND, 1927, \$1,000. Bequest. Income for students who need assistance, Germans preferred.
- 863 USE OF FACILITIES RESERVE FUND, 1945-49. Balance \$390,559.97. Appropriated for renovation or improvement of physical plant and facilities (see page 9 of this Report).
- 277 THEODORE N. VAIL FUND, 1925-49, \$68,072.34. Bequest. For benefit of Vail Library.

- 343 LUIS FRANCISCO VERGES FUND, 1924, \$10,000. Gift from Caroline A. Verges. Income for graduate students doing research work in sugar industry or, if no such candidate, undergraduate student in Civil Engineering.
- 521 VERMONT SCHOLARSHIP FUND, 1924-37, \$25,000. Gift of Redfield Proctor, '02, in memory of Vermonters who, having received their education at the Institute, served as engineers in the armies of the Allies in the first World War. Income to students preferably from Vermont. Mr. Proctor reserves right to designate recipients as long as he lives.
- 523 ANN WHITE VOSE FUND, 1896, \$60,718. Bequest. Income for free scholarships for young men of American origin.
HORACE W. WADLEIGH FUND, 1916-20, \$22,143.14. Bequest. Appropriated for new buildings, 1924.
- 525 ARTHUR M. WAITT FUND, 1925, \$9,761. Bequest. Income for deserving students in second, third, and fourth year classes in Mechanical Engineering.
- 679 GRANT WALKER FUND, 1943-47, \$75,500. Bequest. For general purposes. \$50,000 used 1949. Present balance \$25,500.
- 527 GRANT WALKER FUND, 1944, \$55,000. Bequest. Income for scholarships.
- 169 WILLIAM J. WALKER FUND, 1915-17, \$23,613. Bequest. Income for general purposes.
- 865 WALKER MEMORIAL RESERVE FUND. Present balance \$14,162.50. For purposes of repair and renovation of the building.
- 867 WALKER MEMORIAL DINING SERVICE RESERVE FUND. Present balance \$14,971.41. For repair and replacement of Dining Service Equipment.
- 257 WILLIAM R. WARE FUND, 1939, \$15,000. Gift of Mr. and Mrs. William Emerson, the income to be at the disposal of the Dean of the Architectural School for extra budgetary purposes.
- 621 CHARLES D. WATERBURY FUND, 1941. Present balance \$17,928.65. Bequest. For erection of a building as a memorial to above-named at such time as M. I. T. shall decide.
- 171 HORACE HERBERT WATSON FUND, 1930-48, \$36,057.19. Bequest of Elizabeth Watson Cutter as a permanent fund. Income for general purposes.
- 172 ARTHUR P. WATT MEMORIAL FUND, 1949, \$1,500. Bequest. Income for general purposes.
- 529 JAMES WATT SCHOLARSHIP FUND, 1942, \$13,259.72. Bequest under will of Jennie A. Douglas. For scholarships in Mechanical Engineering.
- EDWIN S. WEBSTER FUND, 1912-24, \$15,000. Gift. Used toward purchase of land.
- FRANK G. WEBSTER FUND, 1931, \$25,000. Bequest. Used for new construction, 1947.
- 531 LOUIS WEISBEIN FUND, 1915, \$4,000. Bequest. Income for scholarship for student in Architectural Department, preference to be given to a Jewish boy.

- 173 ALBION B. K. WELCH FUND, 1871, \$5,000. Bequest as a permanent fund. Income for general purposes.
CHARLES G. WELD FUND, 1907, \$15,000. Gift. Used for educational plant, 1924.
- 175 EVERETT WESTCOTT FUND, 1935-38, \$171,394. Bequest as a permanent fund. Income for general purposes.
- 177 MARION WESTCOTT FUND, 1938-49, \$245,604.74. Bequest for endowment. Income for general purposes.
- 533 FRANCES ERVING WESTON FUND, 1912-31, \$5,000. Bequest. Income to aid a native-born American Protestant girl of Massachusetts.
- 535 SAMUEL MARTIN WESTON FUND, 1912-31, \$5,000. Bequest of Frances E. Weston in memory of husband. Income to aid a native-born American Protestant boy; preference to be given one from Roxbury.
ALEXANDER S. WHEELER FUND, 1907-16, \$30,000. Contributed by friends. Used for new dormitories, 1924.
GEORGE R. WHITE FUND, 1912, \$10,000. Gift. Used toward purchase of new site.
- 537 AMASA J. WHITING FUND, 1927, \$4,515. Bequest of Mary W. C. Whiting. Income as scholarship to deserving students; preference to students from the Town of Hingham, Massachusetts.
EDWARD WHITNEY FUND, 1910, \$37,171. Bequest as a memorial to him and his wife, Caroline. Principal and interest used (1930-38) for conduct of research in geophysics.
- 345 JONATHAN WHITNEY FUND, 1912. Present balance \$516,193.95. Bequest of Mrs. Francis B. Green. Income to assist poor and deserving young men and women in obtaining an education at M. I. T.
- 683 HARRY C. WIESS FUND, 1947-49, \$135,800. Gift. For unrestricted purposes. Income to be added to Fund. Present balance \$151,229.50.
- 179 GEORGE WIGGLESWORTH FUND, 1931, \$25,000. Bequest. Ten per cent of gross annual income to be added to principal, balance of income for general purposes of the Institute. Present balance \$26,873.65.
GEORGE WIGGLESWORTH, 1917-24, \$65,000. Gift. Used for additional land purchase, 1924.
H. SYLVIA A. H. G. WILKS, 1948, \$175,000. Round Hill property, Dartmouth, Massachusetts.
- 684 BELLE A. WILLISTON FUND, 1948, \$17,118.68. Bequest for general purposes.
- 539 ELIZABETH BABCOCK WILLMANN FUND, 1935, \$5,065. Bequest. Income to be used toward tuition of young women students taking Chemistry courses.
- 989 GEORGE S. WITMER FUND, 1938-49. Balance \$78,372.80. In Trust, subject to special annuity provisions.
- 685 EDWIN J. WOOD FUND, 1949, \$5,000. Bequest for general purposes.
KENNETH F. WOOD FUND, 1926, \$25,000. Bequest. Appropriated for new dormitory, 1930.
WRIGHT MEMORIAL WIND TUNNEL, 1937-41, \$95,795. Contributed by friends toward construction of wind tunnel.

- 181 EDWIN A. WYETH FUND, 1913-35, \$254,703. Balance of Trust Fund held by M. I. T. from 1913 for itself and five other beneficiary institutions subject to annuity. Distributed January, 1935. Fund separately invested until June 30, 1943. Net income available for general purposes of the Institute.
- 541 MORRILL WYMAN FUND, 1915-16, \$66,538. Bequest. Income to aid deserving and promising students upon understanding that if in after life the person receiving aid shall find it possible, he shall reimburse said fund — not a legal obligation.

LIST OF
PERIODICAL PUBLICATIONS, BOOKS AND REVIEWS
BY MEMBERS OF THE STAFF

(Persons desiring reprints of articles should apply to the Department concerned. Photostat or microfilm copies may be obtained from the Reference Librarian.)

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